IFRC

First Aid Reference Centre

INTERNATIONAL FIRST AID, RESUSCITATION, AND EDUCATION GUIDELINES 2020

Audience: First aid programme designers, programme managers, education and scientific committees, trainers

Red Cross Red Crescent Networks
Coordinated by IFRC Global First Aid Reference Centre

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International first aid, resuscitation, and education guidelines 2020
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> To know that the first aid programme of the National Societies is in accordance not only to the state or local standards but also to international guidelines makes the Georgia Red Cross Society first aid training more attractive and trustful. Having the guidelines and other resources online, on one platform, will make our team's work easier and more effective.

Tea Chikviladze, MD, First aid coordinator, Georgia Red Cross Society

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- International Committee of the Red Cross
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- Belgian Red Cross, Centre for Evidence-Based Practice (CEBaP)
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- IFRC Global First Aid Reference Centre
- IFRC Reference Centre for Psychosocial Support
- International Liaison Committee on Resuscitation (ILCOR)
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Foreword

As we publish these Guidelines, I reflect on the global scale of the COVID-19 pandemic, the increasing incidence of disasters due to climate change, and the unprecedented levels of displacement of people because of conflict, violence, and disaster. I also reflect upon the capacity of National Societies to address diverse public health needs and to help people cope in times of crisis.

Central to our response to these challenges is the need to preserve life, alleviate suffering, prevent further illness or injury, and promote recovery. First aid was the foundation stone of the Red Cross Red Crescent Movement and though the world in which we operate has changed dramatically, first aid remains as relevant as ever.

When any crisis occurs, citizens are the first to respond and help those affected. Their ability to respond effectively is, therefore, an essential ingredient whether the crisis is global, local, or personal. We know from individual testimonies from first aid responders that “every minute counts” in crises. We must continue to support the role of citizens as first aid responders and equip them with the skills and confidence to save lives.

For over 150 years, the Red Cross Red Crescent has been the leading trainer and provider of first aid in the world, upholding quality training standards, and developing evidence-based guidelines. All 192 Red Cross and Red Crescent National Societies offer first aid training, education, and services. There are more than 165,000 active first aid trainers serving their communities and making first aid available for all. It is these strengths in experience and reach that put us in a unique position to develop people’s personal and community resilience.

The *2020 International first aid, resuscitation, and education guidelines* have been developed to support first aid programme designers in updating their materials, education, and skills. The Guidelines are based on the available evidence from the past two decades of publications and research and draw on our extensive experience, and best practices from subject matter experts and programme evaluations. The Guidelines represent our continued drive to better understand and advance the science behind effective first aid education.

Our Strategy 2030 envisions a global network of strong and effective local actors that mobilize for the good of humanity and alleviate human suffering. In implementing these latest guidelines, our expertise in health can encourage wellbeing at all levels, including positive social, mental, and physical health, especially in vulnerable populations. In doing so, we support individuals and communities around the world to cope with crises, find hope and become more resilient.

Sincerely yours,

Jagan Chapagain,
IFRC Secretary General

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INTRODUCTION

First aid remains a core area of work of the International Federation of Red Cross and Red Crescent Societies (IFRC) and the International Committee of the Red Cross (ICRC). The IFRC through the Global First Aid Reference Centre is a major first aid educator and provider in the world. Almost all 192 Red Cross Red Crescent National Societies have first aid as their core activity.

We believe first aid is a vital initial step for providing an effective and rapid intervention that can help reduce injury and suffering and improve the chances of survival. Taking immediate action and applying appropriate first aid measures makes a difference. Having high-quality, evidence-based first aid education available to people worldwide contributes to building safer and healthier communities by preventing and reducing risks in daily emergency, disaster and crisis situations.

First aid is part of a common vision: to inspire, encourage, facilitate and promote humanitarian activities by alleviating human suffering and respecting human dignity. We believe everyone has the potential to save lives. First aid education and services are essential tools for achieving these goals.

We advocate for first aid to be accessible to all and that at least one person in each household has access to learning first aid regardless of their socioeconomic status or other potentially discriminatory factors.

About the Global First Aid Reference Centre

The IFRC Global First Aid Reference Centre was established in 2012 as a Centre of Excellence. The Reference Centre is hosted by the French Red Cross and collaborates with 192 Red Cross Red Crescent National Societies as well as scientific bodies, academic institutions and private sectors.

The Reference Centre aims to reduce the number of deaths and the severity of injuries by supporting National Societies to scale up and improve the quality of first aid education and services. It works closely with National Societies to facilitate knowledge sharing and to promote good practice.

To ensure the IFRC first aid is evidence-based and remains relevant to national and local contexts, the Reference Centre works with National Societies' first aid, medical and education experts, the ICRC, and participates in numerous studies and research. The ***IFRC International first aid and resuscitation guidelines 2020*** is a key outcome of such an effort.

Number of people reached

In 2018 at least 20 million people were trained in first aid by Red Cross Red Crescent National Societies according to the 2018 survey carried out by the Reference Centre. 100 out of 192 National Societies responded to the survey. Around the globe there are more than 1,650,000 active first aid trainers (See Appendix 1 for data: Global survey 2018 data on first aid).

Every year more than 100 Red Cross Red Crescent National Societies participate in the World First Aid Day on the second Saturday of September. During this event, more than 900,000 volunteers and staff are mobilised and reach out to millions of people through social media and public events. With all those initiatives, more than 46 million people are reached by Red Cross Red Crescent National Societies with first aid and preventive health information.

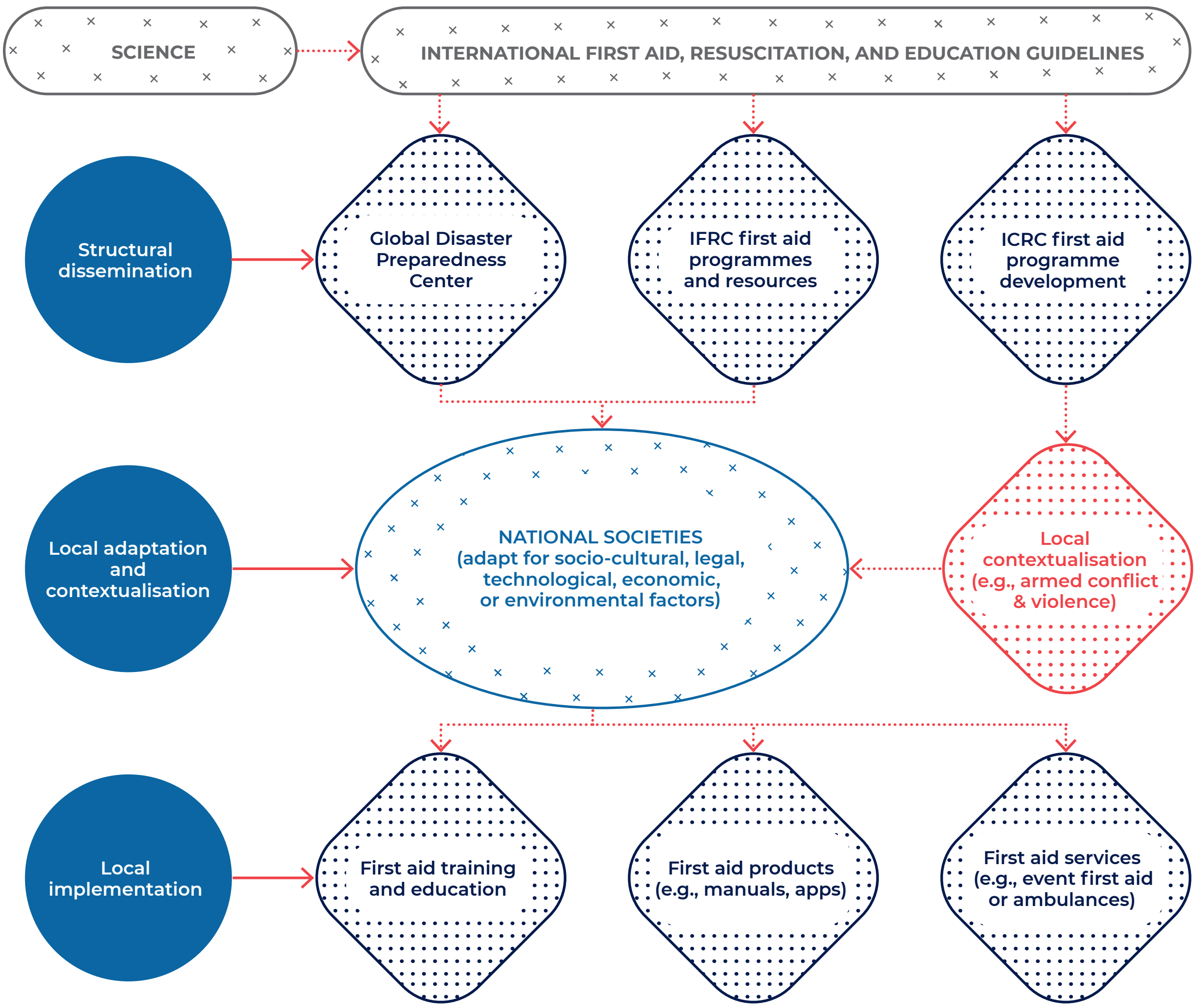
About the 2020 Guidelines

The ***International first aid, resuscitation and education guidelines 2020*** evaluate and report on the science and good practice behind first aid, resuscitation and education. The 2020 Guidelines have been produced with the main goal of fostering harmonisation of first aid practices across the Red Cross Red Crescent Movement by providing a strong evidence-base. This includes working in collaboration with the ICRC and harmonising practices where appropriate. This forms a key part of the quality assurance that people receive first aid education in accordance with IFRC international guidelines. These guidelines become the common denominators for the IFRC to establish its International first aid attestation.

The International first aid attestation is another priority of the Global First Aid Reference Centre. It is a continuous quality improvement process and recognition, awarded when first aid training provided by a Red Cross Red Crescent National Society is consistent with the latest IFRC ***International first aid, resuscitation and education guidelines.***

The Guidelines do not replace first aid manuals and associated educational materials. Instead, they serve as the foundation resources for first aid programme designers to develop their first aid materials such as manuals, programmes, courses, learning apps, digital products, public information, and associated educational materials. National Societies should use and adapt the Guidelines according to their local cultural, linguistic, technological, environmental and legal contexts, including the local prevalence of injuries and illnesses. The adaptation must also consider the populations' capacities and available resources. In addition, the Guidelines provide scientific evidence for first aid programme managers and designers to make strategic decisions.

Figure 1:. Linking the 2020 Guidelines and the Movement



First aid education

Through engaging with first aid education and the fundamental principles of the IFRC, we reinforce values of humanity by giving people skills, confidence and willingness to help. It is the role of the Movement to champion first aid education as a universal means to help people engage in more helping behaviours and to live more safely, be more resilient, and provide care when needed.

The Movement views first aid as one of the greatest humanitarian acts for which first aid education has an integral part in building personal and communal resilience. As such, it is the duty of the Movement to advocate for and provide effective first aid education that is of the highest quality, affordable, and accessible to everyone.

The Movement's effectiveness will be magnified if first aid actions are recognised and encouraged by healthcare professionals. Embedding first aid education into national health policies and culture, both as a life skill that is learned by all, and a resilience and emergency response tool that is recognised as a vital part of health systems is an important role for the Movement. The 2020 Guidelines promote evidence-based practice as the foundation for first aid education by ensuring that the best available scientific evidence is combined with the preferences and resources of the target group and practical experience and expertise of experts in the field.

Link to IFRC's Strategy 2030

First aid is central to the five global challenges identified in the IFRC's 2030 strategy:

- Climate and environmental crises: first aid as a resilience enabler allows communities to prepare for and respond to local climate-related emergencies.
- Evolving crises and disasters: first aid education develops communities' capacity to respond, aiming for first aid for all and having at least one person trained in first aid per household.
- Growing gaps in health and wellbeing: first aid empowers communities in prevention, health promotion and psychological first aid according to common injuries and health priorities.
- Migration and identity: first aid facilitates the inclusion of vulnerable people and migrants to learn first aid and save lives, regardless of their situation.
- Values, power and inclusion: first aid is an act of humanity, showing a willingness to save lives without discrimination.

The Guidelines provide us with evidence and good practice in first aid knowledge, treatment and education to achieve what is set out in the IFRC 2030 Strategy. By promoting and using proven first aid techniques to address key emergency-related injuries, we can build local communities' preparedness and response capacity.

Where do the Guidelines fit in IFRC's first aid policy?

In the IFRC's first aid policy, it states that the IFRC supports National Societies and participates in the development of harmonised first aid techniques in accordance with scientific research, international standards, good practice guidelines and measures of quality services. National Societies should develop their first aid education and services using the most up-to-date, evidence-based guidelines and best practice. To support the policy implementation, the IFRC has set up alliances with scientific bodies, public health experts and pedagogical specialists in first aid and emergency response. As a result, the ***International first aid, resuscitation, and education guidelines*** were first produced in 2011, then reviewed and enhanced in 2016, and again in 2020.

In the 32nd International Conference of the Red Cross and Red Crescent 2015, a resolution was passed on the legal aspects of first aid. It encourages States to consider all necessary steps to encourage the first aid provision by laypeople with appropriate training, including, where appropriate, establishing protection from liability for their good faith efforts and ensuring that they are aware of this protection. In order to collectively advocate for this legal protection, the Guidelines are essential for the Movement to ensure its training and services are good quality and based on the evidence-based, international Consensus on Science.

A distinction is made between harmonisation and standardisation. The intention is not to have one technique for each situation, but rather to have a consensus on minimum agreed principles. This consensus is based on a critical review of the available evidence and information learned from the experiences of the Red Cross Red Crescent Movement.

Definitions

First aid is the immediate assistance provided to an ill or injured person until professional help arrives. It is concerned not only with physical illness or injury but also with other initial care, including psychosocial support for people who are emotionally distressed due to experiencing or witnessing a traumatic event. First aid interventions seek to preserve life, alleviate suffering, prevent further illness or injury and promote recovery.

First aid provider is defined as someone trained in first aid who should recognise, assess and prioritise the need for first aid. The first aid provider provides care using appropriate competencies, recognises limitations and seeks additional care when needed.

This document refers to the ill or injured person requiring first aid as the **person**. First aid educators should use the appropriate term according to their local contexts. This person may be described as the person in need of care, patient, victim, casualty or other terms.

Emergency refers to an incident where first aid is required. An emergency can be small or large and can happen in a private or public space.

Emergency medical services (EMS) signifies that the first aid provider should quickly access the next available higher level of care. In some places, EMS may mean an ambulance service and hospital, while in others it may mean contacting a local health worker or travelling to a field hospital. Programme designers will need to adapt the language according to the local context in which it is used.

First aid education is a programme developing behaviours, knowledge or skills in first aid procedures and techniques. This programme has defined outcomes and is provided by qualified facilitators or published physically or virtually.

First aid services may provide first aid at public events or respond to potential emergencies, among others. These services are based on agreements established between local authorities, event organisers or local communities and the organisation providing the service.

Levels of first aid provider

The levels of providers available around the world vary considerably. The continuum below describes the increasing level of training and responsibility of providers. The Guidelines support first aid, resuscitation, and education for the following levels of first aid provider.

Level	Description	First aid training or responsibility	Example of care *Vary significantly by National Society*
Bystander	A bystander happens to be present during an incident that requires first aid, however, they may not be directly involved. A bystander can provide basic care and follow specific instructions from a higher level of support.	No formal training Contact others (first aider, EMS) to request care.	Access emergency medical service (EMS) and request care. Maintain direct pressure on a bleeding wound as directed.
First aid provider	A first aid provider can recognise, assess, and prioritise the need for first aid, providing appropriate care. A first aid provider should provide care to their level of training. If there is not access to medical care, a first aid provider does the best they can do.	First aid education was completed at some point, but skills are likely not used regularly or refreshed through training. Contact EMS to request care if required and provide first aid according to training.	Do CPR on a person that does not show signs of circulation. Apply a splint to an injured limb.
Designated first aider	A designated first aider is similar to a first aid provider but also has some responsibility to act. A designated first aider is typically found in a workplace; however, first aid is not their primary responsibility.	First aid education and typically some context-specific training; typically, skills are refreshed and retrained regularly, and they have opportunities to practise with some regularity. Contact EMS to request care if required and provide first aid according to training. Document care provided.	Provide care for a chemical burn according to the specific Material Safety Data Sheets (MSDS) in the workplace. Removal of fishhooks from an injured person's arm.

Other roles in providing medical care

There are other roles that provide medical care. They include:

First responder	• A first responder has a professional responsibility to respond as a primary role of their position. • First responders are often dispatched by a central organisation and are directed to the incident; they are typically the first step in a formal emergency medical service.
Paramedic	A paramedic provides advanced care according to their profession in varied environments. A paramedic can often provide sufficient care for the person to return to their activities, however, a paramedic also provides transport services to other health services as required (e.g., hospital).
In-hospital care	In-hospital care refers to doctors, nurses, or other professionals that provide emergency care in the hospital. Those providing in-hospital care work in a controlled environment with access to all required tools and professionals available.

Other terms used frequently in these Guidelines

CPR	Cardiopulmonary resuscitation
CEBaP	Centre for Evidence-based Practice (Belgian Red Cross Centre)
ICRC	International Committee of the Red Cross
IFRC	International Federation of Red Cross and Red Crescent Societies
ILCOR	International Liaison Committee on Resuscitation
The Movement	The Red Cross Red Crescent Movement

Global First Aid Reference Centre online platform

The Global First Aid Reference Centre works with international experts to enable National Societies to provide quality first aid courses, that empower people with the necessary skills to save lives. The online platform is a global hub for first aid resources, news and events, as well as a key tool to disseminate the Guidelines. It also offers a place where Red Cross Red Crescent staff and volunteers can share and learn about successful first aid processes and programmes.

This tool targets the 192 National Societies of the IFRC and other first aid education providers within the Movement and responds to one of the objectives of the Reference Centre: the sharing of knowledge. The goal of the project is to create a virtual workspace to improve communication, share tools, materials and information, strengthen teamwork, and mobilise a network of first aid providers around the activity of first aid education.

Users of the platform can:

- find relevant first aid guidelines that can be adapted to match their National Society's context
- find and adapt first aid resources for use in their own local contexts
- find it easy to access and use
- share and publicise their own first aid news, events and resources.

Future development

These Guidelines are not exhaustive. For this edition, topics requested by National Societies and others thought to be current and relevant have been included. First aid topics that were not reviewed have not been included here. National Societies should inform the Reference Centre if there are topics for which they need an evidence-base. The evidence-based network will consider these requests for future work.

Process to develop the 2020 Guidelines

Red Cross Red Crescent National Societies developed their own national guidelines for many years. In 2011 and 2016, the IFRC through the Global First Aid Reference Centre published its evidence-based guidelines, drawing on National Societies' experiences.

In 2017, the Global First Aid Reference Centre embarked on the process of updating and developing the ***International first aid and resuscitation guidelines***. The process was initiated by identifying subject matter experts, doing a needs analysis of first aid education programme developers, determining the list of topics to address, identifying evidence reviews, and cataloguing existing evidence-based processes. Collaboration with the ICRC was particularly important given the changing nature of first aid situations across the globe.

Evidence-based guidelines

Figure 2: Approach in the development of an evidence-based guideline.

The Guidelines are developed based on the principles of evidence-based practice (Figure 2). Evidence-based guidelines are developed by combining:

- The best available scientific evidence is searched for and collected through databases.
- Practical experience and expertise are input from experts in the field.
- Preferences and available resources from the target groups such as first aid providers and people receiving first aid are integrated in order to formulate recommendations.

After developing the list of topics and questions to be addressed, the first step in the development of evidence-based guidelines was to collect the best available scientific evidence (the ***Scientific foundation***). The Movement has become a leader in first aid, resuscitation, and education science. National Societies, while experts in resuscitation in their own right, have traditionally worked in partnership with local resuscitation councils and their parent organisations, ILCOR and regional Resuscitation Councils. In addition, the majority of the first aid evidence summaries (first aid topics) are supported with evidence summaries from the Centre of Evidence-Based Practice from the Belgian Red Cross (CEBaP). Relevant existing systematic reviews were also used as part of the scientific foundation. For Education topics, independent evidence reviews were conducted.

In order to tailor the Guidelines to the needs of the users, the Reference Centre sent out a questionnaire during the last trimester in 2017 to evaluate the 2016 Guidelines. It gathered the perceptions of Red Cross Red Crescent National Societies as well as contributors and identified strengths and weaknesses of the 2016 Guidelines. These were used to inform adjustments of the main objectives of the 2020 Guidelines.

As part of the process, the steering committee organised two initial meetings; one in Washington DC hosted by the American Red Cross in January 2018. The second in Paris hosted by the French Red Cross in June 2018. The objectives of the meetings were to:

1. Determine the process to develop the Guidelines.
2. Define the topics of the Guidelines.
3. Setup a clinical worksheet template.

Based on the available sources of evidence, draft recommendations were formulated by the different subject area coordinators. Monthly conference calls were held to report progress. Each topic of the Guidelines was generated through collaboration between members of the clinical and education working groups.

First aid topics were reviewed by the clinical working group. Educational considerations were then added using a review of relevant educational-facing literature, as well as expertise from the working groups that described each first aid topic through the lens of the Chain of survival behaviours. For each topic, reviewers with expertise from high and low resource settings were consulted. Where a topic had particular relevance to conflict contexts, reviewers from the ICRC contributed expert opinion and additional insight from literature.

Education modality topics were developed from evidence reviews by the education working group. The context topics were developed with support from experts in conflict (ICRC), disaster management (Global Disaster Preparedness Centre and disaster sub-council of the American Red Cross Scientific Advisory Council), and water safety (Swiss Red Cross and aquatics sub-council of the American Red Cross Scientific Advisory Council). Psychological first aid topics were developed with support from the Psychological Reference Centre. After the content was established, editors reviewed and rewrote the entire worksheet in conjunction with the others in order to apply a consistent tone of voice.

In the summer of 2020, a final implementation meeting was held virtually, hosted by the Reference Centre. The aim was to discuss and consider how different target users in various contexts around the world could apply these guidelines. In order to include a field perspective and ensure that these guidelines are appropriate and relevant for the end-user, multiple representatives from each IFRC region (Africa, Americas, Asia and the Pacific, Europe, Middle East and North Africa) participated in this meeting. The results of this meeting brought added value by demonstrating the feasibility of how these guidelines are rooted firmly in their practical application. This aspect is fundamentally important to the Movement. Together with the representatives from the different regions, final points in practice and implementation considerations were formulated. This part of the process is vital in the recognition of the usefulness, quality and the important link between science and practice.

Structure of the guidelines

Throughout the Guidelines significant effort was made to link the recommendations to first aid education. Each topic now includes considerably more information to support programme designers in developing learners to be confident and skilled in providing first aid. Prominence is given to education as the way to build their ability and confidence - so much so that education is now recognised in the title of the Guidelines. Specific additions to the Guidelines include the key action and education considerations for each topic.

Each topic in the Guidelines includes:

- Key action
- Introduction
- Guidelines and good practice points
- Chain of survival behaviours
- Education considerations
- Scientific foundation
- References

NOTE

Within each topic, each section builds up from the scientific foundation. So, while they are presented in a way that can be used most effectively by programme developers, the sections are in themselves building blocks:

- Scientific foundation establishes the evidence base.
- Guidelines are based on the scientific foundation.
- Key action and Chain of survival behaviours are based on the guidelines.
- Education considerations are tailored to support the development of first aid programmes with consideration of the key action and Chain of survival behaviours.

Scientific foundation

Education

Recommendations in the Guidelines emerged from the 2020 ILCOR scientific review, evidence summaries by CEBaP, independent scientific review of questions, and from additional expert opinion.

For the education review, two research questions formed the basis of search strategies:

1. In **laypeople** (population), following first aid programmes, which **learning modalities** (intervention) compared to another learning modality or no training (comparison) will impact **patient, learner and/or societal outcomes** (outcome)?

2. What are the **factors influencing implementation** (outcome) of a **first aid training** (intervention) to **different target groups** (elderly, disabled, workplace, children etc...) (population)?

Search strategies for each question were developed to maximise qualitative and quantitative sources of evidence for review and were run through PubMed and EBSCO (ERIC; CINAHL; Global Health; PsycARTICLES; SPORTDiscus) databases. Two lead researchers scanned 2749 articles for research question 1; and 2043 articles for research question 2. They compiled lists of abstracts for possible inclusion into sets according to learning modalities and first aid topics.

Table 1: Criteria for inclusion or exclusion of studies

Studies included in the title and abstract sift:	Studies excluded in the title and abstract sift:
• First aid education studies. • Feature at least one aspect of the Chain of survival behaviours. • Drowning, disasters, conflict, epidemic. • Comparisons of first aid equipment. • Bystander or non-medical professional responders. • Lay emergency responders such as Red Cross staff and volunteers.	• Healthcare professionals including medical students, paramedics, nurses, midwives. • Mental health first aid. • Heavy use of medical terms (indicating healthcare professionals rather than lay responders). • Programmes or studies targeted at training advanced level instructors.

Education reviewers with practical and academic expertise were invited to participate by reviewing papers identified from the literature search and other papers found by hand searches. Papers were scrutinised for quality using a standard quantitative evidence review template, and a qualitative review checklist developed in collaboration with CEBaP. Where evidence did not exist, educational experts in first aid across the Movement provided advice on good practices.

First aid topics

In each topic, a summary of the scientific foundation is provided. The following evidence sources were included:

- Up-to-date evidence summaries by CEBaP (updated in 2019 or 2020); all summaries are available via registration to the CEBaP First Aid Evidence Summary Database.
- Systematic reviews conducted by ILCOR; we refer to the ILCOR Consensus on Science with Treatment Recommendations publication or to separately published ILCOR systematic reviews in the reference list of the topics.
- Other relevant systematic reviews identified by the topic contributor.

The findings of these existing evidence sources are summarised under the sub-heading Systematic reviews. The overall quality of the evidence ("certainty of evidence") was taken over from the original evidence sources. In addition, a sub-heading Non-systematic reviews is provided for many topics. The paragraph contains additional expert opinion or findings based on individual studies or other sources of information. These sources of information were gathered in a non-systematic way.

Guidelines

To go from the scientific foundation to creating specific guidelines, the quality of the evidence, benefits, harms, risks, preferences and contexts were all taken into account.

- All first aid topic guidelines are based on the systematic review sources.
- Education and context topic guidelines are based on scrutiny of available evidence found.

All guidelines are classified as either ** (strong) or * (weak) recommendation:

- For a strong recommendation, the evidence of benefits strongly outweighs the evidence of harms.
- For a weak recommendation, the evidence related to benefits is either weak or the studies conducted were at a small scale. There was either no or weak evidence of harm that was outweighed by proof of benefit or appreciable uncertainty exists about the magnitude of benefits and risks.

Where no clear evidence was available or missing but clinical practice or expert opinion is available, good practice points were formulated based on the experience of Red Cross Red Crescent National Societies or based on the non-systematic review sources, provided in the scientific foundation.

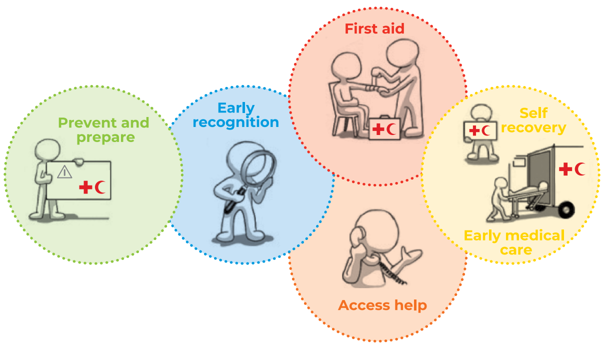
Table 2: An overview of the types of guidelines and implications for practice.

Strength of guideline	Description and strength of evidence	Implications
**** Recommendation terms: must/should (or must/should not)**	• A strong recommendation. • Benefits strongly outweigh the harms. • This recommendation is the most appropriate action.	• Must be followed unless a clear and compelling rationale for an alternative approach is present.
*** Recommendation terms: may, could (or not recommended)**	• A weak recommendation. • Benefits and risks and burdens are finely balanced or appreciable uncertainty exists about the magnitude of benefits and risks. • There is some uncertainty regarding the most appropriate action and different choices can be appropriate.	• Prudent to follow, but one should remain alert to new published evidence that clarifies the balance of benefit versus harm.
GPP Good practice point terms: can also contain active wording such as should, must.	• Based on common sense, good practice or (very) low-quality evidence, expert opinion, etc. • An important practical point for which the expert panel reaches a consensus, and nobody is likely to question it.	• A good practice point is based on common sense and consensus, however, could be sensitive to context.

Key action

The key action describes the most important action in relation to the topic. In education, this highlights the key takeaway for programme designers in relation to the education modality. In first aid topics, this highlights the one key action that programme designers should emphasise to learners. The addition of the first aid key actions can be considered for training materials.

Chain of survival behaviours



Each topic is considered through the domains of the Chain of survival behaviours. These domains represent the most effective ways to prevent, recognise or treat an illness or injury, based on the scientific foundation and guidelines. They are provided as instructions. However, they will need adapting to different contexts. For example, if first aid providers in certain contexts are unlikely to have a particular piece of first aid equipment (such as clean water), an alternative should be used. Educators should stress the importance of learners applying all the first aid steps which are possible to reduce pain and suffering and further harm, even when it is not possible to apply all the steps in a particular context or situation.

Education considerations

Education considerations suggest how location, environment, access to resources and other local factors may influence how a topic is taught. The education considerations are informed by a combination of evidence (only if systematic review was done and then referenced) and expert opinion. Elements may include:

Context considerations	• Describe how location, environment, access to resources and other local factors may influence how a topic is taught.
Learner considerations	• Describe factors that program developers should consider about learners. • Identify and recommend strategies to remove barriers to providing treatment. • Identify any social norms that are associated with this topic, including strategies to respect that norm while providing treatment.
Facilitation tips and tools	• Identify teaching approaches, adaptations, and points to emphasise to strengthen learning. • Common training gaps or missteps. • Suggests tools for effective training.
Learning connections	• Connections to other first aid topics or general concepts of care.

Additional considerations

Involvement of the International Committee of the Red Cross

The International Committee of the Red Cross (ICRC) has contributed significantly to the development of these Guidelines. This summary explains the ICRC approach to first aid and education and the ways in which ICRC staff and delegates have supported the work of the Reference Centre and the National Societies with this project.

Approach to first aid and first aid education by the ICRC

For the Red Cross and Red Crescent Movement, first aid is not simply about performing CPR, bandaging a wound or taking an injured person to a hospital. It is also about taking someone's hand, reassuring the frightened and giving a bit of one's self to the role. This applies to any first aid provider in any context.

Safety and security

First aid providers working with the ICRC operate in areas of armed conflict and other situations of violence. In these contexts, first aid providers take the risk of harm from such dangers as gunfire, collapsing buildings, burning cars, unstable rubble and tear gas. This places safety and security at the centre of ICRC first aid education.

Context adaptation

From the ICRC perspective, the best way to educate people to provide first aid in armed conflict is by adapting to the context. The ICRC trains and educates different groups of people, often in very low resource settings. Education provided needs to adjust both the first aid skills and the way of teaching to the realities of providing first aid in these contexts. In ICRC first aid training we focus on each individual learners' needs, but we also need to adapt training tools, educational methods and curriculum to the given context which can be harsh and unsupportive.

The Guidelines reflect this approach across all contexts, aiming to put the learner at the centre and adapt the education to their needs and the realities of their situation. The ICRC has contributed insight to this approach, and the content reflects challenges faced by those providing first aid education in peacetime and in war.

A focus on trauma

Trauma as a result of violence can appear very different from that caused by accidents. Wounds sometimes have a disproportionate effect internally to what is visible externally (for example some bullet wounds) and penetrating injuries are often seen. The types of traumatic incidents can be varied, for example, minor knife wounds, breathing problems from tear gas and shrapnel injuries from explosions. War injuries can also have devastating long term effects, especially when caused by mines and other unexploded devices.

Input to the Guidelines from ICRC

These Guidelines will serve as the basis for first aid practices across the Red Cross and Red Crescent Movement including the ICRC. The focus of the Guidelines on both the evidence-based aspects of first aid and how to teach people to become a first aid provider is supported by the ICRC.

In that capacity, the ICRC has offered input into these guidelines, especially through its knowledge of safety measures during conflict, expert opinion on trauma first aid and how to adapt and contextualise best practice and training techniques. Delegates and staff have contributed to the review of the evidence for the sections on conflict and disaster contexts as well as the multiple casualty situations outlined in the general approach. They have also provided expert opinion on the Chain of survival behaviours and the education considerations for many of the first aid topics.

Specifically, the ICRC provided input on considerations that have to be made if, for various reasons, a situation does not allow full adoption of the scientific evidence provided within the guidelines. Suggestions are there to help allow first aid to be provided in very harsh and extreme conditions and under all circumstances. In general, the considerations to be considered are local requirements and security concerns, available resources, effective local practices, and access to, and the capacity of, further care.

ICRC first aid providers are trained to step forward to help the wounded in armed conflict when the most natural reflex would be to run away. Whilst their experiences are often enriching, they must also sometimes cope with despair, when – despite their best efforts, despite all their skill – the wounded and sick they tried to save do not survive. Through their commitment, their selflessness and willingness to expose themselves to possible physical and psychological harm, first aid providers demonstrate their humanity in the fullest sense of the term, and we owe them an immense debt of gratitude. The ICRC, therefore, holds an obligation to prepare first aid providers as well as possible for being skilled, able and willing to help, but also to be able to cope with the challenges of armed conflict at the same time.

A harmonised approach to education

Similar educational approaches apply to those learning in ICRC and National Societies, as well as in peace and wartime conditions. These Guidelines seek to form a common basis for that education, acknowledging the similarities as well as the differences, and allowing for adaptations according to context, but most of all, responding to the needs of the learner.

Evidence to action

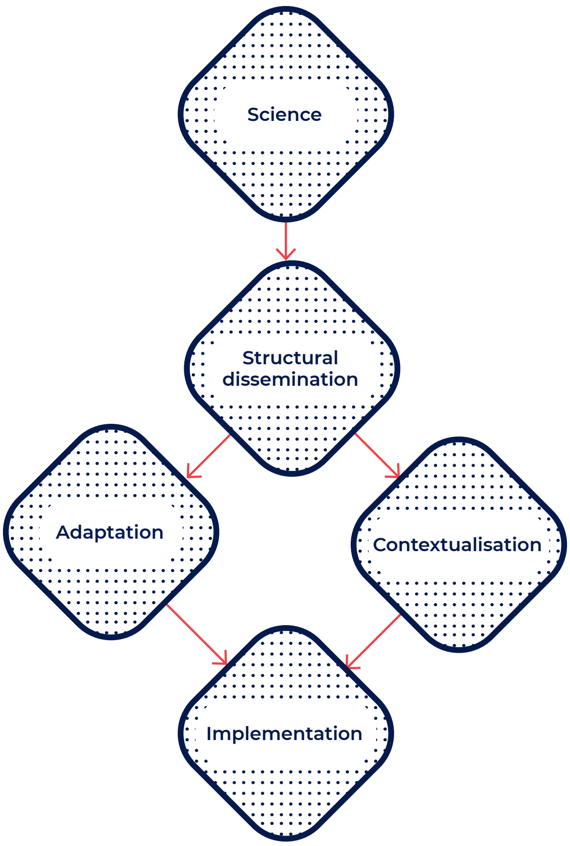
When using these Guidelines, National Societies should consider risk factors, health care systems and capabilities, public health culture and legislation relating to first aid. The common health concerns and injuries identified by specific communities or target groups must be addressed with special attention paid to their cultural and religious beliefs as well as the available resources.

Where possible, this process should be done with the National Society scientific advisory group (or equivalent). Ideally, this group would include education experts, medical experts, researchers, first aid educators and local community representatives. This can be accomplished through partnerships with other stakeholders, including among National Societies.

Shifting the Guidelines from evidence to action consists of three elements:

- **Adaptation** for use in your National Society that recognises the varied personal, community, regional and national factors that impact an educator's ability to provide first aid education and an individual's ability to provide first aid.
- **Contextualisation** to match the unique contexts that National Societies operate within, including those that have varying degrees of access to resources or medical care.
- **Implementation** which is a process of creating or revising first aid education interventions that are based on the Guidelines.

Figure 3: From Evidence to action



Changes over time

This framework provides a structure for National Societies to examine their first aid education programming in order to adapt the Guidelines to meet their specific needs. The analysis that is conducted using this framework represents a snapshot of time, meaning that it must be reapplied at regular intervals to be most effective.

Adaptation

Local factors

Examine common personal, community, and regional and national factors that impact individuals' ability to provide first aid.

Local factors–organised by *personal*, *community*, and *regional and national* factors are nested within one another. This reflects that the factors are influenced by one another.

Identify the key factors that will influence how first aid care and education are provided. This may result in a high number of factors, which then need to be turned into some actionable principles for contextualising the Guidelines.

Local factor	Considerations	Guiding questions
Personal	• Individual values, ethics and moral imperatives • Risks to their health (acute illness or injury) • Preferences of the individuals	1. How does an individual identify with their communities? 2. What is important to individuals (values; family.)? 3. What are the risks to individuals' health? 4. What preferences are shared?
Community **A community could *also refer* to the workplace.**	• Cultural norms, beliefs, and practices • Prevalent risk and health factors • Resources available (e.g., defibrillators) • Access to medical care	1. What cultural beliefs may influence a first aid provider's ability to provide care? 2. Are there first aid systems or groups already in place? What types of resources are available? 3. What are the patterns in how people are injured or the types of illnesses they experience? 4. How are gender and sex perceived in this community and how might they affect a first aid provider's ability to provide care?
National or regional	• Legal and regulatory requirements • Influence of specific industries • Health care systems	1. What laws are relevant to providing first aid care? 2. What legislation exists that may require or inhibit a first aider providing care? 3. What industries influence providing care and how?

NOTE

A PESTEL analysis may help you to frame the adaptation section. This analysis considers the political, economic, socio-cultural, technical, environmental, and legal forces that influence programming.

Contextualisation

Identify the contexts in which your National Society provides first aid education.

There is an unlimited number of specific contexts for providing first aid, however, they have been summarised here in a set of overarching contexts. These include urban, remote, disaster, and conflict. While some of these contexts could overlap, the purpose of these categories of contexts is to describe commonalities and differences within the context and ultimately start to identify how providing first aid in that context may differ from that which is described in the Guidelines.

Much of the evidence for the Guidelines comes from studies conducted in western contexts during peacetime, where access to emergency medical care services is possible. Yet internationally the burden of trauma falls on countries with limited access to resources where first aid providers might have to act with limited access to first aid equipment or healthcare.

Understanding the contexts in which people give first aid is fundamental to making first aid education effective. Program designers need to contextualise their approaches according to the risks that learners face, their environment and access to the healthcare they have. These Guidelines are not comprehensive in covering all possible contexts, but we have included contexts which are common for the Movement. In addition to the overarching contexts described here, there is additional information for providing first aid education in workplaces, aquatic environments, and in a pandemic.

Urban

The urban context describes where access to resources is likely high and medical care is readily available within a short time frame. This context differs from the workplace context in that there is no designated first aid provider.

The urban context indicates there are structures in place to provide care (governmental, non-governmental, private) that will respond when requested.

Urban is the common level for which the Guidelines are provided.

Key considerations

- Bystanders may be a significant factor (see the Bystander Effect in the General approach chapter).
- No dedicated first aid providers in this context.
- First aid providers are likely providing care to family and community members.
- Urban scene safety may be a consideration (e.g., traffic, downed power lines, etc.).
- The public can access emergency care and may have to decide which type of medical care is relevant (community health centre, hospital, walk-in clinics, etc.).

Remote

Remote refers to a delay in medical care and access to additional resources. Like the urban context, there is no designated first aider that is responsible for your care and medical care could be hours or days away.

The remote context does assume that structures for medical care are available, but that they will be delayed in reaching the person that needs care.

Key considerations

- In serious incidents, transportation of the ill or injured person will be important.
- The remote context will require additional planning for emergencies (e.g. additional supplies, food, medication, ability to shelter somewhere until medical care arrives).
- Safety of first aid providers should be given additional consideration in unknown environments.
- There are often visitors to remote environments that may not be accustomed to delays in care (e.g., expeditions, voyages).
- First aid providers may be required to provide medical care under direction from a medical professional through communications devices.
- The length of time for medical care to arrive will vary considerably according to the specific context.

See the Education chapter for specific evidence and practices for this Remote context.

Disaster

The disaster context is more complex than urban or remote contexts in that the infrastructure that may have existed prior to the disaster is either temporarily or permanently disabled. This means that access to medical resources or care is often delayed for an extended period of time.

Additionally, the instability of the environment may pose significant safety risks (e.g., likelihood of aftershocks following an earthquake).

Key considerations

- There is likely the requirement to coordinate with other agencies providing relief.
- The IFRC has a Global Disaster Preparedness Centre which houses research, practices, and resources.
- Safety of the first aid providers should be given additional consideration in unknown environments.
- There may be a requirement for improvisation for first aid (e.g., improvised splints).
- Triage will be important where there are multiple casualty incidents and first aid providers may need to make difficult decisions in the days following a disaster.
- Temporary treatment infrastructure may be required. This will include access to shelter, water, food, spiritual services, etc.
- First aid providers are more likely to encounter death and therefore psychological wellness should be considered.
- Natural disasters are increasing significantly due to climate change.

See the Education chapter for specific evidence and practices for this Disaster context.

Conflict

The conflict context is yet more complex: it is likely that all infrastructure that existed before the conflict is permanently disabled and will not be able to provide care. In addition, there is a significant security risk (threats from intentional harm) for anyone providing care as they will be vulnerable if they are not seen as a neutral.

Key considerations

- Security of first aid providers must be considered before providing care.
- Mobility to access medical care may be limited or different (e.g., you may have to transport very large distances to reach professional care).
- Temporary treatment infrastructure may not be recommended due to needing the ability to change locations quickly. This will include access to shelter, water, food, spiritual services, etc.
- Neutrality is of particular importance in providing first aid education.

- Placement of equipment must be considered due to threats of destruction, theft, or use to cause harm (e.g., oxygen tanks).
- First aid providers are more likely to encounter death and therefore psychological wellness should be considered.
- First aid providers must consider the safety of the person, themselves and their team when transporting.
- First aid providers may be required to provide medical care under direction from a medical professional through communications devices.
- Easy identification of first aid providers (their units, establishments and material) by use of a Red Cross Red crescent emblem (distinctive emblem) is highly recommended in conflict.

See the Education chapter for specific evidence and practices for this Conflict context.

Identify the contexts in which your National Society provides first aid education

Guiding questions
- Which of these contexts is relevant in your country?
- What other contexts do you have in your country and what are their key considerations?
- How could the contexts and their considerations affect your first education programming?

Implementation

Implementing first aid education in a sustainable way.

Implementation moves into the domain of providing first aid education so that it is sustainable for the future. This refers to the ability to develop or update programmes, reach learners, and recover costs. Implementation is the act of shifting the Guidelines from evidence into tangible learning opportunities. Implementation requires a strong understanding of the Guidelines, adaptations for the local factors and contextualisation.

Implementation is highly specific to each National Society. The following provides some high-level goals for implementation of the Guidelines which build upon one another. The tools noted here are common tools used for programme and strategic planning and can be found freely on the internet with step-by-step guides for use. Using these tools can help programme managers to better understand the environment in which they operate and the assets they have as an organisation in reaching learners.

Learning needs analysis

Implementation begins with conducting a learning needs analysis. The purpose of a learning needs analysis is to profile learner groups to develop programming that connects specifically to their needs. The high-level steps of a learning needs analysis are:

1. Describe all types of learners that your programmes serve.
2. Group the types of learner by common needs and backgrounds.
3. For each group, consider the follow questions:

A. What contexts will each learner group need to provide care in and what are the types of risks they will face?	*Consider the contexts of learner groups and the main risks they will face and make these the focus of the education you plan for them. For example, the risks faced in a mining workplace differ to the risks faced in a domestic home setting, or those in an area of conflict differ from those in an area of peace.*
B. What resources are the different learner groups likely to have available and how should I adapt the guidelines so they can provide first aid?	*Consider the resources such as medical services, clean water, sterile dressings, and defibrillators that the learner groups in different contexts will be able to access in an emergency and adapt their education so they can respond effectively with available resources.*
C. What skills, knowledge and attitudes are critical for this learner to be confident in providing first aid?	*Determining the skills, knowledge and attitudes will help you to identify gaps. These can be indicated by personal, community, or organisational need.*
D. What gaps in skills, knowledge or attitudes exist in the learner group?	*To determine gaps, identify the current skills, knowledge and attitudes and how they compare to the critical skills, knowledge and attitudes identified above. The disparity between these is the learning gap that can be addressed through learning interventions.*
E. How often will this learner group use their first aid skills?	*Consider how often the person will use their first aid skills as this will guide the level of information the programme should go into.*
F. How often will this learner group refresh their first aid skills?	*Learners who have regular refresh will be able to build greater knowledge and skills. These should be constructed gradually over time and with practise.*

Each of the following elements are built upon the completed learning analysis.

Element	Purpose	How to	Tools
Programme analysis	Understand the strengths of the existing program and areas for further development.	Conduct a review of existing programmes and educational tools.	SWOT analysis: indicates the strengths, weaknesses, opportunities, and threats to the programme Surveys, focus groups, or interviews of past or potential learners Updated brand standards and practices from your organisation
Programme development	Develop first aid content for learners.	Create and revise programme materials (e.g., manuals, presentations, references, online learning) according to the needs identified.	Guidelines Education modalities
Communication	Ensure that all stakeholders understand how first aid knowledge and skills have developed according to the best available evidence.	Communicate changes to your partners, trainers, and other stakeholders.	The Reference Centre's training of trainers program Communications plan Learning and development package (e.g., training of trainers)
Evaluation	Ensure the programme remains current to meet the needs of the target audiences.	Determine how you will conduct ongoing programme evaluation.	Outcomes evaluation toolkit

For guidance or support in implementing the Guidelines, contact the Reference Centre at first.aid@ifrc.org

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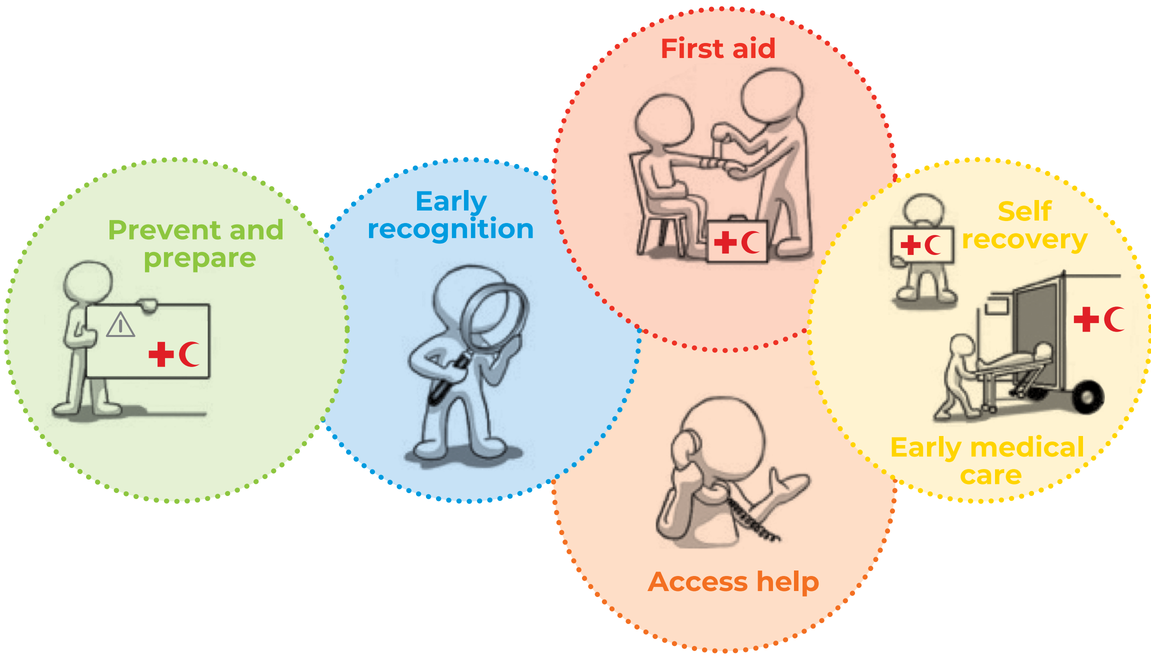
EDUCATION

Education strategy essentials

As the largest provider of first aid education in the world, it is our duty to provide high-quality, accessible education so everyone can give help safely and effectively in a first aid emergency. Here, we provide the essentials for aid programme designers to do this.

The Education chapter includes a selection of contexts for first aid education and an overview of modalities to deliver first aid education.

Chain of survival behaviours



Central to the resilience of individuals and communities is the ability to respond effectively in a crisis. The Movement views first aid as one of the greatest humanitarian acts and first aid education as an integral part of building resilience. As such, it is the duty of the Movement to advocate for and provide effective first aid education that is accessible to everyone and engages learners to ultimately respond to an emergency appropriately.

The Chain of survival behaviours defines the broad domains of first aid education. Consider each first aid topic alongside the domains to decide where the emphasis and opportunity lie for that particular topic for your learners. For example, some topics, such as stroke, usually focus on recognition, while others such as bleeding, usually emphasise the first aid skills. The Chain of survival behaviours also gives a structure to the way we communicate education messages. For example, we can use media to prepare people for different emergencies. We can use visual aids to help people to recognise different conditions, scenarios and role play to practise first aid. We can use technology to alert people to imminent danger, or to signpost them access support.

The five domains

- The first domain emphasises the role of **prevention and preparedness in** reducing the impact of emergencies.
- The second domain emphasises **early recognition** of dangers environmentally and with the ill or injured person.
- The third domain of response has two actions that can take place at the same time, **providing first aid** and **accessing help**, depending on the number of first aid providers and resources.
- Last in the sequence is the domain of **recovery** that can be done with or without **medical care**.

Educational activities to develop these survival behaviours include awareness campaigns, training and certification, and just-in-time tools for disasters and crises. The Guidelines aim to empower and guide first aid education providers to be creative and flexible with their approach. Learners must be at the centre of all educational activities and be empowered to act. The aim of doing so is to fulfil the crucial aspects of educational effectiveness and local implementation.

Principles of first aid education

The principles of first aid education support programme designers in developing programs that match the needs of their learners. These principles should be applied to any first aid education intervention:

- **Link to learners**: Consider all aspects of the learner group (age, gender, responsibilities, needs etc). Adapt your approach so it is relevant and based on contexts they recognise. Ensure that suitable safeguarding precautions are in place.
- **Variety**: Use a variety of activities to engage the learner, develop their skills and construct their knowledge.
- **Simplicity**: Restrict content to what is necessary and keep learning messages simple: learners should not be overloaded with content, topics or techniques that they are unlikely to come across or would not be able to use.
- **Discovery**: Allow time for learners to explore and reflect on what they have learned in order to develop their attitude and confidence to help.
- **Clarity**: Use language that the learners understand and that builds confidence. Avoid scientific language or overly complex theories.
- **Outcome-driven**: Identify learner outcomes (such as knowledge and confidence) and measure how these change between the start and end of your education intervention.

Theories relating to emergency response behaviour

An individual's response to an emergency will vary by demographic characteristics, culture, previous attitude towards an emergency, and exposure to other variables (e.g. media). First aid education must take these components into consideration to be relevant for short and long-term behaviour change. This theory is set out in Fishbein and Yzer's Integrative Model of Behaviour Prediction.

Embedded in this theory are the Theory of Reasoned Action and the Theory of Planned Behaviour. Together these theories identify attitude, subjective norms, and perceived control to affect behaviour. They suggest that education will be most effective if the learner's intention is known. By understanding learners' motivation to help and incorporating messages which build on their understanding of their role and how they can make a difference, a learner's self-confidence in their ability (and therefore likelihood) to help can be increased (Ajzen & Madden, 1986; Ajzen, 2011; Fishbein & Yzer, 2003, Miller & Pellegrino, 2018).

Organising first aid education in stages to support behaviour change also reflects the transtheoretical model of behaviour change. This theory suggests that it is beneficial for the educator to explore the needs and preferences of the learners before designing the learning approach in order to help inform obtainable goals. This also allows the learning design to take into account issues such as cost, literacy levels, technology access, and job requirements (Prochaska & DiClemente, 1983).

Feedback and reflection

Preparedness for a real-time response can be supported through educational practices which involve reflection and feedback. This process starts with the programme designer reflecting on who learners are and what they need to know and extends through the learning to exercises which give feedback to help the learner improve. Collaboration between learners and educators can make education both authentic and meaningful, both of which support deeper understanding and retention (Hattie, 2012; Foran et al., 2019). See also Feedback devices or Refresh and Retrain.

Outcomes measurement

Measuring the effectiveness of first aid education is essential to understanding how to make it better. While many education providers collect data about how many people they teach, it is knowing how well people learn that is much more valuable. This information can help secure funding to reach new audiences, be used to influence national policies on who should learn, and most importantly, will improve education so that learners are better able to save lives.

The core aim of education outcome measurement is to enable programme designers to understand the change made through the first aid education provided. By identifying which outcomes programmes are most likely to affect, and measuring how learners change, that data can be used as an indication of how effective the education programme is. The Outcomes measurement toolkit is a good place to start to consider how to measure education outcomes.

Disability

In its idealised form, a first aid skill should be universally acceptable. However, there may be situations in which you must adapt the skill to specific physical needs of the learners. The key is to focus on the desired outcome of the technique (e.g., we perform chest compressions and rescue breaths to pump blood and oxygen around the body) and work with learners to develop an approach that works for them and meets these desired outcomes. The ideal technique should allow the first aid provider to perform the principles of the method safely and effectively, be safe for the ill or injured person and be quick to start.

Contexts

Conflict context

Key action

Promote the first aid provider's safety and security before giving lifesaving first aid care in first aid education.

Introduction

Conflict areas are common and ever-changing. Preparing people for the injuries they may encounter in these situations is important across cultural, political and societal divides. Groups who will benefit from this type of first aid education include anyone who faces conflict situations, whether as a community, military or non-military weapon bearers or displaced people.

Good practice points

- First aid education may be adapted to the type of conflict learners will experience.
- Exposure to the relevant conflict, as well as practising the skills they will need, may be critical to the success of the first aid care learners will provide.
- First aid education within a conflict context should acknowledge that safety, security, and military tactical objectives (if applicable), often take priority over providing care.
- First aid education should focus on the needs of the learners, such as the kinds of resources they have access to (they may not have a standard first aid kit) or the dangerous situations they are in when providing care.
- Programme designers should work together with learners (or those who represent them) to develop context-specific programmes, rather than relying on a predetermined set of knowledge and skills.

Education considerations

In general, there are three distinct conflict phases that education should cover:

Phase	Description	Priority
Highly dangerous	You are in the middle of a violent situation, possibly under fire. Get yourself and (if possible) the ill or injured person out of harm's way.	Get to safety.
Medium safety	You and the ill or injured person are no longer in a violent situation and the environment is relatively safe (e.g., a sheltered place that offers protection from combat and environmental elements).	Provide care for immediate life-threatening injuries followed by any other first aid emergencies.
Safe to act	You and the person are in a secure location (such as a first aid post*), which is far enough away from the fighting to be considered out of danger, yet near enough to enable the rapid transfer of injured people to the location.	Complete a full assessment of the person. Provide the necessary care to the best of your ability using the available resources. Plan how to refer or access available EMS for the ill or injured person as soon as possible.

(Adapted from Giannou & Baldan, 2019)

**Note: The establishment and organisation of a first aid post is part of the first aid education for this phase.*

Planning for first aid education in a conflict context

- When possible, develop the content together with group leaders so that it is defined, understood and used in a way that reflects the local reality. Select content that responds to the needs that have been identified.
- Inform the relevant authorities and leaders of the course content and learning methods. Seek their support and approval for the programme in advance.
- Communicate that communities should select participants based on their ability to participate in the education and to act as first aid providers for emergencies.
- Guarantee absolute safety and security for facilitators and learners during the sessions (including their arrival and departure).

Context considerations

- First aid learners in conflict contexts will likely have different priorities and considerations compared to learners in other contexts. Programme designers should take these differences into consideration.
- Weapon bearers will always assess their tactical situation for threats before providing first aid as they may be required to return fire. To be accepted by this specific group of learners, educators must understand that this assessment is critical to survival and takes priority over providing first aid.
- Reducing or eliminating enemy fire is more important to the injured person's survival than immediate care by the first aid provider. Attempts to help the injured may expose the first aid provider to enemy fire. The provider must avoid entering a situation if it places them in immediate danger.
- In active fighting, the most likely threat to a person's life is from Severe bleeding (Giannou & Baldan, 2019). It is therefore important that individuals learn how to manage bleeding as it may buy time for others to provide additional care later.
- Essential first aid equipment in conflict contexts includes three-sided bandages, tourniquets, deep wound packing and other materials to stop Severe bleeding or to manage an Amputation.
- First aid programmes for a conflict context should include ways to find or create cover or shelter (e.g., using smoke as cover).

Facilitation tips

- Sequence educational sessions to develop an environment of trust. Start with discussions to develop knowledge and progress to role-play and scenarios as learners become more familiar with you and build trust among each other.
- Devote time to practical exercises that explore possible and probable scenarios according to the type, length and scale of the conflict. Conflict environments are ever-changing, and scenarios will help to prepare learners for a variety of situations.
- Emphasise the aim of the first aid technique, rather than technique itself. For example, emphasise the need to stop bleeding, rather than how to tie a bandage. While this is true for any first aid education, this approach will help to address the kind of stress a learner might experience in a conflict context.
- Stress the importance of learners applying all the first aid steps which are possible to reduce pain and suffering and further harm, even when it is not possible to apply all the steps in a particular context or situation.
- Use visuals such as drawings or graphics, rather than text, to develop educational materials. This is not only helpful for communication purposes but can also help to support learners with a low literacy level. It can also remove any risk of misinterpretations or using unintentionally triggering language.
- As for any first aid providers, avoid using medical, anatomical or physiological terms for teaching medical techniques (including using drugs or giving injections).
- Emphasise that first aid providers must assess their own safety first. In conflict contexts, the ill or injured person plays a bigger role in responding to an emergency. For example, if the provider cannot reach the person, they can instruct the person to apply pressure to their own wound.

- Impress how important it is for first aid providers to spread awareness, educate and mobilise the community with regards to preventing and responding to emergencies.
- Encourage learners to consider the local healthcare system and what is available to them within their situation. (There may be a lack of medical care or transport options.)
- Ensure as much as possible that the programme is consistent with first aid education and the practices implemented by the local Red Cross Red Crescent National Society.

Scientific foundation

Adopting standard practices in a civilian setting when conflict occurs

The Canadian Forces conducted a study of Tactical Combat Casualty Care in Afghanistan. They identified that tourniquets and haemostatic dressings were carried easily and applied quickly to prevent shock and save lives, especially when used before the person goes into shock (Savage et al., 2011).

Understanding and addressing common barriers to action

Addressing barriers to action is particularly important where state or voluntary and community sector emergency response plans rely on volunteer deployment. Barriers may include:

- risk to personal health
- length of deployment
- safety of the deployment area.

First aid providers with training or previous deployment experience have a deeper understanding of their response roles and an increased comfort and confidence in their ability to respond to a variety of public health emergencies (Sztajnkrycer et al., 2007). Qualitative reports from the International Committee of the Red Cross (ICRC) delegates delivering first aid education in fragile contexts support this insight. They found that learners' fears, initial understanding of risks, their available resources and likely injuries, shaped the format of first aid education. Adapting the content to address the unique barriers that learners face is essential to make learning meaningful and relevant (Gordon et al., 2019).

Using serious games to improve performance

The French Military Medical Service developed a video game (called a "serious game"), designed for use within Tactical Combat Casualty Care training. Use of the game increased performance, indicating that programme designers could implement similar approaches for cost-effective civilian training to respond to terror attacks (Planchon et al., 2018).

Additional resources

In 2013, the ICRC produced the First aid in armed conflicts and other situations of violence, a practical manual built on the field experience of the ICRC and other organisations. It identifies the unique characteristics of armed conflicts to consider for first aid education, such as the:

- rules and laws protecting individuals
- hazards and risks caused by weapons and people resorting to force or violence
- effects of disorganised healthcare, society and necessities (food, shelter, water) to responders.

The Pediatric Blast Injury Field Manual (Reavley et al., 2019) has specific target audiences, including bystanders and medical personnel. The first section of the manual addresses how bystanders can provide first aid care safely in a conflict zone, identifying bleeding control and airway management as the first aid priorities. The manual also offers technical advice for those with medical training but limited experience of treating injured children. The information supports those in charge of planning, providing lists of the required resources, training and equipment to prepare a medical facility to treat injured children properly.

War Surgery: Working with Limited Resources in Armed Conflict and Other Situations of Violence, Chapter 7: First Aid (Giannou & Baldan, 2019). This chapter highlights the importance of first aid in situations of conflict to retain fighters, support the recovery of minor injuries and stabilise those who are badly wounded until they can be transported to medical care. This manual identifies the goals of a first aid provider in action as follows:

- to provide care securely and safely
- to provide life-saving care by supporting vital functions
- to limit the effects of injuries and to prevent further ones
- to prevent complications and disability
- to ensure the ill or injured person receives medical care when needed
- to ease suffering by providing comfort and moral support
- to promote recovery.

> The above three sources are not academically published and therefore any practice within them is cited here as good practice and only done so with validation from our own experts involved in the development of these Guidelines.

Disaster context

Key action

Ensure that first aid programmes are built on a foundation of preparedness that includes preparedness of individuals, families, communities and emergency services to respond to disaster situations.

Introduction

Disasters can be natural (e.g., earthquakes or flooding), man-made (e.g., explosions or chemical spills) or a combination of both (e.g., fires). The unexpected nature and scale can affect large numbers of people and all aspects of a community. People in disaster situations often sustain injuries and require lifesaving first aid. Communities with the confidence and willingness to act and the skills to provide care will be better prepared to respond to a disaster.

The disaster context is more complex than urban or remote contexts in that the infrastructure that may have existed prior to the disaster is either temporarily or permanently disabled. This means that access to medical resources or care is often delayed for an extended period of time. Additionally, the instability of the environment may pose significant safety risks (e.g., likelihood of aftershocks following an earthquake).

Good practice points

- First aid education should emphasise the hazards in different disaster settings, as well as what help might be available and how to access it.
- First aid education programmes should focus on developing learner's ability to adapt to the disaster's context and any limitations they might face (such as reduced access to water or equipment, delayed access to emergency services).
- First aid education should support learners to prepare for disaster including knowing the risks, making an emergency plan, and getting an emergency kit.
- First aid education organisations should work with local and national authorities and emergency response agencies to establish response mechanisms involving the public, as well as identify appropriate messaging.
- Different forms of media communication should be considered to motivate and empower the public to learn how to respond effectively in disaster situations.
- First aid education should focus on life-saving skills (e.g., putting pressure on a severe bleed) and the use of improvised equipment (e.g., using a shirt to stop the bleeding). It should also include content on recovery and minimising further injury and risk of infection.
- First aid education programme designers should consider educating pre-formed groups, such as workforces, to develop an effective response as a team. This should include facilitating regular refresher opportunities. See Refresh and retrain.

Education considerations

Context considerations

- Frame disaster preparedness education so that it reflects the likely hazards within a particular context.
- To respond and recover, communities need communication systems to ensure collaboration and clear roles and responsibilities. They also need recovery planning that includes a range of different people and agencies.

- Help learners understand the risks they may face by encouraging them to think about the possibilities relevant to their context. Each of these types of factors influence how they should plan and what they need in their preparedness kit. Consider:
  > hazards and their impact such as whether a person lives alone or with a family
  > whether there are children or someone with mobility issues
  > if they live in a tall building or a house.

Learner considerations

- Make time to explore the responses people might have to a disaster such as experiencing high emotions or filming it on camera. Discuss how to manage emotions and the positive or negative outcomes of behaviours.
- Educate groups that act as a community – such as those in workplaces, schools and community centres. Involve local emergency services when possible (Wynch et al., 2011).

Facilitation tips

- Emphasise that individuals can play a critical role immediately after a disaster as the time it takes for emergency medical services (EMS) to respond can vary enormously from hours to days or even weeks (Jacobs et al., 2016).
- Concentrate on bleeding control, maintaining an open airway and shock. A focus on simple steps for stabilising life-threatening conditions is paramount (Bazeli et al., 2017; Jacobs et al., 2016; Loftus et al., 2018; Turner et al., 2018).
- Emphasise the importance of infection prevention, especially as first aid supplies may not be readily available.
- Stress the importance of learners applying all the first aid steps which are possible to reduce pain and suffering and further harm, even when it is not possible to apply all the steps in a particular context or situation.
- Emphasise the role of bystanders as immediate responders and build learners' confidence to act, alongside their skills and knowledge.
- Encourage communities and families to prepare for disasters by creating their own disaster preparedness kit to meet their basic needs for the first three days after a disaster. Kits are filled with essentials such as a torch, water, and toiletries and are kept in a place where they can be quickly accessed. Make sure everyone knows the location of their emergency kit.
- Encourage learners to improvise in the likelihood that first aid supplies are unavailable or inaccessible (Gordon et al., 2019; Jacobs et al., 2016; van Romburgh & Mars, 2019).
- Consider building these sessions into preparedness education:
  > scene safety
  > size and scope of the disaster and identifying immediate needs
  > resource assessment for short, medium and long term
  > available help (e.g., bystanders or EMS)
  > what level and type of triage is possible (both according to the skills of the provider and the needs of the ill or injured people).

Facilitation tools

- The Global Disaster Preparedness Center is a reference centre to support innovation and learning in disaster preparedness. Visit preparecentre.org to learn more about citizen preparedness for disaster.
- Practical exercises or role-play scenarios are an important part of disaster preparedness. These exercises should include focusing on the safety and security of first aid providers and the people they are helping.
- If programme designers have access to country-specific preparedness apps, they should consider using these to prepare the population and motivate them to learn first aid.

- Help learners develop their own emergency plan. It is important to ensure that everyone is prepared and informed in the event of a disaster or emergency. A family group may not always be together when these events take place and should have plans for making sure they are able to contact and find one another.
  > Determine the best ways to evacuate your home in case of an emergency such as a home fire, as well as a safe place to meet.
  > Know the plans for your workplace, school, community centre, etc. in the event a disaster happens when you are not at home.
  > In the event of a disaster, listen to local radio and television. If local officials or community leaders ask you to evacuate your neighbourhood, follow the routes and go to the location specified. Do not take shortcuts as they could take you to a blocked or dangerous area.

Scientific foundation

Papers for this review were sourced from the original literature search for qualitative and quantitative insight on first aid education and supplemented with insight from experts in the field who were also able to suggest additional evidence sources.

Understanding disaster contexts and the varying impact of different hazards

Johnston et al. (2014) and Salita et al. (2019) explored why disasters happen and how to characterise them, providing insight into the likely injuries and harm caused. Both authors draw on the Extended Parallel Process Model of Behavior (Witte, 1992 &1994), which proposes that increasing personal efficacy and threat perception encourages attitudes, intentions and behaviours that can lead to improved disaster preparedness in individuals. In other words, training people how to respond, instilling the willingness and ability to do so, and clearly communicating the threat level of different disasters can better equip people to prepare for disasters. The training links a person's belief that their actions will help to control the situation (either the danger or the fear they feel) and affect its outcome (Ejeta et al., 2015). Understanding context, including site-specific hazards, the available help and how to access it in real-time, can be important for preparing populations for disaster.

Integrating lay response with the emergency services

Studies from different countries have highlighted a shared challenge of integrating response systems and the ability to make use of lay responders. Bazeli et al. (2017), Leow et al. (2012) and Turner et al. (2016) identified the problem as existing between the response agencies where lack of coordination, delineation of duties and other deficiencies reduce the effectiveness of the response. The Institute of Medicine's workshop on Medical Surge Capacity in 2010 articulated the barriers to gaining acceptance from emergency response agencies for increased first aid training and lay responder roles (IOM, 2010). Participants identified the need for public preparedness training and for public involvement in the research and development of communication strategies. However, they also pressed the point that this would only be worthwhile if EMS had already engaged with the public. Public training that is endorsed or supported by EMS providers could help to minimise the disconnect.

Motivation to act

The public needs to understand how they can help (and not hinder) a response and what factors will affect their motivation to respond. There is an emerging body of evidence on the motivation to respond. See Miller and Pellegrino's paper on Intent to Aid (2017), Jacobs et al.'s paper on empowering the public through the recognition of their critical role (2016), and Pellegrino and Asselin's paper on motivations to learn first aid (2020). Oliver et al. (2014) and Muise and Oliver (2016), both explore the need to develop the confidence and willingness of learners within first aid courses, as well as their skills and knowledge. These papers do not consider disaster on a significant scale, but the findings could apply across large scale and more personal disasters.

Wynch et al. (2011), in their paper on reflections of the community response following Hurricane Katrina, found benefits to training people in identified communities (such as workplace teams). They found that working together in a real situation, as they had trained for, fostered pride, professionalism and humbleness. The paper concludes with a recommendation to policymakers to consider this kind of community engagement when planning education and building community resilience.

The Institute of Medicine focused on the role of media and effective communication to promote preparedness and resilience messages to the public as a mechanism to generate a response. In their notes from a workshop in 2015, they explicitly recommend that emerging media types, branding and promotion are essential tools to mobilise individuals and communities to engage in disaster response. Wilson et al. (2005) reported a strong use of media to inform the public in New Zealand on how to respond to a flood emergency. See the section on Media learning within the Education chapter of these Guidelines for more information.

Focus of first aid education for disaster preparedness

Several authors focused on the crucial elements of first aid education when considering disaster preparedness. These are:

- Bleeding control, open airway and shock: Focus on the critical importance of simple steps for stabilising life-threatening conditions (Bazeli et al., 2017; Jacobs et al., 2016; Loftus et al., 2018; Turner et al., 2018).
- Injury prevention and infection control in the early recovery phase of a disaster: Focus on safety and implementing methods to prevent a dependence on the professional healthcare system (Johnston et al., 2014).
- Leadership: Encourage leaders to feel confident and organised enough to distribute lay and professional responders' skills and willingness to engage in a broad range of areas after a disaster (Kay, 1984).
- Refresher training: Use methods such as digital games to regularly reinforce skills and psychological preparedness for unexpected emergencies (Cicero et al., 2018; Mohamed-Ahmed et al., 2016; Turner et al., 2016; Wilkerson et al., 2008; Yanagawa et al., 2018).
- Improvisation: Incorporate training that encourages learners to improvise when first aid supplies are unavailable or inaccessible (Gordon et al., 2019; Jacobs et al., 2016; van Romburgh and Mars, 2019).
- Memory aids: Suggest using an app or carrying an information card in a wallet. First aid providers might be reassured to know that professional responders consult checklists en route to (as well as during) an emergency (Motola, 2015).
- Human factors: Understand how human factors affect communication, leadership and teamwork (Hunziker et al., 2010).

Understanding human response to disasters

Ejita et al. (2015) examined articles on behavioural theory and how this applies to human response during disasters. Studies that consider how human factors affect the response, particularly for medical response teams, is currently a gap in the Guidelines. However, we anticipate further work on this topic in relation to first aid education.

Water context

Key action

Develop a culturally inclusive programme with key water safety messages that address local risk factors.

Introduction

Rivers, lakes, pools, seas and oceans provide people with their livelihoods, places of leisure, and vital resources for daily life. However, drowning is the third leading cause of unintentional injury-related death worldwide. Over 320,000 people die from drowning annually including 57,000 adolescents, two-thirds of them boys, drowned in 2015. Over 90% of deaths from drowning occur in low- and middle-income countries where open bodies of water are generally unprotected and people carry out daily activities on and in the water (World Health Organisation, 2014). Children are disproportionately affected by drowning and in many countries, drowning is the leading cause of death in children between the ages of one and four (World Health Organisation, 2020).

Guidelines

- Delivering water safety messages to children should be part of a layered approach that includes engaging and educating caregivers on drowning prevention - with a particular focus on the importance of close supervision.**
- When developing and teaching water safety messages, activities which integrate physical water competencies with the development of knowledge and attitudes, may be included.*
- The environmental, social and economic context should be considered in developing water safety messages. Messages should be culturally and contextually relevant and consider any traditional beliefs and current practices of the local population.**
- Providing regular Refresh and retrain opportunities to learn about water safety may be considered.*

Good practice points

- The development of water safety messages should be based on evidence of local risk factors for drowning and be mindful of the risk reduction measures to implement at each phase of a drowning event.
- Water safety messages should be developed and delivered using appropriate theories to change behaviours.
- Where water safety is taught in schools, refresh and retrain opportunities may be provided each term.
- Owing to the lack of evidence on the effectiveness of water safety messaging, organisations should consider developing an evaluation framework that allows them to monitor the effects of the messaging on children and caregivers' behaviour when exposed to an aquatic environment. This framework should ensure the messaging does not increase risk-taking behaviour.

Education considerations

Context considerations

- Consider local culture, context, and risk factors for drowning when designing programmes. Additionally, ensure the messaging is age appropriate. Considering these factors is particularly useful in settings where the availability of safety equipment (lifejackets), personnel (lifeguards), signage (warning signs and flags) and adequate prehospital and hospital care is limited.
- The risks and causes of drowning vary significantly by setting and are affected by several factors including:
    - Geography: prevalence and types of water bodies, seasonal weather (monsoons) and impact of climate change.

  > Social context: attitudes towards risk-taking, education levels, alcohol consumption, water competency skills and recreational use of water.
  > Economic context: type of use of water, availability of safe equipment (e.g., boats), availability of early warning systems and availability of response services (rescue, emergency medical services, hospital care).
- Be considerate of existing common practices based on traditional or cultural beliefs. These practices may be positive; for example, using local materials to reduce the risk factors of doing activities on the water. However, they may be harmful, such as promoting practices that have proven to cause injury.

Learner considerations

- The World Health Organisation recommends several interventions, including teaching school-age children basic swimming, water safety and safe rescue skills, as well as strengthening public awareness of drowning to highlight the vulnerability of children.
- For school-aged learners, consider combining theoretical classroom-based learning with practice sessions in the water.
- Engage and educate caregivers on water safety during children's swimming lessons.
- While caregivers are generally aware, they should supervise their children around water, they may overestimate their ability to do so. Emphasise the importance of being vigilant and provide specific suggestions on how to do so within the local context (e.g., instead of saying "supervise children", be specific and say "supervise children and keep young children within arm's length).
- Communities should engage in water safety programmes to generate a collective understanding of the dangers and preventative strategies for activities in, on or near water.

Facilitation tips

- Ensure water safety messages are simple and visually engaging.
- Water safety lessons delivered by educators with whom learners can culturally identify are likely to be most effective.
- Use hands-on (experiential) learning when safe to do so.
- Change caregivers' attitudes about the value of supervision by using context-specific examples.
- When appropriate, consider providing water safety messages as part of a broader practical programme aimed at developing water competence.
- Develop programmes using behaviour change models, clearly identifying the risk factors you are trying to reduce.
- Media may be considered as part of a multi-approach to inform people of risks, safe behaviours and how to access help.

Facilitation tools

- Different organisations have developed classroom-based water safety education programmes using various methods, such as videos, lectures or games to deliver messages. See the water safety app discussed in Gamification. Check with your local organisations to see what they have available.
- Use the Water Competencies checklist to ensure you include physical, knowledge and attitudinal elements to provide a holistic approach to water safety education.
- Use the Open Water guidelines in the table below established by the International Task Force on Open Water Drowning Prevention (2011) if relevant to your context. They are based on the best available evidence and expert opinion. They aim to be generic across all settings, focused on keeping yourself safe and keeping others safe, and are set out below. Note that the only evidence-based messages were "learn to swim" and "avoid the use of alcohol", with the other messages based on suggestive evidence or common risk factors.

Keep yourself safe	Keep others safe
1. Learn swimming and water safety survival skills. 2. Always swim with others. 3. Obey all safety signs and warning flags. 4. Never go in the water after drinking alcohol. 5. Know how and when to use a life jacket. 6. Swim in areas with lifeguards. 7. Know the water and weather conditions before getting in the water. 8. Always enter shallow and unknown water feet first.	1. Help and encourage others, especially children, to learn swimming and water safety survival skills. 2. Swim in areas with lifeguards. 3. Set water safety rules. 4. Always provide close and constant attention to children you are supervising in or near water. 5. Know how and when to use lifejackets, especially with children and weak swimmers. 6. Learn first aid and CPR. 7. Learn safe ways of rescuing others without putting yourself in danger. 8. Obey all safety signs and warning flags.

Learning connections

- Make connections to the topics Unresponsive and abnormal breathing (baby and child) and Unresponsive and abnormal breathing (adolescent and adult), including raising awareness of the importance of rescue breaths combined with chest compressions for people who are not breathing as a result of drowning (as opposed to chest-compression-only CPR).
- Consider any relevant practice in topics of drowning, Decompression illness, or Aquatic animal injuries.

Scientific foundation

Evidence provided for this topic was found using the search strategy used for the Education elements of these Guidelines and further embellished with insight of published work provided by water safety experts. It includes one systematic review and one structured review as well as multiple empirical studies and insight from the WHO.

Evidence available suggests that water safety messaging needs to:

a. include context-specific content targeted at learners who will be in the water and caregivers who will supervise them (Lawson et al., 2012; Ramos et al., 2018; Moran & Stanley, 2006; Sandomierski et al., 2019; Barcala-Furelos et al., 2018; Denehy et al., 2017).

b. be delivered in conjunction with activities supporting the development of water competencies (Langendorfer, 2018; Stallman et al., 2017).

However, there is an inconsistent approach to developing relevant water-safety messaging. While the International Task Force on Open water drowning prevention provides generic water safety messages, and there are several evidence-based narratives on the drowning process (Szpilman et al., 2016), this review did not identify any framework to support the development of risk-based messages.

Additionally, the programmes we reviewed included different facilitation methods (lectures, videos, posters, practical engagement, etc.). It was not possible to compare the effectiveness of each technique. Based on our review of the scientific literature we have identified the following conclusions about water safety messaging for children and caregivers.

Children

Children are disproportionately affected by incidents of drowning. Globally, the highest rates of drowning are found in "newly mobile" children ages 1–4, followed by children ages 5–9 (World Health Organisation, 2020).

Most of the studies we identified focused on the knowledge gained and retained following a lesson using pre and post questionnaires to gather data. In nearly all cases, children were better able to answer questions immediately after the learning experience and were able to retain this knowledge for a short period (Ramos et al., 2018; Azeredo & Stephens-Stidham, 2003; Barcala-Furelos et al., 2017; Greene et al., 2002; Shen et al., 2016; Wilks et al., 2017; Soloman et al., 2013; Terzidis et al., 2007; Lawson et al., 2012) . However, none of the studies measured whether this knowledge of water safety messages led to a short- or long-term behaviour change, whether they sustained this behaviour change or, ultimately, whether it reduced their risk of drowning.

Barcala-Furelos et al. (2019) and Wilkes et al. (2017) were unable to provide evidence that children retain this knowledge beyond one to two months; and Liu et al. (2019) found limited evidence that children who have water safety knowledge are at a reduced risk of drowning.

Countries with developed water safety programmes usually include messaging aimed at changing behaviours around water and teach these to children as part of basic swimming or lifesaving programmes. This is described by Stallman et al. (2017) as 'water competencies' - the physical, cognitive and affective competencies that help to reduce the risk of a person drowning. These competencies are set out clearly by Langendorfer et al. (2018) as a set of 15 items to be included in water safety education and are included in the Facilitation tools above.

For an example of how the competencies are used, see Royal Lifesaving Society UK or Royal National Lifeboat Institution. The messages highlight the risks of being in, on or around water and suggest practical actions to reduce these risks. In areas where resources are limited, or a training venue (e.g., a pool) is unavailable, water safety messages are often delivered to children as a stand-alone programme, often in a classroom setting and without any practical experience in the water.

There have been no comprehensive studies that evaluate the outcomes of drowning reduction nor learners' behaviour change following a classroom-based water safety programme for children.

Supervision by caregivers

Evidence suggests that caregivers underestimate the need to carefully and continuously supervise their children; they also overestimate their ability to do so (Moran, 2009). Studies showed that caregivers' belief in the value of supervision is influenced by their perceived judgements of their children's swimming skills (Moran & Stanley, 2006; Sandomierski et al. 2019). In other words, caregivers place a lower value on supervision if they believe their child to be a good swimmer. As such, these evidence sources point to the need for drowning reduction programmes to be focused on educating children as a component of a broader educational strategy. This broader strategy should include components aimed at caregivers and targeted community members to educate them on preventive measures (e.g., supervision and covering outdoor pools) and rescue and resuscitation skills (Barcala-Furelos et al., 2018; Denehy et al., 2017).

While there is a gap in comprehensive studies examining how behaviour changes after receiving education on risk factors and how to reduce them, there are studies that suggest caregivers' attitudes regarding the value of supervision may change when they learn using context-specific examples (Denehy et al., 2017; McCallin et al., 2020; Moran & Stanley, 2006; Sandomierski et al., 2019). One study supported the use of explicit messaging (e.g., using videos to depict real-life scenarios), alongside risk reduction strategies, to increase perceived susceptibility (Denehy et al., 2017). However, a separate study suggested that even families who have been affected by a submersion injury may not change their water safety practices (Hijazi et al., 2007).

Remote context

Key action

Differentiate the first aid education delivered to communities living in remote locations and to those individuals who are visiting.

Introduction

Examples of remote contexts include wilderness environments, isolated communities or rural areas with limited resources. Medical care may be limited or take a long time to access in this context. Additionally, individuals and communities may experience longer wait times for medical help and have to consider extra factors – such as environmental hazards – compared to those living in urban areas.

Good practice points

- First aid programmes should reflect the difference between visiting and living in a remote location.
- Local government or community organisational support should be secured before developing the first aid programme.
- Where possible, learners should be involved in the development of educational content.
- Local organisations should manage the selection process of community-based first responders if they are expected to fulfil a defined role in the community after their training.
- Education should be aimed at those most likely to encounter ill or injured individuals.
- If learners plan to visit a remote place, they should be advised to plan their route, as well as inform family and friends of where they are going and when they expect to return.

Education considerations

Context considerations

- Base educational content for remote contexts on the risks posed in those specific environments. For example, where medical assistance is limited or requires longer travel times, learners need to know how to prioritise and provide care for life-threatening injuries.
- Draw attention to context-specific illnesses such as Hypothermia, Hyperthermia or Altitude sickness. Provide general advice such as avoiding alcohol, drinking plenty of water and developing ways to protect against the weather (e.g., by building a shelter or starting a fire) to help learners prepare for such conditions.

Learner considerations

- Include information specific to the remote location, such as how to signal for help, who can provide help, and what level of care is available for learners who are unfamiliar with the remote context.
- Adapt first aid education to the needs of the learners. For example:
  - Drivers who encounter a road traffic collision where a person has a Spinal injury may not be able to immobilise the spine properly while transporting the person in a moving vehicle. Therefore, education should focus on simple ways to protect the neck and back, including gentle handling and restricting movement.
  - If someone has a Burn and water or other liquids are in short supply, they could put a bowl under the burn and pour the liquid over the burn into the bowl so that the water can be used again. This is more effective than putting the burn into the bowl of water as the body part will warm the water. Pouring it keeps the temperature of the water lower.

Facilitation tips and tools

- Emphasise the role of first aid providers in situations where medical care takes a long time to access and how they may have to prioritise care for an ill or injured person.
- Empower learners to make informed decisions, bringing awareness to the stress they may experience in these situations.
- Use scenario-based role-play to help learners critically assess what actions they should take. Follow up with a debrief to allow learners to discuss any feelings of uncertainty, fear or anxiety. Provide reassurance.
- Encourage learners to improvise when they do not have appropriate first aid equipment. Help them to understand the purpose of the equipment, rather than the need for something specific. For example, if they are in a cold environment and do not have a blanket, encourage them to think about building a shelter or a fire instead.

Scientific foundation

Based on the evidence, we identified the key actions to take when developing first aid programmes for a remote context.

Differentiate the first aid education

Differentiate first aid education according to the learners' context (i.e., the programme for those living in a remote community should differ from one aimed at people visiting a remote area). This point is particularly relevant to how a bystander might respond to an ill or injured person. In remote communities, people are more likely to know one another and know where and how to get help. In contrast, individuals on short trips to these locations need to find out in advance how to access help for themselves and others (Born et al., 2012; Orkin et al., 2012). Additionally, communities with limited access to medical care need customised education that takes their geographical setting, infrastructure and access to resources into account and tailors public health and emergency response messaging accordingly (Orkin et al., 2012).

Prioritise the first aid interventions

People in a remote setting will likely have to wait a significant length of time to receive medical care. Therefore, first aid providers should understand which actions to prioritise. It is also essential to ensure learners understand why some first aid actions are a priority over others (Born et al., 2012; Tiska et al., 2004).

Secure local cooperation and agreement.

Local government, community or voluntary organisations can be active sponsors and organisers of first aid education, such as community-based first responder programmes. Understanding a community and being present within it establishes the foundation for a programme to be successful in the long-term (Orkin et al., 2012). Local government organisations can help with the administrative aspects of a programme by organising Refresh and retrain sessions (Kay & Myrick, 1982). In some rural contexts, local community groups or networks have created sustainable first aid programmes that do not rely on outside assistance (Ratner & Katona, 2016).

Use peer selection to identify capable first responders

Some evidence has shown that the best way to identify people who will perform effectively as first responders is to have local organisations manage the selection process. This is another example of why it is important to secure local support for any first aid programme before it begins (Jayaraman et al., 2009; Kay & Myrick, 1982; Raj Pant et al., 2015).

Target education

In remote communities, there may be a group of people who are more likely to encounter and transport ill or injured individuals. One example is commercial drivers who transport people to medical facilities in areas where it would take too long or be too difficult for an ambulance to arrive. Programme designers should capitalise on the opportunity these individuals have to provide first aid and offer the appropriate training. Other examples of groups to target include farmers or park rangers. It is important to work with these particular groups and create the programme's content together. This collaboration is an effective way to ensure the content and approaches meet the needs of the specific audience (Born et al., 2012; Jayaraman et al., 2009; Orkin et al., 2012; Pant et al., 2015; Tiska et al., 2004).

Pandemic context

Key action

Protect learners and facilitators through protective practices (e.g., wearing personal protective equipment, spacing, hand washing) while providing first aid education during a pandemic.

Introduction

During a pandemic or other health crisis, the disease is transmitted throughout populations and there can be widespread fear of infection. However, people still get injured or become ill and require help. It remains important that first aid providers continue to provide help safely, particularly life-saving help. Protecting the first aid provider, the ill or injured person, and bystanders remain central to first aid. Offering educational activities and providing first aid care during a pandemic also remains a priority, but it is challenging and comes with some risks.

Crisis	Description	Example
Pandemic	Epidemic over a very large area; affecting a large proportion of a population.	COVID-19 in 2020
Epidemic	Prevalent among a people or a community at a special time and produced by some special causes not generally present in the affected locality.	Ebola virus disease (EVD) in 2014-2016 in West Africa
Outbreak	A sudden increase in the incidence of a disease; an epidemic of infectious disease, esp. when relatively localised.	Yellow fever in November of 2019 in Venezuela

Good practice points

- First aid should not be delayed due to disease transmission concerns; however, actions may need to be modified to protect the first aid provider, the ill or injured person, and any bystanders.
- When providing first aid to someone from outside their household first aid providers should maintain a physical distance (2 m or 6 feet is recommended) using verbal instructions to their ill or injured to help themselves. When this is not possible, appropriate personal protective equipment (e.g., gloves, face mask, eye protection) or other barriers should be used.
- Training and practise of how to safely put on and take off personal protective equipment (PPE), and how to appropriately clean or dispose of PPE, may help reduce transmission.
- First aid providers should wear medical-grade PPE (face mask, eye protection, gloves, etc) if possible.
- If possible, first aid providers should use a buddy system for putting on and taking off PPE, where they ensure best practices for applying PPE are followed while maintaining their own physical distancing.
- First aid providers should practise proper Hand hygiene after each interaction with an ill or injured person.
- Where appropriate, the first aid provider may apply additional measures of risk mitigation during first aid, including:
  > offering personal protective equipment to the ill or injured person
  > identifying obvious signs and symptoms of infection
  > asking if the ill or injured person has been in close contact with someone that is infected as defined by public health
  > asking if the ill or injured person has returned from travel to a defined high-risk area as defined by public health

- Assessment of the person may begin from a safe distance by calling out to the person and observing them for signs of normal breathing (whether the abdomen and chest are moving regularly).
- Programme designers should follow specific recommendations from the Global First Aid Reference Centre or local resuscitation council on how to safely provide CPR safely.

Education considerations

Context considerations

- Emphasise to learners that providing first aid should be prioritised over the risk of infection if they are helping someone in their household because previous exposure to them may reduce any additional risk of infection. Using PPE and physical distancing can greatly reduce the risks of transmission.

Learner considerations

- Ensure classroom-based first aid education complies with distancing advice. Learners should be able to maintain a two-metre (six-foot) distance between participants at all times.
- Ensure learners are advised they must wear appropriate PPE (e.g., a face mask and gloves) to enter the classroom and complete training.
- Communicate to learners that if they become ill or are unable to wear appropriate PPE, that they cannot be admitted into the session.
- Post information on the symptoms of the pandemic (as defined by public health) at entry points and ask visitors not to enter when experiencing any symptoms of illness.
- Consider foot-traffic flow into the entry of the building to ensure social distancing can be maintained – this can include markers for those standing outside the premises or where to stand within the premises.
- Consider that wearing PPE and keeping safe distance will cause additional stress on the learners and the facilitator alike. Try to mitigate this where possible (e.g. provide adequate breaks, ensure a comfortable room temperature).

Facilitation tips

- Spend extra time planning the session outline and how best to adapt the learning activities to the pandemic context.
- Provide easy and visible access to sanitisation stations near the classroom space. Sanitisation stations must include a space to wash hands with soap and water, paper towels (instead of cloth towels), or hand sanitiser with at least 70% volume of ethanol or 60% of other alcohol. See Hand hygiene.
- Thoroughly clean all non-disposable equipment and manikins used during the session before participant use. Clean the face, mouth, and chest plate of manikins. Please consult the manufacturer's cleaning and disinfecting instructions.
- Assign any triangular bandages, blankets or other fabrics used to specific learners at the start of the session, for their use only and then wash them immediately at the end of each day of use.
- Clean and disinfect training materials (such as trainer auto-injectors or inhalers) using 70% volume of ethanol or 60% of other alcohol. Disinfect before and after each user has handled the item and also before storage.
- First aid manuals or booklets should be for single person use rather than shared between learners or used in multiple sessions. Alternatively, encourage learners to bring their own tablet to the session and access the digital version of a manual during the session.
- Be mindful of the other items used in the classroom (e.g., pens, trainer-defibrillators, floor mats, tables, chairs). Ensure any surfaces that may collect germs are regularly cleaned using a 70% volume of ethanol or 60% of other alcohol disinfecting wipe.

- Do not place contaminated training aids into the clean carrying bags as this creates contamination. Bring a separate receptacle (e.g., garbage bag, laundry tub) to transport the contaminated training aids to the designated cleaning space.
- Have learners do their skills practise on manikins or other props rather than other learners. For the brief periods of the sessions that have CPR practice, it is understood and accepted that the mask will have to be lowered.
- Have learners reduce exposure by working with the same partners and groups for the entire class or course. Avoid mixing up groups and partners for activities.

Facilitation tools

- Be alert to advice from the Global First Aid Reference Centre which will provide relevant and up to date information. See guidance on resuming training during COVID-19.
- Use the Safe classroom checklist to check your education environment has mitigated risks related to the COVID-19 pandemic.
- Consider increasing the use of blended and online learning courses.
- Ensure every learner wears gloves during all skill practice and assessment scenarios.
- At a minimum, hand hygiene should be performed at the following times by all learners and the facilitator:
  - Beginning and end of class
  - Before and after meals and snacks
  - Before and after skill practice sessions. (When wearing gloves, hand hygiene should be done before putting on gloves and after removing them.) See Hand hygiene for more on critical times for handwashing.
- Non-medical or surgical masks can become contaminated on the outside or when touched by your hands. When wearing a mask, facilitators and learners should take the following precautions:
  - avoid touching your face mask while using it
  - change the mask for a fresh one as soon as it becomes damp or soiled
  - non-medical face masks that cannot be washed should be discarded and replaced as soon as they get damp, soiled, or crumpled.

Workplace context

Key action

Position first aid education for the workplace as central to health and safety needs and requirements.

Introduction

The workplace context is considerably varied. It ranges from multi-site organisations engaged in high-risk operations that are responsible for large numbers of workers (e.g., oil rigs and mines), to single-site organisations employing a single individual for a low-risk activity. The extent of variation means that the design of workplace first aid education provision should take into account how it enables workforces to respond appropriately, as well as considering the injury and illness risk profile of each workplace. Planning how to increase and improve workplace first aid education provision is an important issue for first aid education programme managers. The International Labour Organisation (ILO) estimates that more than 2.78 million people die as a result of occupational accidents or work-related diseases, while there are some 374 million non-fatal work-related injuries each year (ILO, 2020).

For both large and small organisations, in all manner of settings, the key aspect that differentiates the workplace context from other contexts is that the employer, or the organisation that is responsible for engaging workers, has a duty of care over its workers even if it is not enshrined in national law. This duty of care should form the framework for providing workplace first aid education provision since the type of work people are engaged in, the environment in which they work, and the existence (or absence) of wider occupational safety and health protection will define what content is needed and how best it can be provided. Since many organisations, both profit-based and not-for-profit, consider training for workers to be a necessary business cost, a successful approach in many countries is to provide workplace first aid education through a business model.

Good practice points

- In countries with weak or non-existent first aid regulations, the Ministry of Labour, or similar body responsible for occupational safety and health at the national level may be a valuable source of information on the workplace context and can facilitate greater uptake of first aid education.
- In countries with safety and health regulation, the local, regional or national requirements and regulations should be paramount considerations for the programme designer. These might be affected by transnational corporations or trade union policies.
- Education programmes should be targeted to the workers and the risks they face in the workplace.
- Organisations requesting first aid education for their workers should be advised on how many people need to be trained and how frequently. In the absence of a national policy recommendation, workplaces should consider having between 5% and 10% of their workforce participating in a regular first aid training cycle.
- Where technological capacity exists among potential learners, programme designers should include online learning options as part of a workplace first aid programme. Some organisations will have an organised learning and development programme for their workers and there may be opportunities to embed first aid education content within these programmes.
- Workplace first aid programmes should include an active advocacy and sensitisation programme aimed at policymakers to improve national legislation on first aid training and the protection of workers
- The duty of care an organisation has over its workers should form the framework for providing a workplace first aid education programme.

Education considerations

First aid education in the workplace needs to be planned in the context of the risk assessment that has been undertaken. While there might be individuals who are employed to have a specific first aid role, the greater the proportion of the workforce trained in first aid, the greater the likelihood that injured and ill people will receive the help they need quickly.

Context considerations

- Position first aid education for the workplace so that organisations with workers identify it as an important part of their broader occupational safety and health agenda.
- Adapt workplace first aid education provision to ensure that workers in organisations are able to react properly to workplace first aid emergencies and that organisations meet legislative requirements where these exist.
- If available, refer to a risk assessment of the workplace which will have identified any potential hazards that can cause harm to the health of employees, visitors and the environment. This assessment is normally done by occupational safety and health experts. It should also identify if any specific equipment or facility is needed (e.g. defibrillators, stretchers, a first aid room), and can be used alongside any statutory guidelines to identify the number of workers that should receive training.
- Based on the risks faced by the workforce, consider which first aid topics should be covered, and what additional content should be included. This could be equipment and facilities that exist within a specific workplace.
- Include in the programme some content on any relevant workplace legislation, and where they exist, include procedures related to the specific organisation or industry sector and take into account the specific risks of the sector (handling of heavy loads, the existence of toxic products, etc.). Organisations, industry representatives or Government bodies may also have information on the frequency of specific injuries or incidents in the workplace environment that can be taken into account when designing specific programmes.
- In contexts where access to resources and medical care is quite high, as the workplace is a controlled environment, typically there is a designated first aid provider that has access to any tools and training that may be required to provide first aid. The designated first aid provider may also have a duty to document any safety and health incidents.
- The main purpose of workplace first aid education is to increase the chances that workers who experience an injury or illness receive first aid treatment at work. And that this enhances their health outcome before they present at, or are taken to, medical care. This assumes there is onward medical care available.
- The orientation of workplace first aid education towards the workforce means that core workplace first aid programmes will often focus on adult first aid and would not include baby or child first aid techniques. However, in contexts where there are identified needs related to baby and child first aid, such as in education, or where work has a public-facing element (e.g., in retail environments, hospitality, leisure and tourism), workplace first aid programmes should take into account teaching of baby and child first aid techniques.
- In contexts where members of the public are present, the employer should be clear about the requirements for first aid trained employees to help members of the public who need first aid. Check local Good Samaritan laws and regulations and where there are none, encourage learners to help anyone who needs first aid.
- Organisations purchasing workplace first aid education are often pressured by economic considerations when deciding the length of time workers can be absent to receive training, despite the obvious worker safety and health considerations. This is particularly problematic in a context where there is minimal or no regulation or enforcement. Workplace first aid education providers will need to consider ways in which demand for training remains, such as reducing the length of courses while maintaining essential content.
- Ensure that content meets the context risk profile of the workplace while taking into account the fact that workers with first aid skills are lay first aid providers. See the table below:

Risk of accident and injury	Example context	Adaptation
High risk and complex work environments	Construction and specialised industries such as oil rigs, mining	More frequent refresher training on topics related to the context. Practice scenarios related to the environment, e.g. moving an injured person in a restricted environment. Include relevant specific topics, e.g., inhalation of poisonous gases and chemical burns.
Medium risk	Manufacturing, logistics, agro-industry	Adapt injury treatment and practical scenarios to fit with the specific environment, e.g. injuries related to machinery use or vehicles.
Low risk	Offices, financial services	Adapt first aid to possible specific risks.

- Take into account the specific workplace context, such as the type of work undertaken, worker attendance pattern, sickness and staff turnover rates, number of multiple sites, off-site working etc and adapt scenarios accordingly to make them relevant as possible.

Learner considerations

- Informal workers might need enhanced engagement activities to both alert them to learning opportunities and to motivate them to dedicate time out from their work to train. Consider community-led approaches; use of free online courses; or bite-size learning modules (Aquino et al., 2016).
- Workers who are visible and present at times and places where injury frequently occurs (such as taxi drivers, police, bus and commercial delivery drivers, or who are already informally involved in pre-hospital transport could be targeted for first aid education as part of a community resilience programme (Jayaraman et al., 2009 a and b; Tiska et al., 2004).
- There might be varying levels of motivation to learn depending on the recognition (financial or status) that is given to learners who are required to learn by their employer (Pellegrino & Asselin, 2020).
- Workplace learners might develop enhanced collaborative responses to disaster due to being trained together and acting as a response team (Fraser-Wynch et al., 2011).

Facilitation tips

- For long courses, particularly those running over several days, try to ensure a variety of activities are provided for learners, including peer learning, practical practice sessions and use of feedback in order to maintain engagement with learners.
- Consider Blended learning for the workplace, particularly where workers are reluctant or uncomfortable with classroom-based learning, or where a more flexible approach is appropriate (Mancini, 2009; Oliver 2020).
- In places where people are unable to attend courses due to lack of time or access, provide visual educational materials such as posters and public media broadcasts to help people learn.

Learning connections

- There are several learning modalities papers that may be relevant to consider including - Blended learning, Peer learning, Online learning, and Media learning.
- First aid topics should be selected based on the risk profile of the workplace but some common first aid topics in medium to high-risk workplaces might include: Severe bleeding, Amputation, Cuts and grazes, Poisoning and/or Burns.

Scientific foundation

We identified papers from across our education literature search related to specific workplace learner audiences. The references provided here cover a broad cross-section of topics related to the workplace environment, which will help guide those planning a workplace first aid programme. These include research in high and low resource settings.

Community response

Wynch et al. (2011), in her paper on reflections of the community response following Hurricane Katrina, found benefits of training people in identified communities (such as workplace teams) where working together in a real response, as they had trained for, fostered pride, professionalism and humbleness. The paper concludes with a recommendation to policymakers to consider this kind of community engagement when planning education and community resilience building (see Disaster context).

Jayaraman et al. (2009a; 2009b) conducted a cross-sectional survey on first aid providers in Kampala, Uganda and developed a training programme to upskill them. In a follow-up study, participants were shown to have used their skills and the researchers conclude that this type of training for this workforce would be a cost-effective way of developing emergency care services in Uganda and other low-resource settings.

Motivation to learn first aid

Pellegrino and Asselin (2020) undertook a literature review of motivation to attend first aid learning. Legal and compulsory requirements were found to be a strong motivation to learn. Two studies showed that a requirement to learn first aid at work is a stronger motivational factor than having an at-risk family member. Weaker evidence was found regarding the duty to care in sports and for recertifying after certification had expired.

Findings from specific workplaces

Aquino et al. (2016) identified a specific group of people who came into regular contact with a specific species of venomous freshwater fish because of their livelihoods and economic activity and exemplified a low resource setting. The target group had a high degree of illiteracy and limited availability for extensive classroom-based learning (see Aquatic animal injuries topic).

Tiska et al. (2004) report on a model devised for commercial drivers in Ghana to attend a first aid and rescue course and concludes on the effectiveness of training laypeople already involved in pre-hospital transport and care.

Online and blended learning

Mancini et al. (2009) compared self-directed learning of CPR using a kit that could be used at home with traditional in-class instruction and found that they were comparable in terms of skill development and attitude to providing CPR for company employees. This finding is also reflected in a study set in the workplace by Oliver at al. (2020) which compares a blended approach to a traditional classroom approach and also finds that outcomes are equivalent. In both cases, workplace learners appreciated the flexibility that the self-directed element offered and the reduced requirement to attend in person.

Education modalities

First aid education should be adapted to the learner to ensure that it is relevant and engaging. This includes making sure that follows the principles of first aid education:

- Linked to learners
- Variety
- Simplicity
- Discovery
- Clarity
- Outcome-driven

In this section, we provide insight and recommendations on different approaches to learning. First aid programme designers are encouraged to explore new learning options and discuss these with learners to create effective learning opportunities for different audiences. The approaches we discuss allow for education on different scales (from mass reach to specific populations) and with different levels of resourcing.

“Put your learners at the centre and plan education around their needs.”

Motivation to learn first aid

Key action

Consider the individual's specific motivation to learn and use this to inform the planning and content included in first aid education.

Introduction

People have different motivations to learn first aid, the strongest being a requirement to attend (e.g., for work). Other motivations include if the learner has a family member at risk of illness or injury, or if they live far away from healthcare services. When people are motivated to learn, they will likely be more engaged with the process.

Guidelines

- First aid programme designers should advocate that decision-makers make first aid learning a requirement for specific groups, such as school children, new drivers and employees.**
- Self-led learning completed in a familiar context (e.g., at home) may improve individuals' motivation to successfully achieve the learning outcomes.*

Good practice points

- Certain factors, such as cost, location method of learning, or duration of the training, should be considered as to how they might influence the decision to learn. These factors should be adapted to meet the needs of each group and encourage learning.
- For maximum engagement, learning opportunities should be adapted to meet learners' needs and preferences. The content should be limited to what is relevant and necessary for the learners.

Chain of survival behaviours

People may be motivated to learn the knowledge and skills within the domains of prevent and prepare, early recognition and first aid steps, especially if they have an at-risk family member or young children at home, or if they live in a remote or dangerous location. Some people may be motivated to learn first aid skills regardless of their family or living situation.

Education considerations

Learner considerations

- When learners' motivations are understood, programme designers can adapt first aid programmes to focus on different aspects of the Chain of Survival Behaviours. For example, parents with young babies may want to be prepared if their baby starts Choking. Someone living with an elderly relative may want to be able to recognise the signs of Stroke.
- Identify what learners already know and what they want to achieve in advance. Learning that is targeted at the right level for the learner will ensure that it is neither intimidating nor boring.
- Opportunities to gain a deeper understanding of first aid, as well as maintain or improve their skills, may motivate learners who already have first aid knowledge or experience.

Facilitation tips

- Encourage learners to share their first aid experiences as this will help to understand their motivation for attending and resolve any concerns they have about providing care in an emergency.
- Avoid overwhelming learners with too much information as this could weaken their confidence and demotivate them.

Scientific foundation

We drew our scientific evidence from a scoping review on the theoretical organisation of motivations to attend first aid education (Pellegrino and Asselin, 2020). The review included 13 studies, of which eight were survey-based and none were experimental.

Four factors were identified as motivations to learn first aid:
Cost: Cost can present a barrier to attending a first aid course. Reducing the cost may motivate more learners to participate (Fortington et al., 2017; Pearn et al., 1980).

Face-to-face versus at home: At-risk populations who were told by their doctor to learn CPR were more likely to complete self-led learning rather than attend a course (Greenberg et al., 2012). Those with an at-risk family member also preferred to learn at home (Kliegel et al., 2000).

Having an at-risk family member: Huang et al. (2016) state that having an at-risk family member has a positive impact on one's motivation to learn. However, alternative studies found that it is not as strong as other factors, such as the requirement to learn first aid.

Requirement to learn: Legal and compulsory requirements were found to be a strong motivation to learn (Arbon, 2011; Cariou & Pelaccia, 2017; Platz et al., 2000). Additionally, two studies showed that a requirement to learn first aid at work is a stronger motivational factor than having an at-risk family member (Cariou & Pelaccia, 2017; Platz et al., 2000). Weaker evidence was found regarding the duty to care in sports (Fortington, 2017) and for recertifying after certification had expired (Bouland, 2017).

Due to the quality and diverse nature of the studies, we were unable to discern with confidence which factors provided greater motivation to attend first aid education.

First aid education for children

Key action

Encourage children to develop their first aid knowledge and skills and become lifelong learners.

Introduction

First aid education refers to developing first aid knowledge and skills in children. This topic explores how to develop first aid abilities in children of different ages and the methods to help them retain their knowledge, skills and attitudes in both high and low resource settings.

Guidelines

- First aid programme designers should refer to the educational pathway provided by the Centre for Evidence-Based Practice (CEBaP) to create contextually relevant educational programmes according to children's intellectual, social and behavioural abilities.**
- When combined with a secondary method (e.g., educational songs), hands-on training may help children to retain knowledge and skills as well as increase their confidence and willingness to act.*
- Training teachers to facilitate first aid education may be more productive, time-efficient and relevant than bringing in medical facilitators.*

Good practice points

- Relevant, engaging scenarios that encourage children to apply their life experiences should be used to support learning.
- Repetition of learning can help children to develop and retain knowledge (although the optimum frequency is not known. See Refresh and Retrain.)
- When access to care is difficult:
  > Though the educational pathway recommends teaching children how to access medical care at ages seven to eight, we recommend waiting until they are ages nine to ten. Repeat this knowledge until they are 18 years old.
  > Due to the presence of infectious diseases, facilitators should teach children to wash their hands before and after providing first aid. Repeat this skill until they are 18 years old.
  > Children may be taught to recognise their role in a first aid emergency with age-appropriate activities such as assessing the scene and calling for help. This approach will also encourage them to learn about the importance of scene management.

Education considerations

Context considerations

- Always align children's first aid programmes with your own organisation's and any partnering organisations' (e.g., schools) child protection policies.

Facilitation tips

- Keep messages short, clear and focused on the first aid outcomes.
- Avoid using over-medicalised terms or high-level language to describe illnesses and injuries. Language should be appropriate to the age and experiences of the children.
- Start by asking young learners what they know about how the body works and why providing first aid is important.
- Facilitate a preliminary discussion on learners' experiences with emergencies or illnesses; doing so can help to avoid trauma that a child may have experienced (e.g., death of a family member or an accident).

- Support the development of first aid clubs where children and youth can teach and learn from each other. Children and youth are often influenced by their peers and older children.
- Encourage children to share first aid knowledge and skills with their families.
- Build on children's interest to learn first aid by incorporating first aid education into different subjects and activities, such as biology class or sports.

Facilitation tools

- Create relevant, engaging scenarios (such as role-play or simulations) where children can draw from life experiences to support their learning. You may do any of the following:
  - > use scripted and age-appropriate role-plays
  - > carry out simulations of different injuries or illnesses
  - > engage children to come up with their own scenarios
  - > practise providing first aid in challenging spaces, such as in a car, instead of in a classroom setting. Be sure to follow the latest child protection policies.
- Use games, quizzes, online apps and online content to engage children.
- Short webinars or videos with tips may help to encourage and support teachers who lack the confidence to teach first aid (Ellis et al., 2020).

Scientific foundation

The educational pathway

The educational pathway is evidenced in two systematic reviews by CEBaP. The pathway focuses on the re-emphasis of knowledge and skills through an "encourage, know, repeat" approach. The pathway systemises the repetition of topics and identifies the expected outcomes at the end of each learning stage. The "encourage" and "repeat" stages are aimed at the facilitator, while the "know" stage is aimed at the learner.

	Encourage (E)	Know/know how (K)	Repeat (R)
Facilitator	Focus on a specific learning objective.		Repeat and emphasise the learning objective with children.
Learner		Achieve certain knowledge, skills or attitudes.	

During the repeat stage, the facilitator has two objectives:

1. Repeat the learning outcome for the children who have already achieved it.
2. Continue to try and reach the children who have not yet mastered it.

NOTE

The pathway has been adapted for an African context and is available for free in the additional files of the scientific paper by De Buck et al. (2020).

Two systematic reviews from CEBaP looked at three questions regarding first aid for children. The first review from 2015 included 30 studies to identify how first aid education impacts learning knowledge, skills and attitudes for children in different age groups. The second review from 2019 contained an update of the first review resulting in 58 studies in total and also contained an additional research question about the effectiveness of educational interventions in low and middle-income countries. The latter part of the review resulted in 2 systematic reviews, together including 36 individual studies.

Based on the evidence, we drew general conclusions about children developing knowledge and skills in the following first aid topics.

- Bleeding
- Burns
- Choking
- Diarrhoea
- Epilepsy
- Fever
- Injuries to bones, muscles or joints
- Poisoning
- Resuscitation
- Skin wounds
- Stings and bites

NOTE

Refer to the education pathway for specific suggestions on which topics to teach to each age group.

Evidence indicated that children as young as six could learn how to provide basic first aid. Evidence also showed that alternative teaching strategies, such as problem-solving, guided questions or cooperative instruction, significantly increased learning and successful testing outcomes. However, the certainty of the evidence was rated as low.

As part of this study, an expert panel consisting of first aid practitioners, academic educational experts and clinicians reviewed the available evidence and considered how it might affect education for children in lower resource settings. For example, in some African contexts, medical care is less accessible. The experts decided to postpone the topic of accessing medical care for African children until the ages of nine to ten. Learners then repeat this topic until they are 18 years old. A second example looked at handwashing before and after providing first aid. Because there is a higher prevalence of infectious diseases in some African contexts, the panel proposed to repeatedly teach this skill to children until they are 18 years old.

In some instances, the panel extended the application of one topic's evidence to another that was lacking in evidence. For example, they took evidence of burns knowledge, which showed that children ages six to seven could learn how to apply first aid correctly and applied it to bleeding and skin wounds as these topics lacked evidence for children under the age of 11. The panel concluded that children should have basic first aid knowledge of burns, bleeding and skin wounds by the ages of seven to eight. Children should attain more advanced education at the ages of 11 to 12 (e.g., understanding the link between skin wounds and tetanus) or at the ages of 13 to 14 (e.g., knowing how to identify different types of burns). Skill competencies were set according to knowledge outcomes. A complete overview of the available evidence can be found in the additional files of the scientific paper by De Buck et al. (2020).

School-based first aid education

In addition to the reviews described above, we also considered a systematic review of school-based first aid education that supported mixed methods of delivery including practical and presentational components (Reveruzzi et al., 2016). We also identified additional studies that demonstrated the effectiveness of teachers delivering first aid education (Bohn et al., 2012; Ellis et al., 2020).

Alternative learning methods

Other studies showed some low-quality evidence for alternative learning methods and their effect on retention rates. Evidence showed that incorporating hands-on components supported higher knowledge retention and increased children's confidence and willingness to help in an emergency (Lucas et al., 2016; Wingen et al., 2018). One study found that integrating songs improved children's retention of the CPR sequence (Fonseca Del Pozo et al., 2016). There is also evidence that children can retain broader skills, such as scene management and the associated age-appropriate behaviours (e.g., calling for help) (Frederick et al., 2000; Wilks et al., 2016). This is also the case in younger children, ages four to five (Bollig et al., 2011). Conversely, there is limited evidence that the use of video supports knowledge or skill retention (Nord et al., 2016).

Due to a lack of comparison between studies, there is no substantial evidence to suggest that a specific length of learning or amount of repetition influences retention.

Online learning for adults

Key action

Use online learning to develop learners' first aid knowledge.

Introduction

Online learning refers to self-directed or facilitator-led interactive learning tools accessed on digital devices, such as tablets, phones or computers. Approaches include digital education programmes, mobile apps, online games and multimedia. Online learning is suitable for a variety of audiences because of its accessibility and flexibility.

Guidelines

- Online learning is a beneficial tool and could be as effective as face-to-face learning for adult audiences.*
- Online learning may improve learners' knowledge of asthma treatment, burns treatment and CPR techniques, but may not lead to an improvement in skills.*
- Given the increased use of social media and smartphones, as well as technological expertise, online learning may be a cost-effective method to spread public information campaigns to a broad audience.*

Chain of survival behaviours

Online learning has been shown to increase knowledge (Burgess et al., 2015; Luckie et al., 2018). While there is no conclusive evidence whether this method improves the performance or retention of first aid skills, knowledge is critical in building confidence and a willingness to act. Therefore, this method can be used in the domains of prevent and prepare, early recognition and access help.

Online learning may contribute to improving learners' skills when combined with other facilitation methods, such as physical practise.

Education considerations

Context considerations

- Online learning is most effective when the appropriate technical resources are available. This factor may present a barrier in areas without these resources or when regulation exists for limiting access as learners may be unable to access the information. Consider how learners will access online learning, including the availability for offline access (e.g., through an app).
- Online learning can make learning more accessible to people who cannot attend a course and can be used to reach large numbers of learners.
- The cost of online learning and the equipment needed to complete it may create issues of discrimination and exclusion.
- The content communicated in online learning will need to be adapted to the local context, just like any other form of education.
- The evidence supporting the effectiveness of online learning may be used to support advocacy campaigns for extending first aid learning to more people.

Learner considerations

- Learners' age, as well as cultural and socioeconomic backgrounds, may influence their confidence and ability to complete online learning. Many learner groups, particularly younger generations, are more familiar and comfortable with online learning.
- Adequate safeguarding measures should always be implemented, especially for more vulnerable learners. Consider how you will maintain a safe online learning environment.
- Online learning may be used by a variety of learner audiences such as military service personnel, workplace staff, youth, parents and caregivers.

Facilitation tips and tools

- Use online learning to support other approaches (such as face-to-face facilitation) to improve learners' knowledge and skills. See Blended learning. Note that while there is evidence that online learning can improve learners' knowledge, there is not enough evidence to suggest it can be used as a standalone tool for developing skills.
- Encourage learners to return to the online content and use it as a reference tool. This effort may help them to retain knowledge for a longer period of time.
- Online learning can improve first aid knowledge through a variety of delivery methods such as mobile apps, Gamification, and multimedia (e.g., 3D videos, augmented or virtual reality).
- Online learning can have social benefits if learners can interact and collaborate.

Scientific foundation

A literature review identified seven relevant papers that looked into whether online learning impacts the learner or the person in need of care. The papers referenced learners who were parents, employees completing first aid education, and students.

Burgess et al. (2015) used a randomised control trial to evaluate Cool Runnings, an app designed to increase parents' knowledge of burn risks to children (specifically burns caused by hot drinks) and the correct first aid treatment. Through a single-blind randomised control trial, 121 participants used the app and demonstrated a statistically significant increase in burn knowledge compared to the control group with 123 participants ($p<.001$).

Conversely, Krogh et al. (2015) used a randomised non-inferiority study to assess the impact of a 17-minute Paediatric Basic Life Support online course, compared to a facilitator-led course. The intervention group had 67 participants, while the control group had 71. Online learning was non-inferior to the facilitator-led course (difference in pass rate −4%; 95% CI −9:0.5). Pass rates were 100 per cent among those who took the facilitator-led course and 96 per cent among those who completed the online learning.

A randomised control trial by Luckie et al. (2018) assessed the impact of a 60-minute online asthma management program. They compared asthma treatment knowledge and skills in 78 university students before and after completing the training. Asthma first aid knowledge scores improved significantly after the online asthma training. The median increased from 64 per cent pre-learning to 79 per cent post-learning, and the mean skills score increased from 55 per cent to 79 per cent pre- to post-learning. However, three weeks after the learning, participants were required to explain to evaluators how they would act in an asthma attack scenario and only 29 per cent of participants demonstrated a level of competency sufficient to save the life of a child experiencing a severe asthma attack. This evidence suggests that online sessions increased knowledge but did not translate into application in a scenario setting.

Mancini et al. (2009) conducted a randomised control trial to assess the difference between learning CPR with a facilitator compared to a self-directed learning kit (consisting of a DVD and manikin pack) using test scenarios, theory and practice. The results showed that online learning was non-inferior to the facilitator-led learning (difference −4; 95% CI−9:0.5). However, the self-directed intervention group scored lower when performing effective compressions and safely using a defibrillator, which could compromise the outcome for the ill or injured person.

The evidence is unclear what type of online learning is best suited to specific audiences or the critical elements to include to make an online learning programme effective. We recommend testing different online programmes with specific audiences to determine which is most suitable.

Online learning for children

Key action

Use online learning to increase children's first aid knowledge.

Introduction

Online learning refers to self-directed or facilitator-led interactive learning tools accessed on digital devices such as tablets, phones or computers. Approaches include digital education programmes, mobile apps, online games and multimedia. Online learning is suitable for a variety of audiences because of its accessibility and flexibility.

Guidelines

- Online learning may be most beneficial when paired with face-to-face learning.*
- Online learning could be as effective as face-to-face learning to develop first aid knowledge for conditions such as heart attack, stroke, lifestyle factors and using a defibrillator.*

Good practice points

- Online learning may be useful when the child has a preferred location in which they like to learn, or when there is limited time and resources.
- Safeguarding measures are crucial for online learning and adherence to national and organisational protocols for protecting children online should always be followed.

Chain of survival behaviours

Online learning can be used in the domains of prevent and prepare, early recognition, and access help. However, there is no conclusive evidence whether this method improves the performance or retention of first aid skills (Mancini et al., 2009). Regardless, knowledge is critical in building confidence and a willingness to act. Online learning may contribute to improving learners' skills when combined with other facilitation methods, such as physical practise.

Education considerations

Context considerations

- Online learning is most effective when the necessary technology is available. This factor may present a barrier in areas without these resources or when regulation exists for limiting access as learners may be unable to access the information. Consider how learners will access online learning, including the availability for offline access (e.g., through an app).
- The cost of online learning and the equipment to develop it may create issues of discrimination and exclusion.
- Learners in high-resource settings may have access to technology at home and school and will be familiar with navigating a website or app.
- The evidence of the effectiveness of online learning could be used to support advocacy campaigns for first aid learning for children.

Learner considerations

- Learners' cultural and socioeconomic backgrounds may influence their confidence and ability to complete online learning. Many learner groups, particularly younger generations, are more familiar and comfortable with online learning.
- Learners' attention spans will vary with age. Consider the level of engagement and length of online activities to ensure they meet learners' needs.
- If online learning is blended with face-to-face learning, it may be possible (and appropriate) to shorten the length of the in-person session and focus on practising skills. This will make lessons more affordable and appealing to learners. (See Blended learning.)
- Children that might not otherwise be able to attend a first aid course (because they are remote or have a disability, for example) might be able to engage with online learning.

Facilitation tips

- Use online learning to supplement other approaches (such as face-to-face facilitation and Peer learning) to improve learners' knowledge and skills. For example, show short learning videos shared on social media.
- Encourage learners to return to the online content and use it as a reference tool and share with peers. This may help them to retain more knowledge.

Facilitation tools

- It is important to determine how you will protect children as they engage in online learning. Consider how they will interact with the tool – and who can interact with them while using it. Research the data and child protection laws for your country, context and organisation (e.g., school) and follow the regulations and guidelines carefully.
- You can deliver online learning in a variety of ways such as mobile apps, online games, and multimedia (e.g., 3D videos or virtual reality). Children learn through play, so gamification is an important method to consider.

Scientific foundation

A review of six papers looked into whether online learning impacts the learner or person in need of care. The studies took place in schools and universities, and the online learning methods were generally interactive. Two topics emerged from the evidence:

The use of online learning methods to teach first aid, specifically CPR knowledge and skills

App-based learning was evaluated as an alternative to facilitators teaching basic life support to school children. The randomised controlled trial consisted of 165 participants (ages 16–18). The control group completed a facilitator-led course, while the intervention group used an application on a tablet. The two groups worked in separate classrooms for 40 minutes, and there was no significant difference in the level of knowledge or skills between them after the learning experience. However, a sub-analysis determined that the facilitator-led group had significantly better results for checking the airway, asking for a defibrillator and shocking the ill or injured person (Doucet et al., 2018).

Another study used a clustered randomised trial to look at the effect of a national online course that provides participants with knowledge before learning how to perform the actual skill of CPR. The study showed that completing an online course before CPR training did not influence practical CPR skills or a willingness to act. However, it did improve the participants' recognition of heart attack symptoms, stroke and their knowledge of lifestyle factors (Nord et al., 2017).

Lifesaver is an immersive, interactive game developed for basic life support training. The *Lifesaver* study ran in three United Kingdom schools and compared the impact of three learning methods for CPR skills and attitudes (*Lifesaver*-only, face-to-face facilitation and a combination of both). The first outcome examined was mean chest compression rate and depth; the second was flow fraction. The study also looked at CPR performance (using an identified course assessment tool to identify whether CPR was successful) and the results from an attitude survey. The study's overall results showed that the use of *Lifesaver*-only, compared to face-to-face facilitation only, led to comparable success for several of the key components of CPR. However, *Lifesaver* was most effective when paired with face-to-face facilitated learning (Yeung et al., 2017).

The use of online learning without a facilitator and fewer resources

- Online learning can be useful when resources or time do not permit formal face-to-face education (Yeung et al., 2017).
- Reder et al. (2005) compared the following three methods:
  - interactive computer training
  - interactive computer training with a facilitator-led practice session
  - traditional classroom instruction to teach CPR and how to use a defibrillator to high school students.

They found evidence that interactive computer-based learning, completed independently, was sufficient to teach CPR and defibrillator knowledge, as well as defibrillator skills, to the students. All forms of instruction were highly effective when teaching how to use a defibrillator. Conversely, the physical skills required to perform CPR were challenging to teach the students across all three methods.

Hawkes et al. (2015) tested the use of a *Mobile Phone Resuscitation Guide* (MPRG) on school children ages 15–16 using a randomised controlled trial. All subjects were taught baby CPR skills using the American Heart Association's Infant CPR Anytime kit. Two weeks later, the students were randomised into one of two cohorts, either using the guide or not, and their CPR skills were re-assessed. The group using the guide was better at accessing the emergency services, completing sufficient CPR cycles, and following the correct sequence for CPR. There was no difference between the cohorts regarding resuscitation skills.

Blended learning

Key action

Use blended learning to increase the flexibility of first aid learning.

Introduction

Blended learning is a formal educational method in which a person learns in part:

- through self-guided or independent learning where they have some control over time, place, path and pace; and
- by attending a supervised learning environment led by a facilitator.

The modules within a blended learning course are connected to provide a unified learning experience. The recommendations and considerations below apply to both adults and children unless specified otherwise.

> We adapted the definition above from one provided by the Christensen Institute via Khan Academy.

Good practice points

- Blended learning may increase learners' knowledge, as well as build their confidence and willingness to act.
- Self-directed components should be paired with a facilitated session that focuses on learning and practising first aid skills with the support of a trained facilitator (this could be face-to-face in a classroom or facilitated virtually in real-time through video communication).
- Including facilitator-led segments and encouraging peer interactions may provide an opportunity to influence learners' attitudes, such as confidence and willingness to act.
- The optimal "blend" of learning methods and the order most effective for different audiences is unknown. Regardless of the combination, blended learning may provide an opportunity to reinforce learning through repetition.
- The self-led learning segment may come before or after the facilitator-led segment but must be a separate session. (I.e., playing a video during the facilitator-led segment is not blended learning. Learners must watch the video before or after their time with the facilitator.)
- Safeguarding measures are crucial for online learning; adherence to national and organisational protocols for protecting children online should always be followed.

Chain of survival behaviours

Blended learning can be used to develop knowledge within each domain so long as a practical component, guided by a supportive facilitator, is included to facilitate first aid skills and build confidence within learners.

Education considerations

Context considerations

- Technological advances provide the opportunity to enhance and apply learning in virtual environments. Refer to Online learning for adults for an example of a successful application in a military context and Gamification for one within a water safety context.
- In areas where technology or internet access may be a barrier to learning, explore low or technology-free options to avoid exclusion. For example, you could provide written content for learners to study beforehand or to use as a reference tool after the facilitator-led session.

Learner considerations

- This approach can be used with a variety of audiences (e.g., youth or older adults, in the workplace, those travelling or living in remote areas or those training to be professional responders). The self- and facilitator-led methods must have a meaningful, integrated connection and form an enhanced learning experience. We advise programme designers to consider which elements need reinforcement based on the learners' needs.

Facilitation tips and tools

- Prepare facilitators on how to bridge the self-guided and supervised learning components together. Time with a facilitator should enhance learning, not repeat it.
- If the facilitator-led session occurs after the self-led learning, focus on applying knowledge in a way that will build learners' confidence. Facilitators can support learners by:
  - providing clarification on self-guided topics
  - completing an assessment of learning (what the person has learned so far) and for learning (any gaps in understanding that require additional support)
  - encouraging people to link the learning to their real-life context, transitioning from knowledge to application.
- If the self-guided learning component takes place first, facilitators may need to distribute learning materials in advance. Consider the type of tool and how much time learners need to explore it thoroughly to determine when distribution should occur.
- Encourage learners to revisit the self-guided learning components as this may increase their retention of the content.
- It is important to determine how you will protect children and other vulnerable learners as they engage in online learning. Consider how they will interact with the tool – and who can interact with them while using it. Research the data and child protection laws for your country, context and organisation (e.g., school) and follow the regulations and guidelines carefully.

Benefits and limitations

- Completing the self-guided component first may reduce costs by shortening the time needed with a facilitator in the physical learning environment.
- Alternatively, keeping the face-to-face session the same length provides facilitators with more time to develop learners' knowledge, skills and attitudes.
- There is a significant variation in cost to produce and implement different blended methods. In all combinations, facilitators will need to be prepared to support the learning approach.

Scientific foundation

We reviewed studies that looked into whether blended learning impacts the learner or person in need of care, compared to face-to-face learning only. We excluded studies that did not include a comparison between a blended and control method.

Very few studies compared blended learning (as the intervention) with a classroom-only session (as the control) with regards to learning first aid. The reason is likely because blended learning is a relatively new approach – especially if the self-led component is completed online as using this technology to learn first aid is also relatively new. We found ten studies from the literature searches, but after a full review, only one of these met the inclusion criteria. We included an additional study found during a hand search.

Video and face-to-face

Brannon et al. (2009) completed a study assessing the impact of watching a video before attending a face-to-face session. Parents of premature babies watched a video on baby CPR before attending a session with a facilitator. The study compared the intervention group to a control group of parents who did not receive any information before attending the classroom component. The intervention group watched the video within 48 hours of completing the CPR class. All parents completed a CPR test based on a set of standardised skills, usually within seven days after the course and before the baby's hospital discharge. The test rated the parents' skills in assessment, ventilation and chest compressions as either "good", "fair" or "fail". Participants had to receive a good or fair on all three segments to pass.

The study took place over six months and enrolled 28 participants. In the end, 23 completed the final test; ten in the blended learning group and 13 in the control group. The study did not find any significant variation in the data. All ten subjects in the video group passed the CPR skills test, whereas only nine from the control group passed. However, this difference was not significant (p=0.08). Eight of ten subjects in the video group received a good on all three sections (assessment, ventilation and compressions), versus three out of 13 from the control group. The authors noted this as a significant difference (p=0.012). In conclusion, the results from the standardised skills test suggest that watching a video before attending a face-to-face session is linked to improved skill performance.

Blended versus facilitated-only

Another study compared the difference in knowledge, confidence and willingness to act between learners who completed a facilitated session versus a blended one using the British Red Cross *Everyday learning approach* (e-learning followed by a face-to-face segment). The control group (facilitator-led only) contained 58 learners, while the intervention group had 70. The study measured the effectiveness of learning through evaluation forms completed before and after the learning experience for both cohorts. The blended cohort also completed a post-digital evaluation using the zero to ten Likert scales with questions about what action to take.

They found comparable results between the facilitator-only and blended learning groups with regards to improved first aid knowledge. However, statistical analysis showed that blended learning was superior to improve learners' willingness and confidence. The authors concluded that this specific blended approach (e-learning followed by a face-to-face segment) is a reasonable alternative to face-to-face only learning and that it offers greater flexibility to facilitators and learners (Oliver et al., 2020).

Blended learning for children

Studies on blended learning for children were found through our search for Online learning for children. Three relevant studies from that topic are also reflected here.

1. Reder et al. (2005) compared the following three methods:

> interactive computer training
> interactive computer training with a facilitator-led practice session
> traditional classroom instruction to teach CPR and how to use a defibrillator to high school students.

They found evidence that interactive computer-based learning, completed independently, was sufficient to teach CPR and defibrillator knowledge, as well as defibrillator skills, to the students. All forms of instruction were highly effective when teaching how to use a defibrillator. Conversely, the physical skills required to perform CPR were challenging to teach across all three methods.

2. Another study used a clustered randomised trial to look at the effect of a national online course that provided participants with knowledge before learning how to physically perform CPR. The study showed that completing an online course before CPR training did not influence practical CPR skills or a willingness to act. However, it did improve the participants' recognition of heart attack and stroke symptoms, as well as their knowledge of lifestyle factors (Nord et al., 2017).

3. *Lifesaver* is an immersive, interactive game developed for basic life support training. The *Lifesaver* study ran in three United Kingdom schools and compared the impact of three learning methods for CPR skills and attitudes (*Lifesaver*-only, face-to-face facilitation and a combination of both). The first outcome examined was mean chest compression rate and depth; the second was flow fraction. The study also looked at CPR performance (using an identified course assessment tool to determine whether CPR was successful) and the results from an attitude survey. The study's overall results showed that the use of Lifesaver-only, compared to face-to-face facilitation only, led to comparable success for several of the key components of CPR. However, *Lifesaver* was most effective when paired with face-to-face facilitated learning (Yeung et al., 2017).

Media learning

Key action

Use media to raise awareness, change attitudes and beliefs, and motivate people to learn or recall basic first aid knowledge and skills.

Introduction

We have defined media as using communication outlets (such as television, radio, newspapers, magazines, posters and the internet) to reach local, regional, national or global audiences and share first aid information. The media outlet should be appropriate for the audience, and the message should contain authentic, relevant content that is engaging, entertaining and educational.

Guidelines

- Media may be used to:
  - increase awareness of first aid or the motivation to learn it*
  - change attitudes and beliefs about first aid*
  - increase first aid knowledge.*
- Media may not be an effective method to improve skills or specific actions associated with providing first aid.*

The following recommendations are for first aid programme designers and the marketing and communications teams with which they work.

- Media may be used intensively over time to repeat multiple, refined messages aimed at a target audience.*
  - Messaging may be most effective when it is specific to a target audience and communicated through the appropriate outlet.
  - Collaboration between programme designers, or marketing teams, with a target audience may produce authentic and relevant educational content.

Good practice points

- Collaborating with community broadcasters and building relationships with journalists may provide opportunities to influence and optimise content and the timing of broadcasts, as well as encourage the inclusion of appropriate and timely first aid education.
- Media is competitive; content should be engaging, entertaining and educational.
- Media may be used to reach a broad audience for a relatively low cost.
- Radio may provide the opportunity to engage with audiences who are harder to reach.
- Narrowcasting may be an effective method to communicate very specific messages.
- In a water safety context, media may be considered as part of a multi-approach to inform people of the risks, safe behaviours and how to access help.
- Communities should engage in water safety programmes to generate a collective understanding of the dangers and preventative strategies for activities in, on or near water.
- Social media may be used to enhance the reach of media broadcasts and collect audience feedback.

Chain of survival behaviours

Media can be used to support the prevent and prepare domain of the Chain of survival behaviours by raising awareness and communicating the necessary response to different first aid emergencies.

Education considerations

Context considerations

- When prioritising where to spend your money and effort, it is important to understand the cost and reach of different media outlets in your country.
- Carefully consider how to best reach your target audience. Some countries are oversaturated with media; therefore, selecting the timing, the key message and getting creative with your delivery method is important.
- Combine media messaging with other approaches to shape policies and practices in your area.
- First aid emergencies are covered daily in news media but do not always inform audiences of the relevant preventative actions or first aid steps (Pribble et al., 2008). Share informative images and soundbites with journalists who need content for a story.

Learner considerations

- Consider the population's literacy level and select the appropriate media outlet that will best engage people. Consult the target audience on which media outlets they prefer to use.

Facilitation tips

- Have subject matter experts or spokespeople share specialised information with specific media channels (e.g., have a wilderness first aid expert provide tips to a publication or televised programme that focuses on the outdoors).
- Use testimonials from people who have seen or heard first aid media content and intend to change their behaviour because of it. This may encourage others to change too.
- Be creative when developing media content (e.g., use a song or fun facts to engage people).
- Include the target audience when developing key messages and media content to ensure it resonates with them and is culturally appropriate.
- Use stories that reflect your message and connect with your target audience.
- Measure educational outcomes by observing behavioural changes over time (e.g., the rate at which medical care was appropriately accessed or the number of people who provided first aid before accessing medical care).
- Avoid using media that you have not validated for accuracy as some YouTube videos and television commercials demonstrate first aid skills incorrectly or provide false information.

Benefits and limitations

- Media should not be used as a standalone educational strategy, but it can remind people how to respond in specific emergencies.
- Most media delivery methods require educational messages to be concise and may limit the amount of information that can be communicated.
- Media may be expensive to produce, especially at a high quality.
- It may be challenging to measure the media outlet's effectiveness as an educational tool.
- There is no way of knowing if the published or broadcasted content reached the intended audience.
- There is little evidence that media content can be used to develop first aid skills effectively.

Scientific foundation

Our review looked into whether media exposure, compared to other learning methods, has an impact on the learner or person in need of care. There were many variables in the evidence, including the degree of media saturation, type and quality of media, measured outcomes and intervention aims. These variables made it difficult to compare studies. Additionally, very few high-quality studies have been completed in this field and the available evidence varies significantly. This does not mean the available papers are poor quality, rather that more high-quality studies are needed to make a proper comparison.

We identified eight papers and included four in this review. The papers examined different media interventions and measured different outcomes.

1. The first paper covered the use of a 30-second public service broadcast and measured participants' knowledge, awareness and intent to perform CPR on a stranger. The randomised experimental study included 384 participants. The intervention group demonstrated significantly more knowledge and awareness of the campaign than the control group. However, there was no difference in the intent to perform CPR (Meischke et al., 1999).
2. The second paper looked at a very brief video broadcast on closed-circuit televisions, shown to people in a hospital waiting room. The participants were then assessed on their skills and ability to perform CPR. One hundred participants took part in a non-randomised prospective controlled before-and-after study. The intervention group (who watched the video) showed a statistically significant improvement in perfect compression-only CPR, as well as in chest compression rate and depth. However, this study had several limitations: the intervention group was passively exposed to the video and there was no means of testing behaviour changes in a real emergency after the study (Benoit et al., 2017).
3. The third paper discussed a non-randomised observational study that looked at the use of public service announcements on broadcast television. The study examined medical records to measure the actual rates of bystander CPR and found a significant increase in the intervention group. However, the study was weakened by the fact that the quality of CPR was not tested, and post-intervention data was not collected (Becker et al., 1999).
4. The final paper looked at a randomised controlled trial that took place over 18 months in 20 paired cities. The study used mixed media, including public service announcements and newspaper articles. It measured the outcomes of actual behaviour (from the time of symptom onset to arrival at the emergency department) and use of emergency medical services, as well as first aid knowledge, attitudes and beliefs. The results showed that there was no difference in statistical significance between the intervention and control groups in regard to actual behaviour. However, there was a significant increase in the appropriate use of emergency medical services in the intervention group.

   There was also evidence of increased public awareness and knowledge of the programme's messages, including the symptoms and appropriate first aid steps for a heart attack (Luepker et al., 2000).

We also identified additional literature specific to water safety education, an area that commonly uses a variety of media messaging formats. In their reviews of drowning prevention literature, Leavy, Crawford, and Leaversuch (2016) and Leavy, Crawford, and Portsmouth (2017) found that the learning outcomes from informational and educational campaigns varied. As such, they caution against relying on a campaign approach as a solitary strategy. They also noted the lack of insight on multi-approach strategies to water safety education as a gap in the available literature.

Additional information

- The effects of a media campaign may lessen once it is over (Eppler et al., 1994).
- Film and television often show incorrect first aid, which may contribute to common misconceptions. For example, television will typically show a person spontaneously start to breathe again after a very short period of CPR. This may lead viewers to falsely believe that they only need to perform CPR for a short time before the person starts to breathe again (Alismail et al., 2018; Colwill et al., 2018).

Gamification

Key action

Apply gamification techniques to first aid education to reach a broader range of learners, repeat learning over time or to reinforce learning from other sources (e.g., facilitator-led sessions).

Introduction

Gamification is the application of game elements (e.g., collecting achievements, earning points or team-play) to first aid education with the intent to increase learner engagement. An example of this is a mobile application that tests the ability to assess various scenes for hazards. Gamification in electronic and physical (non-electronic) forms can captivate learners' interest and provide the opportunity to re-engage with the content on a regular, independent basis. Given the increased popularity of mobile technology, electronic gamification offers the chance to reach a much broader audience, and as such, is the focus of this topic.

Good practice points

- Gamification may be used to deliver first aid content either independently or as part of a comprehensive educational strategy.
- Gamification should be purposeful and supported by an educational approach that identifies its benefits to the intended learning outcomes.
- Online games should be accessible offline.

Chain of survival behaviours

As an educational strategy, gamification can be applied to all domains of the Chain of survival behaviours. For example, a game that shows characters with different signs and symptoms could help learners with early recognition. A scenario app where one must care for multiple injured people at once could create a sense of the stress learners may feel in that situation. However, combining gamification elements with technology (mobile apps, computer games, etc.) may not be as useful to learn first aid steps. It is unclear how well individuals transfer what they learn through a digital medium to a real-world situation.

Education considerations

Context considerations

- Games can be used in learning across high and low resource settings. Consider how the setting of the education (face to face or online) could affect what games can be used.
- Games can be used across all resource settings. Consider how the delivery (face-to-face or online) will influence which games to use.
- Consider how gamification will best serve learners' needs and preferences. Some gamification elements may be inappropriate in certain contexts. For example, competition between individual learners may be irrelevant for some age groups, religious backgrounds or in cultures that strongly value unity. The use of gamification should respect the local context in which it is used.
- If learning from home or in an independent setting, gamification may be an engaging element to incorporate.
- In times of pandemic, educators may need to adapt or reconsider games in which learners need to share physical spaces or learning aids.

Learner considerations

- Consider the cognitive and physical abilities of learners when designing or choosing appropriate games.

Facilitation tips and tools

- Ensure the learning outcomes are clear and the gamification elements are directly applicable to the learning process (e.g., test and retest or learning to prioritise actions). If not, learners may become disinterested with the content.
- Evaluate the effectiveness of the gamification elements by measuring key learning outcomes such as first aid knowledge, skills and attitudes. Secondary outcomes may include the rate with which learners re-engage with the content or the number of individuals they encourage to complete first aid education.
- Use gamification to motivate learners to revisit the material over time (increasing retention) or engage in additional first aid learning (increasing breadth and depth of learning).
- Use games that build on familiar concepts, such as a common board or card game, for testing knowledge and skills in a refresher course. Learners can physically play the game, using the classroom as the game board, or play on paper or online.
- Use technology that allows you to implement gamification elements that are audience-specific and provide easy access to learning, such as online games that learners can download at home.
- Ensure educators who are using gamification within a broader educational programme understand how to use the technology and integrate the content into the rest of the learning experience.

Benefits and limitations

- Using gamification elements that depend on technology, such as a mobile app, may have high development costs.
- Mixed-reality features, such as computer-enabled manikins or equipment with special sensors, may not be accessible to those learning independently (e.g., at home).

Scientific foundation

We identified four reviews and one literature report of a mobile app for the topic of gamification.

Cross-reality elements

There is limited evidence in favour of using cross-reality elements for learning. A longitudinal prospective study was conducted in two high schools, comparing two mobile phone apps: a cross-reality partner game and an information-based application. The partner game resulted in a statistically significant increase in learners' ability to predict their own actions and in their confidence to act, compared to the information-based application. The study also showed that using animations as a feedback device can help learners achieve the intended learning outcomes (Semararo et al., 2017).

Points system

There is some evidence in favour of using a points system where learners earn points by completing activities on a mobile phone app. A randomised controlled trial showed that such a method resulted in a statistically significant increase in knowledge scores, compared to a version of the mobile app without the point system (Burgess et al., 2018).

Face-to-face facilitation and a mobile app

There is limited evidence in favour of combining in-person facilitation with a mobile phone app. A randomised controlled trial conducted in a school showed that when an app supported in-person facilitation, there was a statistically significant increase in CPR assessment and achievement scores compared to either method alone. However, the app method alone did not result in a statistically significant difference in compression rate and showed a statistically significant decrease in correct compression depth when compared to in-person facilitation (Yeung et al., 2017).

Using an app for knowledge development in a water safety context

A grey literature report on the development and trial of a water safety app for children (ages 13–14) demonstrated the app is an effective means for knowledge development when compared with facilitator-led learning. The app guides students through mini games that educate them on keeping themselves and others safe during the Emergency Action Plan. It also tests learners' knowledge in a range of environments and emergencies.

Three approaches (learning using the app, facilitator-led learning and no learning) were tested with the same educational content across the two intervention groups. All intervention participants were assessed one week after learning, while the control group was evaluated without receiving any practical training or use of the app. Results showed that those who used the app demonstrated a similarly high level of knowledge of the critical steps in the Emergency Action Plan and water safety as those who completed the practical session. The app users also demonstrated the highest level of knowledge of potential dangers and hazards, especially near water. Learners in the facilitated group were better able to perform CPR compared to the app group. The app group outscored the control group across all outcome measures (Life Saving Victoria, 2016).

Computer game versus DVD-based learning

Finally, a military-based randomised controlled trial showed no significant difference between a computer game (a 3D video, known as a "serious game") or DVD-based learning intervention. However, the authors concluded the game could be more engaging (Planchon et al., 2018).

Peer learning

Key action

Use peer learning to add extra value to education as learners support each other and provide different perspectives.

Introduction

Peer learning is a term that has many interpretations and includes a wide variety of learning approaches. It has no universally agreed definition, nor is there a standard method to its delivery. All at once, it is an approach, a communication channel, a method, a philosophy and a strategy (UNAIDS, 1999). A variety of descriptors include co-learning, cooperative learning, peer tutoring, peer-led instruction, peer-mediated instruction, peer evaluation, peer coaching and reciprocal learning.

For these Guidelines, peer learning fits into the following two categories:

1. Cooperative learning: Peers learn alongside one another (reciprocal learning).
2. Peer-led learning: Peers play a facilitator role (referred to as *peer facilitators*) and share their knowledge and experience with others.

A peer is defined as someone from a "like-group" who shares some (or all) of the following characteristics: gender, age, cultural background, religion, or socioeconomic circumstances. Peer learning is often used with youth or other specific audiences who may not recognise themselves (or their values and experiences) in a traditional facilitator. The familiarity of a peer can create new opportunities to share knowledge or change behaviour because the relationship is often based on trust and openness. It is especially beneficial to reach audiences who may be underserved by traditional forms of education (British Red Cross, 2015).

Good practice points

- Peer-led learning or cooperative learning may be used to develop first aid knowledge, skills and attitudes. The best practice is to select the approach most suited to the context and audience.
- Peer-led learning or cooperative learning may encourage individuals to share their first aid experiences which may benefit the learning of others. When a peer shares insight or experience, they bring valuable authenticity to support the learning (e.g., in conflict contexts or working with vulnerable people).
- Although peers bring value to the learning experience, they should not be considered a substitution for professional facilitators.
- Where peers are encouraged to provide some form of facilitation (peer-led learning), they should not be viewed as interchangeable with professional educators or trainers. The peer relationship should enrich the learning experience and benefit both the learner and facilitator.

Chain of survival behaviours

The value of this method is when a peer can offer something new to other learners. Their knowledge may be more readily accepted because they are seen as "the same", compared to a professional facilitator who may be viewed as an outsider or someone with different experiences. The knowledge and skills peers may provide include:

- strategies they used when preparing for an emergency (prevent and prepare)
- indicators that alerted them to an emergency (early recognition)
- improvised materials they used to provide care (first aid steps)
- useful resources in the community that provide assistance (access help)
- actions they did to support themselves or others during or after an event (self-recovery).

Education considerations

We have mainly examined how to use this method to develop knowledge and skills. Peer learning is less commonly examined as a method to impact learners' attitudes and values, such as the willingness to act. Still, this strategy does provide the opportunity to influence these aspects of learning.

Context considerations

- While cooperative learning typically requires few resources to develop (human and financial), developing people to become effective peer facilitators can take time and effort, and care should be taken to do this sensitively.
- A broad range of communities can use cooperative and peer-led learning because they are not dependent on internet access or the availability of digital devices.
- Peer learning is inclusive, scalable to any programme size, has a much shorter training time and provides freedom from the traditional classroom setting. As such, it may be useful to reach communities underserved by conventional training. It could also be an affordable format for Refresh and retraining sessions (Wik et al., 1995).
- Educators facilitating peer-led learning and cooperative learning need to bear cultural, gender and religious sensitivities in mind.

Learner considerations

- Peer learning seems to take place most often when working with youth (ages 10–25) in schools with large groups of learners who share common elements and have peers who can take on a facilitator role.
- Either cooperative or peer-led learning can be used with a variety of audiences where the influence of likeness is valued. Some examples include:
  - young children (pre-school and elementary ages)
  - ageing populations
  - those with a specific shared influence (new parents, grandparents/caregivers, homeless persons, those struggling with substance abuse, etc)
  - those living in similar conditions (rural, remote, conflict, etc).

Facilitation tips

- Remember that peer learning has different requirements than traditional, facilitator-led learning. Find the approach where the peer relationship provides a vehicle for learning (e.g., sharing experiences through storytelling).
- Engage peer facilitators in programme development to ensure that they connect with the content, approach and audience.
- Carefully consider who you select to be peer facilitators. Typically, we choose someone we know, which influences the facilitation process as well as how we provide and discuss feedback (Iserbyt et al., 2009).
- For cooperative learning, support peer-based relationships as this may encourage learners to share the knowledge, skills and attitudes gained during a session with other peer groups (e.g., family, friends or colleagues).
- Plan time for tactile learning (connecting and applying previous learning) as this seems to be equal, if not more valuable, than the method of instruction itself. For skills that combine knowledge with physical actions (e.g., CPR), ensure that there is time to apply and practice the learning.

Facilitation tools

- A cooperative learning approach is most successful when learners are well suited to work and construct meaning together. They likely have similar backgrounds and life experiences to draw from and can mutually help each other. With this type of peer learning, pairs will take directions from a facilitator then work together to execute them. This approach applies to all of the domains within the Chain of survival behaviours. For example, the facilitator provides instruction on how to perform a skill then peers coach each other on how to do it (first aid steps). Peers may also work together to brainstorm how to prepare for a variety of emergencies (prevent and prepare) or develop a case study together based on a shared experience (applicable to all domains).
- Feedback between peers has added value compared to a feedback device because it is more personalised. Peers can also provide continuous feedback in conversation, whereas a machine is much more standardised (Iserbyt et al., 2009).
- Some elements of peer learning could also happen in an online format, see Online learning for children.

Limitations

- Programme designers need to ensure that peer facilitators are supported to provide a successful learning experience. Support should extend beyond the initial orientation to motivate and ensure continuous consistency and connection.

Scientific foundation

The reviews for this topic looked at how peer learning impacts learners, and the person in need of care, compared to other educational methods or no education at all. When examined as a learning strategy, we sought to explore evidence to compare peer learning to other methods, rather than consider its potential as a more impactful method (Iserbyt et al., 2009).

Peer-led learning

In a study prepared by Beck et al. (2015), a group of middle school students was trained by their peers in Basic Life Support. The study investigated whether student-led learning was as effective as that led by a professional facilitator (defined as having higher medical education and more instructional experience). The peer facilitators prepared ahead of time before facilitating the session. Using a standardised checklist, two independent evaluators conducted a practical evaluation that determined the key indicators of success.

Results were comparable with 40.3 per cent of students successful in peer-led learning versus 41 per cent successful in professional-led learning. While the groups had similar results, there was concern over the selection of the peer educators, often characterised as strong students who were focused and capable. The authors were unsure how the profile of the selected peers impacted the learning outcomes as they did not consider how the peer facilitators, other students or the relationship between the two would influence the study.

Lester et al. (1997) considered the impact of peer tutoring on resuscitation training. Peer tutoring can be a valuable instructional method in first aid education. It can lead to increased engaged time (time spent actively contributing), provide a mechanism to correct errors at the time of practice and create better opportunities for support and encouragement. During the study, six teachers and 11 students trained as CPR instructors and then taught two groups of course participants. The first group trained by a teacher only included 106 participants, while 137 were trained by a teacher (for knowledge components) and a peer facilitator (for practical components).

Indicators of success for both courses included a ten-point multiple-choice test, a peer assessment of practical skills, an assessment by either the teacher or peer facilitator and an attitude assessment. There was no significant difference between the multiple-choice test and practical skill assessment for either method. However, boys in the second group (instructed by a teacher and peer) showed less willingness to resuscitate in an emergency than girls from either group ($P<0.01$). Those with previous knowledge of resuscitation techniques performed better during the skill assessment than students new to CPR ($P<0.025$).

The study flagged concern over the peer facilitators' ability to assess one another accurately. As unskilled assessors, they may have been more likely to mark an action as correct that would not have been passed by a more experienced person. As a solution, a member of the research team assessed a sample of students to ensure a fair assessment process.

Wik et al. (1994) considered a peer-training model for CPR instruction among Norwegian factory workers. The intervention group was in Norway, and the control group was in the United States. For the intervention, the project followed a group of employees who were trained in CPR (referred to as "tier 1") and then shared their knowledge with co-workers ("tier 2") and then family members and associates at home ("tier 3") using a trickle-down teaching approach. This approach was desirable to the trained group because it allowed for flexibility in terms of pace and method. It was also motivating to help one's family. The study included 1,303 trained individuals: 41 people in tier 1, 311 employees in tier 2 and 873 people at home in tier 3. The study invited people from all tiers back to the factory to demonstrate their skills on feedback manikins within three weeks of training. The primary interest was to assess the capabilities of the tier 3 learners who were taught by people not explicitly trained as facilitators. The performance from those in tier 3 did not vary significantly from those in the control group who were tested directly after attending a facilitator-led CPR session and did not receive any peer training. However, because the intervention group was in Norway and the control group in the United States, the study cautioned that the different locations might have influenced the results of the study.

Cooperative learning

Charlier et al. (2016) considered how training a large section of the population over time might impact the rate of bystander CPR and survival after cardiac arrest (occurring outside of a hospital). The study assumed that those trained are more likely to take action than those who are not. The participants were master candidates in the field of education.

The study used peer-assisted learning as a base and built a model where participants would work together to maximise their learning. Participants were assigned a small section of content and were taught by either an expert or a learning tool. Next, they got into partners and shared what they learned with one another, working together to master the whole content. This type of peer-led learning allowed students to draw from a high level of personal understanding that they used to coach one another. Both the intervention and the control group started with an instructor-led phase.

While the intervention group broke off into pairs to work together, the control group filled the excess time by practising bandaging. The key indicators of success were linked to a practical evaluation. The results showed that the peer-assisted learning approach was as effective as the instructor-led approach in meeting the European Resuscitation Council's 2010 guidelines for CPR quality.

Iserbyt et al. (2009) considered how peer evaluation within a reciprocal learning approach might increase CPR quality. For this study, students were split into two groups and then paired off. Students worked together in a defined doer-and-helper relationship, switching roles every five minutes after completing a set of standardised task cards. In the intervention group, the helper evaluated the doer's performance one minute before switching roles. Both groups took a retention test two weeks after training. While both groups showed relevant acquired learning, the addition of peer evaluation resulted in significantly more students from the intervention group performing all Basic Life Support items in the correct order, compared to the control group. No other significant differences were found following the intervention or two weeks later. This study has shown that students can learn without an instructor when using reciprocal learning and that a peer evaluation strengthens the learning. The doer learns by doing, the helper learns by observing, analysing and giving performance-related feedback. Through cooperation, the peers were able to co-construct knowledge through observation, feedback, reason and discussion of the task.

Knowledge gaps

Peer learning would benefit from further exploration with regards to how it can support first aid education. First aid programme designers are encouraged to consider research projects that could contribute to the current evidence base. This evidence would be used for future guideline revisions, specifically to consider peer learning's positive impact on learning outcomes.

Aspects that are unclear and would benefit from further investigation are included below:

- The impact of peer learning within interventions that result in certification compared to how it affects interventions with no certification.
- The impact of peer learning on audiences other than youth or students (e.g., groups affected by opioid poisoning or using reciprocal learning with older adults or within families).

Video learning

Key action

Provide learners with skill demonstration and skill application videos for learning to support facilitator-led activities.

Introduction

Video learning consists of individuals watching a video to learn about a specific topic. This method is an easy way to address diverse audiences and provide them with standardised information. There are two basic approaches to video learning:

- Individuals watch a video and learn from it.
- Individuals watch a video and apply what they learned using first aid equipment.

Guidelines

- If the learner has access to a personal manikin, videos can be an effective tool to learn and practise CPR.*
- Videos may encourage learners to respond to an emergency and start CPR or other first aid care.*
- Video learning may strengthen facilitator-led training but should not replace it*.

Good practice points

- Video learning could be effective in situations where there would otherwise be no training.
- Video learning can provide a view to realistic scenarios which situate the first aid skill within the context of an emergency.

Chain of survival behaviours

We found that video learning is best suited to developing knowledge within the first three domains of the Chain of survival behaviours (prevent and prepare, early recognition and first aid steps).

Educational considerations

Context considerations

- The opportunities to meet individuals' learning needs are changing due to continuous advances in technology. Educators increasingly use social media and online learning, and therefore, the role of videos has expanded as well. Consider which platforms your audience uses to consume content and what type of first aid education video will resonate with them.

Facilitation tips

- Use video learning to support face-to-face facilitation, but not to replace it. (Exceptions include Refresh and retrain sessions or if face-to-face learning is not an option.)
- Provide the opportunity for learners to practise what they see in the video.
- Prepare facilitators on how to connect self-led learning with supervised learning. The time spent with a facilitator must build upon the self-led learning, rather than just repeat it.

Scientific foundation

We included nine of the 14 papers reviewed and found evidence on the following four topics:

1. The combination of video and facilitator-led learning.
2. The difference in learning outcomes between video-only and facilitator-led learning.
3. The difference between video learning compared to no learning.
4. The effect of using video to learn CPR and how to use a defibrillator.

Our main findings are as follows:

- There is good evidence in favour of combining video instruction with facilitator-led learning for CPR and defibrillator training, compared to video-only learning (Bylow et al., 2019; Godfred et al., 2013; Heard, 2018; Nishiyama et al., 2009). This is particularly evident when the facilitator-led training includes opportunities for learners to practise the skill (De Vries et al., 2010).
- Studies that compared video-only to classroom learning showed mixed results (Beskind et al., 2016; Chung et al., 2010; De Vries et al., 2010; Kim et al., 2016).
- Video learning is effective compared to no learning (Capone, 2000; Eisenberg et al., 1995).

Video and facilitator-led learning

There is adequate evidence on combining video and facilitator-led learning.

Heard et al. (2019) used a prospective randomised controlled trial that compared a one-minute video, a four-minute online tutorial and a 30-minute facilitator-led session to learn compression-only CPR. The video group was the least effective, while the online group outperformed the classroom group on hand positioning but scored lower on compression depth.

Godfred et al. (2013) conducted a prospective randomised controlled trial with three groups:

- Untrained.
- Watching a 10-minute video on chest compression-only CPR (CCO).
- Watching a 22-minute video on chest compression and ventilation CPR (CCB).

The primary outcome was that participants showed a composite (combined) skill competence of 90 per cent during a five-minute demonstration. The three groups resulted in:

- Untrained before testing (control) – 3% competency.
- 10-minute video (CCO group) – 4.9% competency.
- 22-minute video (CCB group) – 10.1% competency.

The 10-minute CCO group had a greater proportion of correct compressions (p-value = 0.028) and compressions with correct hand placement (p-value = 0.0004) compared to the untrained group.

Bylow et al. (2019) used a cluster randomised controlled trial to compare the impact of self-led and facilitator-led learning using a standard training CPR video. The self-led group was provided with training instructions based on the video content. The facilitated group was able to ask questions and discuss the video content as part of their training. There was no statistically significant difference between the two groups' total scores after six months of training. However, the facilitator-led group had a statistically significant higher total score than the self-led learning group immediately after training.

We considered an additional paper with a water safety perspective that investigated the use of video as part of a summer camp's water safety classroom session for children. The study did not collect data specifically on the video learning element, but the children across all age and ethnic groups improved their knowledge and retention over three weeks (Lawson et al., 2016).

Difference between video-only and facilitator-led learning

Beskind et al. (2016) conducted a cluster randomised controlled trial where one intervention group received a short video on CPR, and another intervention group received a video combined with a 20-minute classroom session. These were compared to a control group that watched a sham video on college recruitment. Results showed that the two intervention groups called 9-1-1 more frequently and sooner; they started chest compressions earlier and had improved chest compression rates and hands-off time post-intervention, compared to their baselines and the control group. Chest compression depth improved significantly from the baseline in the classroom cohort, but not in the video learning cohort neither immediately after the intervention nor two months later. The authors concluded that brief CPR video training resulted in improved CPR quality and responsiveness in high school students. Compression depth only improved with a traditional classroom experience.

De Vries et al. (2010) ran a prospective randomised study with a non-inferiority design that compared facilitator-led defibrillator training to three alternative methods using DVDs consisting of: 2.5 minutes without practice, 4.5 minutes with practice and nine minutes with practice and scenario training. All DVD-based groups performed significantly higher on the retention test (two months after the training) than on the post-test (immediately after the training). Participants who received scenario training also scored significantly higher on the post-test compared to the other DVD-based groups. Still, the study showed that none of the DVD groups was adequate compared to the 90-minute facilitator-led training.

Chung et al. (2010) conducted a prospective randomised controlled trial comparing the effects of video-only and face-to-face facilitation on learning CPR. There was no significant difference between the two groups. Kim et al. (2016) used a randomised controlled trial to evaluate the effect of patient-centred CPR education delivered through a facilitator, followed by a revision session two weeks later (intervention group). The control group received booklets and a self-directed video with CPR information. Both the intervention and control groups contained 26 participants. Results showed the intervention group demonstrated significant improvements in knowledge ($F=91.09$, $p<.001$), confidence ($F=15.19$, $p<.001$) and performance of CPR skills ($F=8.10$, $p=.008$).

Difference between video learning and no learning

Eisenberg et al. (1995) conducted a prospective randomised controlled trial where half of a community was sent a 10-minute video on CPR (n=8659), and the other half was not (n=8659). For 15 months, all households were monitored for cardiac arrest and whether CPR was administered. In total, 65 cardiac arrests occurred; 31 in homes that had received the video and 34 where they had not. The rate of bystander CPR was 47 per cent in the intervention group and 53 per cent in the control group. In nine instances of cardiac arrest, an individual was present who had watched the video, and in six of these cases, bystander CPR was administered.

Capone et al. (2000) tested the effect of brief first aid skills videos on two groups of factory workers. The intervention group (n=116) watched the videos on television while the control group (n=86) did not. Skills were tested at one week, one month and 13 months. The control group performed 1–31 per cent correctly, and the intervention group performed 9–96 per cent correctly ($p<0.001$).

Using video to learn CPR and how to use a defibrillator

There is limited, mixed evidence on using video to learn CPR and how to use a defibrillator.

Nishiyama et al. (2009) used a randomised controlled trial to test a simplified compression-only CPR programme. One group received an introductory video beforehand, and the other did not. In a simulation test just before practical training began, 88 (92.6%) participants from the intervention group attempted chest compressions, while only 58 (64.4%) from the control group did ($p<0.001$). The total number of chest compressions was significantly higher in the intervention group, and the proportion of those who attempted to use a defibrillator was substantially higher as well. After an hour-long practice session, the number of total chest compressions markedly increased regardless of the type of CPR training received and the differences between the two groups became insignificant.

There is insufficient evidence to support using video as a standalone educational tool. There is also not enough evidence to suggest the optimal length or content of a video. Furthermore, we did not find evidence on using videos for first aid topics outside of CPR, which indicates a gap in the evidence base.

While cost might be a barrier to providing video learning, with new and accessible technology, it is now easier to create and share videos with a broad audience. More exploration needs to be done with regards to videos as a learning method for first aid education.

Feedback devices

Key action

Use automated feedback devices to teach first aid skills, such as CPR.

Introduction

Feedback devices are tools that provide feedback to the learner through auditory, visual, or physical cues. For example, there are devices that give feedback on the depth and rate of chest compressions. These devices are most useful when tailored to how a learner best receives feedback. For example, an auditory-only device (such as a metronome) may be suitable for a learner with a visual impairment, but less effective for one who is deaf or hard-of-hearing.

Good practice points

- Devices that provide immediate feedback may be used during CPR to improve the quality of performance.
- Feedback devices may be used to improve learners' skills by providing individualised feedback in real time.
- Feedback devices should be selected according to the outcomes that best serve the needs of the learners (e.g., selecting a device that provides visual feedback may be better suited for learners with hearing difficulties).
- Devices should be appropriate to how learners are able to receive information.

Chain of survival behaviours

To date, feedback devices have focused on the first aid steps domain in the Chain of survival behaviours. Some devices help learners give effective compressions during CPR and have been used in both training and clinical settings. These devices range in complexity from a simple metronome (a device that marks time at a selected rate with a simple "tick") to those that monitor performance and provide audio-visual feedback. Some devices can measure hand positioning, chest compression depth and rate and the ratio of compressions to ventilations. The feedback from these devices can optimise the time spent practising these skills and help learners provide CPR effectively. There are many other topics that could benefit from feedback devices, such as splinting or bleeding control.

Other opportunities to incorporate feedback devices in the Chain of survival behaviours include automated devices that help learners experience how to access emergency medical services (EMS).

Education considerations

Context considerations

- Feedback devices may add to training costs, making them less applicable for just-in-time learning or in areas with limited resources. Free first aid apps might be available as a substitute.
- Feedback devices may provide effective learning opportunities when a facilitator is absent. However, they may be less effective in contexts where learners respect or expect facilitator-led programming.

Learner considerations

- Consider the learner audience and their intended learning context (e.g., devices that may work for first aid providers may not fit the needs of professional responders).

Facilitation tips

- Provide a brief orientation of the topic and then introduce learners to the technology before starting to use the feedback device.
- Train facilitators to set up the device and link as necessary to automated external defibrillator, introduce it to learners, monitor and support the feedback provided, as well as resolve any technical difficulties.

Scientific foundation

There is some evidence in favour of using automated feedback devices. Randomised trials resulted in a statistically significant increase in CPR skills with a device, compared to no device (Wultzer et al., 2018) or learning with a facilitator (Sutton et al., 2007).

A review for this topic did not identify evidence showing significant improvement of chest compressions or ventilation rate. However, it did reference evidence that feedback can be useful where compression rates are too fast (Kleinman et al., 2015). Conversely, another study suggested that the use of CPR feedback or prompt devices in clinical practice does improve the quality of CPR and may improve the outcome of cardiac arrest (Lukas et al., 2012).

There is limited evidence to suggest that automated feedback devices increase or maintain learning (Wik et al., 2002). Two studies compared the use of feedback devices against a control group with no device. The results showed no difference between the two groups' skill retention one year after training (Griffin, 2014; Zhou, 2020).

Further evidence is required on the following: the effectiveness of feedback devices, different types of feedback (auditory, visual, or physical) and how feedback devices may be applied to first aid skills other than CPR (e.g., splinting or bleeding control).

Refresh and retrain

Key action

Provide opportunities for learners to maintain their knowledge and skills after completing an initial first aid education session.

Introduction

"Refresh" refers to strengthening or reminding learners of first aid knowledge and skills, while "retrain" addresses re-learning skills that they may have forgotten after the initial educational experience. Methods can include face-to-face, online (either for Adults or Children), Video learning, or a combination (see Blended learning). A refresh and retrain strategy supports all learners in maintaining their first aid knowledge and skills over time. Programme designers should use the evidence of knowledge and skill deterioration as a way to encourage individuals to regularly engage with first aid learning.

Guidelines

- Knowledge and skill abilities decline dramatically in the months following an initial first aid education session. Refresh and retrain strategies should be considered to maintain first aid learning outcomes.**
- All methods reviewed in the scientific foundation section (video learning, feedback devices, face-to-face learning, etc.) may be considered as appropriate refresh and retrain methods.*
- Refresh and retrain sessions may be delivered between three to six months after the initial educational experience. Waiting longer will lead to less effective learning.*
- While there is no recommended session length, refresh and retrain interventions of 45-minutes or less could be valuable.*

Good practice points

- Programme designers should work with different learner groups to establish the most appropriate and feasible refresh and retrain strategy and delivery method.
- First aid volunteers should also take refresh and retrain sessions to ensure their knowledge and skills are up to date.

Chain of survival behaviours

Refresh and retrain methods can be applied to all domains of the Chain of survival behaviours. For example, evidence showed that technical aspects, such as correct compression depth and rate, improve with practice and quickly worsen without it. Refresh and retrain methods also build confidence and a willingness to act, helping learners to achieve the desired outcomes within each of the domains successfully.

Educational considerations

Context considerations

- Consider your organisational and national requirements for refresh and retrain sessions, specifically concerning required qualifications and the process of issuing certifications.
- If using technology to deliver refresh and retrain sessions, access to the necessary equipment may be a barrier in some areas. Still, technology offers the opportunity to reach more people especially with off-line technology, and depending on the learners, may provide more accessibility to learn first aid.
- If facilitating face-to-face sessions, consider the distance that learners will have to travel and plan accordingly.

Learner considerations

- Each learner group will require a different approach to refresh and retain depending on how often they use first aid and their ability to remember and apply it. Programme designers should also take into consideration learners' level of responsibility. For example, a schoolteacher might need to refresh their knowledge of first aid for children more often than someone who works from a home office.
- Consider the cost to learners (time and money) as well as their preferences, availability, access to technology, and motivation when selecting a refresh and retrain strategy.

Facilitation tips

- Plan to provide refresh and retrain opportunities three to six months after the initial education session to improve retention. (However, evidence does suggest that a decline in knowledge is reversible after a year.)
- Identify easy and appealing ways for learners to access first aid information and help them to understand the importance of keeping their knowledge and skills up to date.
- Ask learners for the best way to contact them so they can receive reminders to update their first aid knowledge and skills.
- Consider using peer-to-peer contact through social media to share first aid updates.

Facilitation tools

- There is little evidence to suggest the most suitable method for implementing a refresh and retrain strategy. However, posters, pamphlets, flashcards, video lectures, feedback devices and videos or animations viewed on mobile phones may effectively improve knowledge and skill retention.
- Digital methods used to deliver refresh and retrain sessions can be scaled and made available to meet the needs of the learner. For example, sending periodic text messages or emails with first aid tips to refresh learners' knowledge.
- Face-to-face learning is a moderately effective method to support knowledge and skill retention.
- Suggest learners use free first aid apps to refresh and update their knowledge.
- Use common board or card games as a fun way to establish the knowledge or skills learners need to refresh (see Gamification).

Benefits and limitations

- Developing refresh and retrain interventions might be costly, regardless of the delivery method. Alternatively, they might also offer opportunities for cheaper, shorter sessions that ensure learners retain their skills over a longer period, benefiting them and their community.
- Learners may feel they do not need to take a refresh and retrain session. The more time between initial learning and the refresh and retrain intervention, the more challenging it may be to persuade individuals to develop their first aid knowledge and skills (Sato et al., 2019). Conversely, learners may prefer to receive regular opportunities if this means they do not have to attend longer courses as often.

Scientific foundation

We included eight in this evidence review. All shared the same conclusion that refreshing or retraining first aid education after the initial session can have a positive effect on knowledge and skill retention, compared to no additional learning opportunity. However, there is little consensus regarding the most effective delivery method nor how often refresh and retrain sessions should be conducted.

The evidence we reviewed assesses how the following methods impact first aid providers' knowledge and skill retention: videos and animations viewed on mobile phones, video lectures, computer-based feedback devices, as well as a combination of these methods.

Mobile phone videos

Two studies explored using videos sent to mobile phones as a refresh and retrain delivery method, as well as the impact the videos had on knowledge and skill retention. Choa et al. (2009) conducted a single-blinded randomised controlled trial where the intervention group watched a short CPR animation on their phones before completing a CPR test. The control group did not watch it. The intervention group had statistically significant improvements compared to the control group.

In a case-control study by Ahn et al. (2001), the intervention group viewed a video on their mobile phones three months after initially receiving first aid education. The intervention group's skills, confidence and willingness to act all improved compared to the control group who did not watch the video.

Video training

Hsieh et al. (2018) conducted a randomised controlled trial to assess the impact of a video lecture three, six, and 12 months after receiving initial first aid education. All participants in the intervention group (who watched the video) had improved knowledge and skill retention after 12 months, compared to those who did not watch the video. (See the section below on Frequency of refresh and retraining.)

Nishiyama, Iwami, Murakami, et al. (2015) used a simulated randomised controlled trial to assess the long-term effectiveness of a 15-minute basic refresh video on life support. Participants watched the video six months after completing a 45-minute CPR training session. The intervention group had improved knowledge and skills compared to the control group. The study concluded that a short video might be an effective method to refresh and retrain CPR learning outcomes.

Practical and computer-delivered feedback

Several studies explored the impact of using Feedback devices, such as computers or automated CPR manikins, as a refresh and retrain delivery method. Nishiyama, Shimamoto, Kiyohara, et al. (2017) used a randomised controlled trial to assess the effects of a one-minute refresher practice on a manikin, delivered three months after an initial 45-minute CPR training session. The intervention group showed statistically significant improvements in their total number of chest compressions, as well as how to perform compressions with correct recoil. However, a significant improvement could not be demonstrated between the two groups with regards to the depth of compressions or the time it took participants to start compressions.

Using a randomised controlled simulation study, Sato et al. (2019) assessed the difference between two groups' CPR skills one year after receiving a 45-minute CPR training. The experimental group completed a five-minute self-led retraining session using a high-fidelity feedback manikin after three or six months. Immediately after the initial training and one year later, all study participants were tested on their resuscitation skills using a scenario simulation. The study suggests that the self-led refresher could not be demonstrated in the long-term retention of chest compression skills. However, it does suggest that short, frequent self-led retraining sessions may help people with poor CPR skills to enhance their performance of chest compression depth.

A randomised controlled trial study by Wik et al. (2002) evaluated skill retention six months after initial CPR training using a voice advisory manikin that provides immediate feedback to the person performing CPR on the manikin. The study found that using the voice advisory manikin without a facilitator present does not remove the need for a facilitator, nor could it be demonstrated to improve participants' retention of knowledge and skills. However, the study does suggest that ten, three-minute refresher sessions could serve to enhance retention.

Face-to-face training

A randomised controlled trial by Avau et al. (2019) examined the extent refresher courses with different focuses might impact the retention of first aid knowledge and skills after two years. The first refresher course focused on CPR and bleeding knowledge and skills, while the second focused on road safety as well as CPR and fracture treatment. Results showed that attending a refresher course one year later led to better retention of non-resuscitation knowledge ($p=0.04$). However, there was no effect found on the retention of practical skills for bleeding management. Practical skills for fractures decreased in the group that received refresher training. For CPR, they found that those who took the refresher course had a statistically significant increase in skill retention over time (p=0.23). The study suggests that a refresh and retraining session conducted after one year might modestly improve the retention of non-resuscitation knowledge, as well as resuscitative practical skills.

Frequency of refresh and retraining

There is little conclusive comparative evidence to suggest when to deliver a refresh or retraining intervention after the initial learning.

Two studies offered refresh and retraining sessions at different intervals after an initial first aid education session. The studies assessed how the different timings impacted knowledge and skill retention. In the first study, Hsieh et al. (2018) delivered refresh and retrain sessions for three cohorts; one received retraining every three months, one every six months, and one at 12 months. When learners were tested before the refresh training, they found that in each interval group and control sub-group, the following percentages passed the skills test:

- 100% of the three-month cohort passed
- 78.95% of the six-month cohort passed
- 19% of the 12-month cohort passed (p<0.001).

Knowledge retention saw similar results. At one year after the initial training, in a knowledge test out of 20 marks, the three-month cohort scored a mean of 18, the six-month cohort scored 16 and the 12-month cohort scored 12 (p<0.001). All three groups had similar outcomes when using a defibrillator as well. The results suggested that every three months is the optimal interval to provide refresh and retrain sessions, or every six months for low-resource areas.

Conversely, Sato et al. (2019) found that after three and six months, refresh and retrain sessions had little effect on the retention of knowledge and skills. After one year, the difference could not be demonstrated between the three- or six-month group in regard to resuscitation skills. However, both interval intervention cohorts improved over the control. Both interval cohorts also improved in their performance of chest compressions compared to the control group. Ultimately, the study could not conclusively recommend which interval was more effective to provide refresh and retrain sessions. The results do, however, suggest that short, frequent self-led retraining sessions might be useful in improving chest compression skills for people with poor skills.

In summary

- Studies showed a significant decline in the retention of CPR skills within a short period after initial learning took place (three to six months).
- There was little comparative evidence to suggest that the length of refresh and retrain sessions had any impact on retention.
- From the literature, we observed that the best time to deliver refresh and retrain sessions was as early as three months and no later than one year from the initial learning.
- The use of self-learning technology (e.g., videos or voice animated manikins) as a supplemental tool to initial hands-on training showed an increase in learner retention when compared to no technology. However, there was no evidence to suggest the most effective form of technology to improve the retention rate of CPR skills.

Gaps

This topic requires further evidence on the best ways to refresh and retrain, as well as how often to retrain different population groups. The latter will likely depend on how often the group uses first aid.


NRCS

FIRST AID

The first aid topics included in the 2020 Guidelines span a wide variety of themes. Those included here were determined based on the availability of scientific evidence and expertise from the field, as well as needs identified by National Societies.

The first aid topics are organised by theme:

- General approach
- Unresponsiveness
- Breathing problems
- Trauma
- Medical conditions
- Environmental
- Mental distress

The topics discussed in this chapter are carefully assembled by experts in a variety of fields to support first aid programme developers to translate the evidence-based recommendations into actions.

First aid is driven by evidence but provided by people.

General approach

General approach

Key action

Provide help while maintaining your safety, as well as the safety of the ill or injured person and any bystanders.

Introduction

The actions of the first person on the scene of a first aid emergency are critical. While providing first aid is important, it is only one aspect of the Chain of survival behaviours. It is important to observe and practise other aspects within first aid education programmes too. While actions may be numbered neatly in steps to take, in reality, many may be done simultaneously. For example, if the first aid provider has a phone, they could call emergency medical services (EMS) using the speakerphone function while still providing care. Underpinning the Chain of survival behaviours is the safety of the first aid provider and their ability to make decisions to act effectively.

Good practice points

Assess the scene

- First aid providers should be taught about ambiguity in emergencies, and how deciding to act is the most important first step.
- First aid providers should assess the scene for dangers to themselves or others before providing help.
- In assessing a scene that contains areas of danger, first aiders should also observe which areas are safe (or have fewer dangers) to provide options for themselves and the ill or injured person.

Assess the person

- A standard approach to assessment could be taught to first aid providers. This may help them appropriately prioritise care for time-sensitive conditions and feel more confident in their approach.
- If possible, first aid providers should approach the ill or injured person from the direction they are facing so they can see them coming. This may reduce the risk of scaring the injured or ill person or causing them to move unnecessarily. It may also help keep them at ease.
- First aid providers should assess the ill or injured person by checking for a response, normal breathing and normal blood circulation. These conditions should be treated as a priority if abnormal.
- If the ill or injured person can talk or cry, it should be assumed their airway is open and their breathing is adequate.
- An ill or injured person should be left in the position of most comfort (usually the position that they are found) unless there is a need to move them to a different location or position for safety or wellbeing purposes.
- First aid providers may assess an ill or injured person further by asking them questions to determine their mental status or medical history or more closely examining part of their body (with consent).
- The first aid provider should communicate with the ill or injured person, explaining what they are doing to help, and acting with respect and empathy.

Provide care or access help

- The first aid provider should access emergency medical services (EMS) as soon as they think help is needed. If using a phone, care to the ill or injured person should be provided simultaneously by activating the phone's speaker function.
- A lack of first aid equipment should not be a barrier to providing care; first aid providers should use whatever resources are available to them.
- Filming an emergency incident is inappropriate, particularly if it blocks the path of professional responders. First aid education should raise awareness of this fact.

Multiple casualties

- The first aid provider should protect themselves at all times from danger, aim to preserve life and reduce injury and suffering.
- If there is more than one ill or injured person, it may be appropriate to call EMS first to inform them about a potentially critical situation, and then repeat the call once more detailed information has been gathered.
- In a multiple casualty incident, the first aid provider should assess the ill or injured before providing care and provide care first to those people with the most life-threatening conditions relating to breathing and circulation.

Chain of survival behaviours

Prevent and prepare

- Know the common risks in your environment, and the steps you can take to help minimise the risk of an incident occurring or worsening.
- Ensure you have access to a first aid kit or the specific equipment (a disaster kit, hi-visibility signs or clothing, etc) according to your assessed needs and risks.
- Be aware that diffusion of responsibility (e.g., thinking someone else will help) and ambiguity (e.g. wondering if the person really needs help) are common barriers to overcome in helping an ill or injured person.
- Learn the emergency services that can help in your context and how to access them. This may involve knowing their phone number, location or the types of questions they may ask.
- Understand the potential resistance an ill or injured person may have to certain procedures, such as the associated costs of services. Advocate for them accessing care when it is needed.
- Learn proactive means to de-escalate volatile situations (See De-escalation techniques).

Recognition

Upon entering a first aid situation, be aware of the thoughts and feelings you may have that may affect the help you provide. Be alert to the fact that people read situations differently, and just because no one is responding does not mean that nothing is wrong (the Bystander Effect).

Assess the scene

A scene assessment involves identifying any potential safety risks (to you, the ill or injured person or bystanders), such as fire or exposed electrical wires. The location itself may be unsafe. If the person is in or near a body of water or ice, in a conflict area, or a closed or confined space with minimal oxygen or poisonous gas, extra care must be taken. Additionally, if there is an active shooter, contamination by chemical, radiological or biological agent, or any other risk you can't mitigate, stay away and inform the relevant authorities (fire or police).

- If possible, seek the support of another person who can help you.
- Assess the scene for potential danger to yourself or the ill or injured person and try to identify the potential cause of the illness or injury.
- If necessary, observe areas of safety (or ones with fewer dangers) to provide a safe place for you and the ill or injured person.
- Take steps to make the scene safe. This could include accessing additional help or equipment or by changing your approach based on the danger. Do not approach the scene if it is not safe.
- Identify the number of ill or injured people.
- Remain aware of your surroundings and maintain your personal safety. This will be particularly important in Conflict, Disaster or multiple casualty contexts.

Assess the person

Remember to talk to the person as they may be able to indicate what is wrong. Always act with empathy and respect. Tell them what you are doing before you do it.

Identify any life-threatening emergencies requiring immediate action (e.g., the person is not breathing) and what kind of first aid can support their condition.

1. Is the person responsive?
2. Is the person's airway open and clear?
3. Is the person breathing normally?
4. Has the person got an injury that is bleeding severely?

This is often called the 'ABC check' or 'primary survey'. If there is any concern about cross-infection, do this assessment by observing the person's chest or abdomen for signs of breathing. See Pandemic.

If the person doesn't have any life-threatening conditions, you may be able to identify and provide support for any non-life-threatening conditions.

1. Is the person showing signs of an altered mental status (confusion, aggression, etc)?
2. Does the person have any signs of injury? You may need to examine them more closely.
3. Does the person have any history of an allergy or medical condition?
4. How does the person say they feel?
5. What other signs can you observe in them (temperature, movement, etc)?

First aid steps

1. Provide care for the conditions you find in the order of severity, focusing first on the person's breathing and circulation which are critical to survival.
2. Access help if necessary.
3. Continue to assess and observe the person. Be alert to any changes in their condition. Take note of any vital signs if necessary.
4. Provide care until professional medical care can take over or the person and their support network become self-sufficient. It may be helpful to signpost to onward care options if available.

Multiple casualty incident

- If there is more than one ill or injured person, call EMS first to inform them about a potentially critical situation, and then call them again when you have detailed information to give them.
- Quickly assess all the ill or injured before providing care and provide care first to those with the most life-threatening conditions relating to breathing and circulation.

Access help

- Identify what type of help is needed. It may be more than one type of help. For example, rescue service and medical care. Or it may be that you access the next available higher level of care to you.
- Access emergency medical care as soon as the need is suspected. This will get help to you quicker, and if you are phoning, the call-taker may be able to guide and support your first aid actions.
- Identify additional resources that could help you in accessing help or providing care, such as bystanders or transportation options.
- If lifesaving first aid is being provided, access care in the most efficient way possible. This may mean making a call using the speakerphone function, while others may need to arrange transport that allows care to be continued during transportation.
- In some cases, it might be better to access EMS quickly with incomplete information. For example, accessing EMS early for a full bus crash, even without knowing the exact number of injured will start the process of getting help. In other contexts, more detailed information may be needed. For example, a messenger sent in a remote setting should have detailed information so EMS can send adequate resources to help.
- If calling EMS, remain calm and answer their questions as clearly and accurately as you can. This will help them prioritise your call.

Education considerations

First aid education can increase the likelihood that a person will get the help they need in a first aid emergency. Education can increase a learner’s intention to help by supporting them to develop confidence and willingness to act. This confidence and willingness may be increased by including helping behaviour messages and activities which span the whole content of an educational intervention, including the general approach to providing care in an emergency.

Context considerations

- Assessing the scene for danger will vary considerably across contexts. Discuss with learners the types of incidents they are likely to encounter (road traffic collisions, accidents at work or in the home, conflict etc).
- The role of the first aid provider will also be affected by who else is likely to be on the scene at the time, and this might facilitate or inhibit intervention (Levine et al., 2020). For example, their response might be different if they are alone, if they are with a colleague who can help them, or if they can enlist the help of bystanders.
- The role of the first aid provider might also be affected by the behaviour of other people, and the relationship of the rescuer to those other people. In some contexts (usually ambiguous, non-violent ones), the Bystander Effect can occur where no one responds to an ill or injured person because no one else is doing anything to help (Van de Velde, 2009; Levine & Manning, 2013). In other contexts (usually unambiguous, violent ones) there may be a ‘reverse Bystander Effect’ with bystanders coming together to respond (Fischer et al., 2011, referenced by Levine et al., 2020).

- The type of help available will vary based on local factors. Programme designers should ensure their programmes reflect local circumstances. Be aware that help might not be available for all locations or contexts. Learners should be aware of what is available. For example, an urban area may have easy access using an emergency phone number. However, a remote area in the same country may not have access using the same phone number. This may be even more complicated if people travel between the two contexts.
- Be aware of myths and realities that may exist in local areas that may influence efficient access to care. For example, local taxis might provide faster transportation than ambulances, or this could be a perception which hinders efficient access to care (Jayaraman et al., 2009; Mould-Millman et al., 2015).
- If there are any barriers to accessing care in a particular context, programme designers should ensure that those barriers are addressed in learning activities (Watts et al., 2011). For example, an emergency phone number may offer language translation or text services, allowing those who do not communicate in the dominant language to still seek help.
- Raise awareness that some first aid situations may be solved by helping the person connect with their usual care providers.
- Prepare learners for the type of incidents they are most likely to encounter. For example, in areas where there are frequent traffic collisions, learning should reference these and identify the level and availability of emergency services and others who can help.
- In preparing people for events such as terror attacks, include individual safety measures and local regulations in the first aid education.

Learner considerations

- Encourage learners with sensory or physical disabilities to consider how they can complete the assessments of the scene and the person in a way that works with their strengths. Also, work with them to devise strategies that they can use to safely move a person without injuring themselves in the process.
- Work with learners to develop strategies to overcome fear when faced with an emergency. Use educational approaches which encourage confidence and willingness to act according to learner needs and preferences.
- Seek to understand learners' intentions to act and their motivations or barriers to doing so to make your educational approach effective (Miller & Pellegrino, 2018; Herd et al., 2020; see Motivation to learn topic).

Facilitation tips

Assess the scene

- First aid providers find it most difficult to decide to act. Learners should be taught about ambiguity and how deciding to act is the most important first step (Vaillancourt et al., 2008).
- Guide learners to reflect on their own experiences with helping in the past. The theme of ambiguity and the Bystander Effect may come up in stories shared by learners (or the facilitator). Bringing up these themes as lived experiences will help learners who have not experienced these feelings to relate to these concepts.
- Since there are a large number of potential safety hazards, focus on the principle of scene assessment: identify and manage dangers. Allow learners to identify potential dangers within their contexts, as well as solutions that they would consider. (See Scene assessment resource.)
- Focus on how learners can eliminate, control or work around potential dangers. Avoid focussing on what learners should not do when faced with danger as this may discourage any action instead of encouraging safe action.
- Supplement discussion of potential dangers with specific instruction for any risks where the probability of the risk is high or where there is misinformation present. Consider the work and guidance of other programs (both inside and outside of the Red Cross Red Crescent) to ensure synergy.

- Depending on the situation, the first aid provider may need to decide whether to move the ill or injured person. The first aid provider should only move the person if they are in danger, need to travel to medical care, or if the person is in a position that makes it difficult to assess and provide care. First aid providers will need to balance the risk that may be caused by moving the ill or injured person, versus the risk of not moving them.

Assess the person

- An organised framework to guide assessing the ill or injured person, (e.g., ABC) may help learners to be thorough, and prioritise the care that may be required. (See Assess the person resource.)
- Emphasise that the environment may evolve, both quickly and slowly. For example, tensions may suddenly escalate, or weather patterns may begin to shift over time. As well, some characteristics of the ill or injured person may not be immediately known, especially if they live with a disability. As a result, first aid providers should continue to remain attentive to their environment and the ill or injured person, changing their approach with the situation.
- Even though a first aid provider may not be able to access an ill or injured person in an unsafe environment, first aid providers should consider creative solutions. For example, the first aid provider may be able to verbally coach the ill or injured person in assessing and caring for themselves from a distance.

Access help

- All first aid education should include identifying the types of help and resources they can draw on, how to access them, as well as help learners to determine whether to first access help or provide care, depending on the situation. (See Access help resource.)
- Emphasise to learners in contexts with an active EMS phone system in place that they can access help as soon as they suspect they need it. This may help give them confidence in their actions.
- Help learners understand the community resources they can draw on for help. This could include neighbours or bystanders, or the environment (shelter, water, etc). Bystanders, for example, can be asked to control a crowd, to protect the dignity of the ill or injured by forming a barrier, to create shade over or block cold wind or rain with a tarp (sheet), go to the nearest phone to call for help, or to get equipment such as a defibrillator.

Multiple casualty incident

- Simulations are an educational tool that may be used to develop critical-thinking skills, awareness and preparedness for a multiple casualty incident among first aid providers and healthcare professionals.
- Highlight to learners that a multiple casualty incident is an event that results in multiple injured people, outnumbering and overwhelming emergency medical services. This situation includes road traffic collisions, terror attacks, multiple shootings and disasters.
- If possible, include professional responders, healthcare workers, Red Cross Red Crescent volunteers, civil organisations and other appropriate groups in the exercise. Doing so will help people to understand each other's function and role before an actual event.
- Run simulations on-site or using virtual reality.
- Empower learners by removing any barriers to action and have them practise using the equipment they might have close at hand (e.g., clothing to control bleeding).
- Explain the process of triage and prepare learners to manage onlookers.

Facilitation tools

- Use role-play to practise developing confidence in assessing the scene, moving people and asking others to help. Roleplay can also be useful to practise the process of calling for help, such as the type of questions they may be asked.
- A memory tool may be used to help learners remember the important things to do when assessing a person. ABC is a common tool used. (See Assess the person resource.)

- Encourage learners to program emergency access phone numbers into their phones, particularly if they don't have an easy-to-remember phone number, or if travelling to a new area with different phone numbers.
- Create or find spaces which are awkward and have learners to practise helping people in different positions. For example, set up a scenario where a person has collapsed in a small toilet cubicle or on the stairs.

Learning connections

- See the topics on Disaster context and Conflict context for situations where there could be many injured people.
- The movement of someone with a suspected spinal injury should be minimised. (See Spinal injury.)
- If a person is unresponsive, open their airway and check for breathing. (See Unresponsiveness.)
- It is often helpful to highlight to learners that the mechanism (cause) of injury may be a risk for their safety.
- Bleeding control is a key skill for a multiple casualty context.

Scientific foundation

Non-systematic review

Helping behaviour and the Bystander Effect

There is a large body of literature on helping behaviour and the Bystander Effect. We have selectively drawn evidence from literature sources which are specific to first aid interventions.

Systematic reviews on this topic are provided by Vaillaincourt et al. (2007) and Van de Velde (2009). Vaillaincourt considers bystander CPR rates and concludes that a lack of interest and motivation to learn CPR skills contributes to the reluctance to intervene and provide CPR in real situations. They also identify barriers such as the ambiguity of situations as being important in influencing the decision of a bystander to intervene. Van de Velde concludes that first aid programmes that train participants to overcome inhibitors of emergency helping behaviour could lead to better help and higher helping rates.

Training in first aid is also linked to increased confidence to help in an emergency, as documented by Heard et al. (2020) in a scoping review. The review considers public confidence in first aid skills and willingness to help during an emergency and barriers to or enablers of learning first aid and delivering first aid in an emergency. The findings identify high levels of perceived knowledge, confidence, and willingness to help, supporting the idea that the public can play a vital role during an emergency. However, the findings also point to low uptake levels, and barriers to learning first aid and helping, indicating that the first aid education landscape needs improvement.

Another review of literature is provided by Levine et al. (2020) which draws on previous literature about the Bystander Effect and argues that more recent evidence proves this phenomenon does not apply in violent or dangerous emergencies. They refer to meta-analyses as well as recent research of closed-circuit television (CCTV) footage which reveals that bystander intervention is, in fact, the norm. They also draw on studies of social identity (such as Levine and Manning, 2013) which support theories that individuals are most likely to help people they know (family members, friends and colleagues). Nonetheless, in violent and dangerous situations, the willingness of people to intervene could be due to the emergence of a 'group membership' that forms amongst strangers who are all present at the same event at the same time.

There is a lack of evidence to support any one particular approach to developing 'helping behaviour' through first aid education. Different situations, cultures and legislatures influence behaviour and attitudes to helping, and where there are studies, they are incomparable in terms of outcome measures and variables. We identify this gap whilst acknowledging a growing body of evidence on education which explores the development of the confidence and willingness of the learner to act such as Miller & Pellegrino, 2018.

Role of first aid providers

As the first people on the scene, first aid providers can play a vital role in caring for the injured before professional help arrives. Properly preparing providers is critical to ensuring their skills and efficacy (van Romburgh & Mars, 2019). Awareness of this role is critical in all first aid situations and supporting learners to act as well as to call for help is identified by Oliver et al. (2017a & b).

Confidence to act without proper equipment

Providers need to understand that a lack of equipment does not mean they are unable to help. Providing CPR or controlling bleeding with clothing (or the person's hand) are examples of life-saving actions without any equipment (Jacobs et al., 2016; van Romburgh & Mars, 2019).

Bystander filming

Management of the accident scene has traditionally focused on preventing further danger. However, cultural developments create new challenges for responders (Bazeli et al., 2017). One such challenge is that some bystanders now film the incident, not only humiliating the injured person but also actively blocking the path of professional responders. It is important to emphasise the danger of this action to learners.

Implications of bystander first aid

Jacobs et al., (2016) noted the need to acknowledge bystanders as those able to respond immediately to ill or injured people. Bystanders (first aid providers) should be included in a reorganised response structure and be empowered through the recognition of their role in responding to emergencies. Conversely, another paper warns of the potential damage bystanders can do, such as pulling people out of cars at road traffic incidents (Bazeli et al., 2017). Both studies identified that education is critical to increasing survival rates from multiple casualty events.

Turner et al., (2016) identified that haemorrhage is the leading preventable cause of death in trauma. They also stated that equipment to control bleeding, as well as public education on how to do so, should be made widely available. In a separate opinion paper about improvised first aid techniques for terror attacks, Loftus et al., (2018) suggested empowering providers to get creative and use everyday items to make first aid equipment that can save lives.

Importance of agency coordination

Bazeli et al. (2017) completed a qualitative study in Iran using semi-structured interviews to get insight from different participant groups on the management of multiple casualty traffic incidents. Reports stated there was poor coordination between agencies, duplicated efforts by different organisations and no centralised or integrated command system.

After a multiple casualty training and mock event trial in Sierra Leone, Leow et al. (2012) concluded that when high-resource logistics are applied to environments with limited resources, the result is insufficient systems for transport, tracking and adequate resourcing. Participants identified inter-agency coordination as the most valuable lesson learned.

Turner et al. (2016) conducted a systematic review that identified a need for inter-agency leadership and coordination to be developed in advance as poor communication was a consistent feature when responding to multiple casualty civilian shooting incidents.

Simulation training

Simulations are an opportunity to create a life-like environment where facilitators can teach providing first aid in a multiple casualty incident.

- Wilkerson et al. (2008) showed that immersive training through a virtual reality simulation is a powerful educational tool. The simulation helped first responders to identify how a chaotic, stressful environment challenges the knowledge and skills learned in the classroom.
- Cicero et al. (2018) had positive results when they tested a video game to explore whether it would improve triage accuracy within the game.
- Yanagawa et al. (2018) explored a simulation used as part of a multiple casualty life support course. The results showed the intervention group (who completed the simulation) performed first aid significantly better than the control group.

These three studies were conducted with healthcare professionals or trained rescuers and therefore, cannot be applied without adaptation to first aid providers. However, they do demonstrate the value of simulations for multiple casualty education, and we encourage further exploration of adapting this tool for general first aid providers.

Outside of healthcare and trained rescue professionals, a different paper concluded that regular and specific preparedness exercises are essential. These activities should take place at schools and other public areas and involve both the local public and private authorities (Turner et al., 2016).

Triage by first aid providers

The study by Leow et al. (2012) in Sierra Leone included Red Cross personnel who correctly triaged people in the simulation exercise.

Badiali et al. (2017) conducted a case-control study and assessed 400 basic life support participants in using a rapid assessment tool when responding to multiple casualty incidents. The participants consisted of non-medical ambulance crews, with 200 participants in both the intervention and control group. The intervention group completed a brief START training with the tool 30 minutes before the exercise while the control group did not. The intervention group correctly triaged 94.2 per cent of the cases; the control group did so in 59.83 per cent of cases. However, this study was theory-based rather than practical meaning that triage may look very different in a real-life situation.

Hand hygiene

Key action

Use soap and water to wash your hands.

Introduction

Good hand hygiene is an important measure to stop the spread of germs which may cause people to get sick. The Global Handwashing Partnership estimates that inadequate hand hygiene results in nearly 300,000 deaths each year, with most deaths being among children younger than five years old (Tharaldson and Moore, 2017). It is important first aid providers practise good hand hygiene to avoid spreading germs and to reduce the likelihood of themselves or others getting an infection. During a Pandemic, more frequent hand washing is recommended.

Guidelines

- Handwashing should be done with soap and water.**
- Hand hygiene can be achieved using an alcohol-based hand gel with at least 70% volume of ethanol or 60% of other alcohol for maximum efficacy.*
- Hand hygiene education and access to soap and water may improve hand hygiene compliance in healthcare workers and within the community, including schools.*

Good practice points

- First aid providers should wash their hands before and after providing first aid care to an ill or injured person.
- Hands should also be washed at the critical times listed below at minimum:
  - after using the toilet or changing a nappy
  - before, during and after food preparation
  - before eating
  - after blowing your nose, coughing or sneezing, or wiping a nose
  - after touching an animal, animal food or animal waste
  - when hands are visibly soiled.
- Access to clean running water and soap is necessary. Any kind of soap should suffice.
- Handwashing should be continuous for at least 20 seconds, with the user covering all parts of hands, fingers, nails initially with water, then the introduction of soap, rubbing the lather repeatedly across all areas of the hand.
- After handwashing, hands should be rinsed and dried with a clean towel.
- If a non-alcohol-based gel is used for hand hygiene, it should contain polymeric biocide and virucides.
- If any type of gel is used (alcohol, ethanol or non-alcohol), the amount used should cover the hands and fingers entirely and be rubbed in until dry, usually a minimum of 30 seconds.
- If gloves are being used after handwashing, hand lotion that does not compromise the integrity of the gloves can be used twice daily to minimise skin irritation.
- Fingernails should be kept short and trimmed.
- Hands should be washed more frequently during an epidemic or pandemic to help prevent transmission.
- Dispose of dressings, bandages, sharps, gloves and soiled clothing safely and correctly, while continuing to cover your hands (e.g. use gloves or banana leaves). Wash your hands immediately afterwards.
- When soap and water are not available to wash hands, ash might be used to clean hands.

Education considerations

Context considerations

- There are large parts of the world where soap, clean water, hand sanitiser or other hand hygiene options may be unavailable (Tharaldson and Moore, 2017). Discuss considering the use of ash or other rinse-free methods to clean one's hands (Paludan-Müller 2020; Munn, 2020).
- Community-based learning, hand hygiene strategies may be effective, particularly when combined with sanitation programmes (De Buck, 2017).
- During an epidemic or Pandemic, frequent hand washing is essential to curb the transmission of the virus. Discuss with learners how this can best be communicated and implemented in their context and what barriers and challenges need to be considered.

Learner considerations

- Parents, caregivers and community health workers are important learner audiences for this topic due to their contact and influence in the home and amongst family members.

To promote handwashing as a good health behaviour beyond first aid education:

- Consider developing motivational handwashing messages and activities to make handwashing appealing to young children (Watsonl, 2019). Test the messages with the target group for more likely behaviour change. Posters and stickers with messages can also be effective (Appiah-Brempong, 2018).
- Handwashing campaigns and promotions in schools can be effective. Consider using Peer learning to develop sustainability and culture change, and to promote self-efficacy amongst children (Appiah-Brempong, 2018).
- Children are the best behaviour change agents in every community. Develop school programming that teaches the children and allows them to bring messages and content to share at home.

Facilitation tips

- Encourage learners to wash their hands and use hand sanitiser at the beginning of a first aid course. This reflects good practice and can be a good way to start a discussion on the topic.
- If appropriate, encourage learners to wash hands every time there is a practical session - do it rather than just talk about it.
- Highlight the importance of hand hygiene as an effective way to prevent the spread of infection.
- Discuss what to include in a first aid kit with regards to hand hygiene. Kits should have an ethanol-based product of 70% ethanol, or an alcohol-based product of 60% (e.g., N-propanol, isopropanol), or more. If non-alcohol-based sanitisers are used because of the context, they must contain polymeric biocide and virucides.

Facilitation tools

- Get learners to develop visual cues such as posters to support good hygiene practices.
- Use songs or rhymes to help people experience how long 20 seconds is.
- Identify appropriate locations for posters and other media which promote hand hygiene, such as washrooms (Hamilton, 2019).
- Use videos to show how appropriate handwashing ensures that viruses can be washed away and keep us safe. Videos can be found online or made in the local language using smartphones.

Scientific foundation

Systematic reviews

We used five systematic reviews as the scientific foundation for this topic.

Hand hygiene interventions

Jefferson et al. (2020) completed a Cochrane systematic review showing moderate-certainty evidence from seven studies involving 44,129 participants for the probable benefit of hand hygiene to decrease the number of people catching acute respiratory infection. Low-certainty evidence was found for the more strictly defined outcomes of influenza-like illness (ten studies) and lab-confirmed influenza (eight studies), suggesting that hand hygiene makes little or no difference. When pooling all the 16 studies for the composite outcome of acute respiratory infection or influenza-like illness or lab-confirmed influenza, low-certainty evidence showed that hand hygiene may offer a benefit with an 11% relative reduction of respiratory illness. Few studies measured and reported harms; skin irritation in people using hand sanitiser was mentioned.

Alcohol-based solutions

A systematic review about the use of alcohol-based solutions in hospitals as an option for hand hygiene (Picheansathian, 2004) included 26 studies that looked at effectiveness in reducing microorganisms and 14 that looked at adverse events (skin problems). In summary, it was demonstrated that alcohol-based hand rubs remove bacteria, viruses, fungi and multiple drug resistance microorganisms more effectively than non-medicated soap or other antiseptic agents and water, from the hands of health care workers. At equal concentrations, N-propanol was shown to be the most effective alcohol (of those commonly used) and ethanol the least effective. Six of the 26 studies looked at various concentrations of alcohol-based solutions and isopropanol 90% was shown to be as effective in antimicrobial activity as N-propanol 60%, and ethanol-based solutions were most effective if they contained at least 70% ethanol. When it concerns skin irritation it was shown that alcohol-based solutions are less irritating on skin than soap and water or other antiseptic detergents, however frequent use of alcohol can dry the skin.

Hand cleaning with ash

The Cochrane systematic review by Paludan-Müller et al. (2020) addressed using ash for cleaning one's hands. The review was uncertain whether cleaning the hands with ash effectively reduces the spread of viral or bacterial infections or causes harm compared to using soap or other well-known materials. Studies show that using ash when soap and water are not available to wash hands has been effective in removing some types of bacteria.

Education interventions

The Cochrane systematic review of Gould et al. (2017) concluded there was limited evidence in favour of hand hygiene education to healthcare workers to produce a statistically significant decrease in respiratory outbreaks, MRSA infections requiring hospitalisation, MRSA acquisitions, primary bloodstream infections and MRSA colonisations. Additionally, a statistically significant decrease in the presence of MRSA, the number of MRSA infections, the period of healthcare-associated infections and MRSA colonisations could not be demonstrated.

Promotional approaches

The Campbell systematic review of De Buck et al. (2017) explored promotional approaches and their effectiveness in changing handwashing and sanitation behaviour (see Education reviews).

Non-systematic reviews

A cohort study showed that, for those who handle food, the best practices for fingernail sanitation include maintaining short fingernails and scrubbing them with soap and a nail brush when washing one's hands (Lin et al., 2003).

White et al. (2003) completed a non-randomised study in university dormitories. The study demonstrated that an increase in awareness of the importance of hand hygiene caused an increase in the frequency of handwashing and the use of alcohol gel hand sanitizer. This led to improved hand-hygiene practices overall.

Using literature data, Montiville et al. (2002) completed a risk assessment and observed that soap with an antimicrobial agent (specifically CHG) was more effective than regular soap. Hot air drying could increase the amount of bacterial contamination on hands, while paper towel drying caused a slight decrease in contamination. There was little difference in the efficacy of alcohol and alcohol-free sanitisers. Wearing a ring caused a slight decrease in the efficacy of handwashing.

Research at the University of Birmingham showed a correlation between the countries with high adherence to frequent and appropriate handwashing at critical times to a lower COVID-19 exposure (Pogrebna, 2020).

Education review

Insight for this review was drawn from The State of Handwashing in 2017 report by the Global Handwashing Partnership. This review highlights disparities in access to water and soap for handwashing in households in low and middle-income countries as a key vector for disease transmission. An analysis from 51 low and middle-income countries showed large variations in the proportion of households with soap available at the handwashing place (i.e., from <0.1% in Ethiopia to 91.5% in Iraq). Within almost every country, households with higher wealth were more likely to have soap available than households with lower wealth. Rural healthcare facilities are also reported to have low availability of water, soap, and hand-drying materials. People in urban areas had greater access to handwashing facilities than rural areas, where access was close to zero in many countries.

The report also draws heavily on an extensive Campbell Systematic Review (De Buck et al., 2017) which explores promotional approaches and their effectiveness in changing handwashing and sanitation behaviour. This review finds that community-based approaches to promote handwashing and sanitation efforts appeared to work better than social marketing approaches, sanitation & hygiene messaging, and elements of a psychosocial theory. Programmes that combine hygiene and sanitation measures tend to show a greater impact than either one alone. Studies using a community-based approach which include sanitation were shown to increase handwashing at key times, as well as the use of latrines and safe disposal of faeces, and reduction of open defecation.

Studies cited in the State of Handwashing 2017 review include a study by Appiah-Brempong et al. (2017) to design a hand hygiene intervention framework for schools. It considers that self-efficacy and enhancement of behavioural cues could bridge the intention-behaviour gap for handwashing in schools. They conclude that peer-led educational campaigns are a promising strategy for improving self-efficacy, while cues to action, including posters and stickers, can trigger proper hand hygiene practices.

Studies in the State of Handwashing review which identify barriers faced in some contexts include one by Odu et al. (2019) which reveals that among mothers, caregivers and school children in Nigeria, the availability of handwashing facilities with a reliable water source and soap influences handwashing practice. Even when caregivers have sufficient knowledge and positive attitudes regarding handwashing, these structural inadequacies can be barriers to proper hand hygiene.

Watson et al. (2019) considered children in an internally displaced person's camp in Iraqi Kurdistan concerning hand hygiene. Children in intervention households received transparent soaps with embedded toys, delivered within a short, fun, and interactive household session with minimal, non-health-based, messaging. The control group received plain soap delivered in a short standard, health-based, hygiene promotion session. After four weeks, children in the intervention group were more likely to wash their hands with soap after key handwashing occasions than expected in the counterfactual (if there had been no intervention) based on the comparison to children in the control group.

A Cochrane systematic review has been conduted (Munn et al., 2020) to assess the effectiveness of rinse-free hand washing for reducing absenteeism due to illness in preschool and school children compared to no handwashing, conventional handwashing with soap and water or other hand hygiene strategies. This review identified a small yet potentially beneficial effect of rinse-free hand washing regimes on illness-related absenteeism. However, the certainty of the evidence that contributed to this conclusion was low or very low.

Psychological first aid

Psychological first aid is a method of assisting people when they are in distress and helping them feel calm and supported in coping with their challenges. It addresses both the emotional and social needs of individuals, to empower people to use their own resources, enhance resilience, and make informed decisions. The basis of psychological first aid is about adopting a humane approach to care and support individuals in distress. It involves paying attention to their reactions, listening actively and with empathy, providing practical assistance, such as the help to access basic needs. Psychological first aid is a resiliency-based part of any intervention in a crisis and a component of programmes such as caring for survivors of sexual and gender-based violence or staff and peer support or staff and volunteer well-being programmes.

Why provide psychological first aid?

Everyone will experience stressful situations and events in their lives, such as having conflicts at work, getting stuck in traffic or running late for an important engagement. Most learn how to deal with such challenges; however, some experiences and situations are out of the ordinary, have been building up, repeated or are more difficult to deal with. Examples include the discovery of terminal illness, a car accident, losing a loved one or home, extreme violence, natural disasters and ongoing armed conflict. When an experience becomes overwhelming, it could result in a small- or large-scale psychological crisis, depending on the perception, scale and impacts of the event, the social support available and each person's ability to cope.

Being in a crisis may lead to a reduced state of action and decision capacity because of the restrictions and damages accompanied by the event itself, the emergency response structures, and the person's reactions. Psychological first aid aims to support the affected families or communities in regaining control over their lives and reducing their experience of distress. It is a method of addressing practical needs that often involves linking people with assistance from others.

Psychological first aid skills involve knowing:

- how to assess a situation
- the common patterns of reactions to crises
- how to safely approach people in distress
- how to remain calm and to manage overwhelming emotions when needed
- how to provide emotional support and practical help.

The use of these skills strives to provide comfort and care to people in distress and help them feel they have been seen, heard, and are supported.

Psychological first aid approach

Several different models of psychological first aid have been developed over the past years. They are all slightly different but follow the same principles by ensuring safety, promoting calmness, connectedness, hope, and a sense of efficacy. By integrating various aspects of the different approaches, the World Health Organization (WHO) developed the three action principles of 'Look, Listen and Link'.

Psychological first aid has been developed for the staff and volunteers of Red Cross and Red Crescent Societies working in situations where psychological first aid is relevant and applicable. It is an approach particularly well-suited for the International Federation of Red Cross and Red Crescent Societies, as it is based on the fundamental principle of humanity and the intention to help prevent and alleviate human suffering.

Psychological first aid is...

- comforting someone in distress and helping them feel safe and calm
- assessing needs and concerns
- protecting people from further harm
- providing emotional support
- helping to address immediate basic needs, such as food and water, a blanket or a temporary place to stay
- helping people access information, services and social supports.

Psychological first aid is not...

- something only professionals do
- professional counselling or therapy
- encouraging a detailed discussion of the event that has caused the distress
- asking someone to analyse what has happened to them
- pressing someone for details on what happened
- pressuring people to share their feelings and reactions to an event.

Who can provide psychological first aid?

Anyone with appropriate training including volunteers, first aid providers, and members of the general public can provide psychological first aid. It does not depend on the expertise of mental health specialists or professional psychologists. Learning and receiving training in psychological first aid enables anyone to know how to respond in supportive ways to people in distress.

When is psychological first aid used?

It is normal and common for people to experience distress in response to crises. Many people are able to adapt or function well in crises so not everyone needs psychological first aid. For those in acute distress and needs help, psychological first aid can help provide emotional support and practical assistance during or in the immediate aftermath of the stressful event. It can also be helpful in the days, weeks, months or even years after an event has taken place. Some people have stress reactions during or just after an event, while others have strong reactions much later. In some situations, the long-term impact of an event may be more emotionally distressing than the actual moment of the event or the stressful situation might last for a long time.

Where to provide psychological first aid?

Psychological first aid can be provided in any setting that is safe and comfortable for both the first aid provider and those in distress. It can be in a home, community centre, shopping centre, school, train station, airport, evacuation centre, hospital, clinic, under a tree, or even at the location of a crisis. It is best to be in a quiet and calm environment where everyone feels safe and secure. If someone has experienced something very sensitive, such as sexual violence, privacy is essential for confidentiality and dignity.

The three action principles: Look, Listen and Link

This section explains the three action principles ‘Look, Listen and Link’ of psychological first aid in more detail. It is important to understand that in reality, first aid providers may have to go through these actions in different ways and sequences. It is considered a cycle which can be initiated at any point and may involve repeating or cycling through “Look”, “Listen”, “Link” multiple times during the process.

LOOK for:

- information on what has happened and is happening
- who needs help?
- safety and security risks
- physical injuries
- immediate basic and practical needs
- emotional reactions.

LISTEN refers to how the helper:

- approaches someone
- introduces oneself
- pays attention and listens actively
- accepts others' feelings
- calms the person in distress
- asks about needs and concerns
- helps the person(s) in distress find solutions to their immediate needs and problems.

LINK is helping people:

- access information
- connect with loved ones and social support
- tackle practical problems
- access services and other help.

LOOK

Look involves looking for indicators of needs and risks in the situation and people such as signs of distress in individuals, environmental safety, and any factor that may cause stress or prevent someone from feeling safe.

- **Information on what has happened, and is happening**
  - Try to get as much information as possible on what has happened and what the current situation is by using a calm, considerate and non-intrusive manner. This will help assess safety and security risks and whether others need to be contacted immediately for additional help.
- **Who needs help?**
  - Prioritising who needs help first is not always easy. Psychological first aid skills involve learning how to assess who might need help and how to safely approach them. This involves being able to recognise reactions to stress and also carefully consider frequently marginalised groups.
- **Safety and security risks**
  - Many of the most distressing events we experience involve danger and violence. The first step in psychological first aid (in situations with or without danger or violence) involves checking for security risks and ensuring safety. Once the first aid provider is certain it is safe to continue, other actions follow, including assuring the affected person's confidentiality. This can also help enhance the person's feeling of personal safety. If safety at a crisis site cannot be guaranteed, then it is not appropriate to provide first aid.

- **Physical injuries or illness**
  - > Another important step is to check if the affected person is ill or injured and provide first aid for them if needed. Use these Guidelines for more information on this.
- **Immediate basic and practical needs**
  - > Immediate basic and practical needs are also priorities. Check if the person needs water, shelter, clothing or a blanket, and try to provide these as quickly as possible. It is difficult for someone to focus on solving problems or reaching out to others when feeling cold or thirsty. They may also need social support such as restoring family links, medical or legal assistance. In cases of children, connecting them with caregivers is a basic need that should be prioritised. Knowing how to help people access basic needs is an important psychological first aid skill, and even though it does not mean that one must have contact details for all the resources in the community, it is vital to know how and where to get this information when needed.
- **Emotional reactions**
  - > When someone is in distress, it is normal to feel and show a range of different emotional reactions. A key part of psychological first aid is recognising emotional reactions, accepting these without judgment, and responding in a caring, empathetic and understanding way. It is important to remain calm and be mindful of your own verbal and non-verbal communication to support the person in distress. If the person in distress has strong emotional reactions that endanger oneself or others or begin to interfere with daily functioning over a longer period of time, he or she should be referred for professional mental health support.

LISTEN

Listen refers to supporting others with active listening and empathy and understanding the concerns and needs of the affected people which can help link them to appropriate help and resources.

- **Approaches**
  - > Approach carefully, calmly, and in an appropriate manner. Both the behaviour and attitude will influence how people in distress react to an offer of help. If they meet someone who is calm and focused, this will help them to feel calm and safe. The first aid provider will introduce themselves by name, and if relevant by the name of the National Society or other organisation in a caring and non-threatening or interruptive manner.
- **Pay attention and listen actively**
  - > Look directly at the person; do not use a phone whilst talking to someone and focus on what the person says. Try to be at the same physical level as the other person. For example, if the person is sitting on the ground, kneel to be at the same eye level. Practise active listening using both verbal and non-verbal communication skills.
- **Accept and validate feelings**
  - > Never judge reactions or feelings, even if they are different from the way a first aid provider would react or expect someone to react. Remember, there is no right or wrong way to feel. Be friendly and compassionate even if a person’s behaviour appears challenging and remember that this behaviour is likely related to the distressing situation and may change during your interactions.
- **Calms the person in distress**
  - > When someone is shocked by an event or in crisis, they often have strong physical and psychological reactions. It is helpful to let people react in their own way and in their own time. If they start to cry or shout, do not calm them down by telling them to “stop” or “calm down”. It is more effective to just wait and stay there as a calm, empathetic and safe presence which can help the person withstand the strong emotions being experienced. Another strategy is to avoid approaching a person who is severely distressed with questions about the event, but to ask or talk about other things that are important to the person but that are not as distressing.

Techniques to calm a person in distress:

- ➢ use a calm soft tone of voice
- ➢ maintain eye contact (without staring) with the person while talking with them (if culturally appropriate)
- ➢ remind them of the intent to help, and that they are safe (if it is true)
- ➢ engage in activities or create a physical distance to distract a distressed person or to reinstate a sense of normality (e.g., go for a short walk, distance oneself from the sight of the event, prepare something to drink).

- **Ask about needs and concerns**
  - > The first aid provider will need to ask questions that can help the distressed person identify what support they need. If someone does not want help, do not impose it. The focus of the questions should be on the help needed and the priorities, and not on the details of what happened. Remember it is important to empower people to make their own decisions instead of making decisions for them, particularly at a time where they may feel very disempowered or that they are lacking control over a difficult situation.
- **Help find solutions to immediate needs and problems**
  - > Identify what support is required to address immediate needs and problems and affirm the person's ability to cope with the situation. Psychological first aid aims to enable people to remain or become active and make their own informed decisions. Help them to prioritise their needs. Find helpful and feasible solutions to the issues. The first aid provider may have to accompany the person in taking the first steps and continue to empower the people to act for themselves.
  - > Encouraging the use of helpful coping strategies and avoiding unhelpful ones is also essential. Examples of unhelpful coping strategies are using alcohol or drugs to try to forget the problems, denial or isolating oneself. Whilst these strategies may feel like they are helping the person cope at the moment, if continued over long periods, they are likely to impact the person negatively and cause more challenges. Having information on natural and normal reactions to a crisis event can also help normal and healthy coping to be activated.

LINK

Link is about connecting the person to the resources such as information, groups of people, services, and systems in the community that are appropriate and helpful for them to handle the situations and adapt well gradually. The role of the psychological first aid provider is as one source of support and to empower people to cope with the difficulties and be responsible for themselves.

- **Access information**
  - > Accurate information about the event, the rescue, as well as information about loved ones or others who are impacted, their safety, rights and how to access the services and things are essential for anyone in a crisis. Provide accurate and useful information relevant to the individual. This could range from practical information on what happened, where to access different resources, updates on the rescue progress, or what is possible and important to do at the moment, to psycho-education that helps normalise the reaction of distress and prepare the person for possible reactions that may follow in the coming days and weeks. Information helps people feel less helpless and to make informed decisions about things that can be decided by them in a given situation.

- **Connect to loved ones and social supports**
  - It is a priority to connect a distressed person with their family or friends, either in person or by phone to update them on what is happening and check if the loved ones are fine. The first aid provider should also know how to link people to restoring family link services in emergencies. Ask about who should be informed and called upon in the social network.
- **Tackle practical problems**
  - Examples of helpful practical support are:
    - contacting someone who can stay with the distressed person
    - arranging for the pick-up of children, or the provision of food, shelter, clothing, and reassurance to children
    - helping the person with transport to a safe place
    - helping the person to access a hospital or other support services.
- **Enable access to services or support**
  - Linking to others or services is a key psychological first aid aspect. Depending on the circumstances, the first aid provider may have to accompany the person to the services or wait with them until more help arrives.

Referrals

Referral means linking a person in distress with the needed and appropriate care provided by other people, agency, or facility, by either contacting the other service directly or giving contact details to the affected person. Referrals to other professionals or services are made when an assessment has been made that the person in distress needs help beyond what the psychological first aid provider can give. It is good practice to follow-up with the person afterwards to ensure that he or she has received the support needed.

Refer for specialised psychological help if someone:

- has not been able to sleep for the last week and appears confused and disoriented
- is so distressed that they are unable to function normally and care for themselves or their children
- loses control over their behaviour and behaves unpredictably or destructively
- threatens to harm themselves or others
- uses drugs or alcohol excessively.

Children

Children face various challenges growing up. They may have to live with their own or a family member's serious illness. They may lose loved ones or become separated from their family or may be harassed or exploited. Psychological first aid for children is based on the same principles as for adults. However, children may require more support than adults because they depend on others for protection and care. Children do not have the same experience or physical and emotional maturity as an adult and therefore may respond differently than an older person. Children's reactions are influenced by how they experience the distressing event first-hand. They are also influenced by how their caregivers and others around them react to the situation, and by changes in their daily life and interactions with others. Children react according to what they understand about the crisis event, which in turn is related to their stage of development, abilities, and previous experiences.

Here are some key differences between helping adults and children, or additional actions needed:
LOOK for:

- whether the child is alone or accompanied by others
- protection needs such as risks of exploitation or abuse.

LISTEN refers to how the first aid provider communicates:

- depending on children's age and emotional and social development e.g. use of simpler words for younger children
- about needs and concerns with age-appropriate questions.

LINK is to:

- assess the child's needs with the child and caregiver, whenever possible
- help the child access protection and services for basic needs
- give age-appropriate information
- help parents and caregivers support their children
- help children to distance themselves from the stressors or danger by providing space for play or referring them to a child-friendly space together with their caregivers.

Self-care

Helping responsibly includes first aid providers taking care of their own health and well-being. First aid providers can be affected by supporting others in crises or by their own distress. Providing can be difficult both physically and emotionally. It is not easy interacting with people who are in distress and this could lead to feelings of guilt, sadness, and frustration if providers feel they have not done enough. These may also result in accumulative stress and burnout. It is also important to acknowledge that different situations may affect or resonate with first aid providers who are too unique individuals, shaped by their own experiences. There is no shame in finding things difficult and it is so essential to practise proper self-care and talk in the first aid providers' own lives.

The psychological first aid principles of 'Look' and 'Listen' and 'Link' can be applied as the first aid providers learn to recognise their own risk factors to well-being, their own limitations, and what kinds of situations may be overwhelming. They can also discover what protective factors such as support systems and healthy stress coping strategies they have in place to link to. Building awareness of their own strengths and weaknesses as a first aid provider and knowing when to call for help from others can act as preventative measures.

It is imperative that all psychological first aid staff and volunteers are provided with supervision and continuous support while providing care and assistance for others during times of crisis to ensure they are not overwhelmed by the circumstances and can maintain their own psychological well-being. It is recommended that all psychological first aid staff and volunteers have a support system in place to talk to if they begin to feel overwhelmed or that their work helping others starts to affect them negatively. The team should take time to come together before, during, and after providing psychological first aid.

De-escalation techniques for violent behaviour

Key action

Create a safe environment and relationship for and between the ill or injured person and any bystanders.

Introduction

When dealing with emergencies, first aid providers may encounter people experiencing psychological trauma who require care or bystanders who become emotionally overwhelmed. The causes may precede, complicate, or be the result of the emergency. In these instances, the person may be irrational to the need for first aid for themselves or others. In extreme cases, the person is a danger to themselves or others. Verbal de-escalation is a practice to manage an emergency response safely for all involved (Giacomantonio et al., 2019).

Good practice points

- First aid providers should have the basic skills to:
  - identify individuals and situations that may become dangerous due to other people's behaviour
  - call for help or extra support when needed
  - decide to stop care due to potential or imminent danger.

- First aid providers could be trained to:
  - verbally approach a person to build a trusting relationship
  - verbally de-escalate situations with the goal of resolution or removing oneself from any danger.

Education considerations

Context considerations

- Consult experts and those with experience in reducing violence. This may include doctors, nurses or other trained professionals.
- Organisations that provide first aid care should complete a comprehensive assessment of situations where first aid providers might encounter violent or aggressive behaviour and provide training on de-escalation techniques. The emphasis should always be on prevention.
- Develop broad strategies that will equip learners with practical and straightforward techniques on how to avoid, de-escalate, contain and manage any violent behaviour in any given context.

Learner considerations

- Contextualise techniques based on local practices and the preferences and comfort of the learners. Consider specific beliefs, cultural factors and situations that may increase tensions (e.g., those involving non-state armed groups, law enforcement personnel or communities, tribes and ethnic groups).
- Violence can disrupt the process of getting ill or injured people the care they most need. Prepare first aid providers to navigate these situations within the scope of their roles.

Facilitation tips

- Help learners understand the community resources they can draw on for help and how to access each resource (see General approach). This could include neighbours or bystanders, or the environment (shelter, water, etc).

- Create contextualised scenarios and have learners play different roles (e.g., a person in danger of violence, an aggressive person, a first aid provider or protective bystander). Be aware that the scenario should focus on caring for others.
- Use real-time scenarios with an induced level of stress to develop competencies. The stressors can be increased in longer training and with more experience.
- Emphasise that if a person is a risk to themselves or others, professional services need to be accessed (emergency medical services, police, etc) immediately.
- Emphasise that assessment of potentially violent behaviour and underlying mental illnesses should be conducted by a trained healthcare professional.
- Highlight that it may be necessary to seek help to debrief after a violent incident if there are disturbances to everyday life following the incident.

Learning tools

- Help learners recognise the cues of an ill or injured person or bystander that may indicate they will behave violently. Examples of signs include:
  - body posture (clenched fists or jaw)
  - inappropriately entering another person's personal space
  - avoiding eye contact or giving inappropriate looks
  - eyes beginning to water
  - face becoming flushed or paler
  - pacing the floor, kicking objects or slamming doors.

- Techniques that can be used to de-escalate a potentially violent or aggressive person include (British Red Cross, n.d.):
  - stay calm and self-controlled; try not to become emotional
  - stand to the side (45°) of the aggressive person and keep a distance of an arm's length
  - adopt a non-aggressive posture (e.g., do not cross your arms)
  - talk in a quiet, calm voice
  - do not patronise the person or speak sarcastically or aggressively to them
  - ask open questions to get them talking about the reasons for their agitation
  - avoid talking about your intention to act
  - maintain contact with the person and keep them talking until they have time to calm down
  - assert that the person will not be allowed to harm themselves or others. If appropriate, provide positive reinforcement and suggest other methods to solve the problem
  - ask about the person's social support and resources.

- Richmond (2012) also offers these proactive means to de-escalate volatile situations:
  - respect personal space
  - do not be provocative
  - establish verbal contact
  - be concise
  - identify wants and feelings
  - listen closely to what the person is saying
  - agree to disagree
  - set limits
  - offer choices & optimism.

Learning connections

- Embed these techniques within the broader concepts of the General approach.
- Make connections to Psychological first aid and Mental distress topics.

Medication administration

Key action

If the ill or injured person has prescribed medication which will help their condition, the first aid provider can assist them to take it, if local regulations allow.

Introduction

Generally, a first aid provider is not authorised to prescribe or give medication. In some countries, these legal restrictions are evolving. Depending on the scope of practice, the target audience, medical oversight, as well as the extent and depth of the educational programme offered, medication administration may be appropriate and used in particular first aid situations.

Good practice points

- In situations where a person has prescribed medication (such as an inhaler or auto-injector), first aider providers may assist them to take it to improve their condition, if local regulations allow.
- First aid providers should learn about the common conditions they may encounter and the types of medication that may be used by an ill person.
- First aid providers should become familiar with the various methods of administration (e.g. how to use the auto-injector or inhaler).
- First aid providers should try to contact emergency medical services (EMS) before administering medication if possible.
- First aid providers should inform EMS of any medication the person has taken or been administered, especially if the person is unable to communicate this information themself.
- First aid providers should advise or assist the ill person to take their medication in accordance with the prescribed dose and administration route.

Education considerations

Context considerations

- All countries have different laws and regulations regarding the medication a first aid provider may administer with or without a doctor's prescription.
- The following list includes examples of when a first aid provider may administer or assist with medication, depending on the laws, regulations, medical protocols, as well as the responsibilities and capabilities of the individual first aid provider:
  - The emergency is well-defined, the need for medication is time-sensitive and the first aid provider has the proper training to:
    - recognise the situation
    - understand the dangers of the medication and when to avoid administering it
    - administer the medication as prescribed.
  - The person is experiencing a sudden, acute presentation of a known chronic condition (e.g., allergy or asthma) and has specific medication for the condition that has been prescribed by a doctor. If the medication is available and the person wants or needs it, the first aid provider may assist them.
  - The person is experiencing an acute presentation of a mild condition (headache, earache, mild allergies) and the person or the first aid provider has an appropriate over-the-counter medication available. If the person wants or needs the medication, the first aid provider may assist them.

Facilitation tips

- Medication administration is better taught alongside a discussion of the chronic conditions they may be used for (e.g., asthma). This will help learners create connections between specific medications and their relevant conditions.
- Encourage learners who are responsible for medication, to keep information about the medication with the medicine itself.
- Emphasise to learners that they should ensure that the ill or injured person, and their support network, know where the person's medication has been placed after an emergency incident.
- Highlight that if the emergency medication needs to be refilled or replaced after use, they may need to advise the ill or injured person to access their doctor.
- Encourage learners who are prescribed medication to share tips about how to remember to always carry and take their medication, or where to store it so they can always find it.

Facilitation tools

- Where possible, facilitators should help learners practise using medication administration using training tools (e.g., an epinephrine autoinjector training tool without live medication in it).

Learning connections

First aid providers may typically administer or assist with medication for the following conditions:

- Heart attack (aspirin, nitroglycerin)
- Asthma attack (inhaler)
- Allergic reaction (antihistamine)
- Anaphylactic reaction (epinephrine)
- Decompression sickness and hypoxia (oxygen)
- Opioid overdose (naloxone)
- Fever (antipyretic)
- Earache, Headache, Sore throat, period pain, Back pain (painkiller)
- Diabetic emergency (insulin, glucose).

Oxygen administration

Key action

Until emergency medical care is available, give supplementary oxygen in circumstances defined below, if specifically trained to do so.

Introduction

Giving oxygen to a person with a severe illness or injury is generally accepted practice, although there is no evidence for its overall effectiveness. Providing supplementary oxygen is not a routine first aid step, as many emergencies do not deprive the person of oxygen. Additionally, administering oxygen may cause the body (and therefore the blood) to take in too much oxygen and this may harm the person. However, under specific circumstances, oxygen administration may be beneficial but should be provided by a specifically trained first aid provider.

Guidelines

- A first aid provider should not give supplementary oxygen to an adult with a suspected stroke.*
- If the first aid provider is trained and oxygen is available, the provider may give oxygen to a person experiencing chest pain if they recognise the person as hypoxic.*

Good practice points

- The administration of supplementary oxygen should be limited to first aid providers with specific training in oxygen administration.
- Supplementary oxygen should only be administered to a person with normal, spontaneous breathing.
- Until emergency medical care is available, the administration of supplementary oxygen is reasonable for a person:
  - after exposure to carbon monoxide
  - experiencing decompression illness (e.g. a scuba diver)
  - experiencing breathing difficulties
  - experiencing hypoxia (SpO2 at 94% or less).
- When oxygen is given, it is ideal to taper oxygen supplementation to keep SpO2 at 94% (at sea level) if the first aid responder has been trained in transcutaneous pulse oximetry and has a proper tool for measurement.

Education considerations

Context considerations

- Local laws, regulations and processes, including liability protection, may dictate whether a first aid provider can give supplementary oxygen to an ill or injured person.
- Programme designers may need to adapt how they implement this topic according to the educational opportunities, such as the equipment available in their area.

Learner considerations

- Oxygen administration is not regarded as a routine first aid element but in some circumstances, it may be suitable for some learners to learn about it.
- Oxygen administration may not be feasible for some learners, depending on their line of work or activities in which they participate. For example, a remote rescue team may not be able to carry bulky equipment to provide supplementary oxygen and, therefore, may be less likely to use this topic.

Facilitation tips and tools

- Emphasise the importance of understanding the logistical aspects of the equipment, including how to maintain and store it, as well as how to care for the compressed gas cylinders. Learners should also be aware of and follow any local regulatory testing and inspections.
- Emphasise that it is critical that learners take extra precautions when using oxygen administration equipment as it can be a fire hazard. Learners must complete the necessary training on how to use the equipment if it is relevant to them.
- The SpO2 reading from a pulse oximetry reading often determines the use of oxygen. Therefore, learners may have to complete additional training on their use.
- Provide time for learners to practise using the different devices associated with administering oxygen such as nasal prongs, simple masks or partial rebreather masks.
- Develop scenarios that assess learners' ability to determine when to use oxygen administration, the potential benefits and how to do it safely, as well as how to store the equipment properly.

Scientific foundation

Systematic reviews

The International Liaison Committee on Resuscitation (ILCOR) conducted a systematic review about the use of supplementary oxygen for acute stroke (Singletary, 2020), and identified eight randomised controlled trials and one retrospective observational study.

For the outcome of survival at 1 week, 3 months, 6 months and 1 year, no benefit could be shown of giving supplementary oxygen (moderate-certainty evidence from three randomised controlled trials). Also, for neurological outcomes at 1 week, 3 months or 6 months, no benefit could be shown in six randomised controlled trials and an observational study (moderate- to very low-certainty evidence). However, one of these randomised controlled trials showed a higher chance of improvement for one of its outcomes ("improvement of NIH stroke scale score of more than 4 at 1 week") (moderate-certainty evidence), and a separate randomised controlled trial also showed benefit at seven months (low-certainty evidence).

For the outcome of quality of life, no benefit of supplementary oxygen was shown in two randomised controlled trials, and one randomised controlled trial even showed a lower quality of life (low-certainty evidence). One observational study also looked at complications and could not show an association between supplementary oxygen and pneumonia at hospital discharge, and pulmonary oedema nor the use of non-invasive positive-pressure ventilation. However, it showed a lower rate of hospital-acquired pneumonia, and a higher rate of tracheal intubation and of respiratory complications (very low-certainty evidence).

ILCOR (Singletary et al., 2015) found very low-certainty evidence for the critical outcomes of survival and therapeutic endpoints (a composite measure of death, need for assisted ventilation, and respiratory failure) from one observational study. It showed no benefit of using supplemental oxygen for acute exacerbation of chronic obstructive pulmonary disease. With regards to the outcome shortness of breath, very low-certainty evidence was identified from one randomised controlled trial in terminal cancer patients with dyspnoea and hypoxemia. It showed a benefit of supplementary oxygen administration. For the outcome of oxygen saturation, moderate-certainty evidence was identified from three randomised controlled trials showing benefit with supplementary oxygen. For shortness of breath, low-certainty evidence was identified from one meta-analysis and four randomised controlled trials showing no benefit for supplementary oxygen for advanced cancer patients with dyspnoea without hypoxemia. Very low-certainty evidence was identified from one observational study showing a benefit of using supplemental oxygen when providing first aid to patients with a decompression injury.

A Cochrane systematic review on oxygen use in people with a heart attack identified evidence from five randomised controlled trials that compared people who had a suspected or proven heart attack and were given inhaled oxygen to a similar group of people given air (evidence is current to June 2016) (Cabello et al., 2016). These trials involved a total of 1,173 participants, 32 of whom died. Death rates were similar in both groups (very low-certainty evidence). Regarding pain, there was no effect for oxygen on pain relief when pain was directly measured nor when trials measured opiate use as a surrogate for pain (low-certainty evidence). With regard to complications following a heart attack, there was no clear effect for oxygen on a range of complications in the oxygen group compared to the air group (low-certainty evidence). Together, there is no evidence to support the routine use of inhaled oxygen in people with a heart attack, and we cannot rule out a harmful effect.

A more recent systematic review and meta-analysis by Abuzaid et al. (2018) included a total of seven studies with 3,842 people who received oxygen therapy in post-acute myocardial infarction (heart attack) settings and 3,860 people who did not. High-certainty evidence was identified showing that, compared to no oxygen, oxygen therapy did not decrease the risk of all-cause mortality, recurrent ischemia or myocardial infarction, heart failure, and the occurrence of heart arrhythmias. These findings confirmed that there is no substantial benefit to routine oxygen therapy in people with acute myocardial infarction.

Another Cochrane systematic review by Barbateskovic et al. (2019) included ten randomised controlled trials with 1458 participants that received oxygen therapy in the hospital's intensive care unit (ICU). Seven of the trials (making a total of 1,285 participants) reported relevant outcomes for this review. A meta-analysis indicated two key results:

- concerning the risk of death at about three months after oxygen therapy in the ICU: it may be higher for high amounts of inspired oxygen compared to lower amounts of oxygenation (4 trials; 1135 participants; very low-certainty evidence).
- concerning the occurrence of serious adverse events at about three months after oxygen therapy in the ICU: it may be higher for higher amounts of inspired oxygen compared to lower amounts of oxygenation (6 trials; 1234 participants; very low-certainty evidence).

In addition, there was no evidence of a difference in lung injuries with the use of higher supplemental oxygen compared with lower supplemental oxygen (5 trials; 1167 participants; very low-certainty evidence). Overall, the review found no evidence for a beneficial effect of higher compared with lower supplemental oxygen levels for adults admitted to the ICU.

A recent Cochrane systematic review (Kopsaftis, 2020) identified one study for inclusion, with two awaiting classification, out of a total of 824 citations. This study involved 214 adults with acute exacerbations of chronic obstructive pulmonary disease, who received treatment by paramedics en route to the hospital. The study observed a reduction in pre- and in-hospital mortality when people received titrated oxygen via nasal prongs. This method achieved an arterial saturation of 88 to 92 per cent. There were only two deaths in the titrated oxygen group compared to 11 deaths in the high-flow (oxygen delivered via mask; 8-10 L/min) controlled group. Other than mortality, no other adverse events were reported in the included study. Still, because the review only included one study, in addition to the small number of deaths that occurred, confidence in the size of the difference between the two treatments is limited. Evidence is of low certainty.

Non-systematic review

An ILCOR scoping review by Bierens et al. (2020) found insufficient specific evidence to guide the prehospital use of oxygen therapy in drowning. Work in other domains of resuscitation science has identified adverse outcomes associated with both sustained hypoxia and hyperoxia. Pulse oximetry can be unreliable, particularly following cold water immersion, but where feasible it can support continuous titration of FIO2 following the restoration of spontaneous circulation. In the absence of specific research in drowning, the existing ILCOR Treatment Recommendation for Oxygenation after ROSC applies. A systematic review on oxygen and carbon dioxide targets in adult patients with return of spontaneous circulation after cardiac arrest recommends avoiding hypoxaemia and hyperoxia (Berg, 2020). The review's guidance is to use 100 per cent inspired oxygen until arterial oxygen saturation or the partial pressure of arterial oxygen can be measured.

Carbon monoxide

Public Health England and the Canadian Centre for Occupational Health and Safety recommend that oxygen should be administered to someone with carbon monoxide intoxication (PHE, 2019; CCOHS, 2017).

Unresponsiveness

Unresponsive and breathing normally

Key action

Maintain an open airway so the person can continue to breathe normally.

Introduction

An unresponsive and breathing person has normal, regular breathing, but does not respond to any sound or touch from another person. A person may become unresponsive due to an injury (e.g., hitting their head) or a medical condition (e.g., diabetic emergency) that may indicate a greater danger to their health. Even if the person is breathing regularly, they may still be at risk because their muscles could relax causing their tongue to fall back and block their airway. First aid providers should consider accessing medical care.

If the unresponsive person's breathing stops, becomes noisy or they sound like they are gasping for air or hardly breathing, they may be in cardiac arrest. See Unresponsive and abnormal breathing for baby and child or adolescent and adult.

Guidelines

- The AVPU scale may be used to determine the level of responsiveness: **A**lert – **V**erbal – **P**ain – **U**nresponsive describes what kind of stimulus a person reacts to and can be used to determine the level of responsiveness. A first aid provider using the AVPU scale should maintain an open airway for any person reacting to **P**ain (in addition to **U**nresponsive).*
- In a non-traumatic incident (no risk of spine injury), first aid providers should maintain an open airway for a person who is unresponsive and breathing normally by moving them onto their side and tilting their head back (recovery position).*

Good practice points

- If a person is found motionless (e.g., lying on the ground), their responsiveness and breathing should be checked immediately:
  - shout and shake or tap gently
  - open their airway
  - take up to ten seconds to check for normal breathing.
- In a non-traumatic incident (no risk of spinal injury), if the first aid provider cannot move the person into the recovery position, they can use the head-tilt-chin-lift or jaw thrust manoeuvres to maintain an open airway.
- The first aid provider should avoid moving a person with a suspected spinal injury:
  - If medical help will arrive soon, the head-tilt-chin-lift or jaw thrust manoeuvres can be used to maintain an open airway on a person with a suspected spine injury. The jaw thrust manoeuvre may result in less cervical spine movement than the head-tilt-chin-lift manoeuvre.
  - If medical help is some time away and if there is more than one first aid provider present, the person can be turned into a side-lying position while maintaining spinal alignment.
- A person who is pregnant and unresponsive may be placed in the recovery position on their left side. This prevents compression of blood vessels which feed the uterus.
- The cause of unresponsiveness (e.g., diabetic emergency, poisoning, head injury) should be identified if possible.

- First aid providers should regularly check the person's breathing while maintaining an open airway.
- First aid providers should always access emergency medical services (EMS) for an unresponsive person who is breathing normally, as this may indicate a serious condition.

Chain of survival behaviours

Prevent and prepare

- Follow instructions from your healthcare provider to manage any pre-existing health conditions.
- Wear and use appropriate safety equipment when working or participating in leisure and work activities.

Early recognition

Check for a response by gently shaking the person's shoulders or if they are a baby, tap their foot. Speaking loudly and clearly, ask a question such as, "Are you alright?".
If the person responds, continue with your assessment. (See General approach.)

If the person is unresponsive, they will not move or respond to any noise or touch.
If the person does not respond:

1. **Open their airway:** Gently tilt their head back (or into a neutral position for a baby) until their mouth falls open and lift their chin. (You may need to turn the person onto their back to do this.)

   The jaw thrust manoeuvre might result in less cervical spine movement than the head tilt, which may be useful to consider when you suspect a Spinal injury.

2. **Check for breathing:** Keeping their airway open, look, listen and feel for normal breathing for up to ten seconds. Look for chest or abdominal movement; listen for breathing sounds; feel for air on your cheek.

First aid steps

If the person is breathing normally:

1. Move them onto their side and tilt their head back (or into a neutral position if it is a baby) to maintain an open airway. This is called the recovery position. A baby can be held in this position in your arms.

2. Access emergency medical services (EMS).

3. Monitor the person for any changes in their breathing or level of response. If possible, try to establish why the person is unresponsive.

- If it is impractical to move the person onto their side, the head-tilt-chin-lift or jaw thrust manoeuvres (or neutral position if it is a baby) can be used to maintain an open airway.

CAUTION

- If you suspect a spine injury, maintain an open airway by using the head-tilt-chin-lift or jaw thrust manoeuvres only and access emergency medical services (EMS).
- If medical care is some time away and if there is more than one first aid provider present, you can turn the person into a side-lying position while maintaining spinal alignment.

NOTE

If the person is breathing abnormally (gasping, taking irregular breaths or not breathing), start CPR immediately. See Unresponsive and abnormal breathing (baby and child) or (adolescent and adult).

Access help

- When speaking to EMS, specify that the person is unresponsive and breathing normally. If you know what caused the person to become unresponsive, communicate this to EMS too.

Self-recovery

After a first episode of becoming unresponsive due to an existing health condition, the person should try to quickly recognise any warning signs of it occurring again. This may enable them to get into a comfortable position and call for help.

Education considerations

Context considerations

- The management of an unresponsive person who is breathing normally is dependent on the environment of the incident and availability of EMS. Management of a traumatic context must take account of the local recommendations, regulations and authorities.
- Programme designers should use the recovery position technique advised by the context's medical authorities.

Learner considerations

- When practising how to put an unresponsive person on their side, consider the learner group's needs and sensitivities regarding gender and culture (particularly to touching). Ask the learners how they would like to practise this manoeuvre.
- Talk to learners who have disabilities that prevent them from moving a person onto their side about how they might instruct another person to do this, or what other methods they might use to maintain an open airway.
- Consider teaching learners who might come in contact with spinal injuries about recognition of a Spinal injury and how to apply the head-tilt-chin-lift or jaw thrust manoeuvres. Ensure they understand that this manoeuvre results in the least amount of movement of the spine.

Facilitation tips

- Run relevant and realistic scenarios that allow learners to practise their general approach, recognition and first aid skills to care for an unresponsive person who is breathing.
- When facilitating learning about putting someone in the recovery position, focus on the desired outcome of the person (they are on their side and their airway is open) and keep the steps to achieving this as simple as possible.
- Discuss the mechanics of the tongue with regards to keeping an open airway. When a person is unresponsive, their muscles relax, which can cause the tongue to block the airway. Emphasise the importance of tilting the head back as that will pull the tongue forward and keep the airway open. Moving the person onto their side maintains an open airway as the tongue will fall forward and any blood or vomit can drain out.
- Identify that a person can suddenly become unresponsive (due to a stroke, electrocution, head injury, etc.) or gradually (by certain poisonings or a diabetic emergency).

- Identify that while an altered mental status is frequently a separate issue, the person may display signs before becoming unresponsive. First aid providers may be able to intervene before the person becomes unresponsive.

Facilitation tools

The AVPU responsiveness scale may be useful for some learners, particularly those who use their first aid skills often and have a regular refresh of knowledge. The AVPU check is carried out as follows:

- A= alert: means that the person is aware of their environment, opens their eyes spontaneously and can follow instructions.
- V= verbal: means that the person does not open their eyes spontaneously, and only responds to a verbal cue when it is said directly to them.
- P= pain: means that the person does not open their eyes spontaneously, nor respond to verbal cues and only reacts directly to painful stimuli (like squeezing the fingers or pinching the back of the hand). The person may cry, moan or move.
- U= unresponsive: means that the person does not react, either to verbal or painful stimuli.

Learning connections

- Explore some conditions which could cause unresponsiveness: Head injury, Stroke, Diabetic emergency and Seizure.
- Differentiate between someone feeling faint and someone unresponsive and breathing normally. Someone who faints should be unresponsive only for a very short amount of time.

Scientific foundation

Systematic reviews

Recovery position

The International Liaison Committee on Resuscitation (ILCOR) did a scoping review in 2020 about the recovery position for people with a decreased level of consciousness of non-traumatic cause, not requiring rescue breathing or chest compressions (Singletary 2020). The review includes 31 studies, a case report and two letters to the editor, including people with a decreased level of responsiveness due to medical conditions (e.g. stroke), overdose or sleep-disordered breathing, or including healthy participants, participants with medically induced unconsciousness, or cadaveric models of spine instability. In these studies, several recovery positions were studied. One study, where a decreased level of responsiveness was the result of an overdose, suggested that lying down in a semi-raised position may be preferable to a side-lying position, however, additional studies need to confirm this finding. For the other medical causes of decreased mental status (e.g. stroke), the side-lying position was reported as associated with beneficial outcomes. The studies on sleep-disordered breathing found that side-lying positioning improved apnoea, hypopnea, and oxygen desaturation. However, they may not be directly applicable to the use of the recovery position for people with a decreased level of responsiveness from a medical, toxicological, and non-traumatic cause.

A Centre for Evidence-Based Practice (CEBaP) evidence summary from 2019 identified three experimental studies, including one study with healthy volunteers and two studies with human cadavers, comparing the Haines position (with both legs bent at the knee), modified HAINES position (with one leg bent at the knee) or side-lying trauma position (which requires two rescuers and the use of a cervical collar) to the side-lying recovery position. It was shown that the HAINES position resulted in a statistically significant decrease of movement in the cervical region and a decrease of the spinal range of linear motion, compared to the side-lying recovery position. However, the HAINES position resulted in a statistically significant increase of movement in the thoracolumbar region, compared to the side-lying recovery position. It was shown that the modified HAINES position resulted in a statistically significant decrease of the spinal range of linear motion, compared to the side-lying recovery position. It was shown that the side-lying trauma position resulted in a statistically significant decrease of the spinal range of angular motion, compared to the side-lying recovery position. A statistically significant difference in a range of other motion outcomes could not be demonstrated for any of these alternative positions. No other outcomes were measured, and evidence with people with a spine injury is not available. Evidence is of very low certainty and results of these studies are imprecise due to the small number of participants, the large variability of results and lack of data.

A second CEBaP evidence summary from 2019 compared the recovery position to only doing the jaw thrust, but no studies could be identified.

Use of the AVPU scale

A CEBaP evidence summary from 2018 identified five diagnostic accuracy studies on the use of the AVPU scale, showing limited evidence in favour of using the AVPU scale as a tool to assess the level of consciousness.

In a first study, children with pre-hospital emergencies were classified according to AVPU and the Glasgow Coma Scale (GCS) by paediatric emergency physicians at the scene of the emergency. This study showed that AVPU category 'A' corresponds to a paediatric GCS score greater than 12 (clinical indication of non-critical neurologic condition). Moreover, categories 'P' and 'U' corresponded to a paediatric GCS score less than 8 (neurologic impairment with the need of more invasive treatment).

A second study with a large set of 20,000 participants over the age of five who were assessed by ambulance crews using the AVPU and GCS scales, and transported to the emergency department, also demonstrated that AVPU category 'A' corresponds to a GCS score greater than 12, and that categories 'P' and 'U' correspond to a GCS score less than 8. In addition, this study showed that categories 'A' and 'V' corresponded to a GCS score greater than 8.

Similarly, a third study in people over the age of 13 who were admitted to hospital due to deliberate or accidental drug overdose, and were assessed using the AVPU and GCS scales, demonstrated that categories 'P' and 'U' corresponded to a GCS score less than 8.

Finally, a fourth study in adults with acute drug poisoning confirmed that categories 'P' and 'U' corresponded to a GCS score less than 8.

However, the results of a fifth study, in which the AVPU scale is used during the initial assessment of consciousness at the emergency department in children presenting with a head injury classification, do not support the correlation between the AVPU categories and GCS scores found in studies mentioned above. In this study, classification in the AVPU categories 'VPU' was not clinically helpful to correctly detect the presence or the absence of head injury or depressed fractures in children older than one year of age. Similarly, the study showed that the' VPU' categories can be considered as not clinically helpful to detect the absence of head injury or depressed fractures in babies (less than one-year-old). In other words, this study does not favour AVPU scale use to assess the level of consciousness.

One possible explanation for these diverging results are potential differences in how the AVPU assessment is conducted across the different studies. The AVPU scale is a rapid and very simple method that does not require training, and is, therefore, suitable for use by first aid providers. This simplicity is accompanied by a lack of defined stimuli and responses, making the scale vulnerable to user interpretation. Some studies above report the use of a fixed algorithm on how to use the scale (including which stimuli the assessor should give), some do not. Hence, the AVPU assessment and therefore classification into one of the AVPU categories may have been variable. Evidence is of low certainty.

Feasibility

There is limited evidence neither in favour of AVPU scale use nor GCS scale use. When comparing the level of agreement between the final ratings of two emergency physicians, who independently scored the level of consciousness in adults with altered levels of consciousness from traumatic and non-traumatic causes using the GCS and subsequently the AVPU scale, no statistically significant differences could be demonstrated. In other words, use of the AVPU scale should be as feasible as use of the GCS scale. Evidence is of very low certainty and results of this study are imprecise due to limited sample size.

Non-systematic reviews

New lateral (side-lying) trauma position for cases of cervical spine injury

Hyldmo, Horodyski, Conrad et al. (2016) investigated the safety of the new side-lying trauma position in cervical spine injuries in a cadaver model study and found that in the standard recovery position, the range of motion for lateral bending was 11.9°. While both HAINES positions caused a similar range of motion, the new side-lying trauma position resulted in 2.6° less (P = 0.037). The range of motion of the head, neck and upper body in the standard recovery position was 13.0 mm. In comparison, the HAINES positions showed significantly less motion (5.8 and 4.6 mm, respectively), while the side-lying trauma position showed even less (4.0 mm, P = 0.067). The authors concluded that in unresponsive trauma people, the side-lying trauma position or one of the two HAINES techniques is preferable to the standard recovery position in cases of an unstable cervical spine injury.

In a cadaver study, the new side-lying trauma position and the well-established log-roll manoeuvre resulted in comparable amounts of motion in an unstable cervical spine injury model. (Hyldmo et al., 2020.)

Clinical practice guideline

In a guideline based on a systematic review, Rehn et al. (2016) could not identify any evidence suggesting that placing a person with a spine injury in a side-lying position (including the use of a log roll) causes harm. Although the guideline was intended for professional responders, it can also apply to first aid providers. The guideline recommends the recovery position for all unresponsive people, where there is no suspicion of trauma and where advanced airway management is not immediately available.

For unresponsive people with trauma, the recommendation is to turn them into a side-lying position while maintaining spinal alignment (strong recommendation, limited evidence). This move would require two first aid providers. When spinal precautions are necessary, providers should use the head-tilt/chin-lift or jaw thrust manoeuvre in addition to manual in-line stabilisation to reduce the risk of worsening any spinal injuries.

AVPU (alert, verbal, pain, unresponsive)

Romanelli and Farrell (2020) underlined that the AVPU scale is a quick and simple way of detecting altered mental status in a person. No formal training is necessary to use this score. First aid providers can use the tool in any pre-hospital setting as anything less than «A» is considered abnormal, indicating they should access medical care.

Unresponsive and abnormal breathing (adolescent and adult)

Key action

Immediately start chest compressions and access emergency medical services.

Introduction

If a person's heart is unable to pump enough blood around the body, then this person is in cardiac arrest. The person will quickly become unresponsive and display signs of abnormal breathing (e.g., taking irregular or noisy breaths, or stop breathing altogether). When a person's heart is not working and they are not breathing, their body experiences a lack of oxygen. Vital organs, such as the brain or the heart, can start to deteriorate after a few minutes. Sudden cardiac arrest is one of the leading causes of death worldwide (Berdowski et al., 2010). Early recognition of abnormal breathing and provision of CPR can keep the person alive until defibrillation takes place, either by a first aid provider or professional responder.

NOTE

The techniques of CPR need to be adapted depending on the size of the unresponsive person and the size of the first aid provider. Use the following guidelines on an unresponsive person who looks like an adolescent or adult, (you think they have been through puberty). If the person is an adolescent, consider giving rescue breaths. If the person looks like they are a child, follow the guidelines for Unresponsive and abnormal breathing (baby or child).

It is most important to do something. In the case of someone needing CPR, it is unlikely a first aid provider can make the situation worse for the person.

Guidelines

- If a person is unresponsive with abnormal or no breathing, it is reasonable to assume the person is in cardiac arrest.**
- Taking the pulse as the sole indicator of the presence or absence of cardiac arrest is unreliable.**
- When possible, a lone bystander with a mobile phone should call for help, activate the speaker or other hands-free option on the mobile phone, and immediately begin CPR with dispatcher assistance, if required.**
- If in doubt whether a person is experiencing cardiac arrest or not, the first aid provider should start CPR without concern of causing additional harm.**
- First aid providers who are trained, able and willing can give rescue breaths and chest compressions to all unresponsive adolescents and adults with abnormal breathing.*
- CPR may start with compressions rather than rescue breaths.*
- Chest compressions may be performed in the centre of the chest (i.e., the lower half of the sternum or breastbone) on adolescents and adults who are unresponsive with abnormal breathing.*
- Chest compressions should be performed fast, at a rate of 100 to 120 per minute.**
- Chest compressions should be done to a depth of approximately 5 cm (2 inches); a compression depth of more than 6 cm (2.4 inches) should be avoided.**
- Chest compression may be performed on a firm surface when possible.*
- First aid providers should avoid leaning on the chest between compressions to allow full chest wall recoil.**
- For those who are willing and able to provide rescue breaths, a ratio of 30 compressions and 2 rescue breaths (30:2) should be used on people who are unresponsive with abnormal breathing.**

- Interrupting chest compressions to deliver two rescue breaths should take less than ten seconds.**
- Where an automated external defibrillator is available, first aid providers should continue to perform CPR while the defibrillator is set up and pause only when it is ready for analysis and, if indicated, provides a shock.**
- In any setting, chest compressions can be resumed immediately after shock delivery for adolescents or adults who are unresponsive with abnormal breathing. Any pauses in chest compressions before and after the shock should be as short as possible.**

The following guidelines are specific to emergency medical dispatch centres and the professionals who work there.

- Emergency medical dispatch centres should implement a standardised algorithm or criteria to determine immediately if a person is unresponsive with abnormal breathing at the time of an emergency call.**
- Emergency medical dispatchers should be educated to identify unresponsiveness with abnormal breathing. This education should include recognition and significance of agonal breaths across a range of clinical presentations and descriptions.**
- Emergency medical dispatch centres should have systems in place where dispatchers can provide instructions to callers who will provide CPR. Dispatchers should provide chest-compression-only CPR instructions.**

Good practice points

- To achieve more effective chest compressions the dominant hand should be placed against the sternum with the non-dominant hand over the first.
- If the person is an adolescent, CPR with rescue breaths is preferred.
- Adults receiving CPR will require onward medical care. In contexts where this care is unavailable, first aid providers should prioritise the dignity of the person they are caring for.

Chain of survival behaviours

Prevent and prepare

- There are national and global organisations that research how to reduce the likelihood of cardiac arrest and set up national and regional cardiac arrest registers to define a strategy of intervention. Refer to your country's health authority for more information.
- Make healthy lifestyle choices to minimise certain risk factors such as high blood pressure, obesity, blood sugar level, hyperlipidaemia and renal dysfunction. Avoid activities such as smoking.
- Promote emergency phone numbers and other means to access help fast.

Early recognition

There are two main types of cardiac arrest that result in unresponsiveness and abnormal breathing. The first is when the heart stops suddenly (e.g., from a heart attack). This is the most common type in adults; it prevents the oxygen-rich blood from pumping around the body. The second type is when a person is unable to breathe oxygen into the body (e.g., due to drowning or strangulation). The person will have very little oxygen remaining in their blood.

In the first few minutes after cardiac arrest, a person may have agonal breathing (meaning they are barely breathing or gasping noisily). This type of breathing is not normal. If there is any doubt about whether breathing is normal, assume it is not. Similarly, for professional responders, if you are unsure if a pulse is present, assume it is not.

Check for a response by gently shaking the person's shoulders. Speaking loudly and clearly, ask a question such as, "Are you alright?".

If the person responds, see General approach.

If the person does not respond:

1. **Open their airway:** Gently tilt their head back until the mouth falls open and lift the person's chin. (You may need to turn the person onto their back to do this.)
2. **Check for breathing:** Keeping the airway open, look, listen and feel for normal breathing for up to ten seconds. Look for chest or abdominal movement; listen for breath sounds; feel for air on your cheek. Professional responders may also do a pulse check at this time.

NOTE

Identify that the person is an adolescent or an adult. If they are a child, follow the approach for Unresponsive and abnormal breathing (baby or child).

First aid steps

If the person's breathing is abnormal or they are not breathing:

1. Immediately ask bystanders to access emergency medical services (EMS), or if you are alone access EMS yourself. If using a phone, activate the speaker function.
2. Begin chest compressions without delay; push down on the centre of the person's chest at a fast and regular rate (100–120 compressions per minute).
3. Continue to give chest compressions unless otherwise instructed to pause (either by an automated defibrillator or professional responder). Pause compressions if the person shows signs of recovery, such as coughing, opening their eyes, speaking or moving purposefully and breathing normally.

Local adaptation

NOTE

- If one is available, ask a bystander to bring an automated external defibrillator as soon as possible. Follow the voice prompts, interrupting chest compressions as little as possible. (See Unresponsive and abnormal breathing when a defibrillator is available.)
- If able and willing, combine chest compressions and rescue breaths at a ratio of 30:2 (30 compressions and two breaths). Rescue breaths can benefit people who are unresponsive because they were unable to breathe. Conditions include drowning, Choking, strangulation, opioid overdose or babies and children. Rescue breaths may also be beneficial if there is likely to be a delay in defibrillation.
- If more than one first aid provider is present, alternate giving chest compressions every one to two minutes to prevent getting tired. Ensure that there is no interruption in compressions as the next person takes over.

- If transporting the person from a remote area to medical care, continuous CPR on a firm surface must be provided during transit.
- Where EMS or other forms of onward care is not available, protect the person's dignity.
- If a person has drowned or has hypothermia, there is a chance they may respond to CPR even if defibrillation is not possible.

Access help

- When speaking to EMS, very clearly explain that the unresponsive person is not breathing normally; this will prompt EMS to prioritise your case appropriately.
- Ask bystanders for help accessing EMS and providing CPR, as well as bringing and using an automated external defibrillator.
- An unresponsive person who is not breathing is unlikely to achieve spontaneous circulation from CPR alone. Their heart needs an electric shock from a defibrillator. It is vital that EMS arrive, and a defibrillator is used.
- The survival of the person depends upon immediate and effective CPR; when accessing help, keep any interruptions to chest compressions minimal.

Self-recovery

- Even if the first aid provider has performed CPR and defibrillation and the person is now responsive and breathing normally, you must continue close monitoring until EMS arrives as the person may stop breathing again.

Education considerations

Supporting learners to have the confidence and willingness to attempt CPR on a person who is unresponsive and breathing abnormally is a priority for first aid educators. Remember that the opportunity to provide CPR is generally very low - some learners might never have to perform it. However, if such a situation does arise, learners need to be prepared for feelings of doubt, uncertainty and lack of confidence. Therefore, CPR education should always take these feelings into account, and support the learner to overcome them.

Context considerations

- Refer to and follow the guidance of regional resuscitation councils or other national protocols and tailor education accordingly.
- Consult local regulators to consider differences in regulation and liability protection for first aid providers.
- Where EMS is available, learners should be encouraged to start compression-only CPR rather than hesitate as they consider the possibility of rescue breaths.
- In some countries, specifically those with a high rate of tuberculosis, rescue breaths may be discouraged. Teach first aid providers chest compression-only CPR (or bag-valve-mask resuscitation if they are professional responders). Also, see Pandemic.
- In contexts where there isn't any EMS or access to onward care, prepare learners for the likely death of the person who is unresponsive and has abnormal breathing. This should include telling them what to do according to local regulations and requirements for registering a death.

Learner considerations

- Prioritise training community members most likely to encounter cardiac arrest emergencies in CPR. Members include but are not limited to medics, police officers, firefighters and lifeguards. Also, consider that these groups, given their status and role in the community, might make effective educators for the general public (Tweed and Wilson, 1977). Despite advances in resuscitation science and standardised life-support methods, the overall survival rate of out-of-hospital cardiac arrests remains at less than 10% (Bobrow et al., 2010; Kazaure et al., 2013).
- Build on the motivation that people with family members who are at high risk of cardiac arrest due to illness might have to learn first aid (See Motivation to learn; Huang et al., 2016).
- Adapt educational tools (e.g. manikins and defibrillators), locations (e.g., waterfront scenarios for lifeguards) and methods to make them accessible and appropriate for learners' needs and abilities. (Papalexopoulou et al., 2014; Sopka et al., 2013).

- Consider that age and size of learners. The depth of compressions that can be achieved correlates with physical factors such as increasing weight and height. Children between 10 and 13 may be able to deliver effective chest compressions (Plant, 2013).
- Remind learners that they are most likely to witness the collapse of a person who they know (such as a member of their household), rather than a stranger because in general, we spend more time with people we know.
- Some studies noted that bystanders have concerns about disease exposure and transmission through standard CPR, which has caused a significant decrease in their willingness to provide it to both strangers and family members. Compression-only CPR is the preferred method (Cheng-Yu et al., 2016; Jelinek et al., 2001; Lam et al., 2007; Pei-Chuan Huang et al., 2019).
- Consider the gender makeup of a group of learners. There is limited evidence to demonstrate that female-only learner groups are beneficial to female learners, but there is evidence to support that males are more likely to learn in mixed groups (Sopka et al., 2013).

These considerations are specific to emergency medical dispatchers.

- Emergency medical dispatchers play a critical role by promptly recognising cardiac arrest, providing CPR instructions by phone and dispatching EMS with a defibrillator. Consider as part of the education for this role:
  - The use of scripted protocols as a helpful way to confirm when a person is in cardiac arrest.
  - Additional training around the recognition of agonal breathing.
  - How to provide CPR instructions for an adult.
  - How to provide instructions for both rescue breaths and compressions if the person is a baby or child.
- Dispatchers who communicate using video-assisted emergency calls may need more training for this tool to be effective and widespread within CPR education (Bolle et al., 2009). Bang et al. (2000) suggest that dispatchers with further training (e.g. technical and emotional) are more effective.

Facilitation tips

- Emphasise that survival relies upon:
  - immediate recognition that someone is unresponsive and breathing abnormally
  - early access to help and EMS
  - early high-quality CPR (compression-only or standard CPR)
  - early defibrillation with an automated external defibrillator.
- Emphasise the importance of the first aid provider, other bystanders and EMS working together to provide quick and effective care.
- Help learners understand the desired outcomes of CPR – to pump blood around the body (chest compressions) and get oxygen into the lungs (rescue breaths). This keeps the vital organs like the brain alive until defibrillation can take place.
- Define proper compression rate and depth and highlight that the unresponsive person will have the best chance of recovery if chest compressions are of good quality.
- Emphasise that the person should be lying flat on a firm surface if possible.
- Emphasise that starting CPR early has a significant impact on the likelihood of achieving the return of spontaneous circulation for some people experiencing cardiac arrest. However, overall, the likelihood of return of spontaneous circulation remains low.
- Ensure learners understand the fundamental components of standard CPR before being taught compression-only CPR (Lam et al., 2007).

Facilitation tools

- If instructing learners on how to perform chest compressions and rescue breaths, refer to the resource Facilitating CPR skills (adolescent and adult). See also Pandemic.
- Massive multiplayer virtual worlds allow learners to play a role and experience "real-life" scenarios and environments in which to practise their CPR skills. If implementing this tool, ensure facilitators understand how to use it and that the technology is not too complex (Creutzfeldt et al., 2013). (See Gamification, and Online learning for adults.)
- If video-assisted dispatcher support is provided in your country, explain how this might work so that learners are prepared to use it, if available. Use role-play to help learners to understand what happens when they call an emergency number. (Bolle et al., 2009; 2011).
- In settings without manikins, used car tyres could be used to practise CPR compressions. Dig the tyre about two-thirds of the way into the ground to simulate a chest, which will recoil when pushed on.
- For learners who train regularly and are knowledgeable in CPR, extend skills training to include performing CPR in different settings and situations (e.g., in noisy or distracting environments, with anxious relatives present, in crowds or small spaces with restricted access). Such training exercises stimulate team-based approaches and lateral thinking.
- Use film clips or demonstrations to improve learners' recognition of abnormal breathing including agonal breathing and someone who is not breathing.

Learning connections

- In contexts where a defibrillator is likely to be available, pair this topic with Unresponsive and abnormal breathing when a defibrillator is available.
- Ensure learners also understand how to maintain an open airway if someone is Unresponsive and breathing normally.
- The most common condition to result in a person becoming unresponsive with abnormal breathing is a heart attack (see Chest pain).
- Situations that may influence whether rescue breaths could be beneficial include Opioid overdose, drowning or Remote.
- Consider different learning methods, such as the use of Feedback devices, Peer learning, or video learning with a manikin.
- Consider other topics such as Acute grief and Traumatic event if appropriate to the learners.

Scientific foundation

Prompt recognition of cardiac arrest

In 2010, the International Liaison Committee on Resuscitation (ILCOR) conducted an evidence summary on the recognition of cardiac arrest (Koster et al., 2010). In this context, recognition of cardiac arrest includes checking the pulse and recognising agonal breathing.

To date, there are no studies that assess the accuracy of checking the pulse to detect cardiac arrest. Additionally, first aid providers have difficulty mastering the pulse check and remembering how to perform it.

There is often a high frequency of agonal gasps after cardiac arrest, but several studies showed that first aid providers and EMS dispatchers often do not recognise them. There are many terms used to describe abnormal breathing, confusing first aid providers and dispatchers alike. Sometimes these terms are limited due to cultural influences and translation limitations, even in the same country. Teaching people to identify agonal breathing using a video clip improved the accuracy of recognising cardiac arrest.

Evidence shows that with EMS dispatchers, failure to recognise cardiac arrest may be associated with a failure to follow cardiac arrest protocols while on the call. In a seizure complaint question sequence used by dispatchers, the detection of cardiac arrest cases improved after introducing the question, «Is he breathing regularly?» Special courses aimed at teaching dispatchers to identify agonal breathing also increased their ability to recognise cardiac arrest.

Chest compression-only CPR versus standard CPR

Many studies were conducted to evaluate chest compression-only CPR versus standard CPR with or without dispatcher instruction. We used two systematic reviews, one from ILCOR (Olasveengen et al., 2017) and one from Cochrane (Zhan et al., 2017) and the adult basic life support, 2020 international consensus on CPR from ILCOR (Olasveengen, 2020).

Compression-only CPR versus standard CPR

For the critical outcome of survival with favourable neurological function, a meta-analysis of two cohort studies showed no significant difference between people who received compression-only CPR compared to people who received CPR with a compression-to-rescue-breath ratio of 15:2. Further, a different meta-analysis of three studies, this time using CPR with a compression-to-rescue-breath rate of 30:2, also showed no significant difference in the outcome.

For the critical outcome of survival only, a meta-analysis of six studies did not demonstrate significant differences in people who received compression-only CPR compared to those who received standard CPR with a compression-to-rescue-breath ratio of 15:2. One study showed that people who received compression-only CPR had a worse survival rate than those who received CPR with a compression-to-rescue-breath ratio of 30:2. In another meta-analysis of three observational studies, there was no significant difference between people who received either type of CPR (compression-only or standard with a rate of 30:2).

For the important outcome of return of spontaneous circulation, a meta-analysis of three cohort studies showed no benefit to using the 15:2 ratio compared to using a different ratio.

The Cochrane systematic review compared chest-compression-only-CPR versus standard CPR on non-asphyxial out-of-hospital cardiac arrest. The meta-analysis found high-quality evidence that continuous chest compression CPR without rescue breathing improved people's survival to hospital discharge compared to interrupted chest compressions with pauses for rescue breathing (ratio 15:2).

Compression-only CPR versus standard CPR (adults) - dispatcher-assisted

Low-quality evidence from a randomised controlled trial demonstrated no benefit to favourable neurological function when dispatchers provided instructions for continuous chest compressions compared to instructions for compressions and rescue breaths at a ratio of 15:2. Conversely, three randomised controlled trials also compared the two types of dispatcher-assisted CPR and found that compression-only CPR resulted in a small benefit to peoples' survival to hospital discharge.

In the nationwide recommendation of compression-only CPR for first aid providers in Japan, results associated dispatcher-assisted compression-only CPR with improved bystander CPR rates. However, the outcome for people receiving CPR was better when bystanders performed standard CPR rather than compression-only.

First aid provider fatigue in chest-compression-only CPR

A comparison of first aid provider fatigue in chest compression between first aid providers who perform compression-only CPR versus standard CPR has been the subject of scoping review for the 2020 ILCOR recommendation. Fifteen manikin studies evaluating fatigue and its effects on CPR quality in volunteers performing continuous compressions and 30:2 or 15:2 CPR. They suggest that continuous compressions are effective in the first two minutes with regard to depth and frequency, and there are indications that short periods of rest (pauses in compression) reduce first aid provider fatigue and increase CPR quality.

Chest compression quality

Hand position during compression

The recommendations for hand position during compressions, based on only low- or very-low-certainty evidence in 2015 was reviewed in 2020. No studies reporting favourable neurological outcome, survival, or return of spontaneous circulation. Only two observational studies that reported physiological endpoints are found. One study with a few people who received prolonged resuscitation from nontraumatic cardiac arrest observed improved peak arterial pressure and ETCO2 during compression systole when compressions were performed over the lower third of the sternum compared with the centre of the chest. The other physiological endpoints did not differ in this study and the second one, in 30 adults with cardiac arrest, observed no difference in ETCO2 values resulting from changes in hand placement.

Chest compression rate

The scientific foundation for chest compression rate includes an evidence summary completed by ILCOR (Perkins et al., 2015) and a scoping review by ILCOR (Considine et al., 2019) which served as the basis for the adult basic life support, 2020 International Consensus on CPR from ILCOR (Olasveengen, 2020, S41).

There was an inconsistent association between chest compression rate and survival with a favourable neurological outcome. The results varied depending on the study population (adult versus child), study size and whether any adjustments were made for potential confounders.

One study reported that when it adjusted for confounders, including compression depth and fraction, survival to hospital discharge was lower when compression rates were 80–99 and 120–139/min, compared to 100–119/min. No other studies reported specific compression rates benefitting the survival to hospital discharge outcome.

There were no significant differences reported between various chest compression rates on one-month survival, one-day survival, or hospital admission while alive. Of the eight studies that examined spontaneous circulation return, one study said that, compared to a reference chest compression rate of 100–120/min, 121–140/min was associated with an increased return of spontaneous circulation. Another study associated higher mean chest compression rates with an increased likelihood of spontaneous circulation return. None of the three studies that reported on blood pressure showed a significant effect between chest compression rate and either systolic or diastolic blood pressure.

Chest compression depth

The scientific foundation for chest compression depth includes an evidence summary completed by ILCOR (Travers et al., 2015 S51) and a scoping review by the Basic Life Support ILCOR task force (Considine et al., 2019). This served as the basis for the adult basic life support, 2020 International Consensus on CPR from ILCOR (Olasveengen, 2020, S41). Four observational studies suggest that the return of spontaneous circulation with a compression depth of more than 5 cm in adults is more likely than all other compression depths. Another study suggested that deeper chest compressions were associated with a greater likelihood of successful defibrillation.

For survival to hospital admission, one study showed that increased chest compression depth was associated with increased odds of admission to a hospital alive, while another study showed no association between different mean chest compression depths and survival to hospital admission.

Three studies compared different chest compression depths with survival and a favourable neurological outcome. None of the chest compression depths significantly increased or decreased survival or favourable neurological outcomes. However, one observational study suggests that a compression depth in adults of more than 5 cm increased survival and good neurological outcomes, compared to all other compression depths during standard CPR.

For survival, three studies reported statistically significant relationships between one-day survival and chest compression depth in adults. For each 5 mm increase in chest compression depth, one-day survival increased. One study that looked at survival to the emergency department showed that mean chest compression depths of 5–6 cm had the highest survival to emergency department rates in adults.

One study reported that survival to hospital discharge decreased when chest compression depth was less than 38 mm, compared to more than 51mm and adjusting for confounders. Two adult studies reported that for each 5 mm increase in chest compression depth, survival to hospital discharge increased.

At least one study detailed injury frequency and showed that increased chest compression depths were associated with higher injury rates. The mean chest compression depth of people with injuries was 56 mm versus 52 mm in people with no injuries.

Chest wall recoil

The scientific foundation for chest wall recoil includes an evidence summary completed by ILCOR (Perkins et al., 2015) and a scoping review by ILCOR (Considine et al., 2019). This served as the basis for the adult basic life support, 2020 international consensus on CPR from ILCOR (Olasveengen, 2020, S41). The first two outcomes examined were favourable neurological outcomes and survival to hospital discharge. Two studies had conflicting results, while another study reported that - once adjusted for confounders – there was no difference in survival to hospital discharge associated with different chest compression release speed. One study reported the return of spontaneous circulation and showed no statistically significant improvement associated with a 10 mm per second increase in chest compression release speed. Only animal studies have found reduced coronary perfusion pressure with incomplete chest recoil.

Check for circulation during basic life-support

There is no evidence to justify doing further research and changing the 2015 treatment recommendation. Outside the advanced life-saving environment, there is insufficient data about the value of a pulse check while performing CPR.

Firm surface for CPR

For this topic, we use the adult Basic Life Support, 2020 International Consensus on CPR from ILCOR (Olasveengen, 2020, S41). Variation in backboard use and the practice of moving a person from the bed to the floor to improve the quality of CPR are reported. The identified science has been grouped by mattress type, floor compared with bed and backboard. Four manikin randomised controlled trials did not identify a difference in chest compression depth between mattress types. Two manikin meta-analyses found no effect on chest compression depth and neither two manikin trials identified a difference in chest compression depth between groups. At least, six manikin randomised controlled trials found that the effect of chest compression is improved when they are used on the backboard and one randomised controlled trial did not find a better effect. It’s important to indicate that we have no clinical studies reporting on the critical outcomes of survival and favourable neurological outcome or important outcome of chest compression quality.

Harm caused by CPR to a person who is not in cardiac arrest

This topic’s scientific foundation includes an evidence summary from a systematic review, the Consensus of Science, and a Basic Life Support ILCOR task force treatment recommendation from Svavarsdottir et al. (2019).

Many first aid providers are concerned that they will harm a person who is not in cardiac arrest or cause severe complications by giving chest compressions. This belief makes them reluctant to start CPR. The systematic review included four observational studies that looked at 762 people who were not in cardiac arrest but still received CPR by first aid providers outside the hospital. Pooled data of three of these studies found an incidence of muscle damage of 0.3%, bone fracture (rib and clavicle) of 1.7%, pain in the area of chest compression of 8.7% and no visceral injury. The fourth study reported no injury.

Harm to rescuer from CPR

This topic has not been updated since 2010 and only concerned injury from CPR to people who are not in cardiac arrest (see above). It also reviewed any potential harm to the first aid providers during CPR, including harm during chest compressions, during rescue breaths, and with the use of defibrillators. Since 2008, no randomised controlled trials were identified for this topic and most identified studies addressed the safety of shock delivery during chest compressions when first aid providers wore gloves. Despite limited evidence evaluating first aid provider safety, there was a lack of published evidence supporting the interpretation that CPR is generally safe for first aid providers. Some reports demonstrate the possibility of disease transmission while performing rescue breaths and that CPR is relatively safe. Delivery of a shock with an automated defibrillator during basic life support is also safe. The incidence and morbidity of defibrillator-related injuries in the first aid providers are low. Note that these studies are all prior to COVID-19, see Pandemic.

CPR before calling for help

For this topic, we used the adult Basic Life Support, 2020 International Consensus on CPR from ILCOR (Olasveengen, 2020, S41). The optimal sequence for calling for help and starting CPR frequently arises during CPR education and was the subject of a new question and recommendation in 2020. Increased availability of phones and hands-free options for lone first aid providers were considered important.

For the critical outcome of survival with favourable neurological outcome, only one observational study is identified, and no meta-analysis found. This cohort study from Japan showed no benefit from a “CPR-first” strategy compared with a “call-first” strategy.

Adjusted analyses were performed on various subgroups and suggested significant improvements in survival with a favourable neurological outcome with a “CPR-first” strategy compared with a “call-first” strategy for non-cardiac etiology, out of hospital cardiac arrest, under 65 years of age, under 20 years of age and both under 65 years of age and noncardiac etiology together. The overall certainty of the evidence was rated as very low. The results are not generalisable to all out of hospital cardiac arrests because they refer specifically to bystander-witnessed cases in which the bystander spontaneously initiates CPR after only a short delay.

Starting CPR: rescue breaths or compression?

This topic’s scientific foundation includes the ILCOR treatment recommendation from Considine et al. (2019) and the adult Basic Life Support, 2020 International Consensus on CPR from ILCOR (Olasveengen, 2020, S41). This current systematic review did not identify any additional human or manikin studies published since the 2015 ILCOR systematic review.

There are three manikin studies on whether to start CPR with chest compressions or rescue breaths. All the studies found that beginning CPR with compressions first (30:2) compared to CPR beginning with rescue breaths first (2:30) significantly decreased the time to commencement of chest compression and seemed to decrease the time needed to complete the first CPR cycle. For time to commence rescue breaths, the results are conflicting between studies. The evidence is of very low quality.

Compression-to-rescue-breath ratio

In 2017 ILCOR completed an evidence summary on the ratio of compressions and rescue breaths during CPR, which we used to inform this section of the scientific foundation (Olasveegen et al., 2017). A meta-analysis of two observational cohort studies looked at the critical outcome of survival with a favourable neurological function. The results demonstrated that the 30:2 compression-to-rescue-breath ratio was more beneficial compared to a different ratio. Evidence is of very low quality.

Furthermore, a meta-analysis of six cohort studies showed that the survival rate was higher in the group of people who received the 30:2 ratio compared to the group who received 15:2. One retrospective cohort showed improved survival with a rate of 50:2 compared to 15:2 compressions to rescue breaths, but the evidence is of very low quality.

Reducing pauses between chest compressions

For this topic, we used an evidence summary from ILCOR, completed in 2015 (Perkins et al., 2015). Some CPR guidelines recommend pausing no more than five seconds to provide rescue breaths. First aid providers also have to pause compressions when using a defibrillator during pre-shock and post-shock intervals. Pre-shock intervals refer to the time required to assess the rhythm of a person in cardiac arrest and post-shock intervals refer to the time between shock delivery and when it is safe to resume compressions. One observational study indicated that shorter pre-shock pauses benefitted shock success.

One observational study showed that limiting pre-shock and post-shock pauses benefitted the return of spontaneous circulation, while another observational study suggested that achieving chest compression fractions (i.e., the total CPR time devoted to compressions) greater than 40% also benefitted this outcome.

For the outcome of survival to hospital discharge, three observational studies with 3,327 people demonstrated that shorter pre-shock and post-shock pauses produced a better outcome for people. However, one randomised controlled trial comparing two automated external defibrillator algorithms found no differences.

Rhythm-check timing

This topic's scientific foundation includes an ILCOR treatment recommendation from Ristagno et al. (2019) and the adult Basic Life Support, 2020 International Consensus on CPR from ILCOR (Olasveegen et al., 2017).

There is some correlation between the interruption of chest compressions and adverse outcomes. One of the most common disruptions is checking cardiac rhythm after defibrillation. Still, any unnecessary pausing in chest compressions might impact the result of cardiac arrest.

Regarding the outcome of survival with a favourable neurological outcome at discharge, we looked at one randomised controlled trial and three observational studies. Both the trial and the studies assessed the effect of interrupting chest compressions to check the rhythm immediately after shock delivery. The randomised controlled trial included 415 out-of-hospital cardiac arrests and showed no benefit to interrupting chest compressions. Conversely, the three observational studies, which had 763 out-of-hospital cardiac arrests, showed harmful effects when chest compressions were interrupted.

We also looked at the available evidence to see if the same chest compression interruption (to check the rhythm right after shock delivery) affected the outcome of survival to hospital discharge. Two randomised controlled trials with 1,260 out-of-hospital cardiac arrests showed no benefit to interrupting chest compressions. In contrast, three observational studies with 3,094 out-of-hospital cardiac arrests showed harmful effects when checking the rhythm immediately after defibrillation.

Further, for the outcome of survival to hospital admission, the results from two randomised controlled trials, totalling 1.260 out-of-hospital cardiac arrests, demonstrated no benefit to interrupting chest compressions to check the rhythm right after defibrillation.

Finally, with regards to the return of spontaneous circulation, two observational studies that included 2,969 out-of-hospital cardiac arrests showed harmful effects when chest compressions were interrupted immediately after shock delivery. Additionally, data from three randomised controlled trials, looking specifically at chest compression fraction, demonstrated harmful effects when chest compressions were interrupted to check the rhythm right after shock delivery. The trials included 1,412 out-of-hospital cardiac arrests.

Dispatch diagnosis of cardiac arrest

For this topic, we used the adult Basic Life Support, 2020 International Consensus on CPR from ILCOR (Olasveengen, 2020, S41) and the 2019 ILCOR systematic review of the dispatch diagnosis of cardiac arrest (Drennan et al., 2019).

The review looked at out-of-hospital cardiac arrests and assessed a variety of algorithms and criteria used by dispatch centres to identify potential life-threatening events (such as cardiac arrest) to triage emergency responders to the scene appropriately. Forty-six observational studies with 84,534 adult out-of-hospital cardiac arrests demonstrated the following results:

- Dispatchers correctly identified cardiac arrest with a sensitivity of 0.79 (0.69–0.83).
- Dispatchers incorrectly diagnosed the absence of cardiac arrest when the person was experiencing it (the critical outcome of a false negative) at 0.21 (0.17–0.32).

Twelve observational studies involving 789,004 out-of-hospital cardiac arrests showed the following results:

- Dispatchers correctly identified the absence of cardiac arrest with a specificity of 0.99 (0.93–1.00).
- Dispatchers incorrectly diagnosed cardiac arrest when the person was not experiencing it (false positive) at a rate of 0.01 (0.01–0.07).

Dispatcher-assisted CPR

We used one systematic review (Nikolaou-2019-82), one evidence summary from ILCOR in 2019 to look at the topic of dispatcher-assisted CPR (Soar-2019-e826) and the adult basic life support, 2020 international consensus on CPR from ILCOR (Olasveengen, 2020, S41).

When comparing the difference between a dispatcher assisting with CPR and not assisting, evidence suggested that if the dispatcher offered assistance over the phone, survival and survival with a favourable neurological outcome at hospital discharge, and one month after cardiac arrest, all increased. The review also showed that there was a correlation between the 21 systems offering dispatcher-assisted CPR and a sustained return of spontaneous circulation. However, there was no association with increased survival to hospital admission compared to systems without dispatcher-assisted CPR.

When comparing the outcomes in cardiac arrests outside of a hospital setting, people who received dispatcher-assisted CPR from a bystander include improvements in:

- survival with a favourable neurological function, and survival in general, at hospital discharge and one month later, and
- a greater likelihood of a return of spontaneous circulation.

These improvements were more likely to occur when bystanders received assistance from dispatchers to perform CPR than when no bystander CPR occurred.

The above findings were inconsistent when compared with instances when bystanders performed CPR with the assistance of a dispatcher versus when they performed CPR without assistance. The people receiving bystander CPR with dispatcher assistance were more likely to experience a return of spontaneous circulation upon hospital arrival than when bystanders did not have dispatcher assistance. This result suggests that dispatcher-assisted CPR could be as effective as unassisted CPR.

Feedback for CPR quality

CPR feedback or prompt devices are used to improve CPR quality, as ROSC, and survival from cardiac arrest. Feedback devices can measure various aspects of CPR mechanics, including ventilation rate, chest compression quality or measures of flow time (CPR fraction, etc.). These data can be used by the provider in real-time (audible or visual metronomes, voice or visual prompts or alarm) or as a summary report at the end of a resuscitation (numeric displays, waveforms, percentage).

Three real-time CPR guidance devices were identified in studies: digital audio-visual feedback, audio and tactile "clicker" feedback for chest compression depth and release and metronome guidance for chest compression rate. Nevertheless, due to heterogeneity across studies, it was not possible to make a metanalysis.

Education review

59 papers were identified through our search strategy as having insights to support adults learning CPR. Many supported insights covered elsewhere in these Guidelines concerning educational approaches and learning methodologies, but the evidence set out below indicates issues most specific to CPR.

Adaptation and prioritisation

- Papalexopoulou et al., 2014; Sopka et al, 2013, identify the need for adaptation of educational tools (e.g. manikins and defibrillators), locations (e.g., waterfront scenarios for lifeguards) and methods to make them accessible and appropriate for learners' needs and abilities.
- Tweed and Wilson, 1977 advocate first aid education providers to prioritise training community members most likely to encounter cardiac arrest emergencies in CPR such as medics, police officers, firefighters and lifeguards. They suggest that these groups, given their status and role in the community, might make effective educators for the general public.
- Huang et al. 2016 identify people with family members who are at high risk of cardiac arrest due to illness as being more motivated to learn first aid (See also Motivation to learn).

Barriers and challenges to learning

- Some bystanders have concerns about disease exposure and transmission through standard CPR, which has caused a significant decrease in their willingness to provide it to both strangers and family members. Compression-only CPR is the preferred method (Cheng-Yu et al., 2016; Jelinek et al., 2001; Lam et al., 2007; Pei-Chuan Huang et al., 2019).
- For practical CPR courses, there is limited evidence to demonstrate that female-only learner groups are beneficial to female learners, but there is evidence to support that males are more likely to learn in mixed groups (Sopka et al., 2013).

Enhanced scenario-based learning

- Massive multiplayer virtual worlds allow learners to play a role and experience "real-life" scenarios and environments in which to practise their CPR skills. (Creutzfeldt et al., 2013). (See also Gamification, and Online learning [adults].)

Dispatcher assisted CPR

- There is limited evidence in favour of the efficacy of dispatchers providing instructions to lay responders in giving CPR. Providing CPR instructions using video-assisted technology does not significantly improve the overall quality of bystander CPR compressions or rescue breaths (Bolle et al., 2009). However, in a study by Bolle et al. (2011) participants noted that video-equipped mobile phones should be utilised instead of audio-only phones during a medical emergency. Given the fast-emerging technology associated with smartphones, we identify this as a gap in evidence in need of further exploration.
- Dispatchers who communicate using video-assisted emergency calls may need more training for this tool to be effective and widespread within CPR education (Bolle et al., 2009). Bang et al. (2000) suggest that dispatchers with further training (e.g. technical and emotional) are more effective.

Unresponsive and abnormal breathing (baby and child)

Key action

Immediately start rescue breaths and chest compressions and access emergency medical services.

Introduction

If a baby or child is unresponsive with abnormal breathing (e.g., taking irregular or noisy breaths, or stopped breathing altogether) and has no signs of life, it indicates they are in cardiac arrest. When a baby or child is in cardiac arrest, their heart stops beating and cannot pump blood around their body. This means that vital organs, such as the brain, do not get enough oxygen and can start to deteriorate within minutes. While cardiac arrest occurs less frequently in babies and children compared to adults, it is still life-threatening. Typically, cardiac arrest in babies and children is the result of a breathing problem, whereas, in adults, it usually has to do with their heart suddenly stopping. The causes vary by age, setting and any underlying health problems of the baby or child; however, some common ones include choking, drowning and disease. Since the cause of cardiac arrest is likely to relate to their breathing, rescue breaths play a more critical role in CPR for babies or children. Survival to hospital discharge is primarily linked to the early initiation of CPR.

NOTE

- The techniques of CPR need to be adapted depending on the size of the unresponsive person and the size of the first aid provider. If the person looks like a baby (less than about one-year-old), treat them as a baby. If the person looks like they are a child, treat them as a child.
- If the person looks like an adolescent, (they may have been through puberty) or an adult use the guidelines provided in Unresponsive and abnormal breathing (adolescent and adult).
- It is most important to do something. In the case of someone needing CPR, it is unlikely a first aid provider can make the situation worse for the person.

Guidelines

- First aid providers should use a response check and breathing check to ascertain whether a baby or child is unresponsive and breathing abnormally. Checking for a pulse is not needed.**
- CPR should be performed on a baby or child who is unresponsive with abnormal breathing (e.g. taking irregular or noisy breaths or have stopped breathing altogether).**
- Rescue breaths should be provided as part of CPR to a baby or child who is unresponsive with abnormal breathing.*
- Rescue breaths should be given to a baby or child before chest compressions. Two to five initial rescue breaths may be given.*
- For a baby, chest compressions can be performed with the two thumb-encircling hand method or with the two-finger technique. In new-borns, the two thumb-encircling hand method is preferred.*
- For a child, chest compressions may be performed with one or two hands. (For example, if the first aid provider is small or the child is large the first aid provider may use two hands.)*
- A compression-to-rescue-breath ratio of 30:2 (30 compressions and 2 rescue breaths) may be used on a baby or child who is unresponsive with abnormal breathing.*
- For a baby, chest compression depth should be at least one-third of the chest's depth or approximately 4 cm (1½ inches).*
- For a child, chest compression depth should be one-third of the depth of the chest or approximately 5 cm (2 inches).**
- The rate of chest compressions should be 100–120 per minute for babies and children (this is the same as for an adolescent or adult).**
- Chest compression may be performed on a firm surface when possible.*

- All emergency medical dispatchers should provide CPR instructions (referred to as dispatcher-assisted-CPR) to first aid providers who call regarding an unresponsive baby or child with abnormal breathing.**

Good practice points

- First aid providers who are unwilling, untrained or unable to perform rescue breaths for a baby or child should perform chest-compression-only CPR.

Chain of survival behaviours

Prevent and prepare

- Refer to your local or national health authority to identify the main causes of baby and child cardiac arrest in your region. Preventable and preparable causes include choking, drowning or disease.
- Follow recommended baby and child safety practices, such as supervision near water.

Early recognition

In the first few minutes after cardiac arrest, a baby or child may have agonal breathing (meaning they are barely breathing or gasping noisily and irregularly). This type of breathing is abnormal. If there is any doubt about whether breathing is normal, assume it is not.

Check for a response.

- **Baby**: Pick the baby up or tap on the sole of their foot. An unresponsive baby will be limp and abnormal colour.
- **Child**: Gently tap the child's shoulders. Speaking loudly and clearly, ask a question such as, "Are you alright?".

If the baby or child does not respond or not react:

- Open their airway: For a baby, tilt their head slightly to a neutral position and lift their chin. For a child, tilt their head back and lift their chin.
- Check for breathing: Look, listen and feel for normal breathing for up to ten seconds. Look for chest or abdominal movement; listen for breathing sounds; feel for breaths on your cheek. If you have any doubt whether breathing is normal, take action as though it is not.

First aid steps

If the baby or child's breathing is abnormal (or they are not breathing):

1. Immediately ask a bystander to access EMS, or if you are alone, access EMS yourself. If using a phone, activate the speaker function.

2. Give two to five initial rescue breaths using a mouth-to-mouth-and-nose technique for a baby or a mouth-to-mouth technique for a child. Blow steadily for one second until you see their chest or abdomen rise.

3. Give 30 chest compressions without delay; push down on the centre of their chest at a fast and regular rate (100–120 compressions per minute).

4. Give two rescue breaths. Blow steadily into the mouth or mouth-and-nose for one second until you see the chest or abdomen rise.

5. Continue with cycles of 30 chest compressions and two rescue breaths until emergency help arrives or the baby or child shows signs of life (such as coughing, opening their eyes, speaking or moving purposefully) and starts to breathe normally.

NOTE

- If an automated external defibrillator is available, ask a bystander to bring it as quickly as possible. Follow the voice prompts, interrupting CPR cycles as little as possible. (See Unresponsive and abnormal breathing when a defibrillator is available.)
- If you are unwilling or unable to give rescue breaths, give chest-compression-only CPR at a rate of 100–120 compressions per minute.
- If more than one first aid provider is present, change provider every one to two minutes to prevent fatigue. Ensure there is no interruption to CPR as the next person takes over.
- If you are alone and do not have a way to call EMS while performing CPR (e.g., no speakerphone), perform CPR for one minute before pausing to call for help.
- While performing rescue breaths, be alert to any signs of life such as movement or coughing.
- If the baby or child is unresponsive and breathing normally, maintain an open airway. See Unresponsive and breathing normally.

Local adaptation

- In contexts that do not have an EMS or other higher level of care, if CPR has not been effective within the first 20 minutes, then (except in cases of drowning and hypothermia) the first aid provider could stop CPR as it is unlikely to be beneficial.
- If it is a child drowned or with hypothermia, there is a chance of saving them even with CPR alone.
- If transporting the baby or child from a remote area to medical care, continuous CPR on a firm surface must be provided during transit.

Access help

- When accessing EMS, very clearly explain that the baby or child is unresponsive and breathing abnormally; this will prompt EMS to prioritise your case appropriately.
- Ask bystanders for help accessing EMS and providing CPR, as well as bringing and using an automated external defibrillator.
- The survival of the baby or child depends upon immediate and effective CPR; when accessing help, keep any interruptions to chest compressions minimal.

Self-recovery

- Even if the first aid responder has performed CPR and defibrillation and the baby or child is now responsive and breathing normally, you must continue close monitoring until EMS attend to them as they may stop breathing again.

Education considerations

Context considerations

- Refer to and follow the guidance of regional resuscitation councils or other national protocols and tailor education accordingly.
- Consult local regulators to consider differences in regulation and liability protection for first aid providers.
- In some countries, specifically those with a high rate of tuberculosis, rescue breaths may be discouraged. Teach first aid providers chest compression-only CPR (or bag-valve-mask resuscitation if they are professional responders). See also Pandemic.
- In contexts where there is no EMS available or higher onward care, resuscitation for babies and children can still be attempted.
- Be familiar with local culture, resources and local expectations of healthcare ahead of developing an education programme and contextualise it accordingly (Anderson et al., 2018).
- Programme designers could define within programmes two or five initial rescue breaths to be given depending on what is most commonly advocated in the context.

Learner considerations

- CPR training is an important intervention that can promote a sense of control and reduce the feelings of anxiety and burden experienced by parents with a baby at risk of cardiac arrest (Moser et al., 1999).
- Be aware and respect that some learners may not be comfortable practising with realistic manikins for psychological or emotional reasons. Arrange alternative practice options.

These considerations are specific to emergency medical dispatchers.

- Emergency medical dispatchers can provide a critical role through the prompt recognition of cardiac arrest, provision of CPR instructions by phone and dispatch of the EMS with a defibrillator. Consider as part of the education for this role:
  - The use of scripted protocols as a helpful way to confirm when a baby or child is in cardiac arrest.
  - Additional training around the recognition of agonal breathing.
  - How to provide CPR instructions for a baby or child (including rescue breaths and compressions).

Facilitation tips

- Focus on prevention is critical for the survival of babies and children.
- Emphasise the importance of the first aid provider, other bystanders and EMS working together to provide care quickly and effectively.
- Explore the mechanics of the tongue and airway for the breathing check. Allow learners to understand that when the muscles relax the tongue can block the airway, (so the baby or child cannot breathe). Tilting the head back for a child or into neutral position for baby pulls the tongue forward, opening their airway. Sometimes, simply opening the airway will enable the baby or child to breathe.
- Consider providing both the two-finger and two-thumb techniques when facilitating baby CPR. When in a stressful situation, learners may choose the one with which they are most comfortable (Pellegrino et al., 2017).
- If using manikins, ensure they are realistic in terms of size, weight and features so learners can get a sense of how to perform the skill correctly (Gesicki & Longmore, 2019).
- Help learners understand the desired outcomes of CPR – to get oxygen into the lungs (rescue breaths) and to pump blood around the body (chest compressions) and to keep the brain and vital organs functioning until defibrillation can take place.
- Emphasise that learners should avoid excessively providing rescue breaths as the air will enter the baby or child's stomach.
- Emphasise that the goal of resuscitation remains the same for all ages, only the approach is modified. However, first aid providers who know how to perform adult CPR, but do not know baby or child CPR, may use the same sequence as adults.
- Highlight that the decision to start CPR should be immediate and without delay. Time is critical to a positive outcome. Emphasise that rapid and continuous compressions are also critical for a positive outcome.
- Learners can gain knowledge and some basic skills through self-directed learning which might save time for practice in face-to-face-sessions. (Weiner et al., 2010).

Facilitation tools

- When instructing learners on how to perform chest compressions and rescue breaths, refer to the resource Facilitating CPR skills (baby or child).
- Refer to the General approach for tools which can help learners to sequence and prioritise their actions. Mnemonics such as DR ABCD can be of help to some learners to establish a clear course of action.

- Sequence the learning to include discussions about possible scenarios, role play, demonstration, practice with a peer, and feedback. Involve learners in deciding on the scene and encourage discussions about how they might access help.
- Discuss with learners the emotions and motivations that they might feel when helping a baby or child who is unresponsive and breathing abnormally. Encourage learners to express their fears and doubts and to share experiences to build confidence to help.
- Use alternatives to resuscitation manikins when they are not available, such as teddy bears or cushions.

Learning connections

- In contexts where a defibrillator is likely to be available, pair this topic with Unresponsive and breathing abnormally when a defibrillator is available.
- Pair this topic with Choking or drowning.
- Some learners learning this topic may benefit from learning about how to provide first aid for mental distress.

Scientific foundation

Pulse check

An update was performed in 2020 by the Pediatric life support task force of the International Liaison Committee on Resuscitation (ILCOR) (Maconochie et al., 2020). New studies about the accuracy of pulse check versus assessment of signs of life were insufficient to identify cardiac arrest, and it was decided to keep the 2010 treatment recommendation. Palpation of a pulse (or its absence) is not reliable as the sole determinant of cardiac arrest and need for chest compressions.

The 2010 ILCOR evidence summary on the pulse check versus no pulse check found that many studies observed that neither first aid providers nor healthcare professionals were able to perform an accurate pulse check in healthy babies or children within ten seconds. Two studies blinded healthcare providers and had them assess children with no pulsatile circulation. The providers commonly misjudged the pulse status, and their assessment for signs of life often took longer than ten seconds. The average time to confirm the absence of a pulse was 30 seconds (de Caen et al., 2010).

The sequence of chest compressions and rescue breaths

We used the Pediatric Life Support 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations and an ILCOR evidence summary from 2017 for this topic (Maconochie et al., 2020; Maconochie et al., 2017). In 2015, the consensus on science indicated that in adults and children if we compare CPR beginning with compressions to CPR beginning with rescue breaths, the confidence in effect estimates were so low that it was too speculative to make a recommendation. In 2020, for the same comparison, no new human paediatric evidence was identified. So, the recommendations for sequencing of CPR steps for babies and children in cardiac arrest remain unchanged from those published in 2015.

Chest compression-only CPR versus standard CPR

We used two evidence summaries from ILCOR from 2015 and 2017 (Maconochie et al., 2015; Olasveengen., 2017). One systematic review of two extensive observational cohort studies compared chest compression-only CPR to standard CPR with a ratio of 30:2 or 30:2 and 15:2. The review found that significantly fewer people (ages one to 17) experienced favourable neurological outcomes and survived to the one month mark after receiving compression-only CPR. The result was also significant with fewer people achieving the favourable outcome of the return of spontaneous circulation in the same age group. In babies, there was no demonstrable difference in the outcomes between chest compression-only CPR or standard CPR.

Dispatch-assisted cardiopulmonary resuscitation

An ILCOR evidence summary and a systematic review, both from 2019, explored the impact of dispatcher-assisted-CPR on the survival and neurological outcomes in babies after they experienced out-of-hospital-cardiac-arrest (Koster et al., 2010; Nikolaou et al., 2019).

In babies and children, studies reported a significantly higher rate of CPR in the cohorts that offered dispatcher-assisted-CPR. They also associated an earlier time to CPR initiation with systems that provided dispatcher-assisted-CPR compared with those that provided CPR without dispatch assistance. There were significantly higher rates of favourable neurological outcomes at one month and survival to one month associated with those who received dispatcher-assisted-CPR compared with those who received unassisted CPR. The same results are found for favourable neurological outcomes at hospital discharge and survival to hospital discharge.

When comparing babies and children who received dispatcher-assisted-CPR and those who received unassisted-CPR, one study found that the assisted CPR group reported lower rates of favourable neurological outcomes and survival at one month. However, another study found no difference between the two. The reason seems to be because the start of CPR was longer in the dispatcher-assisted-CPR compared to the unassisted bystander CPR cohort.

Chest compression technique

For chest compression technique used on a child, baby and new-born we used ILCOR evidence summaries from 2010 (de Caen et al., 2010; Wyllie et al., 2010). Several studies on this topic are published after 2010, but, until a new systematic review is done, the Pediatric Life Support 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations propose to apply the 2010 treatment recommendation.

In 2010, we did not find any outcome studies comparing one versus two-hand chest compressions for children in cardiac arrest. The only evidence was for healthcare providers and studies using manikin children. This evidence found that healthcare workers generate higher chest compression pressure when using the two-hand technique and first aid provider fatigue increased when using one-hand compressions.

In new-borns, small case series published before 2010 support the current favoured practice of the two-thumb-encircling hand technique for chest compressions compared to the two-finger technique. The two-thumb-encircling method produces higher blood pressure and can sustain a consistent quality of compressions for a longer time. It is also perceived as easier and less tiring for the provider. In babies and new-borns, providers should centre compressions over the lower third of the sternum rather than the mid-sternum.

Compression-to-rescue-breath ratio

Two ILCOR evidence summaries from 2010 on the optimal ratio for chest compressions and rescue breaths for babies and children formed the basis of this scientific foundation (de Caen et al., 2010; Wyllie et al., 2010). Five studies using a variety of manikin sizes, compared compression-to-rescue-breath ratios of 15:2 with 30:2. The studies found that a ratio of 30:2 yielded more chest compressions with no, or minimal, increase in rescuer fatigue. Another study found that we have less "no flow time" and more chest compressions per minute with a ratio of 30:2 compared to 15:2.

With insufficient human data to identify an optimal compression-to-rescue-breath ratio for CPR in babies and children and ease of teaching and retention, the same compression–rescue breath as for adult (30:2) is proposed.

Chest compression depth

The scientific foundation for this topic includes an evidence summary from 2015, a scoping review from 2020 and the Pediatric Life Support 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations (Considine et al., 2020; Maconochie et al., 2020). All references are from ILCOR and examine the chest compression depth in children.

One study reported a statistically significant relationship between compression depth and the outcomes of one-day survival and the return of spontaneous circulation. Results demonstrated that when 60% or more of chest compressions had an average depth of greater than or equal to 51 mm (compared to less than 60% at this average depth), both outcomes improved. The study found no difference in compression depth for the outcome of survival to hospital discharge. The studies referenced did not document an association between specific chest compression depths and the outcomes of survival to hospital discharge or survival at the one-month mark.

In children with out-of-hospital-cardiac-arrest, one study found no differences regarding the return of spontaneous circulation when comparing CPR with a chest compression depth of 38 mm or more to a chest compression depth less than 38 mm.

Compression rate

As the scientific foundation for this topic, one evidence summary from ILCOR in 2015 and a 2020 ILCOR scoping review was used on the chest compression rate in children (Maconochie et al., 2015; Considine et al., 2020).

There was an inconsistent association between chest compression rate and the outcome of survival with a favourable neurological outcome. One in-hospital cardiac arrest study reported a correlation between a chest compression rate greater than 100/min, in children, compared to a compression rate of 100-120/min. Rates of 120-140/min or greater than 140/min made no difference to survival with a favourable neurological outcome.

In children who experienced cardiac arrest out-of-hospital, a compression rate of 100-120/min, less than 100/min or more than 120/min made no difference to the outcome of survival at the 24-hour mark.

For the outcome of achieving the return of spontaneous circulation following out-of-hospital cardiac arrest, the following comparisons were also made with regards to chest compression rates used on children. A chest compression rate of 100-120/min, compared to rates of less than 100/min, 120-140/min or greater than 140/min, made no impactful difference. A chest compression rate of 100-120/min compared to rates of less than 100/min or greater than 120/min made no difference.

New data is unlikely to lead to a change in recommendations.

Chest compression recoil

There were no studies reporting outcomes for chest compression recoil in baby or child cardiac arrest.

Interactions between CPR parameters

One 2020 ILCOR scoping review formed the basis of the interactions between CPR parameters (Considine et al., 2020).

One study reported no significant relationship between chest compression rates and chest compression depths. Chest compressions depths greater than 51 mm versus less than 51 mm were not associated with the CPR rate in children.

Unresponsive and abnormal breathing when a defibrillator is available

Key action

Use a defibrillator when giving CPR to improve the person's chance of survival.

Introduction

An automated external defibrillator (defibrillator) is a portable device that analyses the heart's rhythm and, if necessary, sends an electric shock (or defibrillation) to help re-establish a normal heart rhythm. Rapid access to a defibrillator can improve the chances of survival for those experiencing sudden cardiac arrest. A first aid provider who is able to give CPR can use a defibrillator with little or no training. Public access defibrillators are proven to be safe and effective, allowing defibrillation to take place immediately.

The automated devices have voice prompts and visual aids to follow and are easy to use. Once the defibrillator detects a shockable rhythm, it will automatically deliver a shock (fully automated defibrillator) or instruct the first aid provider to push the shock button (semi-automated defibrillator). A defibrillator does not replace the need for CPR. First aid providers must provide CPR with as few interruptions to chest compressions as possible while setting up and using the defibrillator.

This topic should be used in conjunction with Unresponsive and abnormal breathing (adolescent and adult) **or** Unresponsive and abnormal breathing (baby and child).

Guidelines

- The implementation of public-access defibrillation programmes is recommended to improve the outcomes for people with out-of-hospital cardiac arrest.**
- For a person who is unresponsive with abnormal breathing (taking irregular or noisy breaths, or they stop breathing altogether), CPR should be provided until the defibrillator is ready to start analysing the heart.*
- For adults and children, automatic external defibrillation with self-adhesive pads can be used and is very safe.**
- For babies and children younger than eight years of age, a paediatric defibrillator should be used.**
- For babies and children younger than eight years of age, if a paediatric defibrillator or paediatric pads are not available, a standard defibrillator and pads could be used.*
- For adults and children (eight years or older), a standard defibrillator should be used.**
- Fast removal of excessive chest hair can be done before the application of pads, so long as the delay to shock delivery is minimal.*
- For optimal defibrillation in adults, pads greater than 8cm are more effective.*
- Pads should be placed on the chest according to the description given on the defibrillator or pads. For babies and children, the anterior-posterior placement of self-adhesive pads may be used (one pad on their front, and one pad on their back).*
- For large-breasted individuals, the left electrode pad should be placed beside or underneath the left breast, avoiding breast tissue.*
- First aid providers should continue to perform CPR while the defibrillator is set up and pause only when it is ready for analysis and, if indicated, provides a shock.**
- After the defibrillator administers a single shock, the first aid provider should resume with chest compressions immediately and not delay for rhythm reanalysis or a pulse check. Any pauses in chest compressions before and after the shock should be as short as possible.**

- When compared, biphasic waveforms are more effective than monophasic waveforms for terminating ventricular fibrillation. Purchasers of defibrillators should purchase biphasic automated external defibrillators.**

Good practice points

- In an oxygen-rich atmosphere (where high-flow oxygen is directed across the chest), first aid providers should ensure that defibrillation does not take place.

Chain of survival behaviours

Prevent and prepare

- Find out where the nearest defibrillators are near your places of work, home or recreation.
- Support or initiate public-access defibrillation programmes to increase the availability of defibrillators in public places, particularly in remote areas or those with longer EMS wait times.
- Advocate that large private organisations or facilities, including schools and universities, should have defibrillators accessible.
- Ensure that public access programmes are explicit that anyone can use a defibrillator and that you do not have to be a medical professional.

Early recognition

- A person is unresponsive with abnormal breathing.
- For more on this, see Unresponsive and abnormal breathing (adolescent and adult) or Unresponsive and abnormal breathing (baby and child).

First aid steps

1. Begin CPR immediately.
2. Ask a bystander to access emergency medical services (EMS), or if you are alone access EMS yourself. If using a phone, activate the speaker function.
3. Ask a bystander to bring a defibrillator as quickly as possible.
4. Use the defibrillator as soon as it is available. Follow the voice prompts, only pausing CPR when it is absolutely necessary.
5. Continue CPR unless otherwise instructed to pause (either by the defibrillator or professional responder). Pause CPR if the person shows signs of recovery, such as signs of life (opening their eyes, speaking, crying or moving purposefully) or starts to breathe normally.

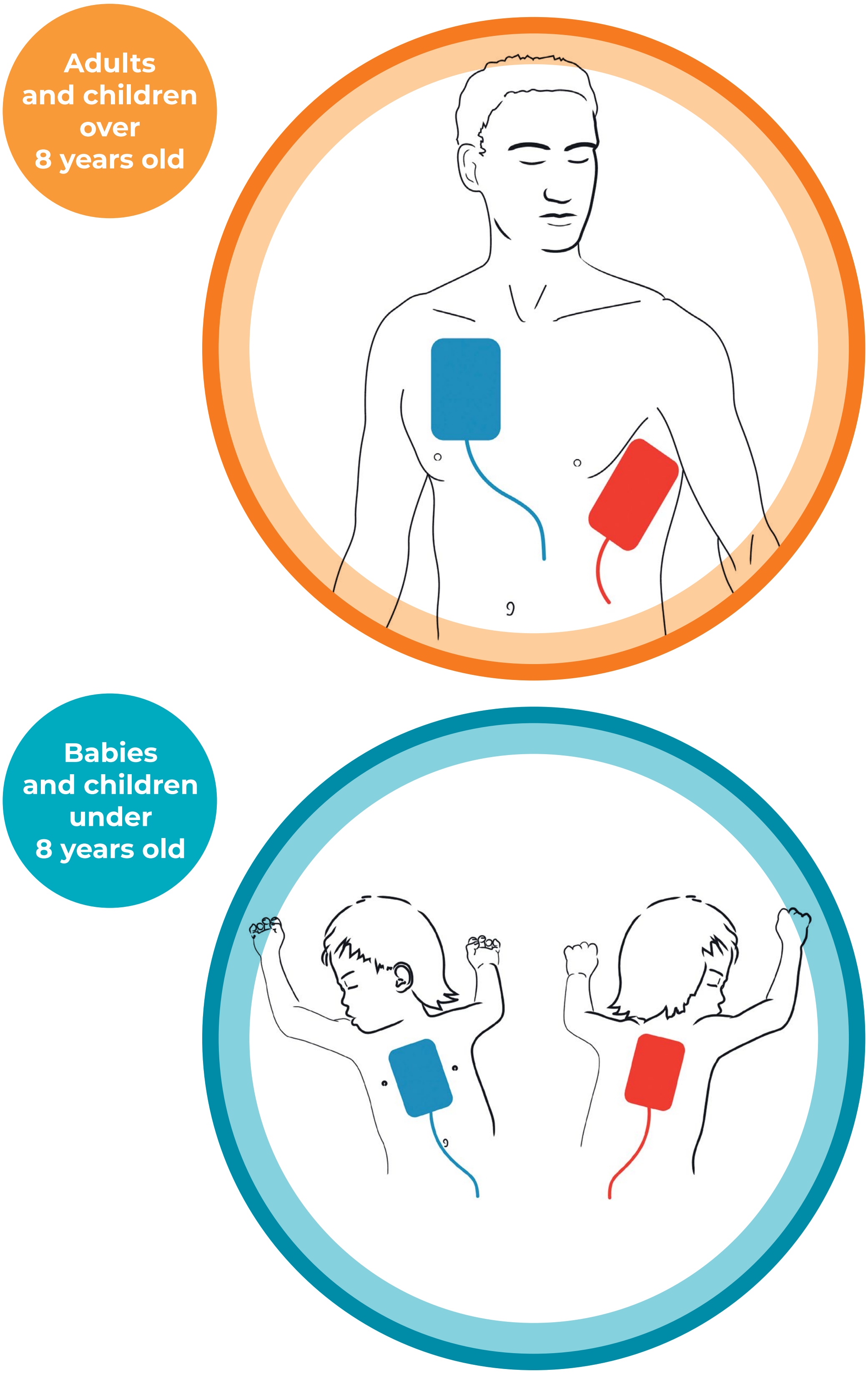
Defibrillation for babies and children

The following are the defibrillation preferences for babies and children. They should be used in the order provided (i.e., if option one is unavailable, then option two is acceptable).

1. Paediatric defibrillator.
2. Standard defibrillator with paediatric pads.
3. Standard defibrillator with adult pads.

If you are alone and the defibrillator is visible in the immediate vicinity, you can leave the person to quickly get it.

Figure 4: Defibrillator pads placement



Access help

- Calling EMS is a priority after beginning CPR, ask a bystander to call or do it by yourself if you're alone. Inform EMS if you are using a defibrillator.
- If accessing EMS via phone they should be able to guide you in CPR and how to use the defibrillator.

Self-recovery

- Even if the first aid provider has performed CPR and defibrillation and the person is now responsive and breathing normally, the person should continue to be closely monitored until they are assessed by a medical professional as they may stop breathing again.

Education considerations

Public access defibrillators

We recognise that public access systems globally may be at different stages of development, but the principle of early defibrillation remains a goal for any unresponsive person with abnormal breathing.

Context considerations

- Refer to and follow the guidance of regional resuscitation councils or other national protocols and tailor education accordingly.
- Consult local regulators to consider differences in regulation and liability protection for first aid providers.
- Where public access defibrillators are present, it is likely that onward medical care is also available. Therefore, learners in these contexts should be made aware of the presence of defibrillators and be empowered to use them.
- Where public access defibrillators are not available, first aid programmes should include information for the learner about how best to access onward care. Where onward care is not available first aid programmes need to equip the learner appropriately (see Unresponsive and abnormal breathing (adolescent and adult) or Unresponsive and abnormal breathing (baby and child).
- In contexts where video-assisted dispatcher support is available to first aid providers, prepare learners for what this is, and how it may help them. There is evidence this technology may further support first aid providers with accurate defibrillator use (e.g. pad placement and delivering shocks) as the video element allows dispatchers to monitor first aid provider actions and provide vital corrections if necessary (You et al., 2008)

Learner considerations

- When possible, educate school administrators and teachers on defibrillators to build their knowledge, skills and confidence before educating students. Doing so will encourage administrators and teachers to implement this type of education and increase their confidence in teaching students how to use a defibrillator. (Zinckernagel et al., 2017)
- Include defibrillator education in first aid programmes for young people as well as adults (Zinckernagel et al., 2017).

Facilitation tips

- Advocate that public access defibrillators have clear signage and are placed in highly visible locations (Brooks et al., 2015; Winkle, 2010).
- Ensure learners are familiar with defibrillator signs and icons and can identify where to find one in their local context (Brooks et al., 2015).

- Emphasise that anyone can use an (automated) defibrillator, even someone who has never used one before. There are visual aids and voice prompts that will tell them what to do.
- Emphasise that a defibrillator will only shock someone if needed – it will never shock a healthy heart. If the defibrillator delivers a shock to the person, this does not always mean their heart will restart. The machine will detect whether the person's heart has restarted and then give further instructions.
- Use scenario-based learning to provide learners with the opportunity to practise using a defibrillator. Practising will increase their confidence and willingness to act in an emergency.
- Have learners practise providing continuous CPR, minimising any interruptions, while another person sets up the defibrillator and applies the chest pads. Have them practise resuming CPR immediately after a pretend shock.
- Emphasise that time is critical to a successful outcome for the unresponsive person. Evidence indicates survival relies upon:
  - immediate recognition that someone is unresponsive with abnormal breathing
  - early access to help and access to EMS
  - early high-quality CPR
  - early defibrillation with an automated external defibrillator.
- Non-professional people can facilitate defibrillator education just as effectively as healthcare professionals (Castren et al., 2004).

Facilitation tools

Facilitating defibrillator skills

Rapid and good quality CPR remains essential to a successful outcome for an unresponsive person with abnormal breathing when a defibrillator is available. Emphasise the importance of CPR while practising the various techniques for successful defibrillation.

All defibrillators provide visual and verbal instructions, but some are fully automated, and some are semi-automated. The instructions below assume there is more than one first aid provider.

1. Begin CPR immediately. See Unresponsive and abnormal breathing (adolescent and adult) or (baby and child) for guidance on this.

2. Ask a bystander to access EMS, or if you are alone access EMS yourself. If using a phone, activate the speaker function.

3. Ask a bystander to bring a defibrillator as quickly as possible. If you are alone and the defibrillator is visible in the immediate vicinity, you can leave the person to quickly get it.

4. When the defibrillator arrives, if possible, one person should continue CPR while the other follows the defibrillator's visual and voice prompts.

5. Apply the pads to the person's skin on their chest as indicated by the instructions. It does not matter if the pads are in the reverse position. Do not remove them as this wastes time and they may not stick to the chest properly when reattached.

6. Once the defibrillator prompts that it is ready to analyse the heart rhythm, ensure no one is touching the unresponsive person. Press the button to begin the analysis.

7. If the machine indicates a shock is necessary, do not touch the person. Push the button to give a shock. (Fully automated defibrillators will shock automatically.)

8. Resume CPR immediately after the shock and follow the defibrillator's prompts. Continue until a professional responder tells you to stop or the person shows signs of recovery (e.g., speaking, coughing, moving purposefully, opening their eyes) and starts to breathe normally.

Learning connections

- Learners must connect this topic with the CPR skills practise and knowledge building in Unresponsive and abnormal breathing (adolescent and adult) or (baby and child).

Scientific foundation

The concept of early defibrillation is well established in improving outcomes from cardiac arrest and there is no new evidence that goes against this principle.

CPR before defibrillation

ILCOR treatment recommendations are used for this scientific foundation (Olasveengen, 2020). Five randomised controlled trials were identified comparing a shorter with a longer interval of chest compressions before defibrillation. A range of outcomes were assessed including one-year survival with favourable neurological outcome and return of spontaneous circulation. When a short period of CPR was provided before shock delivery, the evidence showed no difference to any outcomes. Only one study found a favourable relationship between performing CPR for 180 seconds before defibrillation when the EMS response interval was five minutes or more. However, three other randomised controlled trials could not confirm this relationship. There is inconsistent evidence to support or refute providing a short period of CPR (1.5-3 minutes).

Rhythm check timing

See the summary in Unresponsive and abnormal breathing (adolescent and adult).

Self-adhesive defibrillation pads compared with paddles

There is no new evidence since 2010 so we have used the scientific foundation from the 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations (Sunde et al., 2010).

There's very little evidence comparing the use of self-adhesive defibrillation pads to paddles for someone in cardiac arrest. Self-adhesive pads seem to be associated with a significantly improved rate of return of spontaneous circulation and hospital admission compared with hand-held paddles (Stults, 1987). Several studies showed the practical benefits of pads over paddles for defibrillation.

Pads size and placement for defibrillation

The 2010 ILCOR recommendations have been used for this topic (Sunde et al., 2010). No new evidence was identified in 2020 that modified the recommendations.

For the size of pads, one study demonstrated that increasing the pad size from 8 to 12 cm caused transthoracic impedance to decrease and shock success to increase (Dalzell, 1989). Other studies showed that larger paddle or pad sizes of the same diameter lowered transthoracic impedance. The chest wall size and anatomy limit the maximum paddle or pad size.

For placement studies, many positions of pads were studied. One study supports the anterior-posterior position, another study supports the anterior–lateral position and one study supports the anterior–apex position. At least five studies found no effect of electrode positioning, while one study showed that pads should be placed under the breast tissue.

Two studies showed that hairy males should be shaved before the application of pads.
In summary, pads should be placed on the exposed chest in an anterior–lateral position, but it is acceptable for alternatives. Fast removal of excessive chest hair can be done before the application of pads.

Waveforms, energy levels, and strategies

The scientific foundation is based on the 2010 ILCOR recommendations (Sunde et al., 2010). These topics were not reviewed in 2020.

For the comparison of biphasic with monophasic defibrillation waveform, three trials and four human studies found that biphasic waveforms are more effective in terminating ventricular fibrillation. There is insufficient evidence to recommend any specific biphasic waveform. Nevertheless, in the absence of biphasic defibrillators, monophasic defibrillators are acceptable.

For the waveform and the energy level, there are insufficient quality human studies on the different waveforms and the energy use, making it difficult to make clear recommendations. It is proposed to start defibrillation at a selected energy level of 150–200 joules for a biphasic truncated exponential waveform. There is also insufficient evidence to determine the initial energy levels for any other biphasic waveform. Although evidence is limited, because of the lower total shock success for monophasic defibrillation, initial and subsequent shocks using this waveform should be at 360 joules.

For the energy level of the second and subsequent biphasic shocks, the same initial energy level is acceptable. Studies of biphasic waveforms with varying strategies (fixed and escalating) and energy levels do not find clear evidence of the superiority of one strategy over another. It is reasonable to increase the energy level when possible.

Compared to three-stacked-shock protocols, one-shock protocols suggested significant survival benefit in three design studies and showed a significantly lower hands-off ratio (i.e., percentage of total CPR time when no compressions were provided). Studies also show that the success of the protocol is more dependent on the quality of CPR in different studies than the protocol used. So, when defibrillation is required, a single shock should be provided with the immediate resumption of chest compressions after the shock and chest compressions should not be delayed for rhythm reanalysis or pulse check immediately after a shock.

We did not find any significant survival differences between semi-automatic and manual defibrillation modes in resuscitation either in or out of the hospital. Manual defibrillation is associated with a lower total hands-off ratio. First aid providers delivered more shocks inappropriately with manual defibrillators. So, the semiautomatic mode is preferred for first aid providers.

There is no human data to confirm the superiority of fully or semi-automatic defibrillators.

Defibrillation near supplementary oxygen

In 2010, ILCOR completed an evidence summary that we used to form the scientific foundation for this topic (Sunde et al., 2010). Five case reports described instances where defibrillation attempts with paddles used in the vicinity of high-flow oxygen (greater than 10 litres per minute) generated sparks that caused fires. There were no case reports of fires when shocks were delivered using adhesive pads.

Two manikin studies found that oxygen concentration in the zone of defibrillation was not increased when the oxygen source was vented at least one metre behind the unresponsive person’s mouth. One study described higher oxygen concentrations and longer washout periods when oxygen was administered in confined spaces without adequate ventilation.

Analysis of rhythm during chest compressions

ILCOR recommendations are used for this scientific foundation (Olasveengen et al., 2020). Some modern defibrillators have filtering modes that allow visual or automated rhythm analysis during chest compressions. But we did not find studies that evaluated the effect of the artefact-filtering algorithms on any critical or important outcomes. The studies only assessed the feasibility and potential benefits of this technology. We found studies evaluating artefact-filtering algorithms in animal models of cardiac arrest and simulation studies. Though the result appears to be encouraging, none of these studies evaluated the use of this technology during actual cardiac arrest and resuscitation.

Public-access defibrillation

Two systematic reviews (Holmberg et al., 2017; Baekgaard et al., 2017) and the adult basic life support recommendations from ILCOR are used for this scientific foundation (Olasveengen, 2020). When we compare public access automated defibrillator programs versus systems with traditional EMS response, we can find that for the critical outcome of survival with favourable neurological outcome, one observational study showed an improvement after a public access defibrillator program at one year. Seven observational studies enrolling more than 40 000 people demonstrated an improvement after a public access defibrillator program at 30 days.

We also found that PAD program improved hospital discharge with favourable neurological outcome, survival to 30 days, and survival to hospital discharge. In all cases, the evidence is low or moderate.

Automated external defibrillators for babies and children

Since the last recommendation for this topic in 2010 (Sunde et al., 2010), an update was performed by the Pediatric Basic Life support of ILCOR for the 2020 CoSTR. This update found insufficient evidence to make any changes to the 2010 recommendations.

Data has also shown there is a need for a defibrillator suitable for children and babies. Untreated ventricular fibrillation will lead to death in the absence of prompt defibrillation. Automated external defibrillators reduce the time to shock in many out-of-hospital settings, and first aid providers have successfully used defibrillators on babies. The algorithms used by automated external defibrillators have an acceptable safety and efficacy profile for babies.

For a child above 8 years, first aid providers should use a paediatric device. For a baby, the first aid providers should use an automated defibrillator with a dose attenuator. In all cases, if a specific device is unavailable, an adult defibrillator is acceptable, even for babies.

Energy doses for defibrillation

For this topic, we used the 2019 systematic review and the Pediatric Life Support 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations (Mercier et al., 2019; Maconochie, 2020).

In the 2015 consensus, an initial dose of 2 - 4 J/kg to treat shockable rhythms of cardiac arrest was recommended. For refractory ventricular fibrillation, guidelines recommend increasing the defibrillation dose to 4 J/kg, suggesting that subsequent energy doses should be at least 4 J/kg and noting that while higher levels may be considered, not to exceed 10 J/kg. A single 2019 systematic review of paediatric human and animal studies identified no studies linking the initial or cumulative energy delivered to survival to hospital discharge and no link between long-term survival or survival with good neurological outcome. Meta-analysis could not be performed.

In June 2020, a new study of energy doses for paediatric defibrillation found that for babies and children with in-hospital cardiac arrest and initial ventricular fibrillation. First shock energy doses other than 1.7 to 2.5 J/kg were associated with lower survival to hospital discharge among the 301 people 12 years of age or younger with initial ventricular fibrillation, and first shock doses more than 2.5 J/kg were associated with lower survival rates in people 18 years of age or younger with initial ventricular fibrillation. With this last study and for ease of teaching, a dose of 2 J/kg seems to be a good practice.

Paddles position, size and orientation

This topic's scientific foundation came from an evidence summary completed by ILCOR in 2010 (de Caen et al., 2015). We did not identify sufficient evidence since 2010 to change the treatment recommendations. Paediatric studies demonstrated that transthoracic impedance decreased when pad size increased independently with pad positioning. One paediatric study found no difference in the rate of return of spontaneous circulation between anterolateral and anteroposterior electrode positioning during shock delivery.

Education review

We looked for evidence which contained insights on education considerations on the use of defibrillators. From 22 papers that appeared in our search, we identified five for review.

Educating school administrators and teachers

Zinckernagel et al. (2017) ran a qualitative study using semi-structured interviews and focus groups with 25 participants including nine school leaders and 16 teachers from eight different secondary schools in Denmark. Overall, the results indicated that educating school administrators and teachers about defibrillators affects their attitudes and acceptance of defibrillators within school settings. The perceived ease of use of defibrillators by the participants in this study is correlated with their familiarity with defibrillators. Additionally, participants believed defibrillator education to be helpful but were unclear whether secondary school-aged students should have defibrillator education and access to these devices. These findings identify that school educators are 'gatekeepers' for how and if student defibrillator education will be implemented in schools. It suggests that defibrillator education should be given first and foremost to school administrators and teachers, prior to implementing student education. Educator attitudes and acceptance of defibrillators is crucial to successful defibrillator student education within schools and the overall perception of defibrillator ease of use. Moreover, this study demonstrates that schools may not be aware that defibrillator education is safe and appropriate for students.

Placement of defibrillators

Winkle (2010) compares the use of defibrillators within various settings and highlights that defibrillators are most effective and cost-effective when placed in environments which have a high number of people passing through (e.g. airports, casinos, health clubs). Additionally, the author finds that defibrillators in a community or individual residences are less likely to be used and do not change the rate of resuscitation. These findings suggest that if defibrillators are placed in certain public settings, the public should be made aware of their existence, location, and how to use them.

Brooks et al. (2015) examine whether low rates of public access defibrillator use by bystanders are attributed to public confidence and knowledge. The study took place at a busy shopping centre in the United Kingdom. Using semi-structured interviews and open-ended questions, 1004 participants, ranging in age from 9-90, answered questions about first aid education, basic life support and defibrillator knowledge. They were also given a scenario involving witnessing someone who had collapsed and was unresponsive and asked to describe step-by-step their actions. A majority of participants (79%) reported that they had knowledge of what to do in if someone was not breathing and knew what a public access defibrillator was. However, only 26.1% of participants knew how to use a defibrillator. Just 5.1% of participants knew how to locate the nearest public access defibrillator and 3.2% said they would try to locate a defibrillator. Only 2.1% would attempt to find the defibrillator and use it in a cardiac arrest emergency. The findings of this study indicate that low defibrillator use stems from inadequate public access defibrillator awareness, education and confidence, rather than a lack of defibrillators installed in public settings. The authors suggest that defibrillators are not marked well or placed in highly visible locations, therefore impacting public knowledge of their existence. Moreover, previous first aid education influenced the rate at which participants were able to locate defibrillators and their willingness to retrieve and use them.

Professional healthcare instructors versus non-healthcare-professional instructors

Castren et al. (2004) compare the resuscitation skills of learners educated by non-healthcare-professionals compared to healthcare professionals. All learners (n=38) had no previous defibrillator experience. Ten pairs of learners were educated by four newly educated non-healthcare-professional instructors and the other nine pairs were educated by four healthcare professionals. All eight instructors provided a four-hour course in basic lifesaving and defibrillator skills and then after two weeks, they received a four-hour instructor course. All learners participated in two scenarios and used a trainer-defibrillator and a manikin. Each pair was assessed with a 49-point checklist. A control group of trained first aid staff from the Red Cross was used. Results showed no difference in the performance rates of learners educated by non-healthcare-professionals and those educated by healthcare professionals. However, the nearly 100% correct performances of the educated first aid control group highlighted the importance of the continuous and frequent practise of basic lifesaving and defibrillator skills - this group practised basic lifesaving and defibrillator skills every two weeks. This study suggests that non-healthcare-professionals can deliver basic lifesaving and defibrillator skills education just as effectively as healthcare professionals. Non-healthcare-professionals may have more capacity than healthcare professionals to engage in education, and they may be able to educate others in the community on a larger scale. There is a need for improved and confident timing of step-by-step actions (e.g. positioning of pads for defibrillation) by learners. As timing is crucial for optimal effectiveness of care, this may be something to specifically address when educating.

Dispatcher-assisted-video

You et al. (2010) examine whether the approach of providing defibrillator instructions for untrained first aid provider via dispatcher-assisted video phone technology improves the success of defibrillator use. 52 public officers with no previous defibrillator education or experience were recruited for this study. All participants were provided with a universal prompt, a phone with video capacity, a trainer-defibrillator, and a dressed manikin to simulate an unresponsive person with abnormal breathing. All participant phones were connected with an emergency dispatcher using the same video phone technology. The results suggest that video-assisted phone technology may further support first aid providers with accurate defibrillator use (e.g. pad placement and delivering shocks) as the video element allows dispatchers to monitor first aid provider actions and provide corrections if necessary.

Unresponsive and abnormal breathing with suspected opioid overdose

Key action

Use naloxone for suspected opioid overdose when giving CPR to improve the person's chance of survival.

Introduction

Use of drugs especially opioids can cause impairment of mental status, unresponsiveness and breathing difficulties. These effects can be more pronounced and more dangerous in certain circumstances such as when used in combination with other substances, including alcohol, and may result in an overdose. An opioid overdose is a life-threatening condition resulting in abnormal breathing (e.g., taking irregular or noisy breaths, or stopping breathing altogether) and cardiac arrest. Deaths from opioid overdose are an increasing public health problem in many countries worldwide. Naloxone is a drug which reverses the effects of an opioid overdose if taken in time (WHO, 2020) so the administration of this antidote can be a powerful life-saving tool. However, this topic provides an example of complex social dynamics at play with whether or not people experiencing overdose receive help, and whether people surrounding those at risk of overdose are equipped to help.

This topic should be used in conjunction with Unresponsive and abnormal breathing (adolescent and adult) **or** Unresponsive and abnormal breathing (baby and child).

Guidelines

- Cardiopulmonary resuscitation (CPR) should be started without delay on a person who is unresponsive and has abnormal breathing (e.g., taking irregular or noisy breaths, or they have stopped breathing altogether).**

Good practice points

- CPR should be provided with rescue breaths if the first aid provider is willing to give them.
- Naloxone may be administered by the first aid provider to a person who is unresponsive and has abnormal breathing with suspected opioid overdose. The first aid provider should follow the guidance on the package to administer it. Application is usually by nasal spray or by injection into the upper arm or thigh muscle. Continue to provide CPR while naloxone is being administered, if possible.
- Following administration of naloxone, if there is no improvement after 5 minutes or if the signs of intoxication reappear, the first aid provider may repeat the administration of a new dose of medication.
- People who use opioids should be trained to recognise an overdose, how to administer naloxone, and how to provide CPR.
- Family members, caregivers and peers of people who use opioids may also be trained in overdose recognition, providing CPR, naloxone administration, and how to access onward care.
- The signs of an opioid overdose can vary based on the type of chemical substance and the dose taken. Empty bottles or blisters packs of drugs, syringes, needles, spoons for preparing the injection may point toward an opioid overdose.
- The administration of naloxone to a person experiencing a suspected opioid overdose may be considered by first aid providers who have appropriate training, and if local regulations allow.
- The search for and use of naloxone should not delay the provision of CPR.
- Specially trained first aid providers like harm reduction workers and community health workers or other social care workers should be familiar with administering naloxone.

- Professional responders such as paramedics should know how to administer naloxone and train others to do so. They should be encouraged to treat people who use opioids with equity and dignity and to recognise people who use opioids can provide life-saving interventions in the instance of overdose.
- The lived experience of opioid overdose by people who use drugs should be drawn upon in education interventions to improve educational effectiveness.

Chain of survival behaviours

Prevention

- Support community programmes which help people who use opioids and their families to develop an awareness of the dangers of opioid use and the risks associated with overdose.
- Advocate for dedicated support to people at high risk of overdose (such as people newly released from prison and people with mental health disorders).
- Advocate safe prescribing regulations for opioids, and adequate support and education for those using prescription opioids.

Recognition

You may know the person uses prescribed or non-prescribed opioids. There may be signs to indicate an opioid overdose, for example, empty bottles or blisters packs of drugs, syringes, needles, or a spoon for preparing the injection.

The person is unresponsive with abnormal breathing. Their breathing may be slow or absent, or they may make a snoring or gurgling sound (this should be considered (abnormal). For guidance on how to check for a response and breathing, see Unresponsive and abnormal breathing (adolescent and adult) or Unresponsive and abnormal breathing (baby and child).

First aid steps

1. Begin CPR immediately, starting with two to five rescue breaths if possible.
2. Ask a bystander to access emergency medical services (EMS), or if you are alone access EMS yourself. If using a phone, activate the speaker function.
3. Ask a bystander to bring the naloxone as quickly as possible.
4. Administer the naloxone according to the guidance provided as soon as it is available, only pausing CPR if is absolutely necessary.
5. Continue CPR (with rescue breaths if possible) until the person shows signs of recovery, such as signs of life (opening their eyes, speaking or moving purposefully) or starts to breathe normally or until EMS take over.
6. If there is no improvement after five minutes (or if the signs of overdose reappear), repeat the administration of a new dose of medication.

NOTE

- When delivering CPR, rescue breaths may be beneficial for someone who is experiencing an opioid overdose as their cardiac arrest is usually due to abnormal breathing, so there may be low levels of oxygen in their blood.
- If you are alone and the naloxone is in the immediate vicinity, you can leave the person to quickly get it.
- It is possible the administration of naloxone may cause the person to wake up suddenly with confusion and sometimes aggressiveness. Be prepared for this and adjust your distance and behaviour to respond to the situation.
- If possible, make note of the time the naloxone is administered and provide this information to EMS or another medical professional.

Access help

- In an instance where you are unable or unwilling to approach the person experiencing an opioid overdose, access help as quickly as possible.
- An opioid overdose is a life-threatening condition requiring urgent medical care. Explain the condition of the person clearly and accurately to EMS so they can prioritise your case.
- Even if naloxone has been administered, and the person shows signs of recovery, EMS should be accessed as there is a chance the person may relapse into overdose. Naloxone generally remains effective for about 5 - 10 minutes. Monitor the person's breathing closely in case further administration of naloxone or CPR is required while waiting for help to arrive.

Education considerations

Context considerations

- The administration of naloxone varies depending on the context. Consult local authorities on the prevalent administration methods and regulations.
- Opioid overdose is a growing concern worldwide and programme designers need to consider the prevalence in their country, the populations it affects and the contexts in which those populations live.
- Stigma and marginalisation from mainstream healthcare services are common among people who use drugs. Consider education approaches with this in mind, ensuring your behaviour is inclusive and ethical, and actively advocate against discrimination.
- Tailor education approaches to the appropriate context whilst being careful not to label learners or make assumptions about them (such as literacy levels, attention span, ability, etc).
- Develop education opportunities through partner organisations with specialist knowledge of the learners where possible.

Learner considerations

- There are many learner groups who can be targeted with education on this topic, including social workers, community health workers, first responders, and the friends, peers and families of people who use opioids (Strang et al., 2000; Seal et al., 2003; Buchman et al., 2018).
- Bear in mind that some learners might struggle to find a time when they can learn. Work with partner organisations to identify when sessions should happen, how long they should last and what other adaptations you might need to make (Taylor et al., 2019).
- Some learners may have had a traumatic experience of an opioid overdose. Ensure facilitators are aware of this and prepared to deal with it (Taylor et al., 2019).
- Learners might feel disconnected with, or unable to access EMS, possibly because they are afraid, or they have had a bad experience. Help these learners to build confidence to act by describing their role in the chain of survival behaviours, and in the continuum of care that they become part of (Lackenau, 2013; Orkin & Buchman, 2017).
- Be considerate of the stigma that some learners feel (Denchman, 2013; Neale, 2018).

Facilitation tips

- The focus of education should be on:
  - > How to recognise an opioid overdose.
  - > How to react to an emergency involving an opioid overdose.
  - > How to effectively administer naloxone.
- Develop learner-led education sessions where learners are encouraged to share their experience, knowledge, and fears to shape education. Learners might well have lived experience of this topic that facilitators can draw, both empowering the learner and enriching the learning experience for others (Buchman et al., 2018; Taylor et al., 2019).
- If scenarios are used, be careful not to stereotype the situation or the person who is overdosing. Opioid use covers all sectors of society.
- Try using a guided (non-scripted) approach to sessions as this allows the learners to direct the session with the facilitator confirming the techniques in summary.
- Ensure learner groups are not too small as this can reduce the potential for conversation and discussion. Groups of 5 or 6 learners can work well, allowing time for each learner to share experiences. Avoid facilitating large learner groups as this can be intimidating and hard to develop engagement.
- If the learner group is composed of people who use opioids, consider keeping education sessions short (20 to 30 minutes) with regular breaks.
- Be alert to the fact that learners may know more about street drugs (names and types) and how they affect people than the educator. Facilitators should not pretend to know everything but should empower learners to share what they know.
- Raise awareness that most of the time, the first aid provider will know of the person and that they use opioids. It is more uncommon to need to respond to a stranger.

Facilitation tools

- Storytelling may be a very effective method of delivery for this learner group.
- Peer to peer learning can be an effective way for learners to provide mutual support to each other.
- If using the AVPU scale (Alert, Verbal, Pain, Unresponsive) which describes what kind of stimulus a person reacts to and can be used to determine the level of responsiveness, highlight that a person with an opioid overdose may respond to a painful stimulus.

Scientific foundation

Systematic review

A 2020 review by the International Liaison Committee on Resuscitation (Olasveengen, 2020) did not identify any studies reporting any critical or important outcomes for adults or children with suspected opioid-associated cardiac or respiration arrest in any setting, comparing bystander naloxone administration (intramuscular or intranasal) plus conventional CPR, to conventional CPR only.

ILCOR did identify a summary of four case-series including 66 people, in which 39/39 people who received naloxone after an opioid overdose recovered, compared to 24/27 who did not receive naloxone. ILCOR stated that at the population level, there is evidence to demonstrate improved outcomes in communities after the implementation of various naloxone distribution schemes. A recent systematic review identified 22 observational studies evaluating the effect of overdose education and naloxone distribution using the Bradford Hill criteria, and found causation between the implementation of these programs and decreased mortality rates to be likely.

Non-systematic review

The safety of naloxone in a prehospital setting administered by first aid providers has not been formally established but will likely parallel medically supervised experiences. Naloxone dose and route of administration can produce a variable intensity of potential adverse reactions and opioid withdrawal symptoms. Serious adverse reactions after naloxone administration occur rarely and may be affected by other co-intoxicants and the effects of prolonged hypoxia.

As a response to the growing epidemic, naloxone has been widely distributed by health care authorities to people in various opioid overdose prevention schemes. Overall, these programs report beneficial outcomes at the population level. The ILCOR basic life support task force, therefore, considers it very likely that the desirable effects outweigh undesirable effects, and that use of naloxone is acceptable by key stakeholders as well as the general population(Olasveengen, 2020).

Education review

Ten papers are included in this review which provides insight at different points over the last 20 years on this topic. They are all from either the US, Canada or the UK reflecting an evidence gap from other parts of the world.

Willingness to help

Strang et al. (2000) present findings from interviews with 115 people attending a methadone maintenance clinic. It was found that people who use drugs have a high level of willingness to help others experiencing an overdose. Strang et al. conclude there is an urgent need to increase education opportunities and effectiveness to the user group. This would make the most of this willingness in a population that is likely to witness an overdose.

Take-home emergency naloxone

Seal et al. (2003) reflect on the potential of access to take-home naloxone. The study frames this access as a peer-based, life-saving addition to accessing emergency services but acknowledges the need for it to be embedded within a wider overdose management plan which incorporates education and community support. Strang et al. (2013) develop this concept further in a randomised trial where prisoners were given take-home naloxone and identified the need for training to be integral to the provision of the antidote. Klimas et al. (2015) add to this by identifying a need for healthcare professionals to be trained in how to support people to take naloxone.

Improving access to emergency care

Following a study in Scotland of the effectiveness of overdose education and naloxone distribution programmes (McAuley et al., 2017), Orkin and Buchman (2017) stated that such educational programmes should not distance people from emergency medical services at the very moment when they are most vulnerable and most in need of professional care. Rather, education should integrate bystander and first aid interventions for opioid overdose with a continuum of appropriate care.

This theme was explored further by Buchman et al. (2018) in a discussion paper on the ethics of such education programmes and the intentional and unintentional impact that they might have on vulnerable populations. They argue that having alternative approaches to care for people already excluded from mainstream services does little to dismantle the structural barriers that separate stigmatised people from healthcare systems—and may in fact entrench exclusion. They go on to suggest naloxone distribution programmes only provide part of the answer, and the bigger question is one about the broader social determinants of drug use and stigma. While empowering learners from vulnerable and excluded populations through acknowledgement of their lived experience, the challenge of inaccessibility to mainstream healthcare for them is exacerbated.

In a study to assess community based opioid prevention programmes in the US, a key barrier identified to providing help was fear that calling EMS would draw police to the scene in addition to paramedics (Lankenau, 2013). Dechman (2014) reports on a similar barrier to calling for help which is the attitude of those who arrive to provide care, which can sometimes be humiliating and degrading. This can lead to first aid providers (peers) developing a host of additional roles in order to support their peer group without having to face professional healthcare providers.

Competence to help

Neale et al. (2018) built on this evidence base with training for people who use opioids to test their competency to help effectively. They cited literature and experiences of people who felt stigmatised and routinely associated with incapacity to deal with the harms they cause. Their experiment found high levels of competency despite the diverse cognitive, emotional, experiential, interpersonal and social factors over which they had little control.

Considerations for learning design

Taylor et al. (2019) used quantitative methods to test whether introducing an additional naloxone component to overdose education for people who use drugs and their peers would affect the confidence and willingness to respond effectively to an overdose and collected qualitative feedback from educators. Findings were pertinent to educators in the following ways:

- The need for facilitators to create a safe space for learners to talk, and for space in the session to be given to learners to share experiences and provide peer to peer support.
- The need for facilitators to be extremely flexible in when to plan sessions given the chaotic nature of the lives of some of the participants, including attention spans and the need for frequent breaks.
- Consideration of learning materials bearing in mind reading levels and time available for providing feedback during a time-limited session.

Breathing problems

Choking

Key action

Dislodge the obstruction in the person's throat so they can breathe.

Introduction

Choking occurs when the airway is partially or completely blocked by a foreign body, such as a piece of food or an object (a magnet or small toy). Choking is also referred to as a foreign body airway obstruction and is a common cause of breathing emergencies, especially in young children. Deaths related to choking underline the importance of preventive and first aid measures. It is one of the most common life-threatening emergencies seen by first aid providers. The technique used to help someone who is choking depends on the person's age, size and level of responsiveness.

NOTE

In this topic, a baby refers to someone who is less than one year old. A child refers to someone who is one year or older.

Guidelines

- Immediately after recognition, bystanders can carry out interventions to support the removal of a foreign body airway obstruction.*
- Back blows may be used initially on people with a foreign body airway obstruction and an ineffective cough.*
- Abdominal thrusts may be used on adults and children with a foreign body airway obstruction and an ineffective cough where back blows are ineffective.*
- First aid providers may consider the manual extraction of visible items in the mouth.*
- First aid providers should not use blind finger sweeps on a person with a foreign body airway obstruction, as this may push the object further down the person's airway.*
- First aid providers should use standard CPR, consisting of both chest compressions and rescue breaths if possible, on an unresponsive person with a foreign body airway obstruction.*

Good practice points

- When helping a responsive person, first aid providers must be able to recognise the signs of partial airway obstruction (the person can speak, cough and breathe) and complete airway obstruction (the person is unable to speak, has a weakened cough and has difficulty breathing).
- A person with partial airway obstruction should be monitored until they improve, as it could develop into a complete airway obstruction.
- Responsive babies may receive a combination of back blows followed by chest thrusts to clear the obstruction from the airway.
- Back blows and abdominal thrusts or chest thrusts should be applied in quick succession until the obstruction has been cleared from the airway.
- In responsive adults and children who are choking, chest thrusts, back blows or abdominal thrusts are equally effective.
- An unresponsive baby should receive a combination of rescue breaths and chest compressions to clear the obstruction from the airway. (See Unresponsive and abnormal breathing baby or child.)

Chain of survival behaviours

Prevent and prepare

- Understand the difference between partial or complete choking and Asthma attack, Allergic reaction and anaphylaxis and other conditions that may cause sudden breathing difficulties.
- Be aware when people are eating as this is usually when choking occurs.
- Monitor a baby who is eating or might put something in their mouth.
- Be aware that people who have reduced responsiveness, a neurological impairment that affects their swallowing and coughing reflexes (e.g., Stroke, Parkinson's disease, cerebral palsy or dementia) or respiratory disease are at an increased risk of choking. People are also at a higher risk if they are intoxicated (due to drugs or alcohol), if their teeth are in poor condition or if they are an older adult.

Early recognition

The person may have had something in their mouth, such as food. Ask the person: "Are you choking?".

Mild choking

- Weak or forceful coughing
- Can speak or cry out
- Makes high-pitched noises while inhaling, but is still able to breathe

Severe choking

- Unable to cough, speak, cry or breathe
- Clutches the throat with one or both hands
- Panic
- Bluish colour to the skin of the lips, ears, fingers and toes
- Becomes unresponsive if the blockage is not removed

First aid steps

Adults and children

Mild choking

1. Encourage the person to cough to clear the blockage.
2. Monitor the person until they improve, as it could develop into a complete airway obstruction.

Severe choking

1. If the person cannot cough, speak or breathe, give up to five firm blows between their shoulder blades.
2. If the back blows are unsuccessful, give up to five abdominal thrusts by putting your fist between their ribs and their belly button and pulling it sharply inward and upward using the other hand.
3. If the abdominal thrusts are unsuccessful, immediately access emergency medical services (EMS).
4. Continue alternating between five back blows and five abdominal thrusts until the blockage clears or the person becomes unresponsive.

NOTE

- If the person has mild choking, avoid taking action as they may be able to clear the airway more effectively on their own.
- If the person becomes unresponsive, give standard CPR. (See Unresponsive and abnormal breathing for adolescents and adults or babies and children.)
- Only remove solid material in the airway with your fingers if you can see it. Do not blindly sweep the mouth with your fingers.

Babies

Mild choking

1. If the baby is coughing, wait to see if they can cough to clear their own airway.
2. Monitor the baby until they improve, as it could develop into a complete airway obstruction.

Severe choking

1. If the baby cannot cough or breathe, give up to five firm blows between their shoulder blades.
2. If the back blows are unsuccessful, turn the baby over and give up to five chest thrusts by pushing sharply downwards in the centre of their chest.
3. If the chest thrusts are unsuccessful, access EMS immediately.
4. Continue alternating between five back blows and five chest thrusts until the blockage clears or the baby becomes unresponsive.

NOTE

- If the baby becomes unresponsive, start standard CPR.
- Only remove solid material in the airway with your fingers if you can see it. Do not blindly sweep the mouth with your fingers.

Access help

- In the case of severe choking, always access EMS. The person may have internal injuries from the abdominal thrusts, or the object may have caused some damage to their airway. Even if they are no longer choking, they may have a piece of the object in their lungs that can later cause complications.
- In the case of mild choking, the person should seek medical care if they continuously cough, experience difficulty swallowing or feel as though the object is still stuck in their throat.

Education considerations

Context considerations

- Consider which contexts learners are most likely to encounter choking and if there are specific signs to which they should be more alert. For example, those working with older adults at an assisted living residence should recognise what it looks like to choke. Conversely, the signs of choking present differently in babies so learners caring for this age group will need to be aware of those signs.
- Because choking often happens while eating, a choking emergency could happen in a public place. Programme designers may consider framing this as a "helping behaviour" topic as it is one where the Bystander Effect could result in people feeling uncomfortable to step forward and help. Emphasise the first step as asking the person if they are choking.
- In babies and children, reported cases of choking occur while eating or playing with non-food items such as coins or small toys. Learners should explore ways to reduce the risk of babies and children putting objects in their mouths; for example, placing small items out of reach.

Learner considerations

- Some babies experience mild choking frequently when they are learning to eat solids. While usually not serious, the experience can be very distressing for caregivers. Include an opportunity for caregivers to share their fears and their experiences as a way of building confidence to help babies effectively.
- Learning to give back blows can be challenging as it is not possible to practise this on another person for fear of hurting them. Stress that a gentle slap will not expel the object stuck in someone's throat: force is needed to dislodge the object even if this might hurt the person.
- If the learners are likely to need to help a pregnant or obese person with choking, see the Facilitating choking skills resource for an adaptation for abdominal thrusts.

Facilitation tips

- Focus choking education on the prevention and first aid domains within the Chain of survival behaviours.
- Explain why it is important to do the different actions on someone who is choking. Back blows create a strong vibration and pressure in the airway while abdominal thrusts and chest thrusts squeeze the air out of the lungs, creating additional pressure in the airway. These techniques may dislodge the object and help the person to breathe again.
- Explore how using gravity (by bending over or holding the baby's head lower than the body) can help dislodge the foreign object or liquids drain out.
- Learners practising back blows and chest thrusts for a choking baby should sit or kneel. Although it can be easy to hold a manikin baby in one arm (straddle arm technique), it can be more challenging with a real baby, especially for younger learners. Supporting the baby on their lap can be more effective and safer (Gesicki & Longmore, 2019).
- Explain that learners should not use abdominal thrusts for babies as their organs are still developing and may get damaged.
- While facilitators may include participants in demonstrating how to position oneself to give back blows and abdominal or chest thrusts, the real actions should be demonstrated on a manikin.
- If teaching children or demonstrating for a child, the facilitator should go on their knees at the child's height to demonstrate back blows and abdominal thrusts.
- Explore and address any misconceptions about choking, such as giving the person a drink to clear the blockage or hanging a baby upside down.

Facilitation tools

- When instructing learners on how to do back blows and abdominal or chest thrusts, refer to the resource Facilitating choking skills.
- Use videos or demonstrations to help learners understand how to do back blows, chest thrusts or abdominal thrusts. Emphasise that while these actions may seem aggressive, they could save the person's life. Explain that learners should adapt the force of their actions depending on the size of the person, but that those actions still need to be forceful enough to clear the airway.
- In addition to manikins, use objects such as punching bags or stuffed sacks to practise back blows and abdominal or chest thrusts.
- Develop scenarios to practise recognising and helping someone who is choking. These scenarios may be used to assess learners' knowledge and skills on this topic.

Learning connections

- If someone who is choking becomes unresponsive it is necessary to start CPR as the chest compressions or rescue breaths may dislodge the object from their airway and help them to breathe again. See Unresponsive and abnormal breathing adolescent and adult or baby and child.

Scientific foundation

The International Liaison Committee on Resuscitation (ILCOR) conducted a systematic review on foreign body airway obstruction (Olasveengen et al., 2020).

Back blows

One case series reported the survival of all people treated with back blows. Three case series reported relief of airway obstruction in all people treated with back blows. Four studies reported four cases of injuries or complications in people treated with back blows. Very low-certainty evidence downgraded for very serious risk of bias and/or serious indirectness.

Abdominal thrusts

Six case series reported survival with the relief of a foreign body airway obstruction in all people treated with abdominal thrusts. However, in 49 studies, cases of injuries or complications were reported in people treated with abdominal thrusts. Very low certainty evidence downgraded for very serious risk of bias.

Chest thrusts / compressions

For the critical outcome of survival with a favourable neurological outcome, one observational study showed a benefit to using chest compressions. One case series reported relief of a foreign body airway obstruction in people treated with chest thrusts or compressions. Four studies reported five cases with injuries or complications in people treated with chest thrusts or compressions. Very low-certainty evidence downgraded for very serious risk of bias and/or very serious imprecision.

Finger sweep

ILCOR identified ten observational studies (mainly case series) regarding using a finger sweep.

One case series reported survival in all people treated with a finger sweep. Two case series reported relief of foreign body airway obstruction in all people treated with a finger sweep. Very low-certainty evidence downgraded for very serious risk of bias and serious indirectness.

Eight studies reported ten cases of injuries or complications in people treated with a blind finger sweep. Very low-certainty evidence downgraded for very serious risk of bias.

The studies could therefore not conclude a benefit to using this approach.

Foreign body airway obstruction removal by bystanders

For the critical outcome of survival with a good neurological outcome, one observational study showed a benefit to foreign body airway obstruction removal by bystanders, compared with no bystander attempts. Very low-certainty evidence downgraded for very serious risk of bias.

Other

The evidence about the use of Magill forceps or suction-based airway clearance devices is not provided here.

Education review

The papers we reviewed raised important considerations for learners, particularly concerning a choking baby. Gesicki and Longmore (2019) compared the length of a standard baby manikin with the length of adult forearms. Based on data, they found that the traditional straddle-arm technique was not physically possible for many first aid providers and recommended a more supported version with a seated or kneeling first aid provider.

Breathing difficulties

Key action

Help the person get into a comfortable position (usually seated).

Introduction

A person with breathing difficulty may complain of tightness in the chest or feeling suffocated; they may have very rapid or noisy breathing, or perhaps struggle to inhale. The most important causes that may need first aid are Choking, heart failure (see Unresponsiveness) or an acute episode of a known condition (such as Asthma or chronic obstructive pulmonary disease). Hyperventilation is also a relatively frequent breathing disorder which is usually a consequence of anxiety or being upset and usually passes quickly. In babies and young children, breathing difficulties could also be caused by Croup or bronchiolitis.

Guidelines

- People with breathing difficulties may experience relief from a comfortable position such as a seated position or an arm bracing position (leaning forward with arms braced and leaning on a support).*
- A person who is hyperventilating may be reassured. Rebreathing in a paper bag may also help relieve the symptoms.*

Good practice points

- First aid providers may assist the person to take their medication if they have any.
- If the person is experiencing severe breathing difficulties as well as a change in mental status (such as confusion or drowsiness) the first aid provider should access emergency medical services (EMS) and continue to observe and assist the person until help arrives.
- In certain cases, a specially trained first aid provider can give supplementary oxygen.
- If the person's breathing does not improve after 10–15 minutes, medical care should be considered.

Chain of survival behaviours

Prevent and prepare

- Be aware of any conditions, such as asthma or lung disease, that family, friends, and co-workers have; and how to help them if there is an emergency.
- If possible, avoid entering places with poisonous gases or smoke without appropriate breathing equipment.

Early recognition

Breathing difficulties can be subjective. What may seem severe to one person may not be severe to another. Listen to the person and look for clues in their behaviour and the surrounding environment.

The person may tell you or indicate that they are having difficulty breathing, or that they have a pre-existing medical condition such as asthma or lung disease.

The signs and symptoms a first aid provider may look for to indicate breathing difficulties include:

- shortness of breath
- laboured breathing
- noisy breathing

- coughing
- rapid breathing rate (more than 40 breaths per minute in babies; 30 in children; 20 in adults)
- slow breathing rate (less than 25 breaths per minute in babies; 15 in children; 10 in adults)
- not being able to count to 10 after one deep breath in
- use of accessory muscles for breathing (neck, shoulders)
- movement of nostrils
- bluish colour to the skin of the lips, ears, fingers and toes.

Hyperventilation is also characterised by other typical signs and symptoms, such as:

- dizziness
- headache
- sweating
- tingling sensation in hands, feet, fingers or mouth.

NOTE

Be alert as dangerous gases and other substances can cause breathing difficulties.

First aid steps

Breathing difficulties

1. Help the person into a comfortable (usually seated) position and reassure them. They may experience relief by sitting leaning forward with arms braced and leaning on a support.
2. Assist them to take their medication if they have any. Loosen any tight clothing.
3. Access EMS immediately if:
    - their medication is ineffective after a couple of minutes
    - the person is experiencing severe breathing difficulties
    - the person has a change in mental status, such as confusion, drowsiness or unresponsiveness
    - their breathing becomes slow
    - their lips, fingers or ears turn a bluish colour.
4. If properly trained and access to supplementary oxygen is available, give it to the person as needed. (See Oxygen administration.)
5. Continue to observe the person, keeping them calm and comfortable. Stay with the person until their breathing returns to normal.

Hyperventilating

If the person is hyperventilating:

1. Move the person to a quiet place and ask bystanders to keep their distance. If possible, remove the cause of the panic attack.
2. Comfort the person and act calmly and predictably. Ask them to breathe in and out slowly and steadily into their shell-folded, closed hands or into a paper bag.
3. Loosen any tight clothing.
4. Stay with the person until their breathing returns to normal. Once calmed down, let them breathe in ambient air.

NOTE

If the person is unresponsive, open their airway and check for breathing. See Unresponsiveness.

Access help

- In the case of hyperventilation, access EMS if:
  - > the panic attack continues
  - > you suspect that it may not be caused by a panic attack.

Recovery

- Following a person's first episode of breathing difficulties, encourage them to start to recognise the signs of breathing difficulties as early as possible. This is so they can consider taking their medication (if they have any) and to get into the most comfortable position possible or access help if signs are severe.
- Encourage the person to seek specialised medical care for recurring panic attacks.

Education considerations

Context considerations

- Research has identified that both within and between communities, people may treat breathing difficulties differently. Some communities and individuals wait to seek assistance when in a much more advanced phase of illness (Cartledge et al., 2017).
- In remote areas, it may be beneficial to drive towards the nearest medical facility and meet the EMS vehicle en-route. First aid programme designers should know the availability and response time of pre-hospital services in their area as these may be limited. Education should emphasise that early recognition of potentially time-critical problems is essential.
- Tailor education to learner needs according to the environment they are in (for example areas of high air pollution); or if there is a particular situation where breathing difficulties might become apparent (such as during a Pandemic).
- Non-emergency medical services may be able to treat breathing difficulties that occur slowly and over time. First aid education should include advice about the available options in local health services.

Learner considerations

- Educators should be mindful of the cultural, gender and age-based factors that may influence learners' understanding of breathing difficulties and severity. Ensure first aid programme content is inclusive.
- Learning about how to recognise and respond to breathing difficulties could benefit carers of older adults who have chronic lung or heart conditions, parents with babies, and caregivers of children with asthma.
- Learners who spend time in smoky or dusty environments (such as firefighters or construction workers), or in places where there might be chemicals (such as laboratories, factories or farms), could benefit from learning about breathing difficulties.

Facilitation tips

- Emphasise the importance of listening to the person's breathing to help identify any problems that may worsen and result in a medical emergency. Highlight that breathing can deteriorate over time.
- Re-visit what "normal" breathing looks like by counting breathing rates and regularity.
- Ask learners to show how they think someone may look or act when experiencing breathing difficulties.
- Explore learners' understanding of the term "breathing difficulty", as well as the causes and their experience with it. They might have different interpretations which could affect their response and willingness to act. For example, people with a specific type of breathing difficulty called orthopnoea have trouble breathing when they lie down, typically at night, and may not seek assistance if they feel they can resolve the symptom by sitting upright.
- Run scenarios to rehearse recognising and responding to the typical presentation of various types of breathing difficulties. Assessing the scene for hazards should be a part of the exercise.
- Regarding hyperventilation, explain the purpose of breathing into shell-folded, closed hands or into a paper bag is to develop a normal balance between the amount of oxygen and carbon dioxide in the blood.
- Explain to learners that someone who is hyperventilating may benefit from following a breathing rhythm. Have learners practise setting an example and encouraging someone to follow their breathing rhythm. This may have a count of one to breathe in through the nose and a count of three to breathe out through the mouth.

Facilitator tools

- Use videos to show normal breathing and changes in breathing (e.g., asthma attack), as well as brief clips to demonstrate life-threatening breathing problems.
- Use scenario-based learning to help individuals integrate assessment skills. (See General approach.)
- A method of assessing breathing difficulty is to ask the person to take a deep breath and then have them count from 1 to 30, clearly but quickly (Roth Score). If the person cannot count to 10, at most, they have breathing difficulties. Give learners time to practise this method.

Learning connections

- Common causes of breathing difficulties include Chest injury, chronic obstructive lung disease, bronchitis, Croup (babies and children) and bronchiolitis (babies and young children).
- Other life-threatening conditions which result in breathing difficulty include Choking, heart failure (see Unresponsive and abnormal breathing) and Asthma attack.
- Consider whether it is appropriate for learners to learn about Oxygen administration.
- Any stressful situation, including ones where first aid for injuries and illness might be required, could cause some people to panic. (See Mental distress.) Learning how to calm a person who is hyperventilating could be an important part of scene management.

Scientific foundation

Systematic reviews

The Centre for Evidence-Based Practice (CEBaP) completed evidence reviews on shortness of breath and posture, as well as hyperventilation and breathing in a paper bag. The evidence in both studies is of low certainty and results are considered imprecise due to limited sample size and lack of data.

Shortness of breath and posture

There is limited evidence from three experimental studies in favour of arm bracing and sitting.

A randomised controlled trial showed that arm bracing resulted in a statistically significant decrease of Borg dyspnoea scale. It was compared to leaning forward while standing or erect standing in people with stable chronic obstructive pulmonary disease experiencing shortness of breath (dyspnoea). A statistically significant increase or decrease of Borg dyspnoea score, standing erect compared to leaning forward while standing, could not be demonstrated. In a second randomised controlled trial, it was shown that a sitting position resulted in a statistically significant decrease in Borg dyspnoea score, compared to lying on their back (supine position). In a third trial, a statistically significant change in Borg dyspnoea score, sitting compared to lying on the back (supine), could not be demonstrated. Evidence is of low certainty.

Hyperventilation and breathing in a paper bag

There is limited evidence from one experimental study in favour of breathing in a paper bag. This study in which 12 healthy volunteers were instructed to hyperventilate deliberately showed that breathing in a paper bag resulted in a statistically significant decrease in time to reach baseline CO_2 levels and time to symptom disappearance, compared to not breathing in a paper bag. A statistically significant decrease in time to symptom disappearance when breathing in a closed-circuit tube system, compared to an open circuit tube system, could not be demonstrated.

Asthma attack

Key action

Help the person to sit in a comfortable position and ask them to use their inhaler.

Introduction

Asthma is a chronic illness of the airways in the lungs. When an attack occurs, the airways in the lungs swell, narrow and produce extra mucus, making it difficult to breathe. The person may also wheeze and cough. A severe asthma attack can be life-threatening. Many people with asthma have been prescribed and can self-administer medication through an inhaler. Immediate first aid can sometimes prevent the person from needing to go to the hospital. For children, asthma is a common chronic disease worldwide.

Guidelines

- People with breathing difficulties may experience relief from a comfortable position such as a seated position or an arm bracing position (leaning forward with arms braced and leaning on a support).*
- A first aid provider familiar with the commonly used bronchodilator inhaler devices (inhaler) may assist a person in using the person's own inhaler if local regulations allow.*
- A first aid provider specifically trained may administer bronchodilator upon his or her discretion, if local regulations allow.*
- Fitting a spacer device to an inhaler for medication administration may help to improve the person's breathing.*

Good practice points

- A person experiencing an asthma attack should be reassured.
- Loosening any restrictive clothing may help the person breathe more comfortably.
- If the person has no inhaler, if the inhaler is ineffective, or if the person is experiencing severe breathing difficulties (change in mental status, slow and less noisy breathing), the first aid provider should access emergency medical services (EMS). Continue to observe and assist the person until help arrives.
- The first aid provider should move the person away from things that may be triggering the attack such as smoke or dust.
- Specifically trained first aid providers can give supplementary oxygen to a person having an asthma attack if local regulations allow this. (See Oxygen administration.)

Chain of survival behaviours

Prevent and prepare

- People with asthma should regularly take medicine as prescribed by their doctor and learn about how to manage their condition.
- Educating school staff about asthma can be important to ensure children get the right care when they have an asthma attack at school. This should include learning how to lessen the likelihood of frequent and severe asthma attacks in children.

Early recognition

Usually, a person with asthma knows about their condition and may have their inhaler with them. The person may be able to indicate they are having an asthma attack. They are usually found in an upright position; sometimes sitting leaning forward.

The person may experience:

- difficult or laboured breathing accompanied by wheezing and coughing
- shortness of breath, or a feeling of suffocation or tightness in the chest
- rapid breathing and elevated heart rate
- altered mental status including becoming anxious, confused or unresponsive.

First aid steps

1. Help the person into a comfortable position. Reassure them.
2. Help the person to use their inhaler. Loosen any tight clothing.
3. Access EMS immediately if:
   a. the person has no inhaler and the attack lasts for several minutes
   b. the inhaler is ineffective within a few minutes
   c. the person is experiencing severe breathing difficulties
   d. the person's lips, ears, fingers or toes turn a bluish colour
   e. the person has a change in mental status, such as becoming confused or unresponsive
   f. their breathing becomes slow, less noisy, or if the person is getting tired.
4. If properly trained and access to supplementary oxygen is available, give it to the person as needed. (See Oxygen administration.)
5. Stay with the person and continue to observe them, keeping them calm and comfortable until the attack is over. Depending on the person's prescription, they may use their inhaler again before medical help arrives.

NOTE

- If the person is near to something that may be causing the attack (e.g., a dusty environment) help them to move away from the trigger.
- If the person uses a spacer device, help them to fit the device to their inhaler as this may help the person to breathe in their medication more effectively. Spacers are especially useful for young children but may be used by adults too.
- If the person becomes unresponsive open their airway and check for breathing. See Unresponsiveness.

Local adaptation

- In contexts that do not have inhalers or supplemental oxygen readily available, help the person be calm, for example by sitting near an open window as this may help their breathing.

Access help

Access help if the person's mental state is affected as they may become Unresponsive. In a critical case, cardiac arrest may occur, and the person may stop breathing.

Education considerations

Context considerations

- Administration of an inhaler or other medication should be guided by local laws and regulations. First aid educators may need to vary their education according to the context.
- In both high and low resource settings, a person with asthma may not have an inhaler with them. Allow learners to practise what to do when there isn't an inhaler available. This may include actions to calm the person or help them breathe easier, such as loosening clothing and sitting up. You may also move the person away from the trigger causing the asthma attack (such as smoke).
- In areas where EMS services are extremely limited or non-existent, individuals should learn strategies that can help to ease breathing until the attack passes.
- Check legal restrictions that govern the help first aid providers can give and educate within these. If necessary, include these laws in the educational content.

Learner considerations

- Consider whether learners need to understand:
  - how to recognise someone is having an asthma attack
  - how to help someone use an inhaler
  - when and if to repeat the dose of inhaler
  - when and how to use a spacer device
  - how to administer supplementary oxygen.
- There is limited evidence that schoolteachers are under-prepared for asthma attacks and could therefore be identified as an important audience for this topic (Neuharth-Pritchett & Gretch, 2001).
- Asthma attacks can be fatal, so working with health promotion teams and local clinics can help assess community members for potential asthma and needed prescriptions.

Facilitation tips

- Spend time exploring how a first aid provider may help to calm someone having an asthma attack, as this may help their breathing.
- Administration of inhalers by first aid providers requires education in recognition and medication use depending on the method being used and availability of equipment.
- Discuss different types of inhalers, or other equipment such as spacers, and how to either administer the inhaler or help a person use it.
- Learners should have the opportunity to practise the steps they would use in helping someone having an attack (Espinoza et al., 2009).

Scientific foundation

Systematic reviews

Evidence summaries from the Centre for Evidence-based Practice (CEBaP) were drawn upon to develop these guidelines, as well as evidence review work by the International Liaison Committee on Resuscitation (ILCOR).

Posture

An evidence summary from 2019 identified three experimental studies, involving people with chronic obstructive pulmonary disease, obese people with obstructive sleep apnoea or obesity hypoventilation syndrome, or people with chronic heart failure, comparing different positions to relieve dyspnoea. There is limited evidence in favour of arm bracing and sitting. It was shown that arm bracing resulted in a statistically significant decrease of Borg dyspnoea score, compared to leaning forward while standing or erect standing. A statistically significant change of Borg dyspnoea score, standing erect compared to leaning forward while standing, could not be demonstrated. It was shown that a sitting position resulted in a statistically significant decrease in Borg dyspnoea score, compared to laying on the back. A statistically significant increase or decrease in visual analogue scale dyspnoea score, sitting compared to lying on the back, could not be demonstrated. Evidence is of low certainty.

Cold humidified air

CEBaP developed an evidence summary on inhaling cold air in case of shortness of breath in 2019, but no relevant studies were identified.

Calmly breathing or breathing exercises

A 2019 evidence summary from CEBaP identified a relevant systematic review from 2018 containing eight randomized controlled trials with 197 patients with chronic obstructive pulmonary disease. There is limited evidence neither in favour of calmly breathing or breathing exercises nor not using these methods. A statistically significantly increased exercise capacity or a decreased level of dyspnoea during pursed-lip breathing, compared to normal breathing, could not be demonstrated in seven studies. On the other hand, it was shown in one study that pursed-lip breathing resulted in a statistically significant increase in exercise capacity, compared to no pursed-lip breathing. Furthermore, it was shown in five studies that pursed-lip breathing resulted in a statistically significantly decreased minute ventilation, breathing rate and an increased tidal volume, inspiratory time and respiratory cycle duration, compared to no pursed-lip breathing. Finally, a statistically significant increase in tidal volume, inspiratory capacity and blood oxygenation during pursed-lip breathing, compared to no pursed-lip breathing, could not be demonstrated in five studies. Evidence is of very low certainty and results cannot be considered precise due to limited sample sizes and a lack of data.

Bronchodilator inhalers

ILCOR conducted a systematic review on bronchodilator use in 2015, which identified eight randomised controlled trials, two observational studies and one meta-analysis. Two randomised controlled trials showed an improved time to resolution of symptoms (e.g. wheezing, dyspnoea) and six randomised controlled trials and two observational studies showed improved therapeutic endpoints (e.g. oxygenation, ventilation). No studies were identified on the effect on time to resumption of usual activity, or on harm to the person. In three randomised controlled trials and an observational study, a difference in complications could not be shown when using inhalers compared to placebo. Evidence is of very low certainty and results cannot be considered precise.

Inhalers with spacers

A 2019 CEBaP evidence summary about the use of inhalers with spacers identified two Cochrane systematic reviews on the use of inhalers with spacers.

The first Cochrane systematic review revealed that there is limited evidence from eight randomised controlled trials in favour of using inhalers with spacers for medication administration. It was shown that the use of inhalers with spacers resulted in a statistically significant increase in final peak expiratory flow, 15-minute rise in expiratory flow, 15-minute rise in forced expiratory volume, and a statistically significant decrease in pulse rate and improvement of blood gasses, compared to nebulizers. However, a statistically significant decrease in hospital admission, rise in pulse rate, development of tremor, rise in respiratory rate and deterioration of blood gasses, and a statistically significant increase in 30 min rise in forced expiratory volume and 30 min rise in peak expiratory flow could not be demonstrated. Evidence is of low certainty, and results cannot be considered precise due to limited sample sizes, low numbers of events and wide confidence intervals.

The second Cochrane systematic review indicated that there is limited evidence from six randomised controlled trials neither in favour of using home-made spacers nor commercially available spacers for medication administration. A statistically significant decrease in hospital admission, clinical score, heart rate or need for additional treatment when using home-made spacers compared to commercially available spacers, could not be demonstrated. A statistically significant increase in peak expiratory flow rate or oxygen saturation when using home-made versus commercial spacers, could also not be demonstrated. Evidence is of low certainty, and results cannot be considered precise due to limited sample sizes, low numbers of events and wide confidence intervals.

Croup

Key action

Help the child to rest in a comfortable position which allows them to breathe easily.

Introduction

Croup is breathing difficulty, more often seen in young children, usually triggered by a viral infection in the upper airways (larynx). The infection causes the throat and upper airways to swell, which produces a barking cough and makes the child's breathing sound «squeaky» and hoarse. Symptoms often worsen at night or if the child becomes distressed.

Good practice points

- Help the child into any position that is comfortable and enables easy breathing (usually sitting).
- Breathing in warm, humidified air may help to calm down and distract the child.
- If there is significant shortness of breath or the first aid provider is in any doubt, medical care should be accessed.

Chain of survival behaviours

Prevent and prepare

- Caregivers and parents of young children should be aware of croup, including how to recognise it and what to do.

Early recognition

The child may have:

- shortness of breath
- a hoarse cough
- noisy (rasping or squeaky) breathing (stridor)
- croaky voice.

The caregiver or child may be alarmed by the sound of the child's breathing.

First aid steps

1. Calmly reassure the child and help them into a comfortable position (usually sitting).
2. Measure the child's temperature. If they are running a fever, treat it (see Fever).
3. Breathing in warm, humidified air (e.g. being near a running shower, or hanging over a bowl of hot water) may help to calm down and distract the child. Make sure the water is not too hot to avoid burns.
4. Monitor their breathing and level of response closely. If the episode of croup is severe or persists, access emergency medical care.

NOTE

A child with croup may find their condition alarming. Remaining calm may help them to be calm and ease their symptoms.

Access help

- If the child is having severe breathing difficulty (they are sitting up, bent forward, mouth open, using accessory muscles for breathing such as their neck and shoulders, moving their nostrils, or a hollow forms at the base of their neck), access emergency medical services immediately. Be aware that symptoms can worsen from mild to severe within a few hours.
- Epiglottitis is a croup-like condition which can cause a small flap in the throat to swell and block the airway. A child with epiglottitis needs urgent medical care. If in any doubt access medical care.

Recovery

After the first episode of croup, carers of children may recognise the signs of a recurrence more quickly and act accordingly.

Education considerations

Context considerations

- In some contexts, treatment has included putting the child in a steamy bath or encouraging them to inhale the steam. In doing this, there is a risk of burning the child if hot water is used, so this treatment should only be recommended in contexts where it can be done safely.
- Words or expressions to describe the hoarse cough that accompanies croup vary in different countries and regions. Programme designers should base the learning design on the common words used by local learner groups.

Learner considerations

- Parents and people who care for young children would benefit from learning about this topic.

Facilitation tips

- Talk about the different words that may be used to describe the sounds of coughing and breathing during an episode of croup (e.g., barking cough, hoarse, squeaky, stridor). Create a glossary and mutual understanding of what these mean.
- Use audio clips to help learners identify the specific kind of cough that accompanies croup.
- Many parents have experienced croup, so using storytelling, scenario-based learning and sharing experience with other parents can be both reassuring and a useful way to learn about this topic (Hartgling et al., 2010; Luckie, 2019).
- Emphasise the importance of seeking medical advice if the condition does not subside.
- Learners may like to see a simple diagram of the upper and lower airways to understand the mechanics of what is happening in the body during an episode of croup.
- Talk about how learners might be able to create a safe, warm humidified environment and the associated dangers of using water that is too hot.

Facilitation tools

- Some facilitators use the acronym CRY to support education on croup (or learners could make up their own that they find easy to remember):
  - C: cough and cry in a hoarse voice
  - R: respiratory distress (shortness of breath)
  - Y: young child

Learning connections

- Connect with differences in recognising other conditions like stridor, Choking, Sore throat, Breathing difficulties and Asthma attack. This could be done with the support of a diagram to show the relationship between the upper airways and the mouth and food pipe.
- Link to the risk of Burns if the method to create humidity uses water that is too hot.

Scientific foundation

Humidified air

While humidified air or steam is a well-known treatment for children with croup, there is not much evidence to support it. A 2020 evidence review from the Centre for Evidence-Based Practice (CEBaP) contained a systematic review and a randomised controlled trial. The review showed that a significant decrease in the heart rate, respiratory rate, croup score or hospital admission rate, or an increase in oxygen saturation in children with croup could not be demonstrated when using humidified air compared to no treatment or placebo. However, it was shown that optimally delivered humidified air resulted in a statistically significant decrease in heart rate and breathing rate, compared to traditional delivery placebo. The evidence is low certainty due to risk of bias and imprecision.

Position

CEBaP identified very low-certainty evidence from one systematic review showing that a front-lying (prone) position resulted in a statistically significant decrease in the number of episodes with oxygen saturation levels lower than 80%, oxygenation index (from 6th until 12th hour measurement), tidal volume, breathing rate and heart rate, and an increase in arterial blood oxygen levels, compared to lying on the back (supine). These results were all obtained in cross-over trials.

A statistically significant decrease of the number of people with oxygen saturation levels below 90%, oxygen saturation levels, arterial blood CO2 levels, transcutaneous CO2 levels, oxygenation levels, minute volume and adverse events, using when lying on the front (prone position) compared to lying on the back, could not be demonstrated. In addition, the evidence is indirect as most of the studies were performed in a hospital setting, most of the children were premature babies, and most of the people were intubated during the study.

Hot drinks

CEBaP could not identify any studies on the effect of hot drinks on croup.

Trauma

Severe bleeding

Key action

Apply direct pressure to control the bleeding as quickly as possible.

Introduction

Severe external bleeding is a life-threatening condition requiring urgent first aid. The human body relies upon blood circulating around the body to deliver oxygen to organs and tissues such as the heart, brain and skin. If a person loses a lot of blood, their circulation system may fail and be unable to deliver enough oxygen. This can lead to shock and possibly death. Common causes of bleeding include road traffic collisions, machinery accidents, knife wounds and gunshot injuries. External bleeding forms the basis on this topic. See also Chest and abdomen injuries and Amputation for information on treating those types of injuries.

Internal bleeding, such as unseen bleeding into the chest or abdominal cavity, is also life-threatening. Management of internal bleeding is outlined in Shock, with emphasis on recognition and positioning.

Guidelines

- First aid providers should use direct manual compression for life-threatening external bleeding.**
- If direct manual compression is ineffective or unable to be performed, first aid providers may use a tourniquet for severe, life-threatening external extremity bleeding.*
- If a tourniquet is used, a manufactured tourniquet is preferred. An improvised tourniquet is less effective than a manufactured tourniquet but may be applied if that is all that is available for severe, life-threatening external extremity bleeding.*
- If direct manual compression is ineffective, and a tourniquet is not practical, available or appropriate, a haemostatic dressing may be used for severe, life-threatening external bleeding. The haemostatic dressing should be applied with direct pressure.*
- First aid providers should not use pressure points for severe, life-threatening external bleeding.**

Good practice points

- Emergency medical services (EMS) should be accessed for all severe bleeding.
- The first aid provider should protect themselves from the person's blood by putting on gloves or covering their hands with plastic bags. If not available, bandages or clothes can act as a barrier between your hand and the person's wound.
- The first aid provider should apply direct manual compression rather than applying a pressure dressing to a severe bleed. If bandages are available, they can be used to apply pressure. Once severe bleeding has been controlled, a bandage may be applied to the wound. Bandages are made of the ideal material, however, if none is available, clean materials such as clothes or towels may be used as improvised bandages.
- If the bleeding can't be stopped the first aid provider should consider:
  > applying greater pressure
  > applying a tourniquet
  > applying a haemostatic dressing on the wound while continuing to apply direct pressure.

- The first aid provider should apply pressure around an embedded object (e.g., a knife), and try to stabilise the object. Avoid removing the object.
- Tourniquets should only be used for life-threatening limbs bleeding. They may help save a life but may have severe consequences (e.g., amputation of the limb), especially if applied for too long. Once a tourniquet has been applied, keep it in place until EMS arrives.

Chain of survival behaviours

Prevent and prepare

- Learn how to control bleeding using the resources likely to be available such as bandages, clothing, or manufactured tourniquets.

Early recognition

- Blood is flowing from a wound.
- Action to stem the flow of blood should be taken as soon as possible. Even a cupful of blood, although not immediately life-threatening, can lead to fast deterioration if not stopped early on.

First aid steps

1. Ask the person to apply direct pressure to their own bleed with their hands.
2. Help the person to lie down.
3. Access emergency medical services.
4. Apply direct pressure to the bleed. If blood soaks through the dressing, apply a second dressing over the first one, applying greater pressure.
5. If direct pressure is ineffective and the person is bleeding from an arm or leg, consider applying a tourniquet if available. If no tourniquet is available or it cannot be applied, consider applying a haemostatic dressing, if available, and continue to put direct pressure on the bleed.
6. Shock is likely to develop from significant bleeding. Help the person to lie down on their back and keep them warm by wrapping them in clothing if necessary.

NOTE

- If the injured person can apply pressure to their own wound, this can reduce the risk of cross-infection and keep both the first aid provider and the injured person safe.
- To apply direct pressure to a wound and avoid contact with the person's blood, use a bandage, cloth or some plastic as a barrier between your hand and the person's wound.
- If the person becomes unresponsive, open their airway and check for breathing. (See Unresponsiveness topics).
- If there is an embedded object in the wound - such as a knife - apply pressure around the object and try to stabilise the object itself. Avoid removing the object.

Special case

- In situations of disaster or of conflict, including war, terror attack or violent attack (such as shooting or stabbing), the safety and security of the first aid provider and the injured person are paramount and take precedence over providing immediate care. See contexts Conflict or Disaster.
- The application of tourniquets in war, terror or other violent attacks may be used as the first short-term "stop the bleed" measure, to either deal with the overwhelming number of injured people or to get people with severe life-threatening bleeding out of an immediate danger zone. In both cases, the release of the tourniquet should only be considered under the guidance of a medical professional.

Access help

Severe bleeding is a life-threatening condition requiring medical care. Clearly explain the cause of the injury and the condition of the person to EMS so they can prioritise your case accurately.

Education considerations

Context considerations

- Consider the local health system, especially the availability of well-developed emergency care and manufactured tourniquets to decide whether to include tourniquet education.
- Consider local laws and regulation as well as the availability of haemostatic dressings before including them in learning design.
- Some contexts may have a high incidence of bloodborne pathogens (for example of HIV) or there may be low incidence but high levels of fear about them. In these contexts, allow learners to consider real versus perceived risks associated with the transmission, and reinforce good universal precautions.
- Use scenarios built around the local industry (e.g., agriculture) or local factors such as road traffic behaviour or violent conflict or crime, to make education on this topic relevant to learners.

Learner considerations

- Consider where learners live and work and discuss the most likely causes of injuries that cause bleeding in the local setting to give context and relevance to the topic.
- This topic can be quite graphic (both in training and in reality). The use of images and video can be helpful and can prepare the learners for what they might see in reality. However, this may be unsuitable for children and some other learner groups. Scenarios and storytelling with or without actors might produce engagement without fear and upset.
- Conversely, the use of fake blood to create scenarios and pretend injuries can be fascinating and informative for learners and encourage engagement.
- Check whether learners have a first aid kit, dressings or manufactured tourniquets in their homes, or whether they might be able to access them (Andrade et al., 2020).
- Consider only including haemostatic dressings in training for more advanced first aid providers and in instances where learners may enter remote areas.

Facilitation tips

- Discuss with learners how to recognise a severe bleed: how much blood is coming out, what does it look like? Discuss it in terms of volume (e.g. cup-full, ounces); how it looks (forming a puddle or pool, soaking through the bandage); and the emotional reaction they might have (Pellegrino et al., 2020).
- Emphasise that timely intervention to stop bleeding is vital and may be a life-saving action. Applying pressure to a bleed is often a simple action, easy to do and can be very effective.
- Support learners to practise feeling how much and what sort of pressure is needed to stop a bleed and how this will feel for the injured person. Consider different postures that learners could take to apply sufficient pressure depending on their physical strength (Charlton et al., 2019).
- Discuss with learners what action they should take depending on where the bleed is coming from on the body: when to use a tourniquet (on a limb), when to apply pressure or use a dressing (Pellegrino et al., 2020).
- Discuss the practicalities of there being a lot of blood and what to do when a bandage is soaked through. Explain that the pressure will be reduced if more and more bandages are applied (Charlton et al., 2018).
- Encourage learners to think creatively about what materials they have near them in their relevant contexts that they could use to stop a bleed, for example, a clean towel or T-shirt. Emphasise that even if there is nothing available, they can apply pressure with their own hand if they do not have any open cut on their hand as the risk of infection is very low.

- Emphasise the primacy of direct pressure before finding a bandage to apply. Once the flow of blood has been stopped using pressure, help learners to practise applying a bandage so that it is secure and maintains sufficient pressure. Try bandaging different body parts.
- The topic of bleeding has many potential barriers to helping for learners such as infection, fear of blood or concerns of violence. While these should be explored, the aim should be to develop pro-helping strategies.
- Explore ways learners could protect themselves and the injured person from blood-borne viruses while still providing life-saving care if this is a concern (e.g., they could wear gloves or ask the injured person who is bleeding to apply pressure to their own wound.) Avoid creating a barrier to helping through fear of infection. Explore what alternatives may be available if a person doesn't have gloves (e.g., a plastic bag).
- Facilitate a discussion of the common fear people have of blood and highlight this as a possible barrier to helping. Allow learners to practise dealing with bleeding if it may help build their confidence or develop other strategies to overcome their barriers (e.g. directing the injured person to apply pressure to their own wound).
- Emphasise that objects embedded in a wound should be left where they are if there is the possibility of severe bleeding as the object may be acting as a 'plug'. Removing it may make the bleeding worse.

Tourniquets and haemostatic dressings

- If teaching learners about tourniquets, train them on how and when to use them as this is essential for safe and effective use. Tourniquets are powerful tools for bleeding control but can also cause harm if used incorrectly. Emphasise that tourniquets should only be used when direct pressure on the bleed is ineffective and the injury is on a limb.
- Consider what style of a tourniquet is available locally, and train in that specific style. Training in applying one style of a tourniquet will not necessarily facilitate skill transfer to other tourniquet styles (McCarty et al., 2019).
- Discuss why improvised tourniquets might be less effective. This could be because they cannot be adequately tightened to provide the required amount of pressure and are more likely to break (McCarty et al., 2019).
- Emphasise that the application of a tourniquet is very painful if done correctly, and the injured person may respond violently and try to remove the tourniquet. By being prepared for this the first aid provider can ensure their own safety, but also prepare the injured person, which will make it easier for them to cope with the pain.
- If haemostatic dressings are included in education, training in the proper assessment of severe bleeding and the dressing application techniques are required. Emphasise they should only be used in instances of life-threatening bleeding (Goolsby et al., 2019; Zeitlow et al., 2015).

Facilitation tools

- Provide a glossary of terms of words or phrases that may be used interchangeably (bleeding and haemorrhage for example).
- Discussing what 'severe bleeding' means and looks like could be a useful starter for this topic. This could take place as a discussion exercise using a flip chart with the heading, "What other words can you think of that describe 'severe' bleeding?" (for example, gushing, flowing, spouting, running like an open tap, soaking through the bandage, pooling on the floor etc).
  - This could be followed by exercises based on images and the questions:
    - What do you think has happened here?
    - How badly is this person bleeding?
    - What happens when someone loses a lot of blood?
    - How do they look?
    - How do you think they might be feeling or might behave?
    - What do you think will happen next?
  - Facilitators can use this to develop a 'common language' and understanding for the rest of the topic.

- Encourage learners to share their experiences of accidents where there has been severe bleeding, and for groups of learners to explore the topic through storytelling and role-play scenarios. Role-play can be particularly beneficial as a dynamic and interactive learning format.
- It may be useful to show how different clothing or flooring can affect the perception of how much blood has been lost. Soil or thick clothing for example can demonstrate how severe blood loss can be hidden.
- Use a range of objects to demonstrate bleeding and how to treat it. For example, get a plastic bottle (full of water coloured with food dye). This could be wrapped up in clothing to look less like a bottle. Then an object (nail, knife, etc) could be pushed into it to simulate a penetrating object. With someone else squashing the bottle (to simulate the blood pressure and cause the 'wound' to bleed) learners could practise how to apply pressure, how to stabilise an embedded object or how to dress a wound.
- Alternatively, use fruit (such as an apple) to create 'wounds' which can be dressed. Or use teddy bears to practise applying pressure or bandaging.
- Use simulation to help learners experience the real challenges they may face when dealing with someone who has an object embedded in their body. Highlight the importance of reducing harm, when the possibility of not moving the object is competing with the possibility of moving the person to a health facility.
- Creation of fake wounds using fake blood and other makeup products can help create realistic scenarios to support learning.
- If you have multiple tourniquets, hand them out to the learners. Then demonstrate the correct application of the tourniquet on a volunteer (without tightening it completely) and ask learners to repeat it. Gradually increase the stress of the scenarios: put time limits on, increase background noise, shout (only once a level of trust has been created) and eventually have learners apply tourniquets in uncomfortable and challenging settings, such as upside-down or in the dark. Also, there is value in teaching them how to self-administer, especially when educating weapons bearers.
- If appropriate to the learner group, use visual resources to enable realistic exposure to the sights and sounds associated with the subject and an opportunity to see the graphic nature of some injuries.

Learning connections

- Learners should be taught to recognise the signs of Shock.
- Conditions which may result in severe external bleeding include Amputation, Chest and abdomen injuries, Cuts and grazes, Mammal bites and Fractures.
- Note particularly that an open chest wound may be bleeding but require careful management to ensure the wound can communicate with the air. See Chest and abdomen injuries.
- Internal bleeding is a life-threatening condition, the management of which is outlined in Shock, with the emphasis being on recognition and positioning.
- Maintaining the safety of the first aid provider is paramount. See General approach.
- Localised application of ice or something cold may be beneficial for a minor, closed bleeding injury such as bruising or a haematoma.

Scientific foundation

Systematic reviews

The International Liaison Committee on Resuscitation (ILCOR) conducted several systematic reviews on multiple interventions for the control of life-threatening external bleeding (Singletary, 2020).

Pressure dressings, bandages, devices or proximal manual pressure

Six studies compared the use of pressure dressings, bandages, or devices to direct manual pressure. Three in-hospital randomised controlled trials and one in-hospital cohort study demonstrated a significantly longer time to haemostasis with the use of mechanical pressure devices (pneumatic device, Femostrop, C-clamp) compared with the use of direct manual pressure. In contrast, one in-hospital cohort study showed a shorter time to haemostasis with the use of a mechanical clamp. For the outcome of cessation of bleeding, one in-hospital randomised controlled trial showed benefit of a combined clamp and manual compression compared to pneumatic compression. Also, one in-hospital cohort study showed higher rates of bleeding cessation when using a commercial, elasticized compression bandage compared with manual pressure. Three in-hospital randomised controlled trials and three in-hospital observational studies did not report a significant difference in complications with the use of either pressure devices or with manual pressure. No evidence was identified for the critical outcome of mortality resulting from bleeding or the important outcome of mortality from any cause. All evidence is of very low certainty.

Pressure points

No human studies were identified comparing the use of pressure points with direct manual pressure.

Tourniquets

In 13 studies, the use of a tourniquet was compared to direct manual pressure. In four prehospital civilian cohort studies, there was no reduction in mortality from bleeding with the use of tourniquets compared to direct manual pressure alone. A higher cessation of bleeding was found in a large prehospital military cohort study when comparing tourniquet use to direct manual pressure alone, but this could not be shown in an additional very small cohort study. In a large civilian prehospital cohort study, a significant reduction of all-cause mortality was shown, but this was not the case in five other civilian studies with unadjusted analyses and six prehospital military cohort studies. A difference in complications (e.g. amputation) or adverse effects could not be shown in five prehospital civilian cohort studies and one prehospital military cohort study. For the outcome of time to haemostasis, no studies were identified. All evidence is of very low certainty.

One prehospital military cohort study was identified comparing tourniquets with haemostatic dressings. No difference in mortality caused by bleeding was found, but there was a significant all-cause mortality risk reduction. However, in this study, the types and locations of wounds weren't reported, and it is unknown if the injuries were comparable. For the outcomes of complications or adverse effects and time to haemostasis, no studies were identified. Evidence is of very low certainty.

No human studies were identified, comparing manufactured with improvised tourniquets. Four observational simulation studies were found that provided information about the ability of first aid providers to stop bleeding with both types of tourniquets. In one study, greater success of pulse cessation in lower and upper extremities was shown with manufactured compared with improvised tourniquets. In a second study, a decrease in bleeding cessation was shown to be greater with manufactured tourniquets over improvised cravat tourniquets over bandana tourniquets. All evidence is of very low certainty.

No human studies were identified on the comparison of windlass-style manufactured tourniquets (i.e., one with a rod to tighten the tourniquet) with other types of manufactured tourniquets for the management of severe, life-threatening external extremity bleeding. Ten simulation studies provided information about the feasibility of the use of windlass-style manufactured tourniquets compared with other designs of manufactured tourniquets.

Haemostatic dressings

19 studies were identified, comparing the combined use of haemostatic dressings and direct pressure to direct pressure alone. For the outcomes of cessation of bleeding (studied in three in-hospital randomised controlled trials and one in-hospital cohort study) and mortality (one prehospital military cohort study and two in-hospital civilian randomised controlled trials), no benefit of the additional use of haemostatic dressings could be shown. In 15 in-hospital randomised controlled trials, faster haemostasis was shown with the additional use of haemostatic dressings, and in one of these, a decrease in the number of blood-soaked gauzes was found. In four randomised controlled trials and two cohort studies, a difference in complications and adverse events when using haemostatic dressings and direct pressure, compared to direct pressure

alone, could not be shown. No evidence for the outcome of mortality caused by bleeding was identified. The evidence is of low to very low certainty.

Three in-hospital civilian randomised controlled trials compared one type of haemostatic dressing to other types, but a difference in time to haemostasis (moderate-certainty evidence), all-cause mortality (very low-certainty evidence) and adverse effects (very low-certainty evidence) could not be demonstrated. No studies were found on the outcomes of mortality due to bleeding, cessation of bleeding, or any complications/ adverse events.

No human studies comparing junctional tourniquets with direct pressure, or comparing wound clamps with direct pressure, for the management of severe, life-threatening external bleeding were identified.

Education review

Several additional papers were found through the educational literature search. Included below are papers which had specific educational considerations for learners on this topic.

Andrade et al. (2020) show the additional confidence learners gain by having access to bleeding control equipment. They undertook a study with medical professionals and community members to see if receiving a trauma first aid kit in addition to bleeding control training improves self-reported confidence. After completing bleeding control training, participants assembled their own trauma first aid kits in a provided tactical pouch, which included properly sized personal protective equipment, a combat application tourniquet, haemostatic gauze and bandages, a flashlight, a marker and trauma shears. After receiving bleeding control training, those who did not receive a trauma first aid kit were significantly less confident to stop life-threatening bleeding among both medical professions and community members.

Pellegrino et al. (2020) identified a gap of a standardised assessment tool to measure educational effectiveness of the 'Stop the bleed' campaign. More than a million people in the United States have received training on how to deal with life-threatening bleeding via this campaign. The authors developed and validated a tool with the input of experts, educators and community learners. The tool covers recognition of life-threatening bleeding and where, when and how to apply pressure, a tourniquet or a dressing. Haemorrhage control experts identified 6 oz (≈177 ml) of blood loss to represent life-threatening bleeding for first aid providers. The tool used everyday language to represent medical terms and constructs. For example, people looking at a 6 oz pool of "blood" described its volume, what it looks like and how it made them feel. The authors suggest the tool can be used to compare outcomes from different teaching styles and methods in order to allow for the development of best practice for future bleeding control education. In addition, this approach could help organisations demonstrate value to learners, funders, and policymakers, and advance health sciences education. The Stop the bleed education assessment tool offers a measure for which educational efficiency and effectiveness can be judged within a larger effort to prepare people for personal emergencies or large-scale disasters.

Goolsby et al. (2019) identified which haemostatic dressings first aid providers might best be trained in. They tested whether first aid providers could apply haemostatic dressings, and which they could use most successfully. 360 people participated in a randomised prospective controlled trial to compare the application of plain gauze (control), z-folded gauze, s-rolled gauze, and injectable sponge (experimental). Participants learned using a video and practise and were assessed on the pressure applied for a set amount of time, and the amount of time taken to unpack and apply the dressing. Participants also completed pre and post surveys on willingness to use the dressings. Overall, 202 participants (56%) applied dressings correctly. The most successful in terms of the correct application was the injectable sponges (92%), followed by the s-rolled gauze (48%), the z-folded gauze (43%) and the plain gauze (40%). Participants in all cohorts saw significant improvements in willingness to use haemostatic dressings.

To help educators identify the best techniques to teach direct pressure, Charlton et al. (2019) ran a study on the posture a first aid provider should adopt to apply adequate pressure to a severe bleed for a sustained period of time. They tested two-handed pressure with bent arms against two-handed pressure with straight arms. A sample of 30 participants of similar demographics were randomised to one of the postures and asked to apply force to a standardised haemorrhage control trainer with electronic feedback (Z-Medica), set to record a minimum pressure of 3-psi (155 mmHg) for a three-minute time period. When using bent arms, participants provided pressure at or above 3-psi 63.7 % of the time. Participants using straight arms were above 3-psi 100% of the time. The difference between the two experimental arms remained statistically significant when examined by age, gender, or medical experience. The authors concluded that a straight-armed posture was the most efficient way to provide high-quality direct pressure to stop life-threatening bleeding.

Advice for first aid providers when a serious bleed seeps through the dressing has been to add an additional layer on top rather than replacing the original dressing. This was questioned by Charlton et al. (2018) who sought to establish whether the pressure needed to stop a serious bleed could be maintained when additional layers of dressing are added. They used a tri-phase randomised cross-over trial of medical personnel and a standardised bleeding simulator. Participants were randomised to cohorts of 10, 20 & 30 layers of 4x4 inch cotton gauze, and subsequently to three different methods of pressure application: the finger pads of three digits of the right hand, three fingers of the dominant hand with the opposing hand applying counter pressure, or three digits of each of two hands on top of the other. Participants were asked to hold pressure continuously during each application for 10 seconds. The researchers found that participants generated the most force when a single stack of gauze and when two hands were used to apply pressure over the wound and suggested that first aid educators may apply results to lessons in describing the thickness of the material and need to apply sufficient pressure to stop bleeding.

Zeitlow et al. (2015) sought to establish if bleeding control techniques applied in a military context could be translated into a civilian setting effectively. A retrospective review of people who received a tourniquet or haemostatic dressing pre-hospital. 77 tourniquets were used for 73 people and 62 haemostatic dressings were applied to 52 people. Seven people required both interventions. Mean tourniquet time was 27 minutes, with 98.7% success. Haemostatic bandage application had a 95% success rate. Training for both interventions was computer-based and hands-on, with ability to do skills greater than 95% maintained after two years. The authors concluded that civilian prehospital use of tourniquets and haemostatic gauze is feasible and effective at stopping the bleed. Online and practical training programs result in the ability to use skills, which can be maintained despite infrequent use. Kragh Jr et al. (2008) considered the efficacy and challenges of teaching first aid providers to use tourniquets. They studied morbidity and tourniquet use specifically in a conflict setting and draw attention to the fact that tourniquets can complicate care if used inappropriately, and that the education of the first aid provider in their use is critical.

Educators in a lower resource setting or where tourniquets are not readily available might be informed about the effectiveness of improvised tourniquets as studied by McCarty et al. (2019). They showed that improvised tourniquets tend to have very poor effectiveness and high failure rates. In a randomised clinical trial that saw first aid providers trained to apply different tourniquet types, Combat application tourniquets (CATs) were compared to other commercial and improvised models. In the cases of 'improvised tourniquets,' the learners were allowed to choose from a selection of materials including leather belts or shoelaces, and plastic (PVC) or wooden rods to act as a windlass. Improvised tourniquets were found to fail in a number of cases due to breakage of the windlass (70%) when using a plastic windlass, or the leather belt strap snapping (almost 45.8% of the cases) where a wooden windlass and belt were used together. For the 'non-windlass design' improvised devices, the pressure applied was deemed insufficient in all simulation assessments and demonstrated increased estimated blood loss when compared to the purpose made CAT device provided for training. Only 1 of 22 (4.6%) applications of a non-windlass improvised tourniquet was successfully applied. Their findings supported an earlier observation during the Boston Marathon incident, where 27 improvised tourniquets were applied in the field, and all were deemed ineffective on post-event review (King et al., 2015, cited by McCarty et al., 2019).

There is a gap in the evidence available on how to prepare first aid providers to deploy tourniquets in a multiple casualty scenario.

Chest and abdomen injuries

Key action

Help the person to lie down in a comfortable position and monitor them closely.

Introduction

A chest injury includes any injury to the ribs, heart and lungs while an abdominal wound is any injury to the abdomen. Some chest wounds are 'open' which means there is a hole in the chest, usually caused by injuries such as a gunshot or stabbing. It is also possible to have sucking or blowing chest wounds which can cause severe breathing difficulties. Learners should be able to recognise open chest and abdominal wounds as potentially life-threatening and provide care.

Guidelines

- First aid providers should not use an occlusive dressing on a person with an open chest wound.*

Good practice points

- Safety and security are paramount, and in situations of danger, first aid providers need to be alert to the risks they face from weapons and aggression.
- In the event of a gunshot, blast or knife injury on someone wearing a ballistic vest, the first aid provider should consider the potential for blunt force trauma.
- The first aid provider should help a person with a chest or abdominal injury to lie down in a comfortable position. For someone with a chest injury, this may be lying semi-propped up on their affected side. For someone with an abdominal injury, this may be lying down with bent legs.
- If there is significant external bleeding from a chest or abdominal wound, direct pressure should be applied. (See Bleeding.) If applying pressure to an open chest wound, ensure the pressure does not completely seal the wound.
- An open chest wound that is not actively bleeding may be left open, without the application of a dressing because a sealed wound may allow air to build up in the chest, which may lead to pneumothorax.
- If a dressing is necessary on an open chest wound, (e.g., to transport the person a long distance to medical care), a non-occlusive dressing could be used.
- A sterile (or functionally clean) and wet dressing may be placed on open abdominal wounds where internal organs are visible.
- First aid providers should not push back internal organs into the body.
- Impaled objects in the body should be stabilised, and if the object is pulsating it should be allowed to continue to do so, loosely stabilised.
- First aid providers should access emergency medical care for all penetrating chest or abdominal wounds.
- First aid providers should treat the person for Shock. This could include helping the person to lie down in a comfortable position and keeping them warm.

Chain of survival behaviours

Prevent and prepare

- In workplaces where there is a high risk of falls, crush injuries or explosion risks, such as construction and mining, include training on this topic and provision of appropriate first aid equipment.
- Wear a ballistic vest when entering a conflict zone if possible.

Early recognition

The person has experienced physical trauma such as from a road traffic collision, weapon or fall. You may not be able to see the wound as it might be internal or under clothing. Talk to the person and ask them about their condition to locate the injury as quickly as possible.

A person who has experienced physical trauma may have an internal injury which bleeds inside their chest or abdomen. This may only become apparent if the person starts to show signs of Shock.

A person with an open chest wound may have difficult or painful breathing and they may cough up blood.

First aid steps

Once in a safe location, examine the person as carefully and thoroughly as possible.

Abdominal wound

1. Help the person get into a comfortable position, Usually, this is a lying position with knees pulled up, as this reduces tension on the abdomen.
2. Control any external bleeding by applying pressure.
3. Access emergency medical services (EMS).
4. Place a clean dressing over the wound once the bleeding is controlled by pressure. If internal organs are bulging out, do not try to push them back into the abdomen. Cover them with a clean wet dressing.
5. Reassure the person and monitor their breathing, circulation and level of response, particularly looking for any signs of shock.

Open chest wound

1. Help the person get into a comfortable position. Usually, this is a half-seated position leaning slightly on their injured side to maximize the function of the other lung.
2. Control any external bleeding by applying pressure using your hands, ensuring the pressure does not completely seal the wound.
3. Access emergency medical services (EMS).
4. Reassure the person and monitor their breathing, circulation and level of response, particularly looking for any signs of shock or breathing difficulties.

CAUTION

- Do not seal an open chest wound. If the wound is sealed, blood may clot and seal the wound and allow air to build up in the chest, which may lead to tension pneumothorax.
- If a dressing is necessary on an open chest wound, (e.g., to transport the person a long distance to medical care), a non-occlusive dressing can be used. Monitor the dressing to ensure it remains open, allowing air to pass through it.
- Do not remove any impaled objects from an abdominal or chest wound, as this may cause serious bleeding and makes it more difficult for a medical professional to determine the severity of the wound.

Access help

- Access EMS immediately. Chest and abdominal injuries can be life-threatening and need medical attention.
- Chest and abdominal wounds are common in conflict and crisis situations. Before treating people, it is essential to call for help, including for the police or security services and to act only if it is safe for you to do so.

Education considerations

Context considerations

- Road traffic collisions are common across the globe and form a major cause of traumatic injuries.
- In fragile contexts where there is violence and injuries of this kind are more common, learners will have to pay close attention to issues regarding personal safety.
- Adapt the education and simulation appropriately as this topic can be particularly sensitive depending on cultural, religious or gender norms of the context.

Learner considerations

- Consider the context of learners' helping behaviours or willingness to help. For example, learners may display a willingness to help friends or family in a community affected by conflict but may be reluctant to help state weapons bearers.
- Consider the psychological effect that injuries of this type (in conflict or peacetime situations) may have on first aid providers and explore options available for supporting them after the incident.

Facilitation tips

- The published literature indicates the importance of correct management of an open chest wound. Emphasise the importance of using a non-occlusive dressing to prevent the development of a potentially life-threatening complication of pneumothorax.
- Emphasise also that any non-occlusive dressing placed on an open chest wound should be closely monitored (as well as the person's breathing). This is because all dressings can become sealed (occlusive), due to blood clotting.

Facilitation tools

- Prioritise simulation to give learners time to practise and develop their skills in managing chest and abdominal wounds, and to use their skills in a realistic scenario and to debrief.
- Use virtual reality, video, serious computer games or simulation manikins if available to explore this topic, particularly the application of dressings around impaled or embedded objects.
- Low tech, high-quality simulation can also be very effective. For example, rice or flour sacks can be stitched together and filled with straw or sand to create a manikin of adult size. Or a pillow could be tied to a post to act as a manikin. These can be used to simulate different injuries, including impaled or embedded objects.

Learning connections

- A wound may have external Bleeding.
- A person with an internal or external injury may develop Shock.
- Build realistic scenarios that emphasise the principles laid out in the General approach such as keeping safe.
- Chest and abdominal wounds may be more common in areas of Conflict or Disaster, and also might require the first aid provider to deal with multiple casualties (See General approach).

Scientific foundation

Systematic reviews

The International Liaison Committee on Resuscitation (ILCOR) First Aid Task Force developed a systematic review on the appropriate first aid care for open chest wounds (Singletary 2015). No human studies were found.

The Centre for Evidence-Based Practice (CEBaP) developed two evidence summaries in 2019, about the use of non-occlusive dressings and about the use of the recovery position in people with an open chest wound, but no studies could be identified.

Additionally, with regards to abdominal wounds, CEBaP did not find any evidence to support the repositioning of externally herniated internal organs, applying pressure on the injury or the optimal position in which to place the injured person.

Amputation

Key action

Stop the bleeding and preserve the amputated body part as much as possible.

Introduction

There are two types of amputations: complete and partial. Complete amputation is the total removal of a limb, while partial amputation is when part of the limb is still attached to the body. Amputation does not always lead to the loss of the amputated body part. In many cases, the limb can be re-attached. Prompt first aid care may improve the chances of recovery.

This topic should be taught in conjunction with the Severe bleeding **topic.**

Good practice points

- In the case of a complete amputation:
  - To prevent tissue damage, the amputated body part should be wrapped in a sterile compress or bandage and placed in a clean, watertight plastic bag, which is then sealed firmly.
  - A second plastic bag containing water or ice can be used to preserve the body part. The first bag containing the part may be placed in the second bag containing water or ice. There should be no direct contact between the body part and the ice.
  - The first aid provider should ensure the amputated body part is brought to a medical facility with the person.
- In the case of a partial amputation, immobilise the limb in normal anatomical alignment if this is possible (it might not be possible if the limb is fractured or dislocated).
- If the distance to the hospital is reasonable, do not allow the injured person with a partial or complete amputation to eat or drink, because anaesthetic may be required. When the distance to the hospital is very far and the person is responsive, allow them to sip water.

Chain of survival behaviours

Early recognition

A limb or part of a limb has been severed from the rest of the body.

First aid steps

1. Access emergency medical services (EMS).

2. If the wound is bleeding heavily, apply pressure to the wound to stop the bleeding. Follow the steps for Severe bleeding and also treat the person for Shock. Once the bleeding has been controlled, complete the rest of the steps listed here.

3. If the amputation is partial:
   a. Advise the person to keep the limb as still as possible, preferably in a position of normal alignment to protect it from further amputation.
   b. Use a sterile bandage or dressing, or clean cloth, to cover the wound and keep the limb in place.

4. If amputation is complete:
    a. Use a sterile bandage or dressing, or clean cloth, to cover the wound.
    b. Keep the amputated body part dry and cool. To do this, place the amputated body part in a clean, watertight, plastic bag, and firmly seal it. Place this inside a larger bag of ice and water until it can be taken to a medical facility.

CAUTION

- Do not immerse the body part directly in water or place it directly on ice as this may damage the tissue and make it more difficult or impossible to reattach it.
- Do not straighten an angulated fracture or dislocation.
- If the distance to the hospital is reasonable, do not allow the injured person to eat or drink because anaesthetic may be required. If the distance to the hospital is very far and the person is responsive, they may sip water.

Access help

- Tell EMS about the injury so they can prepare or bring appropriate equipment.

Education considerations

Refer to the Severe bleeding topic for additional education considerations, which have not been repeated here.

Context considerations

- Amputation may occur in particular industrial settings where there is heavy, sharp or fast-moving machinery; and in conflict settings, where they can be caused by explosions of land mines. Case-based examples or scenarios should be used to support learning where these instances might occur. Exploring the most likely incidents that could result in amputation in the local setting will give context and relevance to the subject. This knowledge can be learned through research before the session or could be posed as a question to the group.
- Amputation care kits containing material and instructions to properly store, and transport amputated body parts are available and could be useful in some contexts.

Learner considerations

- Use of video or photographs can enable realistic exposure to the subject and an opportunity to see the graphic nature of some injuries. They should be used with due sensitivity of appropriateness to the learner group.

Facilitation tips

- Due to the traumatic nature of amputation, learners might be sensitively encouraged to share stories about experiences. Roleplay where groups of learners might learn how to respond quickly, using team-based skills, and including peer support could be effective.
- Amputation is a particularly graphic and psychologically affecting injury where the injured person has lost a 'piece of themselves'. This can be very disturbing for them, but also for first aid providers. As such, it is important to spend time exploring the barriers that may affect people's willingness or confidence to provide first aid in the presence of amputation. The permission to explore the fact that they might be afraid or squeamish gives learners an opportunity to develop strategies to overcome these barriers in real life.
- Bystanders and family members are invariably more distressed when amputations have occurred, often more so than the injured person themselves (who can display a 'protective dissonance'). Empathy and support for them should also be discussed.

- Emphasise that timely intervention to stop bleeding is vital and may be a life-saving action and simple actions can be very effective. They should have confidence that their actions will make a real and positive difference.
- Tourniquets may be used if direct pressure does not control the bleeding. (See Severe bleeding.) Note that in an amputation, the tourniquet may not entirely stop the blood flow (due to blood loss through the 'middle' of the bone.) This will be minor, and not gushing but the first aid provider should know that if this is seen, it does not mean that the tourniquet is not working.

Facilitation tools

- Images of amputation injuries might be useful here. Especially if it is possible to demonstrate the injury, tell the story of treatment and show the final healed result in the same person; a full 'patient story'. This will go a long way to providing confidence to act.
- For child learners consider age-appropriate imagery. Presenting the possibility of a return to a near 'normal life' at the story end will achieve the same aims without fear.

Learning connections

- This topic should be taught in conjunction with Severe bleeding, focusing on the use of direct pressure, and (where permitted locally) tourniquets and/or haemostatic agents.
- Severe bleeding from an amputation injury is likely to result in Shock.
- It may be useful to teach this topic with reference to the first aid for a fractured bone (See Fractures, sprains and strains.)
- Learners may benefit from making connections to topics such as Psychological first aid or Traumatic event.

Scientific foundation

Systematic reviews

The Centre for Evidence-Based Practice (CEBaP) developed an evidence summary on keeping amputated body parts on ice in 2019. Only one observational study was included, including 62 people with 66 digital tip amputations, but a significant decrease in graft rejection rate when keeping the body part cool during transport, compared to not keeping the body part cool during transport, could not be demonstrated. The evidence is of very low certainty and the result is imprecise due to a low number of events and large variability in results.

Education reviews

Academic publications which considered educational methods were not found for this topic. However, source material from field manuals was used to inform the content of the Chain of survival behaviours and the education considerations. These consisted of:

- First aid in armed conflicts and other situations of violence (ICRC, 2013).
- Paediatric Blast Injury Field Manual (Save the Children International, 2019).
- Joint Royal Colleges Ambulance Liaison Committee clinical guidelines, 2019.

Cuts and grazes

Key action

Clean the wound and cover it to increase healing and reduce the risk of infection.

Introduction

Cuts and grazes are common injuries seen by first aid providers. They do not usually require emergency medical care. They may include wounds such as a laceration, puncture wound or abrasion. There may be a risk of infection including for example bacteria or tetanus.

Guidelines

- Superficial cuts and grazes should be cleaned with potable (clean) water, preferably from a tap to provide pressurised water flow.**
- After cleaning it, covering the wound (with tape, hydrogel, film, hydrocolloids) may decrease wound size and redness, and increase healing.*

Good practice points

- If no clean water is available, use a disinfectant to clean a simple skin wound.
- Advise the person to seek medical help if you suspect they are not (sufficiently) protected against tetanus.
- If the skin around the wound becomes red, purple, or darker, and is warm and painful, or if the person develops a fever advise them to seek medical advice, as this is an indication of infection.

Chain of survival behaviours

Prevent and prepare

- Wear appropriate protective clothing for the activity.
- Learn safe techniques to carry out activities that may cause harm.

Early recognition

After a small incident, the person has a cut, graze, wound, puncture, tear or scrape on their skin.

First aid steps

1. If the wound is bleeding heavily, apply pressure to the wound to stop the bleeding. Follow the steps for bleeding. Once the bleeding has stopped, complete the rest of the steps listed here.

2. Clean the abrasion or wound with potable (clean) water, preferably lukewarm and from a tap to provide pressurised water flow. If no clean water is available, use a disinfectant to clean the wound.

3. Use sterile compresses to remove any dirt that is left in the wound. When using a disinfectant to clean the wound, regularly change compresses.

4. Dry the area around the wound and cover the wound itself with a dressing such as tape, hydrogel, plastic film or hydrocolloids. If you have no access to such dressings, apply a sticking plaster.

Local adaptation

- If you have no access to a tap with potable water, a clean unused water bottle can be pierced and used to apply a gently pressurised stream of water to the wound.

Access help

Advise the person to seek medical help if they are not (sufficiently) protected against tetanus.

Recovery

Cuts and grazes usually heal within a few days. Check the outside of the dressing each day:

- If it is still clean, don't change it.
- If it is visibly stained with a bit of blood or some clear fluid, remove the dressing. Clean the wound again (using tap water or a disinfectant) and put on a new dressing.

Monitor the wound for any signs of infection. If the skin around the wound becomes red, purple, or darker, and is warm and painful, or if the person develops a fever, this indicates an infection. Never cover an infected wound; seek medical help.

Education considerations

Context considerations

- Programme designers should consider particular local risks that may cause cuts and grazes, as well as access to potable water and dressings.
- The use of topical antibiotic ointment depends on local laws, regulations and processes, including liability protection. Educators may need to vary the treatment options according to the local context.

Learner considerations

- Different populations respond to wounds (particularly minor abrasions) in different ways. While children can react to the shock of the injury by demonstrating high levels of pain, adults might be embarrassed to 'cause a fuss'. Explore with learners how different people might respond by discussing experiences and different severities of wounds, and how they would approach providing care.

Facilitation tips and tools

- Most people have experienced or seen a wound. Work with these personal experiences to deconstruct prior knowledge and create a new collective understanding that is based on the evidence-based first aid techniques (i.e. clean and cover).
- There are myths and social conventions for wound treatment. Allow learners to share these in order to dispel any incorrect practice. However, facilitators should be careful not to dismiss local treatments without evidence as they might be effective. Facilitators will lose credibility if locally effective treatments or traditional practices are ignored without good reason.
- Prepare well for this topic to enable it to be as experiential and hands-on as possible. If possible, create a range of different types of wound simulations that can promote critical thinking about the help to provide. Give learners the experience of cleaning the wounds (making sure that foreign objects do not enter the wound when cleaning them) and dressing the wounds (including use of a range of dressing types).
- The use of a first aid kit can be an easy and practical way to explain the first aid for wounds. As the kit is built, explain the correct use of each of the contents.

- Alternatives to items contained in a first aid kit can be used for developing the confidence of learners to improvise using objects around them, such as a clean cloth as an alternative to a bandage. Facilitate an exercise where learners think of as many items as they can that they have in their homes or workplaces which they could use as alternatives to items in a first aid kit.
- The use of images that show wound healing processes can be useful to illustrate when it is important to go seek medical advice for an infection. Comparison can be used of wounds healing properly with wounds with infection. Images should be shared sensitively and only after careful consideration of the learner audience.

Learning connections

- Make connections to other topics which may also involve a wound such as Severe bleeding, Head injury, Chest and abdominal injuries and Mammal bite.
- Localised application of ice or something cold may be beneficial for a minor, closed bleeding injury such as bruising or a haematoma.
- Emphasise good Hand hygiene. The first aid provider should wash their hands before caring for the wound.
- Place this topic within the General approach to practise skills such as assessing the person, communication and empathy.

Scientific foundation

Systematic reviews

The Centre for Evidence-Based Practice (CEBaP) developed four evidence summaries in 2019 to inform this topic.

Tap water

An evidence summary was made by CEBaP about cleansing skin wounds with tap water compared to no cleansing or cleansing with another solution. There is limited evidence from seven experimental studies, neither in favour of cleansing with tap water nor no cleansing or cleansing with another solution. A statistically significant decrease in infection, using normal saline solution compared to tap water, could not be demonstrated. In one study, a statistically significant increase in healing, using tap water compared to saline, could not be demonstrated. Evidence is of moderate certainty and the results of these studies are imprecise due to the limited event size and large variability of results.

Disinfectants

In another evidence summary, cleansing a skin wound with disinfectant was compared to no cleansing or cleansing with a different type of disinfectant. There is limited evidence from two experimental studies, neither in favour of cleansing with disinfectant nor no cleansing or cleansing with another disinfectant. A statistically significant decrease in infection, using povidone-iodine compared to normal saline, could not be demonstrated. Evidence is of moderate certainty and results of these studies are imprecise due to the limited event size and large variability of results.

Covering the wound

Another summary looked at covering a skin wound (with a sterile compress, wound plaster or bandage) compared to leaving the wound exposed to air. There is limited evidence from five small experimental studies in favour of covering the wound (e.g. with tape, hydrogel, film and hydrocolloids). It was shown that covering the wound resulted in a statistically significant decrease in wound size after 3 days or after 7 to 14 days, a statistically significant decrease in wound redness after 10 to 14 days, and a statistically significant increase in epithelium thickness and coverage after 2 to 7 days, compared to exposing the wound to air. However, a statistically significant decrease in wound width or wound area after 1 to 5 days, a statistically significant decrease in wound redness after 2 to 7 days, and a statistically significant increase in epithelium thickness and coverage after 3 to 9 days and after 14 days, could not be demonstrated. Moreover, a statistically significant decrease in inflammation could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to limited sample size, lack of data and/or large variability of results.

Ointments and creams

An evidence summary was made about the use of ointments or hydrating cremes on skin wounds, but no studies on simple skin wounds could be identified. Most evidence is currently available for people with chronic wounds (ulcers and surgical wounds) or in animal models.

Non-systematic review

Two prospective, randomised controlled trials compared the effectiveness of triple antibiotic ointment with both single antibiotic ointment and no ointment in conditions similar to those seen in first aid situations. In one study, the ointment was applied to intradermal (between layers of skin) chemical blisters infected by bacteria (staphylococcus aureus). Contaminated blisters treated with triple antibiotic ointment healed significantly faster and had a lower infection rate than blisters treated with single antibiotic ointment or without ointment at all. Both triple and single antibiotic ointments were more effective than no ointment. In several of these studies, the wounds were initially cleaned with antiseptic solutions and this may have compromised the results shown for antibiotic ointment. However, this complication may support the value of antibiotic solutions. (Berger, 2000; Caro,1967)

Dental avulsion

Key action

Store the tooth temporarily (e.g. in Hank's balanced salt solution, cling film, or cow's milk) and advise the person to seek help from a dentist as soon as possible.

Introduction

Dental avulsion is the complete displacement of a tooth due to it being forcefully knocked out. This type of injury is common, particularly in children. However, it is only necessary to replant a tooth if it is a permanent one. A permanent tooth that has been knocked out can often be successfully re-implanted by a dentist if it is done quickly.

Guidelines

- The first aid provider may temporarily store the tooth in:
  - > Hank's balanced salt solution
  - > propolis (from 0.04 mg to 2.5 mg per mL of 0.4% ethanol)
  - > oral rehydration salt solutions including Ricetral (a commercial form of oral rehydration salt)
  - > solutions containing sodium chloride, glucose, potassium chloride, citrate, extruded rice
  - > cling film.
- If none of these options are available, the first aid provider may temporarily store the tooth in cow's milk (with any per cent fat or form).*

Good practice points

- The first aid provider may encourage the person to apply gentle pressure to the bleeding gum with gauze to stop the bleeding.
- If the avulsion has created any sharp edges in the person's mouth, have the person apply a compress of gauze or clean cotton to protect their mouth from further injuries.
- When picking up the tooth, it should be held at the crown (the area that sits above the gum), not at the root.
- First aid providers may NOT re-implant the tooth.
- The tooth should NOT be cleaned as this could damage vital tissues still attached to the tooth.
- If cow's milk is not available, the first aid provider may temporarily store the tooth in the person's own saliva. Unless there are no alternative options, do NOT let the person keep the tooth in their mouth, as there is a chance that the person will swallow it (e.g., if the person is not fully responsive, or if they are a child). Instead, use a small jar or another container.
- Refer the person to a dentist. Advise them they should get help as soon as possible.
- There is no need to consider emergency dental treatment if the tooth is not a permanent one (such as in young children). However, advise the person to seek dental care anyway, particularly if the tooth's root has broken off.

Chain of survival behaviours

Prevent and prepare

- Know what solutions are available to you for storing an avulsed tooth and have a suitable container available for transportation.
- Know the phone number of a dentist.
- Wear a mouth guard for contact sports such as boxing, rugby, karate and taekwondo.
- Wear a helmet when riding a motorcycle, bicycle or horse, and for skateboarding.

Early recognition

A tooth has been knocked out.

First aid steps

1. Help the person to stop the bleed in their mouth by applying a compress of gauze or clean cotton.
2. If the avulsion has created any sharp edges in the person's mouth, have the person apply a compress of gauze or clean cotton to protect their mouth from further injuries.
3. Find the tooth and pick it up carefully by the crown. Store it in Hank's balanced salt solution, an oral rehydration solution, or cling film. If none of these options are available, store the tooth in cow's milk, or in the person's own saliva.
4. Advise the person to access a dentist as soon as possible, and to take their tooth with them.

NOTE

When using cling film, make sure to add enough of the person's saliva, in order to prevent the tooth from drying out.

Access help

- If a dentist is not available quickly, access any available medical care.

Education considerations

Context considerations

- The use of the solutions mentioned in the guidelines depends on availability, local laws, and regulations —including liability protection. Facilitators may need to vary their list of recommended solutions accordingly.
- Oral rehydration salts are sometimes provided in first aid kits.

Learner considerations

- Learners who have contact with children or people doing sports might be encouraged to learn how to store an avulsed tooth. Learners can also be encouraged to discuss which storage options are available to them in their context, so they are better prepared.

Facilitation tips

- Emphasise that the role of the first aid provider is to help the person (and their avulsed tooth) get to a dentist.
- Remind learners there might be a lot of blood coming from the person's mouth and that this can be stemmed with a clean cloth or gauze pressed into the gap where the tooth was.

Learning connections

Connect this topic to Severe bleeding.

Scientific foundation

ILCOR conducted a systematic review in 2020 to identify the best available evidence for the effectiveness of any technique available to first aid providers for storing an avulsed tooth compared with storage in milk or saliva (De Brier, 2020).

The review included 33 studies and reported 23 comparisons. The limited evidence available favours storing an avulsed tooth in Hank's balanced salt solution, propolis solution, oral rehydration salts, rice water, and cling film compared with storage in milk. The cell viability rate was significantly lower in teeth stored in saline solutions, tap water, buttermilk, castor oil, GC Tooth Mousse, and turmeric extract than those stored in milk. There is insufficient evidence to recommend for or against temporary storage of an avulsed tooth in saliva compared with alternative solutions. The certainty of the evidence was considered low to very low due to limitations in study design, indirect study populations and outcome measures, and imprecision.

Blister

Key action

Keep the blister clean and covered to prevent infection.

Introduction

A friction blister is a small pocket of fluid that forms in the upper layers of skin caused by continuous rubbing or pressure over time. Friction blisters commonly appear on feet during or after walking long distances, or on hands after using a tool for a long time.

Guidelines

- If a friction blister does not cause serious discomfort, the first aid provider should consider keeping the blister intact. This may decrease the risk of bacteria and infection, compared to draining it (aspiration) or removing the top layer of the blister (deroofing).*

Good practice points

- Friction blisters can lead to an open wound, bleeding or infection, limiting individual mobility. In these situations, the person should stop the activity causing the blister, cover the blister with a sterile dressing and seek medical advice.
- If a friction blister filled with fluid causes serious discomfort or is at risk of self-draining, the first aider should consider draining it. This may reduce the pain associated with the blister. If drained, the blister should be covered with a sterile dressing to ensure the roof attaches to the underlying skin and that the blister does not refill with fluid.
- A small blood-blister can be punctured by a first aid provider; large blood-blisters should be treated by a medical professional.
- Materials like moleskin or commercial hydrocolloid blister-plasters may be applied to minimise additional trauma to the blister and to relieve discomfort.
- Commercial hydrocolloid blister-plasters should not be used at longer distances, because blisters can still come up and the plaster is very difficult to remove from damaged skin.
- Antibiotic ointments are advocated for the immediate treatment of friction blisters only.

Chain of survival behaviours

Prevent and prepare

- Wear dry socks with shoes that fit well.
- Before starting the activity, tape parts of the feet or hands which are likely to rub.
- Carry appropriate dressings if doing an activity likely to cause blisters.

Early recognition

- The person has been doing an activity likely to cause continuous rubbing or pressure for some time.
- A small pocket of fluid can be seen in the upper layers of skin caused by the friction.
- Many blisters will self-drain if hands and feet continue to be used.

First aid steps

1. Wash the blister and surrounding area with clean water and gently pat it dry.
2. If the blister is intact, cover it with moleskin or a blister pad. If the blister has self-drained, clean the wound and cover it with a sterile dressing (see Cuts and grazes). Reinforce the covering by taping if needed.

Special case

- If the friction blister is intact and causes serious discomfort:
  - Clean the skin over and around the blister with (preferably lukewarm) water.
  - Using a standard sterile needle, puncture the blister twice at the lower edge of the blister leaving the rest of the blister roof intact.
  - Gently push the fluid out of the blister until all the fluid has been removed.
  - Clean the skin over and around the blister again with running water, and then gently pat the skin surrounding the blister dry.
  - Cover the blister with a sterile dressing (see Cuts and grazes).

Access help

- Seek medical advice:
  - if the blister becomes an open wound or shows signs of infection such as becoming hot and painful
  - if the person has diabetes or their immune system is compromised. In these people, wounds are more likely to become infected or have trouble healing.

Recovery

- Monitor the blister over several days to check for signs of infection (such as heat, continuous pain or onset of fever). If these appear, seek medical care immediately.

Education considerations

Facilitation tips

- Include friction blister education for learners planning a wilderness expedition or an endurance activity such as a long-distance walk.
- Emphasise prevention and preparedness as this is the most effective strategy for managing blisters.
- Explore the appropriate dressings that support preparedness for blisters.
- Facilitate learning that helps individuals to recognise blisters.
- Education may also cover the removal of dressings which should, if possible, not damage the blister. Adhesive removal sprays are available in some pharmacies and may make removing dressings easier.

Scientific foundation

Systematic reviews

The Centre of Evidence-Based Practice (CEBaP) developed an evidence summary in 2019 concerning deroofing or aspirating friction blisters. The review identified two experimental studies about blisters due to burns, which provided indirect evidence on the management of friction blisters.

Deroofing or aspiration

There is limited evidence from one non-randomized controlled trial in favour of keeping a blister intact. It was shown that keeping a blister intact resulted in a statistically significant decrease of bacteria (or Staphylococcus aureus) colonisation, compared to aspirating or deroofing a blister.

In addition, there is limited evidence from one randomised controlled trial in favour of aspiration at the level of the subjective pain experience. It was shown that aspiration of large blisters (greater than 10 mm) resulted in a statistically significant decrease of the subjective pain experience, compared to deroofing of large blisters. However, this could not be shown for small blisters.

At the level of infection risk, it was shown that aspiration of blisters resulted in a statistically significant decrease of blister colonisation with Staphylococcus aureus, compared to deroofing of blisters. However, a statistically significant decrease of blister colonisation with bacteria in general or increase of wound healing could not be demonstrated when comparing aspiration with deroofing.

All evidence is of very low certainty and results cannot be considered precise due to limited sample size, low number of events and large variability of results.

Second-skin bandage

In a second evidence summary, no studies were identified on the effectiveness of second skin bandages.

Prevention

A systematic review published in 2017, aimed to determine which strategies were effective in the prevention of friction blisters in the wilderness and outdoor pursuits (running, hiking, marching, etc.). Clinical and methodologic diversity precluded meta-analysis. Despite the high frequency, discomfort and associated cost, there is little high-quality evidence in support of socks, antiperspirants or barriers for the prevention of friction blisters. Moderate confidence in the effect estimate suggests that paper tape may be an effective form of barrier prevention (Worthing et al., 2017).

Non-systematic reviews

Limited research has been conducted to examine different treatment or prevention for friction blisters (Brennan, 2012; Levy, 2006; Lipman, 2014; Knapik, 1995). Most studies have been performed within the military or in athletes with a who all tend to be similar in age and physical activity levels, with a primary focus on the prevention of blisters (Janssen et al., 2018).

Neither (aspiration) nor removing the top layer of a blister (deroofing) is a superior treatment for blisters. However, some objective indicators suggest that draining a blister might be more effective than removing the top layer (Ro et al., 2018).

The existing body of literature addressing friction blisters includes some narrative reviews. Most notable among these narratives is that published by Knapik et al. in 1995, who included a detailed evidence-based review of pathophysiology, the factors influencing blister formation and recovery. Clinical experience suggests draining intact blisters and maintaining the blister roof results in the least patient discomfort and may reduce the possibility of secondary infection. Treating deroofed blisters with hydrocolloid dressings provides pain relief and may allow patients to continue a physical activity if necessary. Clinical trials are needed to determine the efficacy of various blister treatment methods. Antibiotic ointments are advocated for the immediate treatment of friction blisters. There is no published evidence that these measures are of any benefit in healing or preventing infection (Knapik, 1995).

The most effective blister management strategy is prevention. Blister prevention starts with an optimally fitting shoe. Also, moist skin is more vulnerable, so the drier the feet, the less chance of blisters. High-quality, dry socks are important (Jagoda, 1981).

Pre-taping the feet with adhesive tape can be used to prevent friction blisters. The success of taping relies on keeping the tape well-adhered to the skin. However, there are no published studies to show these measures work (Richie, 2010). Also, various «best practices» for preventing blisters are recommended by medical professionals, as well as professional and amateur athletes. The choice of tape and taping-method is an individual choice. Surgical paper tape was not found to be particularly protective against blisters in marathoners, although this intervention was well tolerated and had high user satisfaction (Lipman et al., 2014).

Commercial hydrocolloid blister-plasters can be very helpful and come in several sizes and shapes. Apply these according to the instructions. Do not use commercial blister plasters for longer distances, because blisters can still come up and the plaster is very difficult to remove from the damaged skin.

Because the skin provides natural protection against infection, friction blisters on the foot should be left intact if possible. They usually require simple first aid, such as a bandage to protect the blister area. Blisters can, however, lead to increased discomfort, an open wound, bleeding or infection and limit individual mobility. In this situation, first aid providers should focus on further blister management and pain reduction. For example, during the annual Nijmegen Four Days Marches in The Netherlands, the world's largest multi-day walking event with daily distances ranging from 30 to 50 kilometres (~18 to 30 miles), the need for treatment of friction blisters is very high. In previous years of the Four Days Marches, the number of participants requiring at least a single blister treatment varied between 4000 and 5000, accounting for 10% of the total number of walkers (Janssen et al., 2018).

Although most friction blisters remain uncomplicated, materials like Moleskin may be applied to minimize additional trauma to the blister and to relieve discomfort (Schwartz and Elston, 2019).

Because the pain from a friction blister is caused by pressure from the built-up fluid, draining a fluid-filled blister will immediately reduce the associated pain. Evidence for blister management and pain reduction suggests puncturing a blister and using adhesive surgical tape, like Leukoplast® by BSN Medical. Only one evidence-based study from the Four Day Marches recommends taping the blister and part of the foot (Roos, 1954). The high-quality viscose backing material is hygienic and resistant to tension. The purpose of the bandage is to ensure that the blister roof adheres to the underlying skin and that it does not refill with fluid after drainage. Though puncturing and taping have proved effective in the past, it is time-consuming. In the case of the Four Days Marches or other events like it, this can lead to long wait lines and disrupt the walking rhythm of those taking part in the event (Janssen et al., 2018).

Clean the entire footpad to remove any grease and allow the adhesive plaster to attach better. Blisters can best be disinfected before and after puncturing with povidone-iodine (Betadine®), unless the person is allergic to it or there are other objections. In this case, the use of pink chlorhexidine (0.5% in 70% alcohol) is recommended. Never puncture a blister through a previously laid-out bandage as you cannot see the blister and is it unhygienic (Gonzales de la Guerra and Dallasta, 2013).

When removing the adhesive tape applied on the foot or toe, the blister may damage. The «best practice» to remove old tape bandages is to remove the glue with white spirit on a gauze between the skin and the adhesive plaster. Do not remove the patch from the skin all at once; take it off in sections and support the skin. Make sure the white spirit does not enter the wound or open blister. In addition to the white spirit, various types of «adhesive remover» sprays or tissues are also available. They do not contain alcohol so will not irritate the skin. (Van Romburgh, 2017)

Burns

Key action

Cool the burn with running water for at least 10 minutes, ideally 20 minutes.

Introduction

Four of the main causes of burns are heat (fire, steam), chemicals (acid), radiation (radioactive materials, the sun, sunlamps) and electricity. Mild burns in adults generally do not require medical care; however, even burns that appear small or mild can be very harmful to a baby, child or the elderly. The depth and size of the burn determine its severity. It is important to note that even after being removed from the burn source, the burning process can continue in the layers of the skin.

Guidelines

- Thermal (heat) burns should be cooled with running water for a minimum of ten minutes, ideally 20 minutes.**
- Chemical burns on the skin or in the eyes should be rinsed with running water and (if available) diphoterine until the pain eases.*
- After cooling, a dressing that maintains moisture, contours easily to the wound and is non-stick (e.g., hydrogel) should be used on burns.**
- After cooling, vaseline or honey may be beneficial substances to apply to a thermal burn.*
- Aftersun lotion (Hamamelis-free lotion), aftersun cream (e.g., aloe vera cream) or aftersun gel (diclofenac-NA 0.1% Emulgel) can be applied to sunburn according to their instructions and may reduce pain.*
- Silver sulfadiazine should not be used because it seems to be associated with poorer healing outcomes than other treatments.*
- Blisters should not be deroofed or aspirated, as this may increase the risk of infection. If they affect the function of the injured body part, the person should consider seeking medical advice. See Blisters.*

Good practice points

- When possible and safe to do so, the source of danger should be dealt with to prevent further injury. For example, covering a pot of hot oil.
- The first aid provider should avoid direct contact with any caustic substances.
- If rinsing a caustic substance from the skin, the first aid provider should take care that any diluted substance does not harm healthy tissue.
- Potable (clean) water should be used to rinse out eyes that have had contact with a caustic substance.
- If a caustic substance was ingested, do not make any attempt to dilute it. Access the poison control centre, emergency medical services (EMS) or local equivalent. See Poisoning.
- If there is no cold running water available, any cold liquid may be effective in cooling thermal burns e.g., juice, milk etc.
- As long as they don't stick to the skin, clothing and jewellery on or near the burned skin should be removed to support treatment and reduce further discomfort.
- Covering a burn with a clean wet cloth or plastic cling wrap can protect it during transit to medical care. Cover rather than wrap an extremity as it may swell.
- If the burn is large, deep or close to the face, mouth/throat or genital area, or if it is the result of chemical products, electricity or flames, the first aid provider should access emergency medical services (EMS).
- If warmth or pain develops around the burn area, or the person develops a fever this is an indication of infection and the person should seek medical advice immediately.

Chain of survival behaviours

Prevent and prepare

- If possible, try to avoid cooking at floor level, and ensure that where this occurs, small children and babies are supervised and kept away from the fire (Bitter et al., 2016; Forjuoh, 2006).
- Keep clothing away from flames and intense heat sources, ensure safe handling of pressure stoves and coal-burning stoves, and construct kitchens safely with regard to electric cables and fireplaces (Ghosh & Bharat, 2000).
- Put fire safety equipment (e.g., extinguishers or the local equivalent) in high-risk areas such as the cooking area to limit the spread of fire and potential harm.
- Wear protective equipment (e.g., gloves) when using chemical substances or hot objects.
- Review safety information on chemical products before use.
- Cover skin with clothing or sunscreen (SPF 30 or more) when in the sun.
- Avoid long periods in the sun.

Early recognition

- Thermal burns caused by direct contact with a source of heat or chemical burns will immediately be sore and the skin may react with blisters or irritation after contact with a chemical.
- The injured person may tell you or indicate they have been burned.
- Burns vary in size and depth. Do not delay immediate treatment. There are several methods used to recognise the severity of a burn such as the Wallace scale, however, we have no evidence on which is most effective.
- Sunburn can occur quite quickly or over a longer period. The person may not notice they are getting sunburned until they see a change in their skin colour or realise the area is painful.

First aid steps

1. Cool the burn with clean running water for at least 10 minutes, ideally 20 minutes.
2. Access emergency medical services (EMS) if the burn is large, deep or close to the face, mouth or throat or genital area, or if it is the result of chemical products, electricity or flames.
3. As long as they're not stuck to the skin, remove any clothing and jewellery on or near the burned skin.
4. After cooling, cover it with a dressing that maintains moisture, contours easily to the wound and is non-stick (e.g., hydrogel).
5. If necessary, cover the burn with a wet cloth or plastic cling wrap while you transport the person to medical care.
6. Reassure the person and monitor their responsiveness, breathing and temperature especially if it is a child or a vulnerable person (e.g., older adult, diabetic).

NOTE

- During cooling, letting the water flow over the burn may be more comfortable for the person than aiming the water flow directly on top of the burn. Do not use ice-cold water, as this may lead to hypothermia.
- Do not apply ice, as this may aggravate the injury.
- If the burn has blisters, leave them intact and seek medical advice.
- If the burn is large, there is a risk the person will develop shock. To help a person with shock it is necessary to help them to lay down and keep them warm. If possible, prevent the burn from coming into contact with the ground to keep the burn clean.

Local adaptation

- If there is no running water available, use alternative cool liquids (juice, milk) to cool the burn.
- If water or other liquid is in short supply, put a bowl under the burn and pour the liquid over the burn into the bowl so that the water can be used again. This is more effective than putting the burn into the bowl of water as the body part will warm the water. Pouring it keeps the temperature of the water lower.
- If there is no dressing available, use locally available substances such as aloe vera, honey or banana leaves to dress the burn.

Chemical burn to eye

- In the case of a chemical burn to the eye, immediately rinse the eye with clean water.
- Remove any contact lenses during the rinse.
- When rinsing a chemical substance, take care that the now diluted substance does not harm you or the person's healthy tissue by making contact with unaffected skin or the uninjured eye.
- Use diphoterine for cooling if available following the instructions on the container.
- Do NOT apply any other products without consulting medical care.

Sunburn

- Apply aftersun lotion according to the instructions.
- If the sunburn is extensive or if it happens to a baby or a vulnerable person (e.g., older adult, diabetic), access medical care as quickly as possible.

Access help

- If the burn is large, deep or close to the face, mouth, throat or genital area, or it is the result of chemical products, electricity or flames, access EMS or nearest medical care.
- Seek medical advice if the burn happens to a baby or a vulnerable person (e.g., older adult, diabetic).
- In the case of a chemical burn to the eye, be aware that the person will need some assistance. They shouldn't drive a car themselves.

Recovery

Monitor for signs of infection. If warmth or pain develops around the site of the burn, seek medical advice.

Education considerations

Context considerations

- Prevention is the key focus when facilitating the topic of burns. Consider the learners' context, identifying the source of burns they are most likely to experience and adapt the prevention material accordingly (Wallace et al., 2016). For example, learners who live in hot countries could focus on how to prevent sunburn.
- In addition to prevention methods, consider re-focusing the education to best suit learners' needs. Learners who work in professional kitchens, or who cook on open fires may benefit most from learning the first aid actions to treat a burn (Forjouh, 2006; Outwater et al., 2018). In contrast, those who are in remote or resource-limited settings (such as wilderness) will need to develop critical-thinking skills to make use of their surroundings to treat a burn (Bitter et al., 2016).

- Developing contextual education that considers the local environments in which learners live and work (and therefore what resources and immediate help are accessible to them) is useful for teaching burns (Bitter et al., 2016; Outwater et al., 2018).
- While using running water is the most successful treatment for burns, encourage learners to think of effective alternatives in situations when they do not have access to water.
- The first aid treatment of burns varies across communities and, in some cases, is influenced by strong cultural traditions. Acknowledge these traditions and explore the different types of local treatments with learners. Be careful not to dismiss local remedies for which there is no evidence. Build upon the traditions and local treatments and connect learners' knowledge with additional, positive treatments that will reduce harm and provide comfort to the person who has a burn.
- In communities with a high frequency of burn injuries, deliver frequent, shorter, burn-specific first aid courses to ensure learners maintain their knowledge and skills. Another option is to develop a peer-education programme.

Learner considerations

- Acknowledge and correct any myths or incorrect information associated with burns, such as the incorrect belief that only white skin can be sunburned. The use of sunscreen and staying out of the sun for long periods is an important preventative measure for all ethnicities and skin types to reduce the risk of burning and getting skin cancer.
- For caregivers of babies, children or older adults, emphasise that they should focus cooling on the site of the burn only, to reduce the risk of hypothermia.
- Burns (like other injuries) could be caused intentionally by others or by the person such as in situations of physical abuse and self-harm. This is an important point to make to learners who may be caregivers or teachers. Such cases need to be handled with care and referred to the appropriate professionals if needed.

Facilitation tips

- Establish what learners already know about how to treat burns and uncover any strong beliefs. This information will help identify any knowledge gaps as well as any non-evidence-based practices or misconceptions (e.g., putting butter or cooking oil on a burn).
- Emphasise that cooling the burn is critical to reducing any potential tissue damage. The burning effect continues even after the skin has been removed from the source of heat so cooling should take place quickly and for a sustained time (10 minutes minimum).
- Explore how burns look on different skin types and colours.
- Provide learners with time to practise making the person comfortable while cooling their burn. While the recommended time to cool a burn is specific, this may present a challenge if the person does not want to cooperate. Children, in particular, find it hard to sit still and the cold water can start to cause them pain.

Facilitation tools

- In 2017, the Belgian Red Cross-Flanders updated the manual Basic First Aid for Africa (revised in 2016) which has some interesting material on prevention and when to seek medical help regarding burns.

Learning connections

- Hypothermia and shock are both conditions that might develop following a burn.

Scientific foundation

Systematic reviews

The scientific foundation for this section is based on a 2015 evidence review and 2020 scoping review from the International Liaison Committee on Resuscitation (ILCOR) First Aid Task Force, evidence summaries from the Centre of Evidence-Based Practice (CEBaP, 2019, CEBaP2020) as well as a Cochrane review.

Cooling

ILCOR identified one randomised controlled trial and four observational studies in a 2015 evidence review (Singletary, et al., 2015). Based on one randomised controlled trial and one observational study, no difference in pain could be shown in cooled versus non-cooled burns (low-certainty evidence). In the randomised controlled trial, a difference in the amount of erythema could not be shown (low-certainty evidence). Two observational studies showed a reduction in the depth of a burn when cooling, whereas a third observational study found no benefit of cooling (low- to very low-certainty evidence). In one observational study, no benefit in reducing re-epithelialization time was shown (very low-certainty evidence). Three observational studies looked at the need for medical care. Two studies showed a decreased length of hospital stay after a minimum of ten minutes of cooling, and a decrease in hospital admission after a media campaign about the cooling of burns, whereas the third study showed no difference (very low-certainty evidence).

Ice

A 2019 CEBaP evidence summary revealed there is limited evidence from one observational study, neither in favour of using ice nor no treatment. A statistically significant decrease of the need for grafts, scar management, days to re-epithelialize or number of visits, using ice compared to no treatment, could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to a low number of events, limited sample size and large variability of results.

Deroofing

A 2019 CEBaP evidence summary shows that there is limited evidence from one non-randomised controlled trial in favour of keeping a blister intact (i.e., not removing the top layer of skin from the blister). It was shown that keeping a blister intact resulted in a statistically significant decrease of bacteria or Staphylococcus aureus colonisation, compared to aspirating or deroofing a blister. Evidence is of low certainty and results cannot be considered precise due to limited sample size, the low number of events and lack of data.

Burn dressings

A scoping review was conducted by ILCOR in 2020, but no studies on burn dressings were identified in the first aid setting with superficial thermal burns (Singletary et al., 2020). In addition, a Cochrane review was identified reporting on the use of dressings for superficial and partial thickness burns (Wasiak et al., 2013). Silver sulfadiazine was consistently associated with poorer healing outcomes than biosynthetic (skin substitute) dressings, silver-containing dressings and silicon-coated dressings. It was also reported that burns treated with hydrogel dressings appeared to heal more quickly than those treated with usual care. The review authors concluded that it was impossible to draw firm and confident conclusions about the effectiveness of specific dressings. A follow-up systematic review by the same group (Goodwin et al., 2016) did not find any studies on the use of hydrogel-based burn dressings in first aid practices in the pre-hospital setting.

Alternative burn dressings (honey, fatty acids, banana leaf dressings, vaseline)

A 2020 CEBaP evidence summary identified a Cochrane systematic review and four additional randomised controlled trials about the use of honey to treat burns. It was shown that honey resulted in a statistically significant decrease in the mean time to healing and incidence of infection compared to conventional non-antimicrobial dressings. It was also shown that honey resulted in a statistically significant decrease in time to complete healing, presence and completion epithelialization, hospital stay, persistent infection and time until negative swabs compared to silver sulfadiazine. A statistically significant decrease of mean time to healing, number of healing events, incident infection, clinical infections or adverse events, using honey compared to silver sulfadiazine, could not be demonstrated. Finally, it was shown that honey resulted in a statistically significant decrease in time to complete healing, mean time to healing and persistent infection compared to potato peels. A statistically significant decrease in adverse events, using honey compared to potato peels, could not be demonstrated. Evidence is of moderate to low certainty and results cannot be considered precise due to limited sample size, a low number of events, lack of data or large variability of results.

An additional 2020 CEBaP evidence summary identified evidence about the use of fatty acids and banana leaf dressings as burn dressings. There is limited evidence from one non-randomised controlled trial in favour of fatty acids (ethyl linoleate). It was shown that adjuvant topical application of ethyl linoleate resulted in a statistically significant decrease in the narcotic pain relief requirement, time to appearance of the epithelium, the appearance of normal pigment and hair and the number of patients requiring grafts compared to standard burn management. A statistically significant decrease in length of hospital stay, amount of positive cultures, the number of patients requiring reconstructions and mortality, using adjuvant ethyl linoleate compared to standard burn management, could not be demonstrated.

There is limited evidence from two non-randomised controlled trials in favour of banana leaf dressings. It was shown that banana leaf dressings resulted in a statistically significant decreased discomfort score, dressing removal pain score, ease of dressing removal score and time to complete healing, compared to using ordinary gauze dressings. In another study, it was shown that banana leaf dressings resulted in a statistically significant decreased discomfort score 20 minutes after dressing and a statistically significant decreased pain score before dressing. A statistically significant decrease in discomfort score before and during dressing and pain score during and after dressing could not be demonstrated. A statistically significant decrease in signs of wound infection using banana leaf dressings compared to using ordinary gauze dressings could not be demonstrated. A statistically significant difference in complete epithelialisation, need for skin grafting, dressing change pain and discomfort using banana leaf dressings compared with boiled potato peel dressings could not be demonstrated. All evidence is of very low certainty and results cannot be considered precise due to limited sample size, the large variability of results and lack of data.

Another 2020 CEBaP evidence summary revealed there is limited evidence from one randomised controlled trial in favour of using vaseline. It was shown that vaseline application resulted in a statistically significant decrease of time to re-epithelialisation, adherence to the wound, time to change the dressing, and a statistically significant increase in ease of dressing removal compared to silver sulfadiazine covered with a gauze. A statistically significant decrease in pain during dressing application, pain during dressing removal and amount of dressing changes using vaseline compared to silver sulfadiazine covered with a gauze could not be demonstrated. Evidence is of moderate certainty and results cannot be considered precise due to limited sample size.

Plastic cling wrap

A 2019 CEBaP evidence summary could not identify any human studies on the use of cling wrap or plastic film on burn wounds.

Chemical burn

A 2019 CEBaP evidence summary showed that there is limited evidence from two observational studies in favour of immediate irrigation of the burned skin with tap water or diphoterine. It was shown that immediate irrigation with tap water resulted in a statistically significant decrease in length of hospital stay and number of full-thickness burns, compared to no immediate irrigation with tap water or irrigation with saline, isotonic phosphate buffer or Ringer's lactate. It was also shown that irrigation with diphoterine resulted in a statistically significant decreased proportion of severe burn wound, compared to irrigation with tap water. Evidence is of very low certainty and results cannot be considered precise due to low sample size, a low number of events, large variability in results and a lack of data.

A second 2019 CEBaP evidence summary revealed that there is limited evidence from three observational studies in favour of immediate irrigation of the burned eye with tap water or diphoterine. It was shown that immediate irrigation (with tap water) resulted in a statistically significant decrease in the proportion of severe burns, corneal and conjunctival erosion, time until healing less than seven days, and the number of eye operations needed, and a statistically significant increase in clear vision, the proportion of mild eye injuries, compared to no immediate irrigation (with tap water) or irrigation with saline, isotonic phosphate buffer or Ringer's lactate. A statistically significant difference in the proportion of severe burn wounds after irrigation with tap water, compared to irrigation with diphoterine, could not be demonstrated. Also, a statistically significant difference in the proportion of conjunctivitis or superficial punctate keratitis after immediate irrigation, compared to no immediate irrigation, could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to low sample size, a low number of events and large variability in results.

There is no evidence summary available on what to do if a chemical substance is ingested.

Sunburn

A 2019 evidence summary from CEBaP found limited evidence from four experimental studies in favour of aftersun lotion and aftersun cream, and from two experimental studies in favour of aftersun gel.

It was shown that aftersun lotion (Hamamelis-free lotion) and aftersun cream (aloe vera cream) resulted in a statistically significant reduction in erythema (48-54 hours after sun exposure) compared to a placebo lotion or cream or no treatment. On the other hand, in two studies with aftersun cream (Aloe Vera cream), a statistical erythema reduction 24 hours after sun exposure, compared to placebo or no treatment, could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to limited sample size, the low number of events and a lack of data.

It was shown that aftersun lotion with 0.1% diclofenac resulted in a statistically significant reduced erythema and pain, compared to a placebo gel (Kienzler 2005, Magnette 2004).
Evidence is of moderate certainty and results cannot be considered precise due to limited sample size.

Education review

We initially sourced 13 papers through the education search strategy for this topic, of which we included seven. Expert reviewers added a paper, bringing the total to eight. These include the following:

- One systematic review from Nurmatov et al. (2017).
- Two literature reviews from Bitter et al. (2016) and Forjuoh et al. (2006).
- One mini meta-analysis of studies from Tanzania by Outwater et al. (2018).
- Four studies on knowledge and awareness from Alomar et al. (2016), Ghosh and Bharat (2000), Graham et al. (2011) and Wallace et al. (2013).

Language

Nurmatov et al. (2017) identified that awareness, knowledge and practise of burn first aid skills is low among caregivers worldwide; many people either do not cool the burn properly or do not cool it long enough. Public messaging adds to the confusion by providing a variety of recommendations and guidelines. This confusion was evident across the papers we reviewed where each had different "ideal" burn treatments. The review found that when public messaging appears in the local language, knowledge and behaviour change is possible. It concluded that communities with diverse languages need health messaging in each language to promote taking first aid action, quickly accessing help and reducing the use of harmful treatment alternatives.

Limited resource settings

A literature review by Bitter et al. (2016) described how, in remote communities, people had evolved self-care treatments for burns based on experimental familiarity with nature and plants. In particular, where access to clean running water may be unrealistic, first aid providers may find themselves having to adapt first aid principles. While the use of traditional remedies has a variable evidence base and may be sub-optimal, teaching those living, working or visiting remote settings about improvised remedies is important when advanced treatments are not available.

Outwater et al. (2018) provided a perspective from Tanzania on the importance of cooling a burn as early as possible. She focuses on the adaptability of providers, how they need to feel knowledgeable and empowered to use safe and appropriate alternative methods to cool a burn when clean, running water is unavailable. Outwater found that most burn injuries in Tanzania occur in the home cooking area, and most first aid providers are family members, friends and neighbours. Information on burns was most likely to come from these sources and, less often, healthcare workers or the media. The study interviewed 710 people with burns and looked at 24 different materials that had been applied to their wounds. The most common material was honey. Only 14.3% of people received the recommended form of care (application of running water). The study also found that 17.5% of people received nothing for their burns.

The study highlighted that first aid providers are very aware that burns must be cooled; however, there is still a great need to contextualise education and instil confidence to respond in communities where the availability and accessibility of clean running water may be limited. For example, suggesting the use of cold honey and emphasising the need to keep the burn site clean while monitoring for infection are important educational adaptations.

Influence of culture and traditions

Graham et al. (2011) identified significant differences in first aid knowledge between different ethnicities attending the emergency department for burns treatment in the United Kingdom (UK). The difference could be attributed to a lack of education in languages of immigrants needing to learn about the UK healthcare system.

Ghosh and Bharat (2000) undertook a review of a burns awareness strategy over several years around a steel-producing town in India. The study found that before the awareness strategy began, the majority (68.5%) of patients admitted for burns were due to kitchen accidents, mostly of women and girls whose clothes caught fire while working in the kitchen. Inappropriate treatments, such as egg or oil, were common. They undertook a strategy which included school and community education programmes aimed to affect generational behaviour change. It included education about the structure of kitchens, as well as behaviour. Unfortunately, there has not been any strong evaluation of the different approaches used, so it is hard to identify what has worked and what has not. Overall, the strategy is seeing some success.

Alomar et al. (2016) surveyed caregivers attending four paediatric clinics in Riyadh, Saudi Arabia, using a structured questionnaire on first aid burn knowledge and the care they provided. Results showed that 41% treated the burn with water, although 97% had inappropriate or no knowledge of the recommended duration. 65% covered a pot of boiling oil that was on fire with a damp cloth, but only 24% smothered burning clothes. Using questions about where first aid providers got their knowledge from and where they preferred to get it from, the study concluded that social media and TV, as well as information provided at hospital visits, was preferred. The authors also noted a need for a nationwide education programme to raise awareness of what to do for burn emergencies.

Context-specific learning

Wallace et al. (2013) undertook a cross-sectional study using convenience sampling of members of sporting and recreation clubs in Australia. The primary outcome measure was the proportion of correct responses to multiple-choice questions relating to the following four burn scenarios: scald, contact burn, ignited clothing, and chemical burn. This article reinforces evidence of the importance of first aid education that is tailored and responsive to the needs of particular audiences based on their possible experiences.

Forjuoh et al. (2006) provided a literature review to determine burn prevention understanding based on who gets burned and what are the causes. The review identified a common thread of characteristics such as seasons (fewer fires or heating provision in hotter climates) and gender (higher instance for boys up to four years, and then higher instance for girls as they are brought in to help in the kitchen). It found that risk factors are very context-based. Common themes of risk-based prevention were socio-economic factors, maternal education, housing improvements and increased access to water. More studies are needed to ensure data is used for targeted prevention according to the context and local practices.

Flash eye

Key action

Protect the eyes and let them rest.

Introduction

Flash eye (also called snow blindness or arc eye), is a painful condition in the eyes caused by overexposure to ultraviolet (UV) light. It is like the cornea (the transparent outer layer of the eye) has a sunburn. Flash eye is most likely to happen to people who take part in outdoor sports or activities in relatively high altitudes or at sea, where surfaces reflect light into the eyes. At high altitudes, there is less air to filter light and so it is much more intense. Man-made sources of UV radiation, such as a welder's torch or sun lamps, have the same effect.

Good practice points

- If applicable, the person should remove their contact lenses.
- The person should protect their eyes and let them rest as much as possible, by:
  - > staying indoors and wearing sunglasses to relieve pain or discomfort
  - > keeping their eyes closed as much as possible
  - > covering their closed eyelids with a cool, damp cloth.
- The person's eyes should stay moist (e.g., using saline solution or eye drops).
- The person should avoid rubbing their eyes.
- If symptoms last longer than a day or if they worsen, the person should seek medical advice.

Chain of survival behaviours

Prevent and prepare

- Wear protective eye gear when in the sun or undertaking tasks that expose the eyes to UV light. Protect the eyes from direct or indirect radiation that might reach them from above, below, as well as sideways.

Early recognition

The person may have:

- a feeling that something is in their eyes
- a burning sensation in their eyes
- blurred or loss of vision
- red and watery eyes
- sensitivity to light
- headaches
- swelling around the eyes.

First aid steps

1. Move the person away from the source of light and reassure them.
2. If they are wearing contact lenses advise them to remove them.
3. Help them protect their eyes and let them rest as much as possible, by:
   a. staying indoors and wearing sunglasses to relieve pain or discomfort
   b. keeping their eyes closed as much as possible
   c. covering their closed eyelids with a cool, damp cloth
   d. putting saline solution or eye drops in their eyes to keep them moist.
4. If their condition doesn't improve in 24 hours, seek medical advice.

Access help

- Flash eye usually passes but if it lasts longer than a day or the symptoms worsen access medical care.

Education considerations

Context considerations

- Learners who are at a higher risk of flash eye, for example, those who weld, work with or use sunbeds or spend time in the snow or at the sea, may benefit from learning about this topic.
- Use relevant or local terminology for this condition. For example, welders may refer to the condition as arc eye (or flash eye), whereas learners who spend time in the snow may call it snow blindness.

Facilitation tips

- Emphasise that flash eye is not limited to areas with snow. It can occur in any setting where there are high levels of UV light, including near water, sandy beaches, and where there is ice, or in certain work environments (e.g., welding).
- Emphasise that prevention includes wearing proper eye protection.

Scientific foundation

A Centre for Evidence-Based Practice (CEBaP) evidence summary on the use of wet dressings as first aid treatment could not identify any relevant studies.

Prevention

A second evidence summary from CEBaP identified limited evidence from three observational studies in favour of wearing eye protection. The studies showed that wearing eye protection resulted in a statistically significant decrease in work-related eye injuries, compared to not wearing protection. Evidence is of very low certainty and results cannot be considered precise due to limited sample size. (CEBaP, 2019)

Fractures, sprains and strains

Key action

Keep the injury still to reduce pain.

Introduction

Sprains and strains are considered minor injuries, while fractures can range from minor to major. While often not life-threatening, injuries to the extremities (arms, legs, fingers or toes) can lead to disabilities if left untreated. A fractured bone is often painful and can cause internal or external Bleeding (in the case of open fractures when the broken bone breaks through the skin). If a long bone is injured, such as the femur, the bleeding from the bone itself can be life-threatening. See also Spinal injuries.

Good practice points

- Any injury to an extremity should be approached as a potential bone fracture and should be manually stabilised in the position found.
- The injury should be stabilised to minimise any movement and pain.
- An extremity with a suspected sprain or strain may be immobilised if this provides comfort.
- Ice or cooling may be applied for up to 20 consecutive minutes to sprained joints and soft-tissue injuries, as this may decrease pain and improve recovery. Cooling for longer than this may damage the skin.
- A compression dressing may be applied to a strain or sprain if this provides comfort.
- All fractures should be assessed for internal and external bleeding and the injured person treated for Shock, especially if the fracture involves long bones such as the femur.
- In situations where the injured person must be moved, and transportation is expected to be bumpy or jarring, first aid providers should protect the limb (particularly a leg) by splinting. Splinting should be done in a way that limits pain, reduces chances for further injury and facilitates safe and quick transport.
- When in a remote environment (or one with limited resources) and the angulated fracture is cool and pale, the first aid provider may consider straightening it if trained to do so.

Chain of survival behaviours

Prevent and prepare

- Be prepared to care for fractures, sprains and strains for the context in which you will be. For example, sprains and strains are common in sports and it is advised to have cooling therapy equipment (e.g., ice packs) available. Conversely, if going on a trip to a remote location, find out about local rescue organisations and practise immobilising limbs before the trip.

Early recognition

The person may have twisted a limb, fallen or taken a blow from an object.

The person may have:

- deformity, swelling, haematoma or bruising at the site of the injury
- pain and or difficulty in moving the body part
- shortening, twisting or bending of the limb
- a broken bone or bone fragments sticking out of the skin
- the sound of a snap or a pop when the injury happened
- a sensation or sound of bones grating.

First aid providers are not expected to be able to diagnose whether a person has a fracture or a sprain or strain. The only accurate way to diagnose a fracture is with an X-ray. When in doubt, assume it is a fracture.

First aid steps

1. Help the person to keep the injury still.
2. Support the injury in a comfortable position to prevent any movement. Keeping the limb elevated may help to prevent swelling.
3. Apply ice or something cold for up to 20 minutes. Cooling for longer than this may damage the skin. Ask the person to rest.
4. Access emergency medical services (EMS), if the person has a lot of pain or swelling, or if the limb is in an abnormal position.
5. Reassure the person and ensure they are comfortable.

NOTE

- There are many instances when the use of ice or something cold may be beneficial such as bruising, strains, sprains, dislocations, haematoma, swelling or closed fractures.
- To be really effective, the application of ice or something cold must be done as soon as possible after the trauma. Stop cooling if the person finds it too painful. If the pain returns and the skin's temperature has come back to normal, you may start cooling again.
- Dislocations and fractures should always be treated by a medical professional.
- If the injury is an open fracture, your priority is to stop the Bleeding. As for any fracture, stabilise the limb. Treat them for Shock.

CAUTION

- Always wrap an icepack in a cloth to avoid damage to the skin.
- In the case of cramps, do not apply cold, but warm the affected muscle.

Local adaptation

- In remote areas where the injured person must be moved a long distance over bumpy terrain, protect the limb by splinting it in a way that limits pain, reduces chances for further injury and facilitates safe and quick transport.

Access help

- If you are in doubt whether the injury is a fracture, sprain or strain, access medical care.
- Record the time of injury as this information can be helpful for medical professionals when comparing the injured limb to the healthy one.

Recovery

- Mobilisation exercises can help with recovery from a sprain or strain; however, avoid weight-bearing exercises as these could worsen the condition (CEBaP review, 2015).

Education considerations

Context considerations

- Ensure learners living in or visiting remote settings know how to contact local rescue organisations, follow local procedures, and have the confidence and skills to care for a person with an angulated fracture.
- In contexts where learners may have to transport the injured person to a medical facility, practise improvising splints with local materials and emphasise how immobilisation helps reduce pain and prevents the limb from further injury.
- If transportation to medical care is likely to be short and easy, the injured person may prefer to support their own injury, or have it carefully supported by padding or clothing to stabilise it. Splinting or other immobilisation may not be necessary, particularly if it causes pain.

Learner considerations

- Those involved in sports or industrial activities may have more exposure to injured limbs and should know how to recognise fractures, sprains and strains and how to provide first aid care until a medical professional can take over.
- Older people may be more susceptible to falls and therefore sprains and fractures. Learners who care for older people may benefit from learning this topic.
- Some learner groups may benefit from learning how to take the peripheral pulse of the injured person and how to use their findings to identify more severe injuries. A weak pulse may indicate damage to the vessels or compression by a haematoma. While programme designers may consider including this in training, it should not deter learners from helping the injured person in other ways if they are unable to take a pulse properly.

Facilitation tips

- Facilitate discussions on learners' experiences with fractures, sprains and strains and expand on the learning outcomes as they come up in conversation. This may help build learners' confidence.
- Give learners time to identify the different types of medical care available to them in their context and which would be the most appropriate one to access for a range of injury types.
- Identify misconceptions and dispel them. Common misconceptions include that 'you can walk off' a sprain or strain (rest is advised initially), that you should apply alternating heat and cold therapy (only cold is recommended), that a fracture is easily identifiable (which it often is not), that 'if you can stand on it or move on a limb, it must not be broken' (fractures often need an X-ray to confirm, and should not be walked on).
- Brainstorm as a group what you could use to improvise immobilisation such as a newspaper or wood for a splint or rolling your sweater up to support an arm. Also brainstorm how you could find or improvise applying ice or something cold (e.g., icepacks, a bag of ice cubes).
- Spend time practising immobilisation techniques. Emphasise that stabilising the injury through support or immobilisation may reduce pain and prevent further damage of nerves or vessels.

Facilitation tools

- Use items found in the learning environment to make improvised splints. Encourage learners to see what works best and what components are essential for a successful splint.
- Use scenario-based learning to practise accessing medical care and how to minimise pain during transportation.

Learning connections

- Connect this topic to managing Severe bleeding and caring for Shock.
- Someone with a fracture is likely to be in a lot of pain. Help learners connect their first aid actions with care, empathy. Psychological first aid skills or the topic, Traumatic event may be relevant.
- This topic may offer good opportunities for learners to practise their General approach in a relevant contextual scenario.

Scientific foundation

Systematic reviews

The Centre for Evidence-Based Practice (CEBaP) was unable to find any evidence on the benefits of using a sling or a splint for immobilisation, or elevation on a broken or dislocated limb. Therefore, if a person with an ankle strain feels comfort from immobilisation, this is acceptable as there is no evidence of harm caused by doing this.

Ice and cooling

Two randomised studies and one non-randomised trial were identified, comparing cooling with ice (in combination with compression or compression and elevation) with not cooling with ice (with or without the use of compression and/or elevation). There is limited evidence neither in favour of cooling with ice nor not cooling with ice. A statistically significant decrease in tissue swelling, pain, injury severity, time to recovery, improvement in the ability to bear weight, range of movement, and proportion of people showing recovery after 2 or 14 days when cooling with ice (in combination with compression or compression and elevation), compared to not cooling with ice (in combination with compression and elevation) or to compression alone, could not be demonstrated. On the other hand, in one study, it was shown that cooling and compression, compared to compression alone, resulted in a statistically significant increase in the proportion of people showing recovery after seven days. Evidence is of very low certainty, and results cannot be considered precise due to low sample sizes, low number of events, wide confidence intervals and lack of data.

Ice and compression

Upon examining the combination of ice and compression compared to no treatment, there was no statistically significant decrease in pain while resting, walking or running, nor in functional capacity or length of the functional re-convalescence period in one study. Evidence is of low-certainty, and results cannot be considered precise due to low sample size and wide confidence intervals.

Realignment of an angulated fracture versus splinting in the position found

In 2015, the International Liaison Committee on Resuscitation (ILCOR) Consensus on Science looked at whether the realignment of an angulated bone fracture before splinting, compared to splinting the injury in the position found, would minimise injury of nerves and vessels, pain, time to medical transportation, as well as the need for splinting (Singletary 2015). Studies were identified for a full review but were excluded as they did not meet the inclusion criteria and so, no evidence was found. No additional evidence was found for or against the realignment of angulated long bone fractures to minimise injury, pain or time to medical transportation either.

Compression dressings

A 2020 systematic review, also conducted for ILCOR, found insufficient evidence to recommend for or against the use of compression dressings for ankle strains (Borra, 2020). For the critical outcome reduction of pain, low-certainty evidence from two randomised trials and three non-randomised trials was identified. None of the trials reported a reduction of pain with the use of a compression bandage compared with no compressive bandage, a non-compressive bandage, or a splint or brace. For the critical outcome, reduction of swelling or oedema, very low-certainty evidence (downgraded for risk of bias, indirectness, and imprecision) was identified from three randomised controlled trials and one non-randomised trial. None of the studies showed the use of a compression bandage reduced swelling. One randomised controlled trial found significantly less reduction of swelling with the use of an elastic bandage compared with no compression. However, this finding disappeared in a meta-analysis of all four studies.

For the important outcomes of the range of motion and recovery time, low- to very low-certainty evidence (downgraded for indirectness, imprecision or risk of bias) was identified from five randomised trials enrolling adults with ankle sprains. None of the trials demonstrated benefit from the use of a compression bandage compared with an ankle brace. Recovery time and range of motion were measured by the Karlsson score of function, percent of uninjured ankle range of motion, and time to return to work or to normal walking, stair climbing and full weight-bearing.

For the important outcome of recovery time (measured by return to sports), very low-certainty evidence from one randomised trial enrolling 117 adults with ankle sprains was identified, showing benefit from the use of a compression bandage when compared with the use of non-compressive stockings.

Therefore, if the person with an ankle strain wants a compression dressing, this is acceptable as there is no evidence of harm caused by the dressing.

Evidence gaps

More research is needed on the optimal frequency, duration and initial timing of ice or cooling treatments after an acute injury as sources are inconsistent in their recommendations.

Spinal injury

Key action

Help the person to keep as still as possible to prevent further damage to their spine.

Introduction

Spinal injuries can be caused by falling or diving from a height, being crushed by machinery or a heavy object, or being involved in road traffic collisions or sporting accidents. Spinal injuries can result in damage that can be permanent and may include disability such as the loss of use of the arms or legs. As with all first aid emergencies, the safety of the first aid provider should be paramount. Ensuring or maintaining normal breathing and blood circulation of the person with a suspected spinal injury remain vital to their survival.

Guidelines

- First aid providers should not apply a cervical collar.*

Good practice points

- The person may have a suspected spinal injury if they have been involved in a traumatic incident such as they were a driver, passenger or pedestrian in a motor vehicle or bicycle collision, or they have fallen from a height greater than standing.
- A person experiencing the following signs or symptoms following a traumatic incident may have a spinal injury:
  - tingling sensation in the extremities or other parts of the body
  - pain or tenderness in the neck or back
  - an obvious deformity to the head, neck or spine
  - other painful injuries, especially at the head or neck
  - sensory deficit or muscle weakness in the torso or upper extremities.
- First aid providers should always access EMS when suspecting a spinal injury.
- A person with a suspected spinal injury who is alert and awake should be advised to keep as still as possible and may not require manual stabilisation.
- A person with a suspected spinal injury who is not sufficiently alert or awake may benefit from gentle support of the head (manual stabilisation) to prevent inadvertent movement. First aid providers should not strap their head or neck.
- A person with a suspected spinal injury who is unresponsive but breathing normally should not be moved unless absolutely necessary. The first aid provider should open their airway and monitor their breathing.
- In cases of suspected spinal injury, a head injury should also be considered.
- Where the injury includes a suspected pelvic fracture, the first aid provider may apply a pelvic binder and avoid rotating the pelvis.

Chain of survival behaviours

Prevent and prepare

- Promote and practise safe behaviours, such as wearing a seatbelt and using a headrest when travelling by car or wearing back protection when travelling by motorcycle or horse.
- Players should not play sports if they experience spinal pain.

- Junior sports coaches should consider when the introduction of tackling is appropriate and should endeavour to teach the correct technique (Harmon et al., 2019).
- Remove trip hazards from places of work and home, particularly where elderly people or people with a disability live, to reduce the chance of trips and falls.
- Always ensure ladders are stabilised before climbing them.
- Supervise children who are climbing on frames or furniture.
- Never dive into shallow water, or water with an obstructed view or high flow (e.g. rivers) and take particular care when diving in the dark.

Early recognition

You may suspect a spinal injury if the injured person has:

- fallen from a height greater than standing
- been involved in a road traffic collision
- bumped their head while diving head-first into shallow water
- been involved in a traumatic event (e.g., explosion, mechanical incident).

Older adults (over the age of 65) and people with an underlying bone condition may be more susceptible to spinal injuries following minor traumas such as a slip, trip or fall.

The person may also have:

- a tingling sensation in their arms or legs or other parts of the body
- pain or tenderness in their neck or back
- obvious deformity to their head, neck or spine
- other painful injuries, especially at the head or neck
- sensory deficit (e.g., numbness) or muscle weakness (e.g., paralysis) in the torso or upper extremities. This may be accompanied by loss of urine or stool.

However, some people with a spinal injury may not experience any symptoms.

Be alert as babies and young children may be unable to recognise they have a spinal injury. Likewise, someone with an altered mental status (under the influence of alcohol or drugs) may be less likely to be able to recognise they have a spinal injury.

Pelvic fracture

First aid providers need specific training to recognise a pelvic fracture. Pelvic fracture may be associated with spinal injury.

A person with a pelvic fracture may:

- Experience pain at the hip, pelvis, groin or even the knee. This gets worse when moving.
- Not be able to support his legs. Sometimes, the foot (on the side of the fracture) is in an abnormal position.
- Experience sensory disturbances and tingling sensations in the legs.
- No longer be able to pass urine. Sometimes, there is spontaneous loss of urine. In some cases, there is blood in the urine.
- Show signs of Shock.

First aid steps

1. If the person is responsive and alert, reassure them and ask them to stay as still as possible. If necessary, (e.g., they are a child, are drunk, or do not follow to your instructions) gently support their head to help them to prevent movement of their neck and spine.

2. Access emergency medical services (EMS).

3. Ensure minimal handling or movement of the person at all times. Monitor their breathing and level of response for any changes.

NOTE

- Do not move the person if you suspect a spinal injury.
- If the person has to be moved, (e.g., there is imminent danger) this is best done with at least two first aid providers, where one can keep the person's head in line with their spine.

An unresponsive and breathing person with suspected spinal injury

If the person is unresponsive and breathing normally:

- Leave the person as you have found them (e.g. on their back or side).
- Maintain an open airway using the head tilt/chin lift or jaw thrust manoeuvre. The jaw thrust manoeuvre may cause less spinal motion.
- Gently support their head in this position to prevent any movement.
- Access EMS and follow their instructions.
- Monitor their breathing and level of response for any changes.

Pelvic fracture

1. Help the person to lie down on their back and to keep still with their legs straight.
2. Place padding between their legs and then immobilise their legs by binding them together at their knees and feet.
3. Access EMS.
4. Monitor the person's breathing, circulation and level of response, particularly looking for any signs of Shock.

NOTE

If you suspect a pelvic fracture, do not 'rock' or rotate the pelvis as this can restart or worsen bleeding.

Access help

Injuries to the spine are difficult to confirm and difficult to manage in out-of-hospital settings. Help should be sought as soon as possible if an injury to the spine is suspected.

Recovery

Signs and symptoms of spinal injuries should have been resolved before returning to activities with associated risks (e.g., some work activities, driving or operating machinery, contact sports).

Education considerations

Context considerations

- Knowing the mechanism of the injury is crucial to identifying a potential spinal injury. Help learners practise identifying if incidents in relevant contexts may have involved an abnormal force to the body resulting in a violent bending or twisting of the spine.
- Equipment for stabilisation and transport may be context specific. Consider the options for these with learners and use what is locally available (Pysny et al., 2017; Schimelpfenig et al., 2017).
- Rolling and lifting techniques should only be applied if absolutely necessary and when appropriate resources are available. More than one first aid provider is needed to apply these techniques safely so they should be discouraged when providers are acting alone (Schimelpfenig et al., 2017).

Learner considerations

- It is common for learners to be highly concerned about a spine injury in the event of a high-impact incident. Education providers should emphasise the importance of providing life-saving care by maintaining the person's airway and breathing and giving CPR when necessary.
- Consider how different learners may change the meaning of certain signs and symptoms - tingling, tenderness, deformed, etc. Discuss terminology with learners to help them to understand different signs and symptoms and be able to judge the seriousness of the injury using these terms.
- A pelvic fracture is very difficult to recognise so first aid providers should not be expected to recognise one. Consider whether learners need to learn this topic.

Facilitation tips

- This topic should be covered across each domain of the Chain of survival behaviours, with emphasis added depending on the learner. For example, sports coaches might focus on prevention, whereas parents of young children might focus on recognition. All learners will need to practise stabilisation techniques as part of the first aid action.
- Discuss the mechanism of the injury which will help learners understand when to suspect a spinal injury. Consider different scenarios (children playing on climbing frames, trampolining, road traffic collisions etc) and discuss the types of force that could lead to a spinal injury.
- Emphasise that the use of cervical collars is not advised for first aid providers. Manual stabilisation of the person with a suspected spinal injury is the most important action in order to limit unnecessary movement which might cause further damage.
- Practise or demonstrate manual stabilisation techniques with learners, with the injured person in different positions (i.e., lying on their back, sitting etc).
- Explain how manual stabilisation aims to mirror a person's general anatomical standing position.
- Discuss the importance of conservative handling and minimising movement. Use the 'prevention of further injury' and 'promotion of recovery' first aid principles.

Facilitation tools

- Create contextually relevant scenarios to reinforce learning (e.g., sport-focused role play examples for schools and sports club contexts, road traffic accidents using chairs and tables to represent cars for road users) (Kureckova, 2017). Videos of these scenarios can also be very effective.
- Practise asking questions and basic history taking to help with the identification of a spinal injury.
- Depending on the type of education, it may be appropriate to touch on basic sensory monitoring skills (i.e. fingers and feet), or basic assessment tools such as "AVPU". See General approach.

Learning connections

- Make connections between spinal injuries and Head injuries.
- Consider the change in airway management for a person with spinal injury who is Unresponsive and breathing normally.

Scientific foundation

Manual cervical spinal stabilisation

In 2015, the International Liaison Committee on Resuscitation (ILCOR) reviewed the evidence concerning manual cervical spinal stabilisation, but no studies could be identified, and no recommendation was formulated (Singletary, 2015). In a recent scoping review, the need for an update of this topic was explored (Singletary, 2020). No studies were found that looked at manual stabilisation in a first aid setting, and two studies were identified with trained professionals. The treatment recommendation remained unchanged and stated that there is insufficient evidence for or against manual stabilisation.

Cervical spinal motion restriction with cervical collars or sandbags

In 2015, ILCOR looked at the use of cervical collars and sandbags on people with blunt traumatic cervical spine injuries.

One non-randomised study with 5,138 people who had been in a motorcycle crash, could not demonstrate a significant benefit to neurological injuries when a cervical collar was applied. Very low- certainty evidence downgraded for risk of bias and imprecision.

Five non-randomised studies with 107 people showed increasing intracranial pressure with the use of a cervical collar. (Low-certainty evidence). In addition, one non-randomised study with 42 healthy volunteers showed increased intracranial pressure with the use of a cervical collar. (Very low- certainty evidence.)

One non-randomised study, consisting of 18 children with head injuries showed no significant limitation of flexion (low-certainty evidence). In addition, 13 non-randomised studies with 457 cadavers or healthy volunteers showed a significant decrease in cervical spine motion when a cervical collar was used (very low- certainty evidence).

Furthermore, very low-certainty evidence (downgraded for risk of bias and imprecision) from one non-randomised study with 38 patients could not demonstrate a decrease in tidal volume and very low-certainty evidence (downgraded for indirectness and imprecision) from one other non-randomized study with 26 healthy volunteers showing no change in patient comfort score.

With regards to the application of soft collars, there is very low-certainty evidence from three non-randomised studies using either cadavers or healthy volunteers which showed a statistically significant decrease in cervical spine motion (flexion and axial rotation). No significant difference could be demonstrated for limiting extension, flexion or extension and lateral bending.

As for the use of sandbags and tape, there is very low-certainty evidence (downgraded for indirectness) from one non-randomised study with healthy volunteers which showed a significant decrease in cervical spine motion (flexion, extension, axial rotation and lateral bending).

A recent scoping review was performed by ILCOR and identified six additional more recent studies, but they contained no new insights, and thus 2015 recommendations against the use of cervical collars by first aid providers remained unchanged.

Use of backboard and straps

In 2010 the International First Aid Advisory Board conducted a review on the use of a backboard and straps (or similar device) on spinal immobilisation. The American Red Cross Scientific Advisory Committee again reviewed this topic in 2015. They did not find any published studies for or against the benefit of first aid providers using backboards and straps. One retrospective, non-randomised (and probably underpowered) study failed to show any neurological benefit to emergency medical teams using the appropriate devices to immobilise the spine compared to no spinal immobilisation. Two retrospective studies examined two sets of data: a period before spinal immobilisation was routine and a period after it became routine. The studies determined that secondary spinal injury occurred in 3 - 25% of people with a spinal injury.

Education review

Several papers were found which related to actions from healthcare professionals. Messaging for first aid providers focused on what to do in the case of suspected spinal injury, and the findings were unanimous in recommending inline manual stabilisation and access to further help (Fischer et al., 2018; Pysny et al., 2016; Kornhall et al., 2017; Pek et al., 2017). In particular, it is not recommended that first aid providers working alone should attempt rolls or transportation of the person with a spinal injury (Schimelpfenig, 2017).

Barss et al. (2007) explored risk factors and prevention of a spinal cord injury from diving in swimming pools in Canada. The authors found a low level of awareness of the dangers of diving into shallow water or short swimming pools resulting in life-changing injuries and recommended effective education on this topic amongst targeted learners.

Head injury

Key action

Remove the person from their activity and observe them for signs of a concussion or other brain injury.

Introduction

Head injuries are common across all age groups, but particularly in young children, sportspeople, and older adults. They can range from being minor (requiring rest and pain relief) to severe (becoming unresponsive and requiring medical care). A concussion can develop to be one common type of severe head injury. It can be difficult to identify a concussion because there are many signs and symptoms which vary and are not always immediately apparent. In addition, some people do not recognise or admit to experiencing symptoms of a concussion. This can lead to a delay in proper treatment or accessing medical care unnecessarily.

Good practice points

- Any person suspected of sustaining a head trauma (a forceful bump, blow or jolt to the head or body that results in the rapid movement of the head and brain), along with any of the signs of a concussion, must be presumed to have a severe head injury or concussion.
- Following a head trauma, the following signs may indicate a concussion. The person:
  - becomes unresponsive, even for just a few seconds
  - starts behaving differently (they become aggressive, have slurred speech or a loss of balance, for example)
  - they vomit more than once.
- Any person with a severe head injury or concussion must stop any activity and access medical care to evaluate and manage their condition.
- Emergency medical care should be accessed immediately following a blow to the head if the person:
  - becomes unresponsive, even for just a few seconds
  - has an altered mental status (e.g., they become aggressive, have slurred speech, have a seizure; children may have an abnormal attitude or be very quiet and stop playing)
  - has a motor or sensory deficit of one or more limbs (e.g., tingling in a limb, or balance or coordination problems)
  - has a severe headache for more than two hours despite taking pain relief
  - has impaired vision (e.g., sensitivity to light, blurred or double vision)
  - has blood or a clear fluid coming out of their nose, ear or mouth
  - vomits more than once
  - is unresponsive with abnormal breathing.
- If the person has a mild headache, a bump on their head, or feels nauseous following a blow to the head, they may rest and continue to be observed for any change to their symptoms or behaviour requiring medical care.
- If the person shows none of these signs following a blow to the head, they may carry on with their day but should be observed in case any of the above signs develop over the next 24 hours.
- In instances of head injury, a Spinal injury should also be considered.

Chain of survival behaviours

Prevent and prepare

- Promote and practise safe behaviours, such as wearing a seatbelt and using a headrest when travelling by car or wearing a helmet when travelling by motorcycle, bicycle or horse.
- Consider athletic body protection (i.e. helmets, face masks) when participating in contact sports. Sports coaches should be aware of the risks, and players should discontinue their involvement in sports if a head or spine injury is suspected.
- Junior sports should consider at what age the introduction of tackling is appropriate and should endeavour to teach correct techniques (Harmon et al., 2019).
- Remove trip hazards from places of work and home, particularly where there are small children, elderly people, or people with disabilities to reduce the chance of trips and falls.
- Never dive into shallow water, or water with an obstructed view or high flow (e.g. rivers) and take particular care when diving in the dark.
- Learn how to recognise the signs of a concussion.

Early recognition

The person has a forceful bump, blow or jolt to the head or body that results in the rapid movement of the head and brain. This could include incidents such as a fall, a road traffic accident or an explosion.

Mild head injury

- A bump on their head.
- A mild headache.
- Feels nauseous.

If the person has a mild headache or feels nauseous following a blow to the head, they may rest and continue to be observed for any change to their symptoms or behaviour requiring medical care.

Severe head injury (or concussion)

- Becomes unresponsive, even for just a few seconds.
- Has an altered mental status (e.g., they become aggressive, have slurred speech, have a seizure; children may have an abnormal attitude or be very quiet and stop playing).
- Has a motor or sensory deficit of one or more limbs (e.g., tingling in a limb, or balance or coordination problems).
- Has a severe headache for more than two hours despite taking pain relief.
- Has impaired vision (e.g., sensitivity to light, blurred or double vision).
- Has blood or a clear fluid coming out of their nose, ear or mouth.
- Vomits more than once.
- Is unresponsive with abnormal breathing.

Other signs could also indicate a head injury and the signs may present differently in people. The main thing to look for is a change in the person. The signs of a severe head injury can happen immediately or can develop over several hours or days.

The possibility of a spinal injury should always be considered in the case of a forceful impact or fall.

First aid steps

1. Remove the person from their activity and ask them to rest.
2. Monitor the person according to the signs of a concussion and for changes in their level of response and breathing.
3. If the head injury is severe:
   a. Access EMS.
   b. Reassure the person and encourage them to keep their head and neck as still as possible. If the person is lying down, you may also use your hands or knees to keep their head as still as possible.
   c. Monitor the person's level of response and breathing until EMS arrives.

NOTE

Many bumps or knocks to the head do not cause a concussion or other severe head injury. Where the person has had a blow to the head, but the signs are not present or are mild, help the person to rest and then to carry on with their day. However, they should be observed as a concussion can develop over several hours or days.

Access help

- Observe the person for signs of concussion and access help if these are present.

Recovery

- In many cases, rest from activity is the most effective initial treatment. However, injuries to the head are difficult to confirm and difficult to manage in out-of-hospital settings.
- Signs and symptoms of a head injury should have been resolved before returning to activities with associated risks (e.g. some work activities, driving or operating machinery or contact sports).
- Be aware that normal cognitive function may take time to be fully restored and that there may be residual learning and behavioural challenges in the short term (Harmon et al., 2019).

Education considerations

Context considerations

- Minor head injuries are a common occurrence and usually do not result in serious injury. Where learning first aid is within the context of a workplace or school or is for people who are involved with sport or driving, seek to understand the risks and risk behaviours that could lead to head injuries and frame education around them.

Learner considerations

- Consider how different learners or local translation during facilitation may change the meaning of certain recognition signs (such as headache, dizziness, nausea, vomiting, confusion, amnesia, tingling, mood change, behaviour change, fogginess etc). Discuss terminology with learners to help them to understand how to distinguish between a mild and severe head injury (Halter, 2020).

Facilitation tips

- Use scenarios to help learners understand how serious or not the head injury is. Note that in some cultures, medical care is sought for any head injury, but that first aid providers can learn how to recognise a head injury, and many head injuries are minor and will not need professional attention (Kulnik, 2019; Halter et al., 2020).
- Consider differences in management and recognition, including how different people might have different levels of ability to respond to questions about how they are feeling, or what they can remember. For example, a small child or a person with dementia might struggle to answer a question with or without a head injury, so in such cases observation of behaviour change by someone who knows the person will be particularly important.

Facilitation tools

- It might be helpful for learners to understand the signs of a concussion in these three groups:
  - **What the person feels**: such as headache for more than two hours despite taking pain relief, nausea, drowsiness, dizziness, sensitivity to light or noise, double or blurry vision.
  - **Signs that can be recognised by someone who knows the person**: such as a change in how they walk or talk, confusion, a change in their mood or behaviour (becoming anxious or aggressive).
  - **Signs that could be recognised by someone who does not know the person,** such as becoming unresponsive, having a seizure, or vomiting more than once.
- Use simple traffic light illustrations to help learners understand when a head injury might need immediate attention.
- Create contextually relevant scenarios to reinforce learning (e.g. sport-focused role play examples for schools and sports club contexts, road traffic collisions using chairs and tables to represent cars) (Kureckova, 2017). Videos of these scenarios can also be very effective.
- Practise asking questions and taking a basic history of the person to help with the identification of relevant signs and symptoms. (See General approach.)

Learning connections

- In incidents that cause a head injury, a Spinal injury should also be considered.
- A person with a head injury may become unresponsive. (See Unresponsiveness.)
- A Seizure may result from a blow to the head.
- A bruise may form on the head to which an icepack could be applied.

Scientific foundation

Systematic reviews

In 2015, the International Liaison Committee on Resuscitation (ILCOR) reviewed the published evidence on the recognition of concussion by first aid providers (Singletary, 2015). They identified very low-certainty evidence from one observational study with 19,708 people that compared the use of a simplified motor score and the Glasgow Coma Scale (GCS) score. There was no significant difference between both scores concerning the likelihood of differentiating between a minor head injury and a more serious concussion (brain injury), the need for advanced neurosurgical intervention and emergency tracheal intubation.
A head injury without a concussion is a brain injury, but it can be challenging to differentiate between the two. No evidence was found with regards to the critical outcome of the difference in time to recognise a deteriorating person, as well as other important outcomes such as surviving 30 days with a good neurological outcome or the likelihood of a poor neurological outcome.

ILCOR acknowledged the role that a simple scoring system could play. However, since these tools require a two-stage assessment (before concussion and post-concussion), this assessment is not recommended for first aid providers. A recent scoping review explored the need for updating this systematic review, but no recent studies on a single-stage assessment system could be identified.

Non-systematic reviews

The Scientific Advisory Council of American Red Cross (2015) stresses that first aid providers must recognise that no two minor traumatic brain injuries, also known as concussions, are identical in either the cause or symptoms. First aid providers therefore may have difficulty recognising them. The diagnosis of a minor traumatic brain injury should involve the assessment of a range of domains including, but not limited to the person's symptoms, behaviour, balance and coordination, sleeping patterns, cognition and analytical abilities and response to physical exertion. Each assessment tool should contribute additional information regarding the status of the injured person by independently evaluating different aspects of cerebral functioning.

While many assessment tools are commonly used, individual variations in test scores and the necessity of a baseline assessment make it difficult for first aid providers to use these tools and interpret the results.

To help recognise a concussion, first aid providers should look for two signs. First, the person with a minor traumatic brain injury usually experiences a forceful bump, blow, or jolt to the head or body that results in a rapid movement of the head and brain. Second, first aid providers should look for any change in the person's physical, cognitive, emotional or sleep patterns. Note that these symptoms may not appear immediately and that some people do not recognise or admit that they are having problems, particularly athletes in the middle of a match.

A concussion may be subtle and difficult to diagnose. Any person who has sustained trauma to the head, and experiences any of the symptoms identified here should be removed from activity and referred to a qualified healthcare professional, experienced in evaluating and managing a concussion.

Education papers

Many of the clinical papers relating to head injuries focus on the effectiveness of diagnostic checklists which are designed for use by healthcare professionals. We did not find any checklists in the literature that would be suitable for first aid providers. However, one paper qualitatively explored the factors which affect the confidence and willingness of a first aid provider to act in a head injury situation. These included:

- Knowing the person with the head injury - this is relevant because a change in behaviour, attitude, speech or response level are indicators of a head injury.
- Being in a familiar setting with someone else nearby to consult.
- Witnessing the accident.

Authors concluded that education which helped learners to think through scenarios to build their confidence to recognise whether a head injury was serious or not, rather than just calling for help, was important (Kulnik et al., 2019). Linked to this paper is a study awaiting publication which explores how different words describing signs and symptoms are understood by people. Most respondents from the qualitative part of the study reported low levels of confidence in knowing the signs and symptoms of head injury, and there was a variety of understanding of terminology (such as consciousness versus being knocked out) that affected the action that someone might take. This again demonstrates a need to provide clearer guidance to first aid providers on how to recognise a serious head injury (Halter et al., 2020).

Acute lower back pain

Key action

Help the person take the recommended dose of painkiller or apply heat wrap therapy to relieve back pain.

Introduction

Lower back pain is common, and many adults experience it at some point in their lives. Common causes of back pain include injuries to the soft tissues in the back (such as muscles or ligaments). These injuries can result from lifting heavy objects, stress, or an injury to a disc. More serious causes of back pain include vertebral fractures, tumours or infections; these injuries can result in nerve damage. These guidelines focus on the management of acute lower back pain.

Guidelines

- When lifting heavy objects, people should bend their knees and keep their back straight to prevent lower back pain.*
- Paracetamol may be effective at relieving some subsets of acute lower back pain.*
- Nonsteroidal anti-inflammatory drugs (NSAIDs, such as ibuprofen) may be effective at relieving acute lower back pain but may cause side effects including gastric irritation, potential kidney interactions, and high blood pressure.*
- Heat wrap therapy may provide some short-term pain relief and reduce disability in those with a combination of acute and subacute low back pain.*

Good practice points

- The person should sit or lie down in a position most comfortable to them.

Chain of survival behaviours

Prevent and prepare

- Exercise regularly.
- If working at a desk, use an ergonomic chair.
- Educate yourself on how to reduce the risks of lower back pain.
- Modify the way you lift items by bending your knees and keeping the back straight.
- Wear a combination of accessories to protect the back, such as back belts or shoe insoles.
- Change your position regularly and avoid holding a certain position or movement for too long.

Early recognition

The person was involved in a high-speed, direct impact incident, or may have been using their back for physical activity such as lifting or stretching. They may experience:

- Sudden back pain.
- Back pain combined with neck pain or a tingling feeling running down the back of one leg.
- Sudden inability to walk due to lower back pain.

First aid steps

1. Comfort and reassure the person.
2. Determine the cause of the back pain. If it is the result of a fall or other traumatic incident, follow the first aid steps for Spinal injury.

3. Help the person move into a comfortable position and to take the recommended dose of painkiller (such as paracetamol or ibuprofen).

4. Apply a heat source (e.g., heating pad) to the lower back.

Access help

- Access emergency medical care if the acute lower back pain is severe or the result of a traumatic incident (e.g., a fall or car accident).
- The person should seek medical advice if the back pain:
  - is related to an incident that occurred some time ago (e.g., car accident) or they have been experiencing it for four weeks or more
  - spreads to one leg, especially if the leg feels weak
  - is combined with weak legs, sensory disturbances, or the person experiences bladder or bowel problems, or issues with sexual functionality.

The person should seek medical advice if they have a history of cancer, a weakened immune system, osteoporosis or have used steroids (e.g., prednisolone) for a long time.

Recovery

- If the back pain does not improve within four weeks, seek medical advice.

Education considerations

Context considerations

- Learners may have different beliefs as what lower back pain is and what causes it. Facilitate a discussion to better understand these beliefs.

Facilitation tips and tools

- Emphasise that lower back pain has many different causes (some are common and mild while others can be serious). Helping the person get medical advice is an important first aid action so they can learn how to manage their pain.
- Use scenario-based learning (e.g., a road traffic collision) to practise recognising and managing back pain.
- Facilitators can also make connections to lifting techniques used to reduce the risk of back pain:
  1. Hold the load firmly.
  2. Keep the load close to you.
  3. Lift the load by pushing up with your legs.
  4. Ensure your legs are stable before moving.

Learning connections

- Connect this topic to Head injury and Spinal injury.

Scientific foundation

Systematic reviews

We used two 2020 evidence summaries from the Centre for Evidence-Based Practice (CEBaP) and three published systematic reviews for this topic.

Prevention

The CEBaP evidence summary looked at the prevention of lower back pain comparing the results of using specific lifting techniques to lift a heavy weight, other lifting strategies or no technique at all. The evidence summary included three randomised controlled trials and three observational studies. It was shown there is a statistically significant association between an increased risk of developing persistent low back pain or symptoms of a herniated lumbar disk and frequent lifting of any load mass with knees straight and the back bent forward.

There is also limited evidence with benefit for lifting with knees bent and back straight. It was shown there is a statistically significant association between a reduced risk of developing symptoms of a herniated lumbar disk and lifting with knees bent and back straight. A statistically significant association between a decreased risk of developing chronic low back pain and occasionally and frequently lifting of any load mass with upright back could not be demonstrated. Statistically significant associations between back pain and lifting posture could not be demonstrated for non-chronic low back pain.

In addition, there is limited evidence showing no correlation between arm extension or twisting while lifting and the symptoms of a herniated lumbar disk. A statistically significant association between a decreased risk of developing symptoms of a herniated lumbar disk and arm extension or twisting while lifting could not be demonstrated.

Finally, there is limited evidence neither in favour of following a single training session program on low back health nor not following the training program. A statistically significant decrease of back pain, using single training sessions with lifting advice and advice for the prevention of back pain, compared to no training session, could not be demonstrated.

Evidence is of low to very low certainty and results cannot be considered precise due to the low number of events, limited sample size, lack of data and/or large variability of results.

One systematic review indicated that exercise, together with education, is likely to reduce the risk of lower back pain. It also stated that physical activity alone might reduce the risk of a lower back pain episode and subsequent sick leave, at least in the short-term. The available evidence suggested that back belts, shoe insoles, ergonomic equipment or education alone do not prevent lower back pain. Additionally, due to the very low certainty of the evidence, it is unclear whether education, training or ergonomic adjustments prevent sick leave caused by lower back pain (Steffens, 2016).

First aid

Two systematic reviews examined evidence on over-the-counter medication like paracetamol and ibuprofen.

One review looked at the evidence from 65 trials and suggested that NSAIDs effectively provide short-term relief in people with acute and chronic lower back pain without sciatica. However, the effect sizes are small. The evidence did not recommend a specific type of NSAID as being more effective than the others. In the randomised controlled trials, the selective COX-2 inhibitors showed fewer side effects compared to traditional NSAIDs. Still, recent studies have shown that COX-2 inhibitors are associated with increased cardiovascular risks in specific populations (Roelofs, 2008).

The second review shows that there is high-certainty evidence that paracetamol (4 g per day) is no better at improving acute lower back pain in the short or long term, compared to a placebo. Additionally, paracetamol was no better than a placebo on other aspects, such as quality of life and sleep quality. On average, one in five people recounted side effects with no difference between the intervention and control groups. As most of the participants studied were middle-aged, it is unclear if the findings are the same for other age groups (Saragiotto, 2016).

A 2020 evidence summary from CEBaP searched for studies on heat or cold application in case of back pain. Heat treatments include hot water bottles, soft heated packs filled with grain, poultices, hot towels, hot baths, saunas, steam, heat wraps, heat pads, electric heat pads and infra-red heat lamps. Cold treatments include ice, cold towels, cold gel packs, ice packs and ice massage. The review identified four randomised controlled trials from a Cochrane systematic review, and three more recent randomised controlled trials.

No relevant studies were identified for cold application, and thus more research is required on the impact of cold application to improve the symptoms of lower back pain for any duration of time. However, limited evidence was found in favour of heat application. It was shown that heat combined with exercise or education resulted in a statistically significant increase of pain relief and function and a statistically significant decrease of pain intensity and function change scores, compared to exercise or education alone. It was shown that heat resulted in a statistically significant increase of pain relief and a statistically significant decrease of time to pain relief, function change scores, pain and pain affect, compared to no heat.

It was also shown that heat combined with analgesics if needed resulted in a statistically significant decrease of pain severity in the evenings and percentage of people woken up in the night due to pain compared to analgesics alone.

Evidence is of low certainty and results cannot be considered precise due to limited sample size and/or large variability of results.

Non-systematic reviews

A review of clinical practice guidelines identified several effective, conservative (non-invasive) actions to manage acute and chronic lower back pain. Most high-quality guidelines recommend education, exercise, manual therapy and paracetamol or NSAIDs as first-line treatments for lower back pain. However, the use of paracetamol has been challenged by recent evidence, and this recommendation needs to be updated (Wong, 2017).

Another review identified clinical factors to recognise the conditions of acute lower back pain and sciatica. People with acute back pain experience improvements in the pain, varying levels of disability and usually return to work within one month. Further (but smaller) developments occur up to three months, after which the pain and disability levels remain almost constant. Low levels of pain and disability last from three to at least 12 months. Most people will have at least one recurrence within those 12 months (Pengel, 2003).

Mammal bites

Key action

Clean the bite wound by rinsing it with clean water as quickly as possible to minimise the risk of infection.

Introduction

Bites from mammals, such as dogs, cats, monkeys, bats and humans, are common and can cause infections. There are 4.5 million people bitten by dogs every year, with 885,000 seeking medical care, and cat bites make up to 50 per cent of animal-bite injuries across the world (World Health Organisation, 2018). Bacteria can cause skin infection or complications to the whole body, such as sepsis or tetanus. Depending on the local context, first aid providers may also need to consider the risk of rabies.

Good practice points

- People should avoid approaching stray or wild animals and take extra care to keep their hands from getting bitten.
- Bleeding from an animal bite should be treated as per the guidelines for Severe bleeding.
- Depending on availability, the first aid provider should clean the wound with either potable (clean) water, saline, or soap and water. Ideally, human and animal bite wounds should be cleaned with potable water and soap to minimise the risk of bacterial and rabies infections.
- The person should seek further medical care as soon as possible if vaccination or skin closure is required.
- If available, a pressurised water source should be used to clean the bite area (e.g., from a tap, squirting device or water bottle).
- If warmth or pain develops around the bite area, this is an indication of infection and the person should seek medical advice immediately. The bite area should be monitored as infection can happen in the hours or days after the bite occurs.

Chain of survival behaviours

Prevent and prepare

- Avoid approaching stray or wild animals.
- If there is a prevalence of rabies in the area, people should follow the advice of local health authorities.
- Be aware of specific diseases transmitted by animals in your area (rabies, anthrax, hantavirus, bovine, encephalopathy, etc.).
- Always supervise babies and children around animals.

Early recognition

- The person has visible teeth marks on their skin.
- The person tells you they were bitten by an animal or human.

First aid steps

1. If the wound is bleeding, apply pressure to the wound to stop the bleeding. Follow the steps for Severe bleeding. Once the bleeding has stopped, complete the rest of the steps listed here.

2. Clean the bite wound with potable (clean) water as quickly as possible, using a pressurised water source. If no or insufficient water is available, use a disinfectant.

3. Dry the area around the wound and apply a sterile dressing.

Access help

- Seek further medical care as soon as possible if skin closure is required.
- If the injured person has not been vaccinated against tetanus, seek further medical care.
- If rabies is prevalent in the area and the injured person has not been vaccinated against it, seek further medical care.
- Monitor for signs of infection. If warmth or pain develops around the bite area, seek medical advice.

Recovery

- Change the dressing on the bite area as necessary.
- Seek psychological support if necessary.

Education considerations

Context considerations

- In areas where animal bites are common, include this topic to raise awareness. Learners should know the preventative actions, potential effects of, and treatment for animal bites. Emphasise caution when in areas with stray or wild animals.
- When relevant, demonstrate the signs of a rabid dog and how to behave in the presence of one.
- Depending on the availability of resources, the first aid provider should clean the wound with either potable water, saline or soap and water.

Facilitation tips and tools

- Practise how to clean the wound as this may increase learners' confidence to do it themselves.
- Emphasise the importance of long-term wound care to prevent infection.
- Online or printed visuals of bite wounds, including ones that are and are not infected, may help learners to identify this type of wound in the future.
- Suggest local psychological support resources to help people affected by bite incidents involving aggressive animals or humans.
- Educational materials should reflect discussions with local public health authorities regarding the need for vaccinations.

Scientific foundation

Systematic review

The Centre for Evidence-Based Practice (CEBaP) performed four independent searches in 2019. No relevant studies on the use of wound irrigation for human or cat bites could be identified. For the use of wound irrigation for dog bites, one retrospective cohort study showed limited evidence in favour of wound irrigation. It was shown that irrigation of a dog bite with saline resulted in a significant decrease of wound infection, compared to no irrigation. Evidence is of very low certainty (downgraded for risk of bias and indirectness) and results cannot be considered precise due to the low number of events.

Non-systematic review

Potable (clean) water, saline and soap and water solutions are irrigants that benefit an animal bite. There are no direct comparisons between these different interventions. The literature reviewed in the section for Cuts and grazes also supports irrigation as a method to prevent infection.

Despite multiple recommendations in literature reviews and common clinical practices, there is no evidence for the use of povidone-iodine to treat an animal bite.

Insect bites or stings

Key action

Remove the stinger or insect from the person to prevent the further spread of venom or disease.

Introduction

Insect bites and stings can transmit diseases (such as malaria, encephalitis or Lyme disease) and can cause wounds that can become infected. Certain insect bites can also cause an allergic reaction in people, even if they have been bitten before.

Guidelines

- A bee's stinger should be removed as soon as possible.*
- If a commercial tick removal device is available, a tick may be removed with the device according to the manufacturer's instructions.*
- The following tick-removal methods must be avoided: using gasoline, petroleum or other solvents to suffocate the tick, and burning the tick with a match.*

Good practice points

- If no commercial tick removal device is available, the first aid provider may grab a tick as close to the skin as possible with very fine forceps or tweezers and pull it gradually and firmly out of the skin.
- To remove a stinger from a person, the first aid provider may gently scrape the sting area with a flat object, such as a bank card or butter knife. Using tweezers or any other object that can pierce or press down on the venom bag should be avoided, as this may aggravate the symptoms.
- The bitten or stung area should be thoroughly cleaned with potable (clean) water and then an antiseptic solution. If no clean water is available, use an antiseptic solution.
- In the case of a bite or sting to the throat or mouth, the first aid provider should immediately access EMS and apply ice to the affected area to reduce any swelling which may affect the person's airway.
- First aid providers should monitor the person for signs of an allergic reaction or anaphylaxis and provide the appropriate care.
- The person should avoid scratching the bite as this can cause an infection, especially if the fingernails are dirty.
- The skin may become redder, purple, or darker, as well as warm and painful at the site of an insect bite or sting. This should improve over a day or two. However, if it gets progressively worse, the person should seek medical advice as this could be a sign of infection. Antibiotics or vaccinations may be needed.
- Travellers should check to see what insect-related risks are prevalent in the area they are travelling to and seek medical advice. They may need vaccinations or medication before leaving home.

Chain of survival behaviours

Prevent and prepare

- To prevent diseases caused by insects, such as malaria and Lyme disease, use insect repellent and promptly remove any ticks.
- Consult local authorities for information on landscaping and pest management to support any locally recommended behaviour or places to avoid in order to reduce risk.
- In some countries, in accordance with local regulations, report any tick bites to authorities. Some authorities request that you send the biting tick or ticks for identification and testing.

In first aid education, explore the following information with learners on avoiding bites and the behaviours to adopt during an insect attack:

- Keep away from flowering plants, ripe fruit bushes and trees, rotten fruit, compost and food waste. If this is not possible, wear long trousers and long-sleeved clothes and cover your hands and face.
- Wear shoes when walking outside, particularly on grass or flowering ground.
- When outside, cover your drinks and food and check them before drinking or eating.
- Wipe off any food from the clothes, hands and faces of children as this may attract bees or wasps.
- Before moving objects with your hands (such as containers that have been left outside), check underneath and inside them for insects that may bite or sting.
- Shake out shoes, socks and clothing before putting them on as they might contain insects.
- Do not touch or disturb bee or wasp hives. If you want to harvest honey, protect yourself by wearing long trousers and long-sleeved clothes and cover your hands and face as much as possible.
- Remain calm if attacked by a bee or wasp. Do not wave your hands in an attempt to brush them away, since they react to movement.
- Run and find shelter if attacked by a swarm.

Early recognition

A tick bite is not painful and is often not detected, or only discovered by accident. Initially, a tick is only a pinhead in size, making it difficult to spot. An engorged tick is about the size of a small pea. After a few hours, the bite may start to itch.

A person who is bitten or stung by an insect may experience:

- initial sharp pain
- swelling, itching or a rash at the site of the bite or sting.

The person may develop a mild or severe Allergic reaction following an insect bite or sting.

Observe the person closely for any development of an allergic reaction. A rash can be more difficult to see on black or brown skin (Nolen, 2020). Checking lighter areas of skin such as the palms of hands or soles of feet may help you to see it.

First aid steps

Tick bite

1. Reassure the person and remove the tick as quickly as you can. Use a manufactured tick removal device to remove the tick according to the manufacturer's instructions. If a manufactured device is not available, use fine forceps or tweezers to grab the tick as close to the skin as possible and pull it gradually and firmly out of the skin.

2. Wash the site of the bite with water and then disinfect it with an antiseptic solution.

3. Write down the date and the area where the person was bitten in order to monitor the area around the bite.

4. Seek medical advice if there is concern about an infection (fever, inexplicable fatigue, or joint pain) or if a rash appears. The Lyme disease rash is a circular rash that appears as a patch surrounded by a ring.

CAUTION

- Do not squeeze the body of the tick, as this may trigger the release of the disease-causing bacteria onto the skin.
- Do not use chemicals or heat to numb or kill the tick.

Other insect bite or sting

1. Reassure the person and advise them not to scratch, as this may aggravate the injury.
2. If the stinger is still in the person, remove it as quickly as possible. Gently scrape the area with a flat object, such as a bank card or the blunt side of a knife.
3. Thoroughly clean the site of the bite or sting with water. If no clean water is available, use an antiseptic solution.
4. Cool the stung area with ice cubes in a bag of water or a cooling bag to limit swelling, itching and pain. If the sting was made by hand, remove the rings.

CAUTION

When removing the stinger, avoid using tweezers, your fingers, or any other object that can pierce or press down on the venom bag, as this will aggravate the symptoms.

Access help

- Access EMS immediately if:
  - > The person is bitten or stung in the mouth or on the throat, as it can be dangerous as any swelling could block their airway. While waiting for medical care, try to cool the injured area with ice (for example, by letting the person suck on an ice cube) to reduce swelling.
  - > The person shows any signs of a severe allergic reaction.

- Access medical care if:
  - > You can't get the stinger out.
  - > The person develops a painful itchy swelling or a rash.
  - > The person feels progressively worse after being bitten or stung (this can occur up to 24 hours after the bite or sting).
  - > The person was bitten or stung many times.
  - > The person suspects he is not sufficiently protected from tetanus.

Recovery

- Monitor for signs of infection. The skin may become red, purple, or darker, as well as warm and painful at the site of an insect bite or sting. This should improve over the course of a day or two. However, if it gets progressively worse, the person should seek medical advice as this could be a sign of infection.

Education considerations

Context considerations

- Programme designers should consult local medical centres to find out which insect-related diseases are common in the area and what preventative measures to take. These measures may include:
  - > using repellent or a bed net
  - > taking medication for malaria prevention
  - > getting vaccinated for tick-borne encephalitis
  - > wearing long sleeves and trousers (especially at dawn when insects are active).

- In Europe and North America, several species of Ixodes ticks are carriers for tick-borne infections. One major infection is Lyme disease. Typical symptoms include fever, headache, fatigue and a specific skin rash that is circular and appears as a ringed patch on different parts of the body. If left untreated, the infection can spread to the joints, heart and nervous system. Most cases of Lyme disease can be treated successfully with antibiotics.
- In Sub-Saharan Africa and South Asia, malaria is transmitted by the bite of a mosquito. A person with malaria is usually very sick with symptoms such as high temperatures, shivering with shaking and flu-like illness. Many effective medicines are available to prevent and treat malaria. Health professionals can advise you on how to take the medicine that is best for you.

Learner considerations

- In regions where Lyme disease is prevalent, all people are at equal risk of contracting it, though the visibility of skin rashes will vary according to skin colour (Fix et al., 2000). First aid education should emphasise rash recognition across all skin colours and describe other symptoms that may be present. Programme designers should actively look for opportunities to increase awareness of this topic in groups that are more likely to include learners who are black.
- While nearly half the world faces the risk of malaria, children under five years old are the most vulnerable group affected by it. Pregnant women, those with HIV or AIDS, and mobile populations (travellers) are also particularly at risk (WHO, 2020).
- Learners who are aware of family members, friends or colleagues who are allergic to insect bites and stings should be encouraged to familiarise themselves with what support that person might need.

Facilitation tips

- Ask learners to share experiences of being bitten or stung, including how it feels and how they responded to develop the group's confidence to handle this type of injury.
- Demonstrate how to use a manufactured tick removal device or tweezers to effectively remove a tick and a bank card or the blunt side of a knife to remove a sting.

Facilitation tools

- Share photos of local insects and their associated injuries or infections to help learners identify them.
- Bring a variety of tick removal tools to show learners.

Learning connections

- Ensure learners are comfortable monitoring a person for signs of an Allergic reaction and anaphylaxis.
- Link this topic to the removal of stingers of marine and freshwater animals. (See Aquatic animal injuries.)
- Give time to practise giving emotional support and comfort to the injured person as a bite or sting can be very distressing.

Scientific foundation

The Centre for Evidence-Based Practice (CEBaP) conducted several evidence summaries on this topic, in 2019.

Ticks

Forceps

There is limited evidence from one non-randomised controlled trial neither in favour of pulling with forceps nor twisting with forceps to remove a tick. A statistically significant decrease of ticks with damaged mouthparts or mouthparts that broke off, when pulling with forceps compared to twisting with forceps, could not be demonstrated. Evidence is of very low certainty and results of these studies are imprecise due to limited sample size, the low number of events and large variability of results.

Commercial tick removal devices

There is limited evidence from four studies in favour of using specialised commercial devices. Twisting devices (pen-tweezers, Tick Twister and "lasso" (Trix® tick remover)) resulted in a statistically significant decrease of severed tick mouthparts compared to pulling devices (Adson forceps or "card" (TickPic). It was shown that the use of a commercial device resulted in a statistically significant reduction in mouthpart damage of tick nymphs compared to the use of forceps. However, it was shown the commercial device did not result in a statistically significant reduction in damage to the mouthparts compared to using forceps for adult tick removal.

It was shown that pulling straight using forceps resulted in a statistically significant decrease in the number of nymphs and females with damage to mouthparts compared to rotation with the Tick solution. However, it was also shown that rotation with the Tick solution resulted in a statistically significant decrease in the percentage of mouthpart damage and in damaged nymphs and females compared to pulling straight using forceps.

Evidence is of very low certainty and the results of these studies are imprecise due to a lack of data, limited sample sizes, low number of events and large variability of results.

Chemical treatments or heat followed by the mechanical removal

There is limited evidence from two studies neither in favour of removing ticks using chemical treatments (including gasoline, methylated spirit, petroleum jelly and 70 %isopropyl alcohol), or heat (a lit kitchen match) nor of no treatment. A statistically significant decrease in damaged mouthparts could not be demonstrated. Evidence is of very low certainty and results of these studies are imprecise due to limited sample size, the low number of events, the large variability of results and lack of data.

In addition, there is limited evidence from two studies neither in favour of using nail polish nor not using nail polish. It was shown that using nail polish resulted in a statistically significant decrease in damaged tick mouthparts after removal of the tick less than 72 hours after attachment, compared to not using nail polish. However, in a second study, a statistically significant decrease of the number of female ticks with damaged mouthparts after removal 12-15 hours or 72-96 hours after attachment using nail polish compared to not using nail polish could not be demonstrated. A statistically significant decrease in the number of tick nymphs with damaged mouthparts after removal less than 24 hours after attachment, using nail polish compared to not using nail polish, could not be demonstrated. The evidence is of very low certainty, and the results are imprecise due to the limited sample size, the low number of events and large variability of results.

Bee stings

With regards to bee stings, most people who get stung develop a raised, inflamed mark known as a weal. The CEBaP evidence summary revealed limited evidence from one randomised controlled trial in favour of quick removal of a bee sting. The trial showed a statistically significant decrease in the weal area after 10 minutes with a quick time of removal, compared to no quick removal. Evidence is of low certainty and the results of this study are imprecise due to limited sample size and lack of data.

Insect bites and stings, suction, or household treatments

No studies were found about cooling with ice, or on the use of suction, in case of an insect bite or sting.

Regarding household treatments (vinegar, baking soda, sugar etc.), there is limited evidence from one non-randomised controlled trial neither in favour of sugar nor a placebo bandage. A statistically significant increase or decrease of pain, swelling or itching, using a sugar bandage compared to a placebo bandage, could not be demonstrated. Evidence is of low certainty and results of this study are imprecise due to the limited sample size and lack of data.

Education review

Commentary on medical education's bias to use white skin as the standard for the recognition of illness has identified a similar bias in first aid education, particularly regarding this topic. Nolen (2020) referred to a paper on the recognition of Lyme Disease by Fix et al. (2000) that has informed our commentary for this section. The paper concluded that skin rashes caused by Lyme disease are under-recognised in African American populations (and by extension, people of colour). The article suggested a variety of reasons including:

- the rash is less visible
- less accessible care may make African Americans less likely to seek medical treatment
- healthcare professionals might be biased in their diagnosis, assuming African Americans are less likely to be infected with Lyme disease.

Aquatic animal injuries

Key action

Remove any stinging cells from the skin and apply heat to the injury to reduce pain.

Introduction

Aquatic animals include those found in both salt and freshwater. Most are harmless; however, some jellyfish and venomous fish can produce stings that can be painful and cause minor or severe allergic reactions. Stinging injuries are a common occurrence on many beaches worldwide and are problematic for people whose livelihoods depend on activities which bring them into contact with venomous fish or jellyfish. For bite injuries from a non-venomous aquatic animal, see Cuts and grazes or Severe bleeding.

Guidelines

- For jellyfish stings, heat may relieve the pain.*
- Any remaining stinging cells from a jellyfish should be removed from the skin.*

Good practice points

- First aid providers should protect themselves from being stung when removing any tentacles or stinging cells from the skin.
- To remove visible jellyfish tentacles, use tweezers. To remove jellyfish stinging cells, first aid providers may cover the stinging cells with sand or shaving foam and then scrape them off with cardboard or a bank card.
- The first aid provider may immerse the injury in hot water (up to a maximum of 45°C/113°F) for at least 20 to 30 minutes or apply a heat pack.
- If a heat pack or hot water are not available, it is reasonable to apply a cold pack to relieve the pain.
- The choice of an agent applied to a jellyfish injury should be specific to the jellyfish.
  - Salt water may relieve pain for some jellyfish stings.
  - Vinegar may relieve pain for some jellyfish stings (Physalia species). Do not apply vinegar to a bluebottle jellyfish, as it will cause the venom to spread further.
- Aluminium sulphate, meat tenderizer, or cold fresh water should not be used for pain relief.
- First aid providers should discourage the person from rubbing the site of the injury.
- In areas with deadly aquatic animals, when a person has been bitten or stung, medical care should be accessed immediately. This is also the case if the person experiences any signs of a severe allergic reaction. First aid providers should assess the person's airway, breathing and circulation while providing care for any other symptoms caused by the injury.
- There is a risk of tetanus from an aquatic animal injury, so tetanus vaccinations might be suitable as a preventative measure.
- If warmth or pain develop around the site of the injury, this is an indication of infection and the person should seek medical advice immediately. The injury should be monitored as infection can happen in the hours or days after the bite occurs.

Chain of survival behaviours

Prevent and prepare

- Injuries from venomous marine and freshwater animals can be related to livelihoods and economic activity in addition to tourism and leisure, so target preventative measures and education at local people at risk as well as visitors.

- For people at risk, protective clothing should be worn.
- Follow local guidelines about the risks of entering the water.

Early recognition

The person has pain associated with puncture wounds from the stinging cells. You may be able to see stinging cells attached to the skin.

The person may develop a mild or severe allergic reaction following a sting. Observe the person closely for any development of an allergic reaction. A rash can be more difficult to see on black or brown skin (Nolen, 2020). Checking lighter areas of skin such as the palms of hands or soles of feet may help you to see it.

First aid steps

1. If necessary, remove all of the stinging cells from the person's skin. Protect yourself from being stung as you do this.
2. Apply heat to the site of the injury for 20-30 minutes. You could immerse the injury in hot water or apply a heat pack.
3. Advise the person to seek medical care if there is a risk of tetanus or persistent pain that is not relieved by treatment.

Access help

- If the sting injury is from a deadly species of aquatic animal, or if there is any doubt, access EMS immediately.
- If the person experiences a severe allergic reaction, access help immediately.

Recovery

Monitor for signs of infection. The skin may become red, purple, or darker, as well as warm and painful at the site of the sting. This should improve over the course of a day or two. However, if it gets progressively worse, the person should seek medical advice as this could be a sign of infection.

Education considerations

Context considerations

- Consult local aquatic institutions and water rescue associations to identify the most common and dangerous aquatic animals in the region. Include the first aid response for these species only in your programmes.
- If local authorities recommend applying medication to aquatic injuries (such as steroid ointments or lidocaine gels), ensure that this action is in line with the local legislation concerning first aid providers.
- In settings where groups at risk of aquatic animal injuries are defined by employment or livelihoods, provide targeted education programmes on this topic using facilitators from the affected population (De Aquino et al., 2015).
- Work with local aquatic institutions and local authorities to ensure public notices are displayed which alert people to the dangers of being stung by an aquatic animal, and the appropriate first aid.

Learner considerations

- Adapt education to the literacy level of the learner group, being aware that illiteracy might be a factor for some at-risk groups (De Aquino et al., 2015).
- Visitors to areas where there is a risk of being stung might not be informed about the risks. Education in the form of public posters could be necessary. Where possible these should include clear illustrations and an emergency number to call for help, to avoid language barriers.

Facilitation tips

- Emphasise preventative measures, such as identifying warning signs at the beach or wearing protective clothing and workwear when doing aquatic activities.
- If possible, facilitators should be familiar with the aquatic environment about which they are educating as this will allow them to add local knowledge about tides or dangerous places to swim, as well as have local knowledge about how best to get help when necessary (Aquino et al., 2016).
- When educating people in locations where incidences of injury are high, identify and share knowledge on any variations in times or locations where the risk from a particular species is greater (e.g. if injuries occur more frequently at certain times of day or night, or are more common in shallow or deep water).

Facilitation tools

- Share photos of venomous aquatic animals that are prevalent locally and provide basic information such as where they can be found.
- Share photos of wounds with stinging cells or sting fragments to help learners identify what these look like.
- Ensure learners know to use hot water at the optimum temperature range (around 45°C) and what this feels like. Encourage learners to reflect on how they would access hot water rapidly when in a typical aquatic environment, such as a beach or lake.
- Demonstrate the use of a bank card or similar flat object for stinging cell removal.

Learning connections

- Reference could be made to similarities with insect sting removal.
- Highlight the risks of burning the skin if the water temperature is too high.
- Some people with a sting may experience an allergic reaction or anaphylaxis.

Scientific foundation

Evidence for marine animal injuries was reviewed in 2015 and 2019 and the guidelines have been updated accordingly. Additional literature was sought to embellish the educational context, and this led to the inclusion of freshwater animal injuries. However, a scientific review has not been undertaken for freshwater animal injuries.

Systematic review

The Centre for Evidence-Based Practice (CEBaP) made evidence summaries for several different treatments including a selection of topical agents, hot or cold-water immersion and pressure immobilisation.

Jellyfish - topical agents

CEBaP identified moderate-certainty evidence (downgraded for imprecision due to the low number of events) from three experimental studies showing that sting inhibitor lotion resulted in a statistically significant decrease in the number of stings, pain and erythema, compared to the placebo (conventional sunscreen lotion).

The use of vinegar as a method to prevent further nematocyst discharge has only been studied in in vitro studies or animal studies. No controlled studies with humans are available.

Jellyfish - hot water

CEBaP identified low-certainty evidence (downgraded for risk of bias and limited sample size) from three experimental studies showing that hot water or a hot pack resulted in a statistically significant decrease in pain, compared to an ice pack, vinegar or papain meat tenderiser. However, a difference in time to stopping the pain could not be demonstrated. A statistically significant decrease of itchiness, red mark or minor rash, raised and red or wheal reaction or bullous reaction, using hot water compared to an ice pack, vinegar or papain meat tenderizer, could not be demonstrated in two studies.

Jellyfish - pressure immobilisation

CEBaP could not identify any human studies about the use of pressure immobilisation for jellyfish stings.

Jellyfish - seawater

A statistically significant decrease of pain could not be demonstrated using salt water compared to fresh water, sting-aid or Adolph's meat tenderiser. Evidence is of low certainty and the results of this study are imprecise due to the limited sample size and large variability of results.

Non-systematic reviews

Ward et al. (2012) found that if envenomation is from a Physalia species of jellyfish found in North America and Hawaii, vinegar may be beneficial.

Nomura et al. (2002) conducted a randomised paired comparison trial of treatments for acute jellyfish stings and found that the most effective treatment for the Carybdea alata species is hot water.

Education review

One study was found to inform education considerations for this topic. Aquino et al. (2016) identified a high proportion (at least 30%) of the target group experienced injuries from a specific type of venomous freshwater fish because of their livelihoods. Their injuries resulted in a high frequency of trauma and venomous toxins leading to systemic complications. The study identified a high level of inappropriate treatment being applied. Combined, this had a direct impact on the ability of the injured people to work and emphasised the importance of education. The target group had a high degree of illiteracy and limited availability for extensive classroom-based learning. The study also highlighted the importance of facilitators who understand the local context (as opposed to facilitators from 'outside'). The finding that secondary infections and complications related to a lack of knowledge of effective treatment demonstrate the importance of tailoring educational content to specific target groups. It also places equal emphasis on prevention and treatment during first aid education, which can be applied more broadly to this topic.

Snakebites

Key action

Help the person keep as still as possible to slow the spread of the venom.

Introduction

Most snakes are harmless to humans, but some are venomous. A venomous snake injects venom through its fangs and the bite can be life-threatening. If possible, identifying the type of snake will help medical professionals determine whether the snake is venomous, the type of venom it produces and therefore the best way to help the person who has been bitten.

Guidelines

- Limb injuries should be kept still as much as possible to slow the spread of venom. It may be helpful to immobilise the limb by applying a non-elastic bandage (or using clean clothing such as trousers or shirt).*
- If they are properly trained to do so, first aid providers may use the pressure immobilisation technique, by firmly applying a cotton or rubber pad under a non-elastic bandage for special situations such as remote locations and wilderness environments.*
- A tourniquet should not be applied to snake envenomation because it may not be effective and may result in an extended hospital stay.*

Good practice points

- The person should limit physical activity to prevent the spread of toxins. If the bite is on the person's leg, they should not walk on the immobilised leg unless no other option is available.
- It is reasonable to keep the injured area at or lower than the level of the heart.
- It is reasonable to remove jewellery, watches or tight clothing to prevent blood flow being restricted if there is swelling.
- In areas with limited resources (e.g., a wilderness or remote environment with longer wait times to EMS), it is reasonable to wash the wound.
- Suction should not be applied to a snakebite because it does not allow complete removal of the venom and it might aggravate the damage to the skin.
- A cold compress should not be applied to a snakebite because this may cause the blood vessels to contract and make the venom spread more quickly through the body.
- The wound should not be rubbed as this may cause the venom to spread more quickly through the body.
- Cutting the wound with a knife to increase bleeding is not recommended. It does not reduce the effect of the venom and aggravates the injury.

Chain of survival behaviours

Prevent and prepare

- Wear appropriate footwear in areas snakes are present.
- Know how to identify local snakes and whether they are venomous.
- Keep away from snakes that you encounter, trying not to disturb them. Do not kill or injure them.

Early recognition

A person with a snakebite may:

- be in pain
- have a visible bite mark
- experience swelling or discolouration of the skin around the area of the bite.

A venomous snake may also cause:

- thirst
- nausea and vomiting
- blurred or double vision
- sensory disturbances or paralysis
- sweating and excessive production of saliva
- a sudden drop in blood pressure, leading to Shock
- Seizures.

NOTE

If possible and safe to do so, identify the type of snake that bit the person. Do not try to catch the snake. Consider taking a photo or make note of its features for a medical professional to identify.

First aid steps

1. Help the person to lie down in a comfortable position. Advise them to move as little as possible.
2. Access emergency medical services (EMS).
3. Remove jewellery, watches or tight clothing to prevent blood flow being restricted if there is swelling. Do this while moving the limb as little as possible.
4. Monitor the person's level of response and breathing. Encourage them to remain as still as possible.

CAUTION

The following actions are not effective and may even cause further harm:

- applying a tourniquet
- sucking out the venom
- applying a cold compress
- rubbing the bite
- cutting the wound with a knife to increase bleeding.

Local adaptations

- If in an area with limited resources (e.g., a wilderness or remote environment with longer wait times to EMS) immobilise the limb with a non-elastic bandage to reduce the spread of the venom. If a non-elastic bandage is not available, use clothing such as trousers or a shirt.
- If in an area with limited resources (e.g., a wilderness or remote environment with longer wait times to EMS) wash the wound with potable (clean) water and apply a non-elastic bandage to reduce the risk of infection. See Cuts and grazes.
- If necessary, carry the person, for example by making a stretcher or by two people linking their arms to make a chair for the person.

Access help

- It is important to tell medical professionals about the type of snake that bit the person. This will help them provide the best care quickly to the person.

Education considerations

Context considerations

- Contact the local biological centre to find out the types of snakes in the region, whether they are venomous, where to get antivenom and any recommended treatment specific to the types of local snakes.
- Include education on first aid for snakebites in regions where venomous snakes are found or for learners travelling to areas with exotic or venomous snakes.
- Specially trained first aid providers may use the pressure immobilisation technique in special situations such as remote locations and wilderness environments. Ensure adequate guidance and practise of this technique as there is evidence it is often applied with poor outcomes, even by those with specific training. Be clear the technique should only be used in special circumstances.

Learner considerations

- For learners who might be visiting an area where there are snakes, emphasise the importance of research to know what snakes are present and how to avoid them, as well as action to take if bitten.
- For communities who live in places where there are snakes, prevention strategies tend to be well known but first aid treatment seems less well known. Public campaigns to publicise snakebite first aid (immobilisation of the bitten area and loosening restrictive clothing) could be effective (Alcoba et al., 2020).

Facilitation tips and tools

- Introduce this topic with a focus on prevention.
- Emphasise the importance of getting treatment quickly – even if the snake is not venomous, the bite can quickly become infected.
- Use pictures of the most common snakes in the region to increase learners' ability to identify snakes and raise awareness of the danger.
- Use pictures of the signs and symptoms to help learners to understand the seriousness of snakebites.
- Emphasise that people should not try to catch or kill a snake.
- Dispel myths about snakebite if they are prevalent among the learner audience.
  - Do not cut the bite with a knife.
  - Do not use a tourniquet.
  - Do not suck the bite.

Scientific foundation

We used four evidence summaries from the Centre for Evidence-based Practice (CEBaP) for the following topics: pressure immobilisation; tourniquet; cryotherapy and suction for snakebite. CEBaP searches on irrigation or washing a snakebite, and on the application of ice on a snakebite found no relevant studies.

Systematic reviews

Pressure immobilisation

Pressure immobilisation is a technique that can be achieved in several ways: by using an elastic bandage (applying pressure uniformly around and along the limb), or by firmly applying a cotton or rubber pad under a non-elastic bandage (pressure applied specifically to the injection site, with sufficient firmness). However, these techniques are not easy to be performed by first aid providers, and therefore an evidence summary concerning the feasibility of applying this technique was also developed (CEBaP, 2019).

Elastic bandage and splint

There is limited evidence from two experimental studies neither in favour of using an elastic bandage and splint nor of using the control (no first aid treatment). A statistically significant decrease of speed of venom spread, using elastic bandage and splint compared to no first aid treatment, could not be demonstrated in two studies. Evidence is of very low certainty and results of these studies are imprecise due to limited sample size and/or large variability of the results (CEBaP, 2019).

Elastic bandage and splint, combined with rest

There is limited evidence from one experimental study in favour of rest with an elastic bandage and splint. It was shown that using an elastic bandage and splint, in combination with rest, resulted in a statistically significant decrease of transit of mock venom, compared to the same treatment while walking. Evidence is of very low certainty and results cannot be considered precise due to limited sample size and/or large variability of results (CEBaP, 2019).

Firm cloth or rubber pad held in place by non-elastic bandage at a certain pressure

There is limited evidence from four experimental studies in favour of using a firm pad (e.g. a cotton cloth, or a rubber pad), held in place with a broad non-elastic bandage under a minimum pressure of 60-70 mmHg. It was shown that using such a pad resulted in a statistically significant decrease of speed of venom spread or transit of mock venom, compared to no treatment. Evidence is of very low certainty and results cannot be considered precise due to limited sample size and/or large variability of results (CEBaP, 2019).

Feasibility of applying pressure immobilisation by lay first aid providers

There is limited evidence from two experimental studies in favour of training first aid providers to apply an elastic bandage. It was shown that training resulted in a statistically significant increase of bandage application with optimal pressure range, compared to written instructions. However, it was shown that first aid provider volunteers did not succeed in a statistically significant higher correct bandage application or achievement of correct pressure, compared to medical volunteers. Evidence is of low certainty and results cannot be considered precise due to limited sample size and large variability of results (CEBaP, 2019).

Tourniquet

There is limited evidence from seven observational studies in favour of not using a tourniquet. It was shown that using a tourniquet resulted in an increase in local swelling, the amount of antivenom required, duration of hospital stay and severity of local envenomation, compared to not using a tourniquet. A statistically significant increase in haemorrhagic syndrome, amount of antivenom required, acute renal failure, acute respiratory failure, death, death or disability, local oedema, envenoming, duration of hospital stay, tissue necrosis, serum venom level before antivenom treatment and incidence of multiple organ dysfunction syndrome, when using a tourniquet, compared to not using a tourniquet, could not be demonstrated. On the other hand, it was shown in another study that using a tourniquet resulted in a statistically significant decrease in the amount of antivenom required, compared to not using a tourniquet. Evidence is of very low certainty and results cannot be considered precise due to limited sample sizes, low number of events and large variability of results (CEBaP, 2019).

Suction

There is limited evidence from one observational study neither in favour of using suction nor not using suction. A statistically significant decrease of deaths or disability, the amount of antivenom required or duration of hospital stay, using suction compared to no first aid, could not be demonstrated. Evidence is of very low certainty and results of this study are imprecise due to the limited sample size, the low number of events and large variability of results or lack of data (CEBaP, 2019).

Education review

We found one paper to embellish educational insight on this topic. Alcoba et al. (2020) conducted a cross-sectional multi-cluster household survey in the Akonolinga health district of Cameroon and found an incidence of 665 snakebites per 100,000 inhabitants in one year. Despite good community knowledge of preventative measures, the researchers found that resulting fatalities, acute complications and chronic disability were associated with consulting traditional healers. Only 3% of people bitten by a snake received antivenom treatment. The authors concluded that there was an urgent need for first aid training for traditional healers and health professionals.

Poisoning

Key action

Quickly try to identify the poison, the amount and when (or how long) the person was exposed to it.

Introduction

Poisoning is when a person is exposed to a substance that can damage their health or endanger their life. Most poisons are swallowed or inhaled; however, they can also be absorbed through the skin. Many poisonous substances are found in homes and workplaces, including some cleaning products, illicit drugs, medications, and even some plants. International organisations are working to remove toxins such as lead, mercury and asbestos from paint and other building supplies.

Guidelines

- For a person who has swallowed a poisonous substance, the first aid provider should consider laying them on their left side.*

Good practice points

- The first aid provider should stop or limit further effects of the poison by stopping continued exposure. In the case of inhalation of toxic gas, the person should be removed from the area, but only if it is safe for the first aid provider to do so.
- In rooms which are potentially filled with carbon monoxide, exposure to all sources of ignition such as naked flames, electrical equipment, oxidizing chemicals and the smoking of tobacco products should be prevented.
- The nature and time of exposure and the name of the product or toxic substance should be described to the poison control centre, or local equivalent, or emergency medical services (EMS). All bottles, packages or containers with labels or any other information about the poison should be given to EMS.
- If life-threatening conditions are present (e.g., unresponsiveness or breathing difficulties) the first aid provider should access EMS. The first aid provider should start CPR or provide other first aid as necessary.
- If non-life-threatening conditions are present, the first aider should access and follow the instructions of the poison control centre (or local equivalent) or EMS.
- Rescue breaths should be avoided if poisoning by toxins such as cyanide, hydrogen sulphide, corrosives or organophosphates is suspected. The bag-valve-mask device may be used by those who are trained to do so.
- If the person is responsive, the first aid provider should remove any poisonous liquid remaining in the person's mouth by allowing the person to use water to rinse and spit out any remaining toxin.
- First aid providers should not give any diluents such as milk, water or activated charcoal to a person who has swallowed a poisonous substance unless they are instructed to do so by the poison control centre or equivalent poison expert.
- The person should NOT be encouraged to vomit as this may damage their throat.
- Button batteries contain poisonous chemicals which may leak into the body. If they are swallowed this should be treated as poisoning.
- First aid providers with appropriate training may administer oxygen to people who have carbon monoxide or carbon dioxide poisoning.

Chain of survival behaviours

Prevent and prepare

- Ensure that any poisonous substances (such as cleaning products and medicines) are locked away and inaccessible to children. This particularly includes brightly coloured or scented chemicals such as washing machine tablets or e-cigarette liquids.
- Carefully read the information leaflet that comes with new medication to avoid an overdose.
- Regularly service cooking and heating appliances that use fossil fuels and install a carbon monoxide detector.
- Store chemicals out of access to any person who may accidentally or purposefully swallow or sniff them and ensure they have child-resistant lids.
- Depending on the type of work or hobbies, learn how to prevent direct contact with poisonous substances. This may include contacting the person who is responsible for workplace safety to teach specific safety-regulations.

Early recognition

- Upon entering an environment where there may be poisonous substances, assess the area. There may be open packaging near the person (e.g., a packet of tablets) or spilled chemicals. A confined space may smell of gas (note that carbon monoxide is odourless, as well as colourless and tasteless). The person may also be able to tell you that they have had contact with a poisonous substance.

Poisoning signs and symptoms can include:

- burns around the mouth and lips
- the breath may smell like chemicals, such as gasoline or paint thinner
- vomiting
- drowsiness
- difficulty breathing
- confusion or other altered mental status

NOTE

Poisoning signs and symptoms can mimic other conditions, such as Seizure, Stroke or an insulin reaction.

First aid steps

1. Help the person to reduce or stop further exposure to the poison.
2. Try to identify the poisonous substance, the amount and when (or how long) the person was exposed to it. Only touch the packaging if it is safe to do so. If not, wait for EMS.
3. Access the poison control centre (or local equivalent) or EMS and tell them as much as you can. Follow their instructions.
4. Help the person into a position of comfort, on their left side if possible, and monitor them for any change in their breathing or level of response.
5. Gather any bottles, packages or containers with labels and any other information about the poison to give to the EMS.

Special cases

- If the person is unresponsive, open their airway and check for breathing. See Unresponsiveness.
- If the person has a caustic substance in their eye or around their mouth, see Burns.
- If the person is having an opioid overdose, see Unresponsive and abnormal breathing with suspected opioid overdose.
- If the person has been bitten by a snake or stung by a jellyfish, see Snakebites or Aquatic animal injuries.
- If the person vomits while lying on the ground, turn them on their side to prevent choking.

CAUTION

- If a toxic substance is suspected, the first aid provider may need to wear personal protective equipment such as a mask or gloves. If a harmful substance is suspected in or around the mouth, providers should use chest compression-only CPR to avoid contact.
- Do not make the person vomit as this may damage their throat.

Access help

- It is important to tell the poison control centre (or equivalent) or EMS as much as you can about the type of poison the person may have been exposed to. This allows the professionals to give the most appropriate help based on the person's needs.

Education considerations

Context considerations

- Establish with learners what substances and sources are most likely to lead to poisoning in their context and discuss ways to reduce the likelihood of poisoning. For example, discuss living or work conditions and how to store harmful substances.
- Give learners opportunities to assess danger through photos or scenarios, for example of a chemical spill or a gas-filled room. Discuss what signs they should look for. Explore how they can keep themselves safe. This may be particularly relevant to some workplaces.
- Inform learners of any local, regional or national carbon monoxide detector schemes such as free detectors from a local rescue service, regulated charity or commercial providers. These can be professionally fitted and tested.

Learner considerations

- Tailor education to specific learning needs. For example, child first aid courses aimed at parents and care providers may require more time around prevention.
- Decide if first aid education should include whether it is preferable to lay a person who has swallowed poison, on their left side. If including this, reassure learners that if they forget which side to lay the person on, first aid principles remain, and the key is to move the person into a safe position that will maintain an open airway.
- Children younger than five years of age are the most likely to ingest a button battery. Most ingested batteries are from hearing aids, watches, games, toys, and calculators (Ikenberry et al., 2011).
- In adults, the swallowing of caustic substances is frequently intentional, involves large amounts, and is life-threatening.

Facilitation tips and tools

- Make use of visual resources such as danger labels and signs, as well as photographs of the impact of poisoning to help learners identify what to look for.
- Help learners to identify a poison control centre (or equivalent) and how to call them.
- Use audio-visual resources to support facilitation and connect key first aid principles. For example, when covering carbon monoxide poisoning, this teaching clip may be helpful.
- Use information from official organisations when educating specific audiences and tailor the content accordingly. For example, the National Health Service in the United Kingdom provides clear guidance on what to do if you think a child may have swallowed a button battery.
- Suggest reading leaflets distributed by authorities on the specific poisoning risks in the region.

Learning connections

- Make connections to Snakebites, Aquatic animal injuries (e.g., jellyfish stings) and Insect bites and stings.
- Connect to learning about a person who is Unresponsive with abnormal breathing with suspected opioid overdose.
- The approaches of Psychological first aid may be useful for this topic.

Scientific foundation

The Consensus on Science reviewed this subject in 2010. The Centre for Evidence-Based Practice (CEBaP) re-evaluated the available literature for this edition of the guidelines. This literature is available as two published systematic reviews (Avau et al., 2019; Borra et al., 2019). Carbon monoxide and carbon dioxide intoxication were not scientifically evaluated in the Consensus on Science in 2010 nor 2015. CEBaP, however, developed an evidence summary on the use of carbon monoxide detectors for the prevention of carbon monoxide intoxication, as well as an evidence summary on safe storage for the prevention of poisoning in general. The United Kingdom Public Health Authority, the Canadian Centre and the Dutch National Poisons Information Centre provided additional sources of information.

Systematic reviews

Body position

There is limited evidence of very low certainty in favour of lying on the left side. A CEBaP systematic review (Borra et al., 2019) of nine randomised cross-over studies in adult volunteers showed that lying down on the left side resulted in a statistically significant decreased uptake of several drugs (acetaminophen, nifedipine, nitropyridine), compared to other body positions.

Dilution with milk or water

There are no human studies on the effect of treating oral caustic exposure with dilution therapy.

Induced vomiting – Ipecac

A CEBaP Cochrane systematic review (Avau et al., 2019) identified five studies investigating the effectiveness of ipecac syrup as a first aid intervention. None of the evidence on the use of syrup of ipecac as a first aid intervention shows any benefit, and it may even cause harm.

One study provided evidence of low certainty on the use of ipecac versus no intervention in asymptomatic participants with toxic berry ingestion. This study took place in a pre-hospital setting and reported no clinical outcomes. While there may be little or no difference in emergency department referral, there may be an increase in adverse events.

Four studies assessed the addition of ipecac syrup to single dose activated charcoal plus a cathartic (a medication that increases the passage of stool). All studies either did not specify or included multiple types of overdose. Low-certainty evidence suggests there may be little or no difference in the incidence of clinical improvement. On the other hand, we are uncertain about any effect on the incidence of mortality, adverse events, clinical deterioration, hospitalisation or intensive care unit admission.

Activated charcoal

A CEBaP Cochrane systematic review (Avau et al., 2019) shows there is limited evidence with harm for single dose activated charcoal ingestion after poisoning.

It was shown that single dose activated charcoal and a hospital intervention (mostly gastric lavage) resulted in a statistically significant increase in several symptomatic features of poisoning (hospitalisation rate, intensive care unit admission rate, need for intubation rate), compared to hospital intervention alone. However, a statistically significant increase in mortality, convulsion rate, drug absorption (AUC, Cmax or Tmax), or the occurrence of adverse events (vomiting, absence of bowel sounds), using single-dose activated charcoal and a hospital intervention, compared to hospital treatment alone, could not be demonstrated. Furthermore, a statistically significant increase in mortality or the occurrence of adverse events, using single dose activated charcoal compared to no intervention, could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to limited sample size, the low number of events, and/or large variability of results.

In addition, there is limited evidence neither in favour of multiple doses of activated charcoal nor no intervention. A statistically significant decrease in mortality, symptomatic features of poisoning (need for intubation, length of intubation, seizures, need for cardiac pacing or antitoxin treatment), drug absorption (AUC, Cmax or Tmax), or the occurrence of adverse events (absent bowel sounds), using multiple doses of activated charcoal and a hospital intervention compared to hospital treatment alone, could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to limited sample size, the low number of events, and/or large variability of results.

Non-systematic reviews

Prevention

The unsafe storage of chemicals and medicine, household poisons, kerosene and petroleum, and lack of child-resistant lids on bathroom bottles are risk factors that resulted in a statistically increased risk of unintentional poisoning. However, the following risk factors could not demonstrate a statistically significant increased risk of unintentional poisoning: no child-resistant lids on household cleaning supplies, easy access to bathroom beauty supplies and medications, easy access to cleaning supplies and the use of unsafe product packaging. Evidence is of very low quality, and results cannot be considered precise due to lack of data and large variability of results.

There is evidence in favour of using child-resistant containers for paraffin. It was shown that using child-resistant containers resulted in a statistically significant decreased incidence of paraffin ingestion, compared to not using these. Evidence is of moderate quality.

CEBaP's review showed from two observational studies that not having a carbon monoxide detector resulted in a statistically significant increased risk of poisoning or hospitalisation. Evidence is of very low certainty and results cannot be considered precise due to a low number of events.

Despite their utility, the effectiveness of carbon monoxide alarms or smoke alarms is limited by human awareness of the appropriate actions to take when an alarm sounds. (Wheeler-Martin et al., 2015). Messaging around the importance and timing of battery replacement needs improvement. A properly installed and functioning carbon monoxide detector is an effective tool to protect household occupants from residential, non-fire-related carbon monoxide poisoning (McKenzie et al., 2017).

Water irrigation

Irrigation of the skin and eye after exposure to caustic agents can reduce the severity of tissue damage and has been a mainstay of first aid treatment. Evidence from multiple studies examining alkali and acid exposure of both the eye and skin showed that outcomes were improved when water irrigation was rapidly administered in first aid treatment. In one non-random case series of immediate (first aid) versus delayed (healthcare provider) skin irrigation, the incidence of full-thickness burns was lower, and length of hospital stay was decreased by 50% with immediate and copious irrigation of skin chemical burns. Evidence-based on animal studies also supports water irrigation to reduce exposure of the skin and eye to acid. In a study of rats with acid skin burns, water irrigation within one minute of burn prevented any drop-in tissue pH, whereas delayed irrigation allowed a progressively more significant fall in tissue pH (Markenson et al., 2010).

Danger of vomiting

Because caustic substances can cause as much damage when returning up the oesophagus as they did when swallowed, a person who has swallowed a caustic substance should not be made to vomit (Weigert, 2005).

Dry cell battery poisoning

Children younger than five years of age are the most likely to ingest a button battery, and most ingested batteries are from hearing aids, watches, games, toys, and calculators. The electrical current from a battery lodged in the oesophagus rapidly burns and damages surrounding tissue, leading to severe and potentially fatal complications. (Ikenberry et al., 2011). Although hearing aid batteries are not the riskiest of ingested batteries (<1%), larger button cells, such as the popular lithium coin cells, can cause life-threatening damage in just two hours. If the battery is in the oesophagus, it will have to be removed. Burns to the oesophagus may lead to perforations, massive bleeding and complications from scarring, as well as months to years of impaired feeding (Cevik and Boleken, 2013; Martin, 2009). If the battery has passed into the stomach, it is usually safe to allow it to pass on through the intestinal tract.

Fatal complications after button battery ingestion are increasing worldwide. As soon as they suspect a button cell has been ingested, people should contact their general practitioner or another professional caregiver for medical guidance, regardless of the battery's diameter. An X-Ray should be made for every child after battery ingestion. If they are showing signs of being seriously ill, such as vomiting or active bleeding, the emergency services should be called. A battery lodged in the oesophagus of a child may go undetected if parents or caretakers are unaware of it, as the symptoms can appear the same as other conditions such as viral infections (Krom et al., 2018).

Carbon dioxide

Large amounts of carbon dioxide are produced during the fermentation process in wine cellars, silos or cesspools, especially if they are not properly ventilated. It is heavier than air and floods the cellar or confined spaces and can dilute the oxygen concentration in air below the level necessary to support life. In the United States, carbon dioxide is responsible for more than 2700 deaths annually (Wheeler-Martin et al., 2015).

Low concentrations of carbon dioxide can cause increased respiration and headache. In high concentrations, people may die due to the lack of oxygen in the carbon dioxide filled atmosphere. Symptoms may include loss of mobility or consciousness, dizziness, drowsiness and nausea. Additionally, skin contact with frozen carbon dioxide (dry ice) may cause frostbite (IFRC, 2016).

Carbon monoxide

Carbon monoxide is a non-irritating, colourless and odourless gas and may be difficult to detect. It is a flammable gas and it may react violently with other substances and sources of energy, which might also cause explosions. Frequent sources of carbon monoxide are gas combustion engines, fires, furnaces and space heaters, especially in poorly ventilated spaces. Carbon monoxide binds to red blood cells more strongly than oxygen can, thus reducing the amount of oxygen that can be carried by the blood to reach important organs such as the heart and brain. Typical symptoms of carbon monoxide poisoning are headache, nausea, vomiting, muscle weakness (especially in lower limbs), unconsciousness and seizures. Unlike other conditions that decrease oxygen in the blood the person poisoned by carbon monoxide is rarely paler or showing bluish skin colouring around their fingers, lips or nails (cyanotic) (IFRC, 2016).

Medical conditions

Chest pain

Key action

Recognise the symptoms that may indicate a heart attack and access emergency medical services immediately.

Introduction

Chest pain can indicate a range of conditions related to the heart, lungs or rib cage. For first aid providers, the most critical is the risk of a heart attack. A heart attack is usually caused by a blockage in one of the blood vessels supplying the heart muscle, resulting in damage to the heart. Prompt recognition and management of a heart attack can save lives. Delayed treatment increases the probability of complications such as sudden death or later heart failure. Other common causes of chest pain include angina and indigestion.

Guidelines

- While waiting for EMS to arrive, consider having the person suspected of having a heart attack take an oral dose of 150–300 mg acetylsalicylic acid. Acetylsalicylic acid should be avoided if the person is allergic to it, or if the person takes acetylsalicylic acid regularly and has just taken the recommended dose.*
- If the first aid provider is trained and oxygen is available, the provider may give oxygen to a person experiencing chest pain if they recognise the person as hypoxic.*

Good practice point

- If a heart attack is suspected, emergency medical services (EMS) should be accessed immediately. Urgent access is necessary if the pain is intense, the person has shortness of breath, the person's skin is pale or ashen and clammy, or they have a bluish colour to the skin on their lips, ears, fingers or toes. Access EMS even if the pain has only lasted a couple of minutes.
- The first aid provider should help the person get into a comfortable position; the person should refrain from physical activity.
- If the person has medication, is diagnosed with angina and showing signs of acute chest pain, the first aid provider should assist them to take their medication.
- If EMS is delayed, a bystander may get an automated external defibrillator and keep it close to the person in case it is needed.

Chain of survival behaviours

Prevent and prepare

- There are national and global organisations that research how to reduce the likelihood of heart conditions. Refer to your country's health authority for more information.
- Exercise and a healthy diet, combined with low or no alcohol consumption and not smoking, can help to reduce the chances of a heart attack.
- If you have family, friends or colleagues who have angina, be aware of where they keep their medication in case of an emergency.
- Keep acetylsalicylic acid on hand if you are diagnosed with coronary artery disease.

Early recognition

Ask the person about their chest pain. If they have been diagnosed with angina or other heart condition, they should be able to tell you this. Likewise, if the person has a history of indigestion, they may describe this to you. If the chest pain continues even after taking medication, it is important to quickly recognise the possibility of a heart attack and access EMS.

Signs and symptoms that may indicate someone is having a heart attack include:

- chest pain
- chest pain in combination with pain in the arm or shoulder
- chest pain in combination with sweating
- chest pain in combination with palpitations.

Pain may be described as discomfort, vice-like pressure, cramping, squeezing, burning. A heart attack can start with non-specific complaints especially in females:

- nausea
- shortness of breath
- pain radiating to the jaw
- pain in the upper abdomen
- pain between the shoulder blades
- pain that lasts more than a few minutes or it may come and go.

People may also experience the following signs and symptoms.

- paleness
- anxiousness
- bluish colour to the skin on their lips, ears, or fingers.

NOTE

- The suspicion of a heart attack is supported if the person is known to have coronary artery disease. However, if in any doubt, assume it could be a heart attack.
- Heart attack symptoms may include any of the above but might be less noticeable in some populations such as people who are female, elderly or have diabetes.
- For angina, the pain is often familiar and improves when the person rests. For heart attack, the pain is persistent and emergency help must be accessed.

First aid steps

1. Help the person to sit down in a comfortable position and take their medication.
2. Access EMS immediately if you suspect a heart attack. Ask a bystander to bring a defibrillator if possible.
3. Suggest the person considers chewing a dose of acetylsalicylic acid if a heart attack is suspected.
4. Reassure the person and monitor their breathing and responsiveness.

NOTE

- If the person becomes Unresponsive with abnormal breathing, start CPR.
- Do not give acetylsalicylic acid to the person if they are allergic to it, have a bleeding disorder, or have already taken the recommended dose.

Access help

- Ask bystanders to help you access EMS, monitor the person and get medication or a defibrillator.
- Emphasise that you suspect it is a heart attack when you access EMS so they can appropriately prioritise your case. Also update EMS if the person's condition changes (e.g., they collapse and stop breathing).
- It is important to access help quickly to minimise any damage to the heart.
- If the person has been diagnosed with angina and has their medication, it may not be necessary to access EMS. However, you should access EMS if the pain does not subside as it usually does within a few minutes of taking medication.
- If the person has taken medication for indigestion but the pain does not subside, access EMS. Note that a heart attack is often mistaken for indigestion.

Recovery

- If angina pain patterns have changed, a change in medication or treatment may be needed. Suggest that the person seeks medical care.

Education considerations

Context considerations

- In places with ambulances, EMS can provide treatment during transport to the hospital, which can improve the person's outcomes (Cartledge et al., 2017).
- Be aware of the recommended medications available in your country, for example, glyceryl trinitrate for angina or acetylsalicylic acid for a heart attack. Additionally, be aware of the laws surrounding whether a first aid provider can assist with or administer medication.
- In contexts where vasodilators (e.g. nitrates) are used, be aware that they might have side effects, including low blood pressure or unresponsiveness. Therefore, if EMS can quickly arrive, take their advice on whether to assist the person to take this type of medication.
- Consider focussing on the prevention aspect of the Chain of survival behaviours in all contexts and particularly where there is limited or no access to EMS. Awareness of how diet (including alcohol consumption), lack of physical activity and smoking contribute to increased risk should be included as part of first aid education on this topic.

Learner considerations

- Consider which part of the Chain of survival behaviours learners might focus on in this topic according to their circumstances. For example, for younger learners, it might be most appropriate to focus on prevention; while caregivers could focus on recognition.
- When working with a diverse group of learners, be sure to emphasise that symptoms may be less noticeable in females, older adults, and people with diabetes.
- When developing first aid programmes, research which different 'at risk' communities might be best targeted with education. For example, particular ethnic groups or more socially disadvantaged groups might be at higher risk of heart attack and other cardiovascular diseases due to health inequalities and lack of access to health services (Mendis et al., 2011; WHO 2011).

Facilitation tips

- Emphasise the need to recognise a heart attack and get help quickly.
- Raise awareness of risks associated with concealing pain at the early stages of a suspected heart problem by exploring the potentially serious causes and outcomes of chest pain.
- Explore how people may describe or feel different types of chest pain.
- Clarify any unfamiliar terminology. If necessary, resolve any confusion by differentiating between a heart attack and cardiac arrest.

- Identify the causes of chest pain but emphasise that the aim is not to diagnose the cause. It can be very difficult to tell what type of chest pain a person is experiencing, even for medical professionals. If the first aid provider is unsure, they should access EMS immediately.
- Ask learners to share their experiences with heart attacks and to describe what they did or would have done differently. This can be especially useful to explore key messages such as recognising a heart attack and not delaying access to EMS.
- Emphasise that sitting in a comfortable position eases the strain on the heart, and if the person collapses, they are less likely to injure themselves.
- Explain the reason acetylsalicylic acid can be beneficial is that acetylsalicylic acid makes the clot-forming part of blood less sticky and may improve blood flow past the blockage in the blood vessel.
- Include information about the possible contraindication for giving acetylsalicylic acid in some people (allergy or bleeding disorder).

Facilitation tools

- Use case studies relevant to learners' contexts. The discussions from these studies can be adapted to create practice scenarios.
- Casualty simulation provides an opportunity for learners to practise communicating with someone who is in pain, ensuring the person is in a comfortable position, accessing EMS and being prepared to provide care should the person become unresponsive or stop breathing.
- The following materials may be helpful introductions to the topic:
  > Signs and symptoms
  > Heart attack video

Learning connections

- A heart attack may cause a person to stop breathing. Make the connections between this topic and how to help someone Unresponsive with abnormal breathing, including how and when to use a defibrillator.
- A heart attack can be a very frightening experience. Help learners make connections to any psychosocial support skills they can use to provide comfort.
- Encourage learners to think critically about how to position a person depending on their injury or illness. See General approach.

Scientific foundation

Systematic reviews

In 2019, the Centre for Evidence-Based Practice (CEBaP) completed a review on the following topics: clinical signs and symptoms of chest myocardial infarction (heart attack), and body positions for someone having a heart attack. In addition, we used a Cochrane systematic review on oxygen therapy for acute myocardial infarction and an International Committee on Resuscitation (ILCOR) systematic review about the use of acetylsalicylic acid.

Signs and symptoms

There is limited evidence from four systematic reviews of diagnostic accuracy studies showing that pain in both arms and a change in pain pattern over the last 24 hours may be predictive symptoms for the presence of acute myocardial infarction. Positional pain, pleuritic pain, sharp pain and/or palpitations could be considered as clinically helpful for the absence of acute myocardial infarction.

For people with chest pain, pain in the right arm, sweating and palpitations may be predictive symptoms for the presence of acute myocardial infarction. For people with various symptoms (e.g. symptoms of acute myocardial infarction, or suspected coronary artery syndrome) the evidence is not consistent and pain in right arm or shoulder and sweating may or may not be clinically helpful.

The following symptoms could not be considered clinically helpful to diagnose acute myocardial infarction:

- pain in the left arm, shoulder, neck, jaw or back
- central or right-sided chest pain
- sudden onset of pain
- substernal pain
- epigastric pain
- visceral pain
- aching
- oppressive, severe, burning or stabbing pain
- pain that lasts longer than 60 minutes
- time since onset of pain > 6 hours
- worsening pain after exertion
- associated syncope (unresponsiveness)
- nausea or vomiting
- shortness of breath

Evidence is of low certainty.

Body position

There is limited evidence from one experimental study neither in favour of passive straight leg raising (60°) nor lying flat on the back. In a randomised controlled trial with 18 anesthetised patients undergoing myocardial revascularization, a statistically significant difference in cardiac index between passive straight leg raising and lying flat on the back could not be demonstrated. However, this study also showed that passive straight leg raising resulted in a statistically significant (but not clinically meaningful) reduced right ventricular function (a marker of the cardiac fraction).

There is limited evidence from one observational study in favour of lying flat on the back. It was shown in a case-control study with people that had a history of heart attack that lying on the back resulted in a statistically significant increased cardiac index, compared to the lying facing chest down. However, a statistically significant difference in ejection fraction (i.e., function), when lying on the back compared to lying facing chest down, could not be demonstrated. Evidence is of low to very low quality and results cannot be considered precise due to limited sample size and lack of data.

Oxygen therapy

A Cochrane systematic review on oxygen use in people with a heart attack identified evidence from five randomised controlled trials that compared people who had a suspected or proven heart attack and were given inhaled oxygen to a similar group of people given air (evidence is current to June 2016) (Cabello et al., 2016). These trials involved a total of 1,173 participants, 32 of whom died. Death rates were similar in both groups (very low-certainty evidence). Regarding pain, there was no effect for oxygen on pain relief when pain was directly measured nor when trials measured opiate use as a surrogate for pain (low-certainty evidence). With regard to complications following a heart attack, there was no clear effect for oxygen on a range of complications in the oxygen group compared to the air group (low-certainty evidence).

Together, there is no evidence to support the routine use of inhaled oxygen in people with a heart attack, and we cannot rule out a harmful effect.

Acetylsalicylic acid

The ILCOR systematic review on first aid administration of acetylsalicylic acid (aspirin) for chest pain identified two observational studies and one randomised controlled trial that compared early (prehospital phase or within two hours from onset of chest pain) to late (more than two hours from onset of chest pain or in-hospital) administration of acetylsalicylic acid (Singletary, 2020).

Very low-certainty evidence was identified from two observational studies showing improved survival (at seven days and 30 days) with the prehospital early administration of acetylsalicylic acid (median 1.6 hours from pain onset) compared to late administration of acetylsalicylic acid (median 3.5 hours from pain onset, given at hospital admission). One of these studies also showed an improvement in survival at one year (very low-certainty evidence). Very low-certainty evidence was identified from two observational studies showing no significant difference in the incidence of complications, but they report inconsistent results about the incidence of cardiac arrest. Low-certainty evidence from one randomised controlled trial showed no benefit from giving enteric-coated acetylsalicylic acid within two hours of the onset of symptoms versus 3 to 24 hours after symptom onset on survival at 35 days. Very low-certainty evidence from two observational studies showed conflicting results: one of them showed a reduction in the incidence of asystole and the need for resuscitation wit early (compared to late) administration, whereas the other study showed a higher incidence of ventricular tachycardia and fibrillation. Studies evaluating the timing of acetylsalicylic acid administration on cardiac functional outcome, infarct size and/or chest pain resolution could not be found.

Non-systematic reviews

European Society of Cardiology Guidelines

The 2017 European Society of Cardiology Guidelines for the management of acute myocardial infarction in people presenting with a heart attack state the following:

- confirms the early use of acetylsalicylic acid
- underlines giving oxygen only to hypoxic people (oxygen is indicated in people with hypoxaemia: SaO2 < 90%)
- does not mention giving sublingual nitroglycerine routinely and lists contraindications beyond the learning requirements for first aid providers (Ibanez, 2018).

Use of EMS

A 2002 study examined the use of EMS in the United States and ascertained the factors that may influence its use by people with acute chest pain. Only half of the people with chest pain were transported to the hospital by ambulance, and these people had greater and significantly faster receipt of initial reperfusion therapies. People who didn't use the EMS were on average younger, male, and at relatively lower risk on presentation. Wider use of EMS by people with a suspected heart attack may offer considerable opportunity for improvement in public health (Canto et al, 2002).

Education reviews

Two papers provided insights about the education needed to help first aid providers recognise and act effectively when they witness acute chest pain.

National Heart Foundation "Warning Signs of Heart Attack" campaign

Cartledge et al. (2017) explored how awareness from a campaign about the barriers of calling EMS for acute coronary syndrome influenced people's willingness to call. They found no association between having seen the campaign and calling EMS in a cohort of people with acute coronary syndrome. Barriers such as EMS response times or downplaying the seriousness of symptoms were still highly prevalent among the population of concern, despite the campaign's targeted messages.

Though relatively small in quantitative terms, these findings point to cultural and social differences with regards to how people interpret and understand «symptom severity», and whether they are eligible to access EMS. For example, they may question if they actually need medical assistance or believe that what they are experiencing is not severe enough to "burden" EMS. The study revealed a disconnect between what people saw in the campaign and how it related to them. For example, they may have seen a visual of someone experiencing a heart attack but not associate the signs and symptoms with themselves when they experience it. This disconnect has implications on whether people seek help and on the outcomes of their health. These educational considerations can be applied to Breathing difficulties as well.

Delayed hospital arrival

Brokalaki et al. (2011) undertook a two-year cross-sectional study among 477 heart attack patients in two large tertiary hospitals in Greece. They conducted structured face-to-face interviews. Information regarding peoples' socio-demographic characteristics, medical history and factors that might correlate with delayed hospital arrival were collected. The main significant factor connected with delayed hospital arrival among heart attack patients was the absence of another person (such as a companion or attendant) during the heart attack ($p = 0.049$). This correlation highlights the importance of teaching informal and formal caregivers about the signs and symptoms of a heart attack and how to call for help immediately and provide first aid. The study reinforced the evidence that early hospital admission contributes significantly to the successful management of heart attack, therefore also supporting the value of teaching recognition and immediate action in cases of suspected heart attacks (as potentially indicated by chest pain).

Stroke

Key action

Recognise the early signs of stroke and access emergency medical services for help immediately.

Introduction

A stroke occurs when the blood flow to part of the brain is interrupted. This can be caused by bleeding in the brain, or a blockage of a blood vessel such as by a blood clot. It can be very serious and requires immediate medical care. Stroke is the second leading cause of death and the third leading cause of disability (loss of vision, speech or partial or complete paralysis) (Johnson et al., 2016). Early admission to a medical facility greatly increases the chance of a positive outcome so it is important for first aid providers to quickly recognise stroke symptoms and access emergency medical services (EMS).

Guidelines

- First aid providers should use a stroke assessment system to recognise the symptoms of a stroke.**
  - First aid providers should use a stroke assessment system, such as FAST or CPSS (see below), to recognise the symptoms of a stroke.*
  - First aid providers may use stroke assessment systems that include blood glucose measurement, when available, such as MASS or LAPSS, to increase specificity of stroke recognition.*
- First aid providers should NOT administer oxygen to a person experiencing a suspected stroke.*

Good practice points

- Mild stroke-like symptoms that last less than a few minutes indicate a transient ischemic attack (TIA) or "mini stroke". The person experiencing these symptoms should seek medical care as soon as possible to decrease the risk of more permanent outcomes.
- For a person showing stroke signs and/or experiencing stroke symptoms, EMS must be accessed as soon as possible.
- First aid providers should help the person get into the best possible position, keeping in mind the person's comfort, and physical and cognitive abilities. This may include lying on their back or sitting.

Chain of survival behaviours

Prevent and prepare

- There are national and global organisations that conduct research on how to reduce the likelihood of stroke. Refer to your country's health authority for more information.
- Make healthy lifestyle choices to minimise certain risk factors such as high blood pressure, obesity, blood sugar level, hyperlipidaemia and renal dysfunction. Avoid activities such as smoking.

Early recognition

- There are a variety of acronyms in the English language to help recognise the signs and symptoms of stroke. FAST is recognised as an effective acronym for first aid providers. It reflects the need for early recognition and medical care, which improves the person's chances of a positive outcome.

FAST

FACE – Facial numbness or weakness, especially on one side: ask the person to smile or show their teeth. Check if the person's mouth is crooked and whether one corner of their mouth is drooping.

ARM – Arm numbness or weakness, especially on one side: ask the person to extend both arms at the same time, straight out in front of them and ask them to turn their palms upwards. Carefully look if one arm is sagging or drifting around.

SPEECH – Abnormal speech, difficulty speaking or understanding others or a loss of speech: ask the person or companions if there are any changes in their speech

TIME – Time is important: try to find out how long the symptoms have been going on (when the symptoms started or when they were seen acting normally by others). Access EMS immediately.

CPSS

The CPSS (Cincinnati Prehospital Stroke Scale) tests three signs for abnormal findings which may indicate that the person is having a stroke (FACE, ARM and SPEECH).

Signs of stroke

- Sudden numbness or weakness of the face, arm or leg, especially on one side of the body. The probability of stroke is likely if the person, when asked to:
  - show their teeth, the corner of their mouth droops
  - lift both arms with palms turned upwards while eyes are closed, one arm drifts or droops.
- Sudden confusion, trouble speaking or understanding. The probability of stroke is likely if the person, when asked to:
  - repeat a simple sentence, speech is unclear or slurred, or the words do not come easily.
- Sudden trouble in seeing with one or both eyes.
- Sudden trouble walking or experiencing dizziness, loss of balance or coordination.
- Sudden, severe headache with no known cause.
- Seizure (of a non-epileptic person).

First aid steps

1. Use a stroke assessment system to recognise the symptoms of a stroke.
2. If you suspect a stroke, access EMS immediately. Note the time it started.
3. Help the person get into the best possible position, keeping in mind the person's comfort, physical and cognitive abilities. Support them if they are at risk from falling.
4. Monitor the person's breathing and reassure them. Keep talking to the person.

NOTE

If the person becomes unresponsive, open their airway and check their breathing. See Unresponsiveness.
Note that similar symptoms may be caused by high or low blood sugar. See Diabetic emergency.

Access help

- Emphasise the signs and symptoms of stroke to the medical professional.
- The faster the person can get medical help, the less damage to the brain there may be, so it is important to get help quickly.

Recovery

- The signs of stroke indicate brain injury. Even if the person seems to have recovered, they should still access medical care.

Education considerations

Context considerations

- Learners' access to care, such as available transport or distance to the nearest medical facility, will vary depending on their local context. Work with learners to define what EMS access looks like in their community. In some settings, an ambulance will arrive within minutes after EMS is called, while in others, the ill or injured person may need to wait for a medical professional to come to them. In some cases, the first aid provider must transport the person to the medical facility by car, boat, or other means.
- A quick response time is critical to caring for someone who is having a stroke. Understanding the EMS in their community builds learners' confidence to act quickly and determine the fastest method to transport the person to a medical facility.
- In many homes there are ways to measure blood glucose because a family member has diabetes. If possible, the first-aid provider may be able to perform a blood glucose test for the person who has had a stroke and may use a stroke scale assessment including glucose measurement in relation with the EMS system.

Learner considerations

- Stroke knowledge, risk perception and effectiveness of educational media may differ between genders. Consider different educational interventions depending on the learner group (Marx et al., 2010).
- Use appropriate language levels according to the audience (e.g., adults or youth) and cultural context. Depending on learners' context, you may need to replace the phrase "call EMS" with "call a healthcare professional" or "ensure it is safe to travel to the medical facility" (Caminiti et al., 2017).

Facilitation tips

This section focuses on the following points:

- Challenges learners may encounter when applying their knowledge of stroke in a real situation.
- How the facilitator can support learners in overcoming these challenges and confidently care for someone experiencing stroke.

After leaving the learning environment, learners may struggle to recognise the signs of stroke or connect their recognition with the need to access EMS. This gap between their knowledge and application may be due to the following reasons:

- A stroke's visual cues are not the same in every person.
- Learners may not recognise the mild, temporary stroke-like symptoms that indicate a transient ischemic attack (TIA) or "mini stroke". Recognising the possibility of a TIA allows for early treatment and reduces the risk of a major stroke.
- Signs and symptoms may present gradually or be confused with another condition (e.g. a diabetic emergency).
- Learners often require more than one indicator to recognise stroke.
- The ill person may think the symptom they are experiencing is nothing serious (e.g., they may experience numbness but are still able to move). It is often a perceived seriousness of warning signs, rather than recognition that prompts first aid providers to access EMS.
- Many media campaigns and training videos only show severe strokes. This leads learners to believe that a stroke only occurs when several or all warning signs are severe or happen at the same time (Dombrowski et al., 2013).

The result of these challenges is a delay in accessing EMS, which can have negative results and limit care options. Because there is a limited timeframe to administer some medications and other treatments associated with caring for stroke, response time is critical. Emphasise that quick recognition and care links to the highest chance for a positive outcome (Maze et al., 2004).

The following actions will help to connect understanding with action and build learners' confidence to act quickly.

Design activities that will help learners to:

- Understand that their job as the first aid provider is to recognise the signs of a stroke and call EMS or get the person to a medical facility (Maze et al., 2004).
- Develop an understanding of stroke (beyond using FAST) and to recognise minor symptoms, such as impaired vision, unsteadiness and headache.
- Develop critical-thinking skills to determine when and how to respond.
- Understand the chain of people involved in providing immediate care to the person experiencing stroke.
- Engage in the decision-making process of providing care.
- Consider the perceived risks, benefits and barriers to accessing EMS.
- Understand that a quick response time increases the possibility of treatment and recovery (Caminiti et al., 2017).

Design activities and training that support the above learning to help first aid providers trust in their ability to act quickly and effectively. This will help to reduce delays in care.

Facilitation tools

The intent of the learning activities developed for this topic is to build learners' confidence and connect their understanding of warning signs with actions (Caminiti et al., 2017). These activities are also an opportunity to reinforce positive behaviours.

- Use acronyms such as FAST help to quickly recall sequenced information (Bietzk et al., 2012; Robinson et al., 2012; Wolters et al., 2015).
  - The CPSS assessment tool contains similar physical signs to check (face droop, arm weakness, speech abnormalities. Therefore, you may want to consider adapting the acronym (while maintaining the signs, symptoms and actions to take) into a word that is more suitable in your language and therefore more accessible to your learners.

Where educators wish to use alternative stroke scale assessment tools such as MASS or LAPSS (because of the likelihood of a first aider being able to take a blood or glucose measurement, for example), ensure that this is both appropriate for your learners and authorised in your country.

- Use multiple resources such as media, community education and professional education when developing the lessons for this topic. A layered approach has shown to successfully reduce pre-hospital delays (Becker et al., 2010; Caminiti et al., 2013; Flynn et al., 2014; Wall et al., 2008).
- Stories (either read or performed) and shared personal experiences can support learners' understanding of the topic, especially at low levels of education and literacy (Caminiti et al., 2013).
- Facilitate a session where learners build case studies and include details such as recognising the early signs of stroke, accessing EMS and caring for the person while waiting for medical care (Wall et al., 2008).
- Facilitate a game where learners move to different parts of the room based on how much they agree or disagree with a statement. You can use this game to clarify the misconceptions of stroke or as an introduction to identifying which signs are obvious or subtle.
- Explore scenarios that describe a variety of different situations or signs of stroke in detail. Ask learners how they would respond to each circumstance.

Learning connections

- Diabetic emergency can sometimes be mistaken for a stroke. If the person with suspected stroke has diabetes, help them to measure their blood glucose level.
- Assessment: While waiting for EMS to arrive or while in transit to medical care, first aid providers should draw from previous learning and recognise the importance of maintaining the person's physical, mental and emotional safety.
- Recovery position: If the person becomes unresponsive, starts drooling or struggles to swallow, the first aid provider should place them on their side with their head tilted back.
- Psychological support: The first aid provider should monitor the person's condition and provide reassurance until medical care arrives. A stroke can be an extremely frightening experience, and this is an excellent opportunity to reinforce empathy and build confidence in learners' abilities to provide support to those affected.

Scientific foundation

Systematic reviews

Body position

In 2020, the Centre for Evidence-Based Practice (CEBaP) developed and evidence summary on whether the positioning of a person with a stroke affects a variety of outcomes. The 2019 NICE guideline "Stroke and transient ischaemic attack in over 16s: diagnosis and initial management" of 2019 was identified. No additional studies were searched (CEBaP, 2020).

There is limited evidence neither in favour of lying flat on the back nor sitting up. A statistically significant increase of a score of 0-2 on the modified Rankin Scale (mRS, a scale indicating the degree of disability) at 90 days, lying flat compared to sitting up, could not be demonstrated. A statistically significant decrease of mortality, recurrent stroke, pneumonia, length of hospital stay and neurological deterioration, lying flat compared to sitting up, could not be demonstrated.

It was shown that lying flat resulted in a statistically significant decrease of mRS 0-2 (disability) and a statistically significant increase of general health score, compared to sitting up. However, the guideline developers did not consider these differences to be clinically relevant.

Evidence is of low certainty and results cannot be considered precise due to limited sample size, low number of events, lack of data and large variability of results.

Stroke screening assessment systems

The International Liaison Committee on Resuscitation (ILCOR) performed a systematic review on the use of stroke assessment systems to aid with the recognition of stroke by first aid providers (Singletary 2020).

Time to treatment

For the critical outcome of time to treatment, they identified four observational studies evaluating four stroke scales:

- For the Kurashiki Prehospital Stroke Scale (KPSS), there is very low-certainty evidence from one observational study with 430 adults with suspected acute stroke. It reported an association between the use of the KPSS and an increase in the number of people with time from symptom onset to hospital arrival within three hours. Among people with emergency medical services use of the KPSS, 62.9% arrived within three hours compared with 52.3% who did not have the scale applied. This same study reported an association between the prehospital use of the KPSS and a shorter elapsed time from symptom onset to hospital admission.

- For the Los Angeles Prehospital Stroke Scale (LAPSS), there is very low-certainty evidence from one observational study with 1518 participants with a suspected acute stroke. It reported an association between the use of LAPSS and an increased time from symptom onset to emergency department arrival. This same study did not find a benefit associated with the use of LAPSS in a prehospital setting for the rate of people admitted within 120 minutes.
- For the Ontario Prehospital Stroke Scale (OPSS), there was very low-certainty evidence from one observational study in 861 participants suspected of acute stroke. It showed an association between the use of OPSS and an increase in the number of people with time from symptom onset to hospital arrival within three hours.
- For the Face, Arm, Speech, Time, Emergency Response Protocol (FASTER), there is very low-certainty evidence from one observational study with 115 participants. It showed an association between the use of FASTER and a shortened time from symptom onset to time of a specific tissue treatment. Among people receiving the specific treatment, no differences were associated with or without the use of the stroke screening tool and time from symptom onset to hospital.

Recognition of stroke

For the important outcome of recognition of stroke, with the outcome being a definitive stroke diagnosis or administration of thrombolytic therapy, they identified five observational studies evaluating five stroke scales:

- For FAST, there is low-certainty evidence from one observational study with 356 participants with suspected stroke. It showed an association between the use of FAST and an increase in the number of people with confirmed stroke or transient ischemic attack who were admitted within three hours of symptom onset.
- For KPSS, there is low-certainty evidence from one observational study with 430 participants with suspected stroke. It showed no association between the use of KPSS and receipt of thrombolytic therapy for people who were ultimately diagnosed with stroke.
- For LAPSS, there is moderate-certainty evidence from one observational study with 1518 adults. It showed an association between the bundle of changes including the use of LAPSS by paramedics and an increase in the number of correct initial diagnoses of stroke confirmed by a neurologist. The same study showed no association between the rate of treatment with intravenous tPA among people with confirmed stroke and the bundle of changes including the use of LAPSS.
- For OPSS, there is low-certainty evidence from one observational study with 861 participants suspected of stroke. It showed no association between the use of OPSS and the rate of recognition of ischemic stroke. This same study did show an association between the use of OPSS and an increase in the rate of thrombolytic therapy of all people with ischemic stroke, as well as an association between the use of OPSS and an increased rate of thrombolytic therapy for people with ischemic stroke arriving within three hours.
- For FASTER, there is very low-certainty evidence from one observational study including 181 participants with suspected acute stroke. It showed an association between the use of FASTER and the number of people who received thrombolytic therapy. Of patients who had the scale applied, 19.1% received thrombolytic therapy compared with 7.5% who did not have the scale applied.

When looking at studies investigating the correct stroke diagnosis, 19 observational studies enrolling a total of 8153 people and studying nine different stroke screening assessment systems. These studies were divided into subgroups based on whether the stroke scales included a glucose measurement or not.

Public recognition of stroke

Very low-certainty evidence was found on the important outcome of increased public recognition of stroke signs when using a stroke screening assessment system. One human study enrolling 72 members of the public measured the difference before training, immediately after, and three months after training. The study showed a benefit where 76.4 % of participants (55/72) were able to identify stroke signs before training on how to use a stroke screening assessment system compared with 94.4 % (68/72) immediately after training. Additionally, 96.9 % of participants (63/65) were able to identify stroke signs three months after training.

Supplementary oxygen

ILCOR conducted a systematic review about the use of supplementary oxygen for acute stroke and identified eight randomised controlled trials and one retrospective observational study (Singletary 2020).

For the outcome of survival at 1 week, 3 months, 6 months and 1 year, no benefit could be shown of giving supplemental oxygen (moderate-certainty evidence from three randomised controlled trials). Also, for neurological outcomes at 1 week, 3 months or 6 months, no benefit could be shown in six randomised controlled trials and an observational study (moderate- to very low-certainty evidence). However, one of these trials showed a higher chance of improvement for one of its outcomes ("improvement of NIHSS score of more than 4 at 1 week") (moderate-certainty evidence), and a separate randomised controlled trial also showed benefit at seven months (low-certainty evidence).

For the outcome quality of life, no benefit of supplementary oxygen was shown in two randomised controlled trials, and one trial even showed a lower quality of life (low-certainty evidence).

For the imaging outcome "lesion volume change at 6 hours, at 24 hours, and at hospital discharge", no difference could be shown in one randomised controlled trial (low-certainty evidence).

One observational study also looked at complications and could not show an association between supplementary oxygen on the one hand and pneumonia at hospital discharge, and pulmonary oedema and the use of non-invasive positive-pressure ventilation on the other hand, but showed a lower rate of hospital-acquired pneumonia and a higher rate of tracheal intubation and of respiratory complications (very low-certainty evidence).

Education reviews

Campaigns to improve public recognition of stroke and instigate fast action to get the person to a medical facility have had mixed results. In general, evidence identifies that campaigns based on FAST can increase people's awareness of the need to act quickly and get the person to emergency medical care following the identification of one or more signs from the FAST mnemonic. (See Media.)

Wolters et al. (2015) retrospectively considered 668 consecutive patients with stroke between 2002–2008 and 2009–2013. In between these time intervals, a national television campaign on stroke recognition and how to act (based on FAST) ran. Results showed that patients were statistically more likely to seek medical care within three hours after seeing the campaign. The median time to get medical attention fell from 53 to 31 minutes, and arrival at the hospital fell from 185 to 119 minutes post-campaign.

Robinson et al. (2012) surveyed 1300 people in Leicester (UK) following a campaign on stroke recognition (FAST) and found that participants strongly remembered the campaign and the mnemonic elements. After surveying 356 adults in Birmingham (UK) following the same campaign, Beizk (2012) found that 64.9% were aware of the FAST campaign. Of this percentage however, 32.5% could not recall any letters, 9.5% remembered one, 13.0% two, 17.3% three, and 27.7% all four correctly.

Wall et al. (2008) identified low-quality evidence that training leads to an increase in the ability to identify signs of a stroke. After training, those able to identify the signs rose from 76.4% to 94.4%. Additionally, 96.9% of participants were able to identify the signs of stroke three months after training.

Caminiti et al. (2013) describe a study to develop a campaign aimed to increase stroke awareness and preparedness. They found that integrating theory with the information collected from target populations enabled them to create effective tools for that audience.

Bray et al. (2010) interviewed 100 stroke patients and 70 bystanders following two separate stroke awareness campaigns in Australia. 12% were aware of the campaign, and of these, 19% could recall stroke symptoms.

Flynn et al. (2014) conducted an interrupted time series to consider the impact of a UK stroke campaign completed in 2007–2011. They found a statistically significant increase in information-seeking behaviour and emergency admissions for stroke. They also noted a decrease in inappropriate care-seeking and thrombolysis activity which could be attributed to the campaign.

Additional information

Prevention

In analyses using data from the Global Burden of Disease Study, approximately 90% of stroke risk could be attributed to modifiable risk factors (such as high blood pressure, obesity, hyperglycaemia, hyperlipidaemia, and renal dysfunction), and 74% could be attributed to behavioural risk factors (such as smoking, sedentary lifestyle, and an unhealthy diet). Globally, 29% of the risk of stroke was attributable to air pollution. Although global age-adjusted mortality rates for ischemic and haemorrhagic stroke decreased between 1990 and 2015, the absolute number of people who have strokes annually, as well as related deaths and disability-adjusted life-years lost, increased. The majority of global stroke burden is in low-income and middle-income countries (Benjamin et al., 2019).

Recognition

The following content on recognition is from the 2016 Guidelines.

Studies demonstrated that training first aid providers to use stroke assessment systems enabled them to recognise stroke earlier. The faster response time led to a decrease in time between stroke onset and arrival at the hospital, as well as an improved outcome for the ill person. According to these studies, without training to use a stroke assessment system, 76.4% of lay people can recognise signs and symptoms of stroke. However, after such training, 94.4% are able to recognise stroke, and can do so three months after the training.

The American Red Cross Scientific Advisory Council focused on stroke scales that utilised validated and reliable items, including the Cincinnati Prehospital Stroke Scale (CPSS), the Los Angeles Prehospital Stroke Scale (LAPSS) and FAST. Simple stroke assessment systems (e.g. CPSS or FAST) are easy to use and have high sensitivity to recognise stroke. Although there are other stroke scales, these guidelines recommend using FAST. Specificity can be increased if the first aid provider can measure blood glucose levels (to exclude hypoglycaemia) and use a more advanced stroke assessment system.

Stroke-like symptoms that are mild and temporary may indicate a transient ischemic attack (TIA) or “mini stroke”, which is a warning that results in no lasting brain injury. The short duration of the symptoms and lack of permanent brain injury are the main differences between TIA and stroke. Nevertheless, recognising the possibility of a TIA is important because it allows early treatment to reduce the risk of a major stroke.

Access help

The following content on accessing help is from the 2016 Guidelines.

Early admission to a stroke centre greatly improves the prognosis for the person, highlighting the need for first aid providers and the lay public to be able to quickly recognise stroke symptoms and access EMS or initiate transport to a medical facility. The goal is for the ill person to receive definitive treatment in time to benefit from newer therapies. In most cases, this means receiving thrombolytic treatment (to dissolve a blood clot) within three to five hours of the onset of stroke symptoms. While the goal is to provide treatment within three hours, the sooner the better is the rule.

Early medical care

Oxygen supplementation does not significantly improve outcomes. In a randomised clinical trial in the UK between 2008 and 2015, patients with an acute stroke and normal oxygen saturations were randomised within 24 hours of admission to three days of continuous oxygen, nocturnal oxygen, or control. After three months, there was no significant difference in death and disability for the combined oxygen groups compared with control, or for the continuous oxygen group compared with the nocturnal oxygen group (Roffe et al., 2017).

Allergic reaction and anaphylaxis

Key action

Stop further contact with the allergen and help the person to use their medication.

Introduction

Allergies are relatively common, presenting on the skin (hives, itching, swelling), or in the airways (sneezing, snuffles) and sometimes accompanied by gastrointestinal symptoms (cramps, diarrhoea). Chronic allergic disease (e.g, atopic eczema) sometimes deteriorates suddenly. Some people can also be severely allergic to something resulting in a life-threatening anaphylactic reaction (a severe allergic reaction). Many people with a history of anaphylaxis carry a lifesaving epinephrine autoinjector. There is some evidence that allergies and anaphylaxis may be occurring more frequently in recent decades (Lee et al., 2017).

Guidelines

Anaphylaxis

- Epinephrine should be used intramuscularly to treat anaphylaxis using the person's prescribed autoinjector.**
- For a person with symptoms of anaphylaxis who has been treated by, but did not respond to, epinephrine within five to ten minutes, a second dose may be considered, if emergency medical services (EMS) have not arrived yet.*

Mild allergic reaction

- Using moisturisers in case of atopic eczema or dermatitis may relieve the symptoms.*
- Rinsing the eyes or nasal cavity with saline may relieve symptoms of hay fever.*
- If local regulations allow, a trained first aid provider may give common antiallergic medication (antihistamine or corticosteroid tablet) if the person does not have these with them.*

Good practice points

- The person should be asked about any known allergies and prescribed medication.
- If appropriate, the allergen should be removed (e.g., from the skin) or the person should be removed from the environment containing the allergen (e.g., a chemical).
- The first aid provider should help the person to get into a comfortable position and to take their prescribed medication if the person has this with them.

Anaphylaxis

- First aid providers should be trained in recognising the signs and symptoms of anaphylaxis.
- First aid providers should be familiar with the epinephrine autoinjector, so that they can help someone having an anaphylactic reaction self-administer their epinephrine, if local law permits.
- First aid providers may be permitted to use an epinephrine autoinjector if the person is unable to do so, provided that a doctor has prescribed the medication and local law permits.
- Epinephrine should only be given when symptoms of anaphylaxis are present. Inappropriate use of an epinephrine autoinjector (in a case of misdiagnosis, incorrect route of administration, inadvertent intravenous administration, or administration of an excessive dose of epinephrine) may result in adverse reactions.
- The epinephrine auto-injection may be administered through the person's clothing if the clothes are not thick.
- First aid providers should access EMS when a severe allergic reaction (anaphylaxis) is suspected or recognised in a person.

- Unless the doctor's prescription is different, for children between 15kg and 30kg bodyweight, an epinephrine dose of 0.15mg is recommended intramuscularly. For children over 30kg, epinephrine is recommended in a dose of 0.3mg, and for adults, the recommended dose is 0.5mg.
- First aid providers should be aware that anaphylactic reaction can be biphasic (symptoms recur after complete improvement) between 1 and 78 hours after the initial onset. Biphasic anaphylaxis is associated with initial presentation of anaphylaxis that is more severe or needs more than one dose of epinephrine. In these instances, the person should be observed in case of a second reaction.

Mild allergic reaction

- In case of an allergic reaction to the skin, advise the person not to rub the skin, as this may exacerbate the itch.
- In the case of hay fever, rinsing the eye or nose may offer some relief.
- The first aid provider should monitor the person closely, as a mild allergic reaction can develop into a severe allergic reaction.

Chain of survival behaviours

Prevent and prepare

- Prevention is of utmost importance. Anyone with a known allergy should avoid any contact with the allergen.
- Ensure a person with a known allergy carries an allergy card (describing their allergy) and their prescribed medication at all times, and that caregivers know where the medication can be found.
- Teach those with a known allergy, as well as their caregivers, to recognise the signs and symptoms of a severe allergic reaction, when and why to access EMS and how to use the epinephrine autoinjector.
- Consider food labelling at home and about.
- Be aware of the most common allergens causing anaphylaxis (foods, insect venoms, medication and latex).

Recognise

Unless the allergic reaction is the first one in the life of the person, the person usually knows they are allergic to a certain substance and may carry some antiallergic medicine with them. Ask the person if they have any known allergies.

You may notice the person has had contact with a common allergen.

A mild allergic reaction will vary depending on what is causing it but may include:

- red, itchy eyes
- sneezing, snuffles or runny nose
- abdominal cramps, diarrhoea and vomiting
- itching, swelling or hives on the skin, including the face.

A severe allergic reaction (anaphylaxis) is likely to develop further to also include life-threatening conditions such as:

- difficulty breathing including shortness of breath, wheezing or asthma-like appearance
- airway narrowing, swelling of the tongue, throat and larynx, causing hoarseness, noisy breathing. Often, the first symptom occurring is difficulty swallowing.
- signs of shock including confusion or agitation, pale or ashen skin, which may lead to collapse and unresponsiveness.

The severity of anaphylaxis can differ from one person to another, and even in the same person from one episode to another. A mild allergic reaction may unpredictably progress to life-threatening anaphylaxis in minutes. Therefore, high alertness is required in treating a suspected anaphylactic reaction.

First aid steps

Severe allergic reaction (anaphylaxis)

1. Access EMS as soon as you recognise the person is experiencing a severe allergic reaction.
2. Help the person to lie down unless they are experiencing breathing difficulties. In that case, help them to sit down.
3. If the person has an epinephrine autoinjector, help them to use it. The best place for injection is the middle of the outer side of the thigh. The injection can be administered through clothes if the clothes are not thick.
4. If a person with symptoms of severe allergic reaction was treated with but did not respond to the first dose of epinephrine within five to ten minutes, a second dose may be considered.
5. Keep monitoring the person's responsiveness and breathing regularly until EMS is accessed.

NOTE

Follow the usual rules for drug and medical device disposal after the autoinjector has been used.

Local adaptation

If an epinephrine autoinjector is not available, access EMS (or equivalent) immediately.
While waiting for medical assistance, alternative medicines can be used after medical advice such as antihistamines or corticosteroids.

CAUTION

First aid providers should be aware that use of epinephrine may have side effects, (some of which may also result from an anaphylactic reaction):

- faster (pounding) sometimes irregular heartbeat
- excitement, anxiety, or fear
- weakness or shakiness
- nausea and vomiting
- throbbing headache
- dizziness
- paleness
- sweating

Mild allergic reaction

1. Ask the person about known allergies and any prescribed medication.
2. If appropriate, remove the allergen (e.g. by rinsing from the skin) or remove the person from the environment containing the allergen.
3. Help the person get into a comfortable position and to take their medication if they have it with them. If trained to do so, and the local regulations allow, offer the person common antiallergic medication or remedies.
4. In case of an allergic reaction to the skin, advise the person not to rub the skin, as this may make it itch more.
5. Monitor the person closely as a mild allergic reaction can develop into a severe allergic reaction.

NOTE

- An antihistamine or corticosteroid medication may be given to the person.
- For hayfever, rinsing the eyes or nasal cavity with saline may relieve symptoms.
- In the case of hives, an anti-itch ointment might help. Advise the person to seek help from their doctor or pharmacist.
- In the case of eczema, applying moisturiser or using an anti-itch ointment may help.
- Advise the person that some antihistamines could cause drowsiness and diminish the reflexes needed for safe driving or working with a dangerous machine. This is more pronounced with the first generation of antihistamines. Even a small amount of alcohol may enhance these side effects.

Access help

Anaphylaxis

- Anaphylaxis is a life-threatening condition requiring urgent medical attention. As soon as you suspect a severe allergic reaction, access EMS.
- Ensure you tell EMS if the person has received an epinephrine injection.

Mild allergic reaction

Advise the person to seek medical advice:

- In the case of hives: if the allergic reaction to the skin is very bothersome and does not improve over a couple of days.
- In the case of eczema: if it is the first time the allergic reaction occurs, or if the skin lesions are accompanied by signs of infection, such as fever or feeling unwell.
- In the case of hay fever: if it is the first time the allergic reaction occurs.

Recovery

- Ensure that a person who has a severe reaction or requires an epinephrine injection is monitored for the three days following a reaction, as a severe allergic reaction may recur.
- A person who has experienced a severe allergic reaction should keep an allergy card (explaining their allergy) with them at all times.

Education considerations

Context considerations

- Programme designers should be mindful of local legislation and regulation which could affect what should be taught.
- Preparation, planning and training are needed, particularly in high-risk environments, to encourage quick action for anaphylaxis during an emergency.
- Some learners may work in environments (e.g., school, day-care) where they will have a different scope of practice to first aid providers. For example, they might have a responsibility to administer medication. They may also have access to epinephrine as part of their facility supplies or maybe reliant on individual users who have it on prescription from their doctor.
- Focus education on preparedness and prevention in remote contexts where access to medical supplies and EMS may be challenging. Likewise, people with a known allergy who are visiting remote places should take adequate supplies of antihistamine or epinephrine; tell others where they are going and when they expect to return, and research what allergens they need to be alert to and avoid.

Learner considerations

- Consider how you may differently prepare people (health care professionals, parents of young children, etc.) to help someone in case of a severe allergic reaction. Be aware in learning design that young people are susceptible to certain factors which may delay the recognition of an anaphylactic episode. They tend to have higher risk behaviour thus potentially leading them to disregard triggers of anaphylaxis. They also try to hide their allergy problems from others, avoid epinephrine autoinjectors, and seek medical care only at late stages of the reaction. The first experiences with alcohol may also act as a co-factor of severity.
- Schools might have their own policies and practices which school staff need to know about. Where these do not exist, learners who work in schools should be encouraged to develop safe and effective policies and protocols (Morris et al., 2011).
- A wider educational approach to this topic may be useful for caregivers of people with severe allergies, including practical considerations such as food labelling and psychological considerations such as how to cope with the anxiety of someone vulnerable to anaphylaxis (Brockow et al., 2015).
- Decision making about how to respond can be challenging for learners (deciding to give the injection, whether to repeat the dose and how to access help). Often, they need to acknowledge several symptoms to recognise the significance of the situation (Simons et al., 2009).
- Help learners to think through how they can help themselves if they are alone when they experience an allergic reaction or anaphylaxis.
- Help any learner with an epinephrine autoinjector to develop a personalised emergency action plan if they have not got one already.

Facilitation tips and tools

- It is valuable to emphasise the importance of a prescription of epinephrine autoinjector for those at risk, the key signs and symptoms which indicate a need for an auto-injection, administering epinephrine (having it available, when to use it and how to use it) as well as the importance of accessing medical care after administration (Simons et al., 2009).
- Use a training autoinjector to demonstrate their use to learners. If using a real autoinjector, ensure it does not contain any medication, and take care to mitigate risks of a learner coming in contact with a sharp needle. Do not use live medications for demonstrations.
- There are different types of auto-injectors, for instance, the needle is visible in some but not in others. First aid providers should know the main types and the principles of their function so use a variety of trainer examples in sessions (Ring et al., 2018).
- Emphasise the user should hold the device pressed down for about ten seconds to allow the entire dose to be administered.
- Delayed injection of epinephrine is associated with higher hospitalisation and mortality rates; while prompt administration of epinephrine is associated with better outcomes (Alvarez-Perea et al., 2017).
- First aid providers not trained in using an autoinjector may not be able to quickly learn how to use it properly. In an emergency, there may not be time to read the instructions for use. So, practise is essential.
- Reassure learners that epinephrine autoinjectors are safe to use in the event of someone having a severe allergic reaction.

Facilitation tools

- Beyond learning the first aid steps, focus on building learner confidence and ability by providing opportunities to practise decision making (possibly through a scenario or case-based learning) to encourage quick action (Litarowsky et al., 2004).
- Using a peer education approach, whereby learners are encouraged to teach their families and friends about this topic, could be beneficial to the wider community (Brockow et al, 2015).
- Regular practice and refreshing (small dose, high-frequency learning) could be helpful to maintain confidence/self-efficacy (Arkwright & Farragher, 2006).

Scientific foundation

Systematic reviews

Anaphylaxis

In 2015, the International Liaison Committee on Resuscitation (ILCOR) conducted a systematic review on the benefit of a second dose of epinephrine for severe anaphylaxis when signs and symptoms fail to respond to an initial dose. Based on very low-certainty evidence from nine observational studies, it was shown that resolution of symptoms improved when giving a second dose to people not responding to a first dose (Zideman et al., 2015; Singletary et al., 2015).

Another review on the recognition of anaphylaxis concluded, based on observational studies and case studies, that first aid providers have difficulties recognising signs and symptoms (Markenson, 2010).

The update of the existing systematic reviews was explored via two scoping reviews (Carlson et al., 2019), concerning the second dose of epinephrine for anaphylaxis and recognition of anaphylaxis by first aid providers. Both concluded there was not sufficient information to alter the existing ILCOR treatment recommendations or to pursue a new systematic review.

A recent comprehensive systematic review of the topic (Shaker et al., 2020) summarises current knowledge. It underlines that due to human anaphylaxis being a potentially fatal, acute condition, ethical considerations make double-blind studies almost impossible. This limits the availability of evidence. Some highlights here are either confirming our former knowledge or updating certain points:

- The lifetime prevalence of anaphylaxis has been estimated at 1.6% to 5.1%, and recent studies demonstrated the rate of biphasic reactions closer to 4% to 5%.
- While diagnostic criteria for anaphylaxis (National Institute of Allergy and Infectious Diseases, 2006) are very sensitive and quite specific, fulfilling these is not a prerequisite for epinephrine administration in a person experiencing an acute allergic reaction.
- US, European, and international anaphylaxis guidelines recommend intramuscular epinephrine in the front and outer sides (anterolateral) of the thigh rather than subcutaneous epinephrine in the upper muscle of the shoulder (deltoid) for the treatment of anaphylaxis. This is based on a limited number of studies in volunteers (not in anaphylaxis) that demonstrated that when administered intramuscularly into the thigh, epinephrine works rapidly and reaches maximal efficacy within ten minutes of injection, though no proof exists that subcutaneous delivery is not effective.
- Epinephrine administered intramuscularly (in a dose of 0.01 mg/kg of a 1:1000 [1 mg/mL] solution to a maximum of 0.5 mg in adults and 0.3 mg in children) into the n the front and outer sides (anterolateral) of the thigh is the first-line treatment for anaphylaxis. The availability of newer auto-injector dose formulations (0.1 mg for infants) allows greater epinephrine dosing accuracy. However, a 0.15-mg intramuscular dose is also widely prescribed for infants at risk for anaphylaxis. Particularly in settings where a 0.1-mg autoinjector dose is not available, the speed and precision gained from a 0.15-mg auto-injector dose compared with having caregivers draw up doses using a syringe method may justify trade-offs in dosing accuracy, especially in infants weighing more than 7.5 kg. Depending on the response to the initial injection, the dose can be repeated every 5 to 15 minutes.
- Biphasic anaphylaxis is a well-recognised potential complication of anaphylaxis and has been defined as recurrent anaphylaxis after complete improvement. This has been reported to occur between 1 and 78 hours after the onset of the initial anaphylactic reaction, and this must be clinically differentiated from a reaction that does not fully respond to initial treatment and persists or quickly returns.
- Biphasic anaphylaxis is associated with a more severe initial presentation of anaphylaxis or repeated epinephrine doses (i.e., more than one dose of epinephrine) required with the initial presentation (very low certainty evidence). A person presenting with severe anaphylaxis or requiring more aggressive treatment (e.g., more than one dose of epinephrine) should be considered for longer observation time for a potential biphasic reaction following complete resolution of signs and symptoms. Certainty rating of evidence: very low.

Shaker et al. (2020) provide some additional good practice statements for anaphylaxis:

- Administer epinephrine as the first-line treatment for anaphylaxis and biphasic anaphylaxis.
- Do not delay the administration of epinephrine for anaphylaxis, as doing so may be associated with higher morbidity and mortality.
- After recognition and treatment of anaphylaxis, the person should be kept under observation in a setting capable of managing anaphylaxis until symptoms have fully resolved.

Allergic reaction

The Centre for Evidence-Based Practice (CEBaP) developed four evidence summaries for eczema or hives and hay fever.

Use of moisturisers in atopic eczema or dermatitis

CEBaP found moderate-certainty evidence from one Cochrane systematic review showing that using moisturisers resulted in a statistically significantly increased number of people experiencing good improvement and a statistically significant decrease in disease severity and itch in people with a flare of atopic eczema or dermatitis. Any adverse event or a statistically significant change in their quality of life, could not be demonstrated.

Cooling the skin for itching or wheals (eczema, hives)

CEBaP identified very low-certainty evidence from four randomised controlled trials. It was shown that cooling the skin to temperatures less than 22°C resulted in a statistically significant decrease in itch intensity, wheal size and flare size, compared to not lowering the skin temperature or maintaining a skin temperature of 32 °C, (in three studies). However, a statistically significant decrease in itch intensity or wheal size when cooling the skin to 28 °C compared to maintaining skin temperature of 32 °C; or a statistically significant decrease in wheal diameter when cooling the skin to 22 °C, compared to not lowering the skin temperature, could not be demonstrated in two studies. A statistically significantly decreased risk of itch resolution or reduction when cooling the skin to 10 °C, compared to heating the skin to 45 °C, could not be demonstrated in one study.

Use of antihistamines in cold urticaria (hives)

First-generation H1-antihistamines

There is limited evidence neither in favour of first-generation oral H1-antihistamines nor placebo. A statistically significant increase in the rate of complete response, using first-generation H1-antihistamines, compared to placebo, could not be demonstrated. However, it was shown that first-generation H1-antihistamines were associated with a statistically significant increased occurrence of adverse events, compared to placebo. Evidence is of low certainty.

Second-generation H1-antihistamines

There is limited evidence in favour of second-generation oral H1-antihistamines. It was shown that second-generation H1-antihistamines resulted in a statistically significant increase in the rate of complete response, compared to placebo. However, it was shown that second-generation H1-antihistamines were associated with a statistically significant increased occurrence of adverse events, compared to placebo. Evidence is of low certainty.

H2-antihistamines

No relevant studies comparing oral H2-antihistamines to placebo could be identified.

Use of antihistamines in eczema

CEBaP identified low-certainty evidence from two systematic reviews for the use of antihistamines in eczema.

Oral H1-antihistamines compared to placebo

No relevant studies comparing oral H1-antihistamines to placebo could be identified.

Oral H1-antihistamines and topical treatment compared to placebo and topical treatment There is limited evidence neither in favour of combining topical treatment with H1-antihistamines nor combining it with placebo. A statistically significant change in the rate of response, overall response rate, physician-assessed number of people for whom treatment helped itching or reported pruritus, could not be demonstrated when using the combination of topical treatment and oral H1-antihistamines compared to the combination of placebo with topical treatment. It was, however, shown that Fexofenadine resulted in a statistically significant increased reported change in pruritus, compared to placebo. Also, it was shown that Acrivastine resulted in a statistically significant increase in the physician-assessed number of people for whom treatment helped itching, compared to placebo. A statistically significant increased occurrence of adverse events, using the combination of topical treatment and oral H1-antihistamines compared to the combination of placebo with topical treatment, could not be demonstrated.

Nasal rinsing for hay fever

CEBaP identified low-certainty evidence from one Cochrane systematic review on nasal rinsing for hay fever. There is limited evidence in favour of nasal irrigation with saline. It was shown that nasal irrigation with saline, compared to no irrigation, resulted in a statistically significant decrease in disease severity scores within four weeks and between four weeks and six months. A statistically significant increase in health-related quality of life within four weeks or between four weeks and six months could not be demonstrated.

Eye rinsing for hay fever

CEBaP identified very low-certainty evidence from one non-randomised controlled trial on eye rinsing for hay fever. There is limited evidence in favour of eye rinsing. It was shown that eye rinsing resulted in a statistically significant change in overall improvement, compared to no eye rinsing. A statistically significant change in clearness, redness and comfort, when eye rinsing, compared to no eye rinsing, could not be demonstrated.

Non-systematic reviews

Autoinjectors

Sicherer and Simons (2017) state that while epinephrine autoinjectors are usually prescribed for people with a history of anaphylaxis, they may also be prescribed for some people at high risk without a history of anaphylaxis. Epinephrine autoinjectors are best prescribed in the context of a written, personalised anaphylaxis emergency action plan, developed by the doctor with input from the family. It is important to teach people and caregivers how to recognise anaphylaxis symptoms; when, why, and how to use an epinephrine autoinjector; and the rationale for accessing EMS. Morris et al. (2011) support this with a call to schools to develop safe and effective policies and protocols in order to support the school community to respond effectively in the event of someone having an allergic reaction.

Simons et al. (2009) report a study of survivors of anaphylaxis in a community using a survey. In this study more than half the responders reported problems in using the autoinjector. Such problems included knowing when to use it, how to decide whether to give a second dose, and knowing how to use it. The authors conclude that there is a need for greater guidance to those with prescribed autoinjectors on when and how to use it, the signs and symptoms of anaphylaxis and recovery actions.

Ring et al. (2018) conducted a selective literature search between 2007 and 2014. The authors stress that several epinephrine autoinjector types are available, being different in dose, shelf life, length of the needle, and usage technique. Their use needs to be learned and practised, meaning that they are not simply interchangeable.

Incidence of anaphylaxis

Lee et al. (2017) in the framework of the Rochester Epidemiology Project performed a population-based incidence study in Olmsted County, Minnesota, from 2001 through 2010. This showed a 4.3% increase per year in the incidence rate of anaphylaxis.

Recognising anaphylaxis

Sampson (2006) state that anaphylaxis is highly likely when any one of the following three criteria are fulfilled:

1. Acute onset of an illness (minutes to several hours) with the involvement of the skin, mucosal tissue, or both (e.g., generalised hives, pruritus or flushing, swollen lips-tongue-uvula) **and at least one of the following**:
   a. Breathing difficulties (wheezing, high pitched wheezing, hypoxia).
   b. Reduced blood pressure or associated symptoms (e.g. feeling faint, fainting, or becoming unresponsive).

2. Two or more of the following that occurs rapidly after exposure to a likely allergen for that patient (minutes to several hours):
   a. Involvement of the skin-mucosal tissue (e.g., generalized hives, itch-flush, swollen lips-tongue-uvula).
   b. Breathing difficulties (wheezing, high pitched wheezing, hypoxia).
   c. Reduced blood pressure or associated symptoms (e.g. feeling faint, fainting, or becoming unresponsive).
   d. Persistent gastrointestinal symptoms (e.g., crampy abdominal pain, vomiting).

3. Reduced blood pressure after exposure to a known allergen for that person (minutes to several hours):
   a. Babies and children: low blood pressure (age specific).
   b. Adults: blood pressure of less than 90 mm Hg.

Managing anaphylaxis

A narrative review by Alvarez-Perea et al. (2017) reports that delayed injection of epinephrine is associated with higher hospitalisation and mortality rates. In contrast, prompt pre-hospital administration of epinephrine is associated with better outcomes. The review also suggests that after administration of epinephrine, people with anaphylaxis should not let be in an upright position but should be placed on their back with their lower limbs elevated and if possible, supplemental oxygen should be given.

The review also states that adolescents are at greater risk of anaphylaxis owing to the intrinsic characteristics of this age group. Adolescents tend to have higher risk behaviour thus potentially leading them to disregard triggers of anaphylaxis. They also try to hide their allergy problems from others, avoid epinephrine autoinjectors, and seek medical care only at late stages of the reaction. These factors may delay the recognition of an episode of anaphylaxis. Management of anaphylaxis in adolescents presenting at the emergency department may be hampered by misinformation (e.g., lessening of symptoms, hiding triggers). The first experiences with alcohol may worsen the severity of anaphylaxis.

Shock

Key action

Identify the signs of shock and provide care accordingly while supporting blood circulation.

Introduction

A person experiences shock when their circulation system fails and major organs and tissues do not receive enough blood (and therefore, oxygen). A common cause of shock is Severe bleeding, including external and internal bleeding. Very serious burns cause leaking of fluids from the blood vessels into the burn and may result in shock. A person experiencing problems with their heart (e.g., a heart attack) may not have enough blood pumped around the body, which may also cause shock. Anaphylaxis is also a cause of shock as the blood vessels dilate which causes low blood pressure. The first aid provider's priority needs to be on identifying shock and initiating care of the cause if it is evident.

Guidelines

- The person in shock should be placed in a supine position (lying on their back).**

Good practice points

- Emergency medical care should be accessed immediately if it appears the person shows signs of shock.
- As shock is caused by another condition, the first aid provider's priority should be to identify and manage the cause if possible.
- If a known heart attack is causing shock, a supine position with the upper body slightly elevated should be considered.
- If the person has difficulty breathing or is uncomfortable in lying on their back, they may be placed in the position most comfortable to them, such as sitting while leaning back or leaning forward.
- After the person has been helped to lie on their back, if it makes the person feel better, the first aid provider may raise the person's legs 30 to 60 degrees (also called passive leg raising), provided they are uninjured.
- First aid providers should prevent heat loss from a person experiencing (or with potential to experience) shock.

Chain of survival behaviours

Prevent and prepare

- If a person is losing a lot of blood, the first aid provider should apply pressure to the bleeding and keep the person warm. Observe for signs of shock.
- If the person is having a severe allergic reaction, help them to take their medication.
- If the person is having a heart attack access EMS immediately.

Early recognition

Shock, a failure of the circulation system, will be caused by another condition, usually Severe bleeding. Sometimes heart attack (see Chest pain), severe Burns, an infection such as sepsis or a severe Allergic reaction.

In addition to the signs of one of these conditions, the person may also:

- have ashen or pale skin with bluish lips, ears and fingers
- have cool or clammy skin
- sweat and shiver
- feel weak, tired, or dizzy
- have a rapid pulse and breathing
- display an altered mental status (anxious, sleepy).

First aid steps

1. Help the person to lay down on their back (or in a comfortable position).
2. Provide care for the cause of shock if possible. For example, apply pressure to a severe bleed or help them take their medication if they are having a severe allergic reaction.
3. Access EMS immediately.
4. Continue to provide care for the cause of the shock if possible.
5. Keep the person warm. Cover them with a blanket or clothing and protect them from the ground if it's cold.
6. Reassure the person by talking to them. Monitor their responsiveness and breathing regularly.

NOTE

- If the person is unresponsive with abnormal breathing, begin CPR.
- After the person has been moved to lie on their back, if it makes the person feel better, you could raise their legs 30 to 60 degrees if they are uninjured.

Access help

- Clearly explain to EMS about the person's condition, signs of shock, and what the cause may be.
- Shock is a life-threatening condition so emergency medical care is needed.

Education considerations

Facilitation tips and tools

- As many illnesses or injuries can lead to shock, facilitate the treatment for shock early in the programme and re-emphasise it throughout the learning.
- Because shock is always present with another condition, and clinically speaking, there are several different types of shock, learners may find the topic confusing and their confidence to act may be reduced. Try to keep the topic simple, emphasising the common cause (failure of getting oxygenated blood to the body), the common recognition points (see recognition) and the first aid steps.
- Emphasise that the best way to treat shock is to effectively treat the condition causing the shock, for example, to apply pressure to a bleed.
- Learners' actions in treating shock should not interfere with their treatment of the causing condition and should not negatively impact on the comfort of the ill or injured person. For example, a person experiencing shock due to a heart attack may be more comfortable sitting than laying down.
- Clarify if necessary that shock, as described here, is different from emotional shock. Shock is a life-threatening condition caused by a severe illness or injury in which the circulation system fails. Whereas emotional shock or feeling shocked is a psychological response to an event. See Mental distress.

Learning connections

- Help learners make connections to the causes of shock including a heart attack (see Chest pain), Severe bleeding, Fractures, severe Allergic reaction, infection such as sepsis.

Scientific foundation

A formal scientific review on the optimal position for shock was carried out in 2015 by the International Liaison Committee on Resuscitation (ILCOR), (Zideman et al., 2015). A recent review by ILCOR did not identify any new evidence (Singletary et al., 2020).

Low-certainty evidence from one randomised controlled trial and five observational studies was identified with benefits for the supine position (lying on the back) to improve vital signs and cardiac function, compared to an alternative position.

ILCOR recognised that for people with no evidence of trauma, the use of passive leg raising may provide additional, temporary improvement. The clinical significance of this improvement is uncertain. Therefore, ILCOR did not make a recommendation concerning passive leg raising. They were also unable to identify an optimal degree of elevation; studies range between 30 to 60 degrees elevated. No study has reported negative effects due to passive leg raising.

Diabetic emergency

Key action

Give the person something sweet to eat or drink to raise their blood sugar level (in the case of low blood sugar).

Introduction

Diabetes is a chronic condition in which the body struggles to produce or respond to insulin, the hormone which regulates blood sugar levels. A diabetic emergency happens when a person's blood glucose level goes outside the normal range, resulting in either too much sugar in the blood (hyperglycaemia) or too little sugar in the blood (hypoglycaemia). 442 million adults have diabetes worldwide, or one in 11 people. The number of diabetes cases worldwide has quadrupled since 1990 (WHO, 2020). A high blood sugar level (hyperglycaemia) may evolve gradually and can be asymptomatic over several hours or even days. A low blood sugar level (hypoglycaemia) is usually sudden and life-threatening and therefore forms the focus of this topic.

Guidelines

- Oral glucose administration (swallowing or eating glucose) should be used for an adult or child with suspected hypoglycaemia who is responsive and able to swallow.**
  - > First aid providers should give glucose tablets to a person who has symptoms of hypoglycaemia and is responsive.**
  - > If glucose tablets are not available, various forms of dietary sugars such as Skittles, Mentos, sugar cubes, jellybeans or orange juice can be used to treat the symptoms of hypoglycaemia in a responsive person.*
- If oral glucose (e.g. tablets or dietary sugars) is not available, a glucose gel can be given to an adult or child with suspected hypoglycaemia who is responsive and able to swallow. These gels are both absorbed into the cheeks (buccal) and swallowed (oral).*
- Sublingual glucose administration (putting glucose under the tongue) may be used for suspected hypoglycaemia in children who may be uncooperative with swallowing a glucose substance.*

Good practice points

- 15g to 20g of glucose tablets should be used to treat symptomatic hypoglycaemia in responsive babies, children and adults.
- Glucose administration should be repeated if symptoms continue after 15 minutes.
- If it is unclear if the person is hypoglycaemic or hyperglycaemic, the first aid provider should provide care for hypoglycaemia.

Chain of survival behaviours

Prevent and prepare

- People who are diabetic should be encouraged to carry blood testing kits with them as well as insulin or other oral medication or sugary food.
- People who are diabetic should be advised to alert their family and friends to their condition and inform them on how to respond in an emergency.

Early recognition

Talk to the person. They may be able to tell you they are having a diabetic emergency and how you can help them.

Someone with low blood sugar may experience:

- sweating with cold, clammy skin
- weakness, faintness or hunger
- drowsiness, restlessness, aggressiveness (often resembling drunkenness)
- headache
- rapid pulse
- muscle tremors
- deteriorating level of response and leading eventually to seizures or unresponsiveness.

First aid steps

1. Help the person to sit down.
2. If the person has their own glucose or another sugar source, help them to take 15-20 grams of it. If they do not, give them a sugary (non-diet) drink, such as fruit juice, or some sugar (such as three teaspoons of sugar or three pieces of candy, like jellybeans).
3. If symptoms continue after 15 minutes, give the person a repeated amount of glucose or sugar substance.

CAUTION

Only give the person something to eat or drink if they are responsive and able to swallow.

Access help

- If the person's condition does not improve quickly (around 30 minutes) or they become unresponsive access EMS. Monitor the person's level of responsiveness, breathing and circulation while waiting for help to arrive. Advise the person to seek medical help if their symptoms are occurring more frequently than usual or if they have a fever.

Recovery

- If the person starts to feel better, advise them they can eat some slow-acting sugars (e.g., a slice of bread or a waffle).
- Encourage them or their companion to measure their blood sugar level.

Education considerations

Learner considerations

- Learners may have some misunderstandings, or pre-existing notions, of those impacted by diabetes (such as only overweight people get diabetes, it only affects middle-aged men, or it is a rich person's disease). Ensure learners know diabetes (and therefore diabetic emergencies) could affect anyone.
- Introducing the terms hyperglycaemia and hypoglycaemia may be important for some learners; however, you may consider keeping language to "high blood sugar" or "low blood sugar", particularly for children.

Facilitation tips and tools

- Explore different ways in which learners can help the people they live or work with, who may have diabetes, recognise the signs of a diabetic emergency.
- Even in an emergency, the ill person might be able to tell you what to do, so encourage learners to listen to them and act accordingly.
- Emphasise the importance of recognising low blood sugar as it requires immediate care. If the brain is deprived of sugar, this can lead to Seizures and possible brain damage.
- Emphasise that giving sugar to someone who has high blood sugar is unlikely to harm them. Whereas, not giving someone sugar who urgently needs it can be much more harmful.
- Emphasise that diet food and drinks do not contain any sugar and will not raise the sugar levels of someone having a diabetic emergency.
- Encourage learners to share their experiences with diabetic emergencies. For example, if they have a family member who has experienced a diabetic emergency. Sharing experiences can help people gain confidence and act effectively if the same thing happens again.

Learning connections

- If the person becomes unresponsive, open their airway and check for breathing. See Unresponsiveness.
- If the person has a Seizure, protect them from injury.
- Diabetes can damage blood vessels and cause other serious conditions such as a heart attack (see Chest pain) or Stroke.

Scientific foundation

The International Liaison Committee on Resuscitation (ILCOR) conducted two systematic reviews on hypoglycaemia.

Dietary sugars versus glucose tablets

The first systematic review looked at which dietary forms of sugar, compared to a standard dose (15g to 20g) of glucose tablets, should be used when providing first aid to someone experiencing hypoglycaemia (Carlson et al., 2017). The four studies identified all compared glucose tablets with sucrose, fructose, orange juice, jellybeans, Mentos and milk.

For the important outcome of clinical relief from hypoglycaemia in 15 minutes or less, three randomised controlled trials were included. Pooled data from 502 people with diabetes treated with dietary sugars (sucrose, fructose, orange juice, jellybeans, Mentos, and milk) and 223 people treated with glucose tablets (15–20 g) showed a benefit with glucose tablets. There was a slower resolution of symptoms 15 minutes after a person with diabetes was treated with dietary sugars compared with glucose tablets. Low-certainty evidence downgraded for risk of bias and imprecision.

For the important outcome of blood glucose (at least a 20-mg/dL increase of blood glucose by 20 minutes), one observational study is included. In it, 13 people with diabetes were treated with dietary sugars and nine were treated with glucose tablets. It showed a benefit with glucose tablets. Fewer people demonstrated a 20-mg/dL increase in blood glucose level 20 minutes after treatment when treated with dietary sugars compared with glucose tablets. Very low-certainty evidence downgraded for risk of bias and imprecision.

For the critical outcome of time to resolution of symptoms, the important outcome of risk of complications (e.g., aspiration), and the low-priority outcome of hospital length of stay, there were no human trials found.

First aid glucose administration routes

In the second systematic review, De Buck et al. (2019) identified the following four studies:

- One randomised study that compared sublingual glucose administration in the form of table sugar, with an oral administration of 42 hypoglycaemic children between the ages of one and 15
- Two non-randomised studies that compared buccal glucose administration with oral administration in 23 healthy, fasting, adult volunteers
- One randomised study that compared a dextrose gel with oral administration of glucose in 18 people with type one diabetes and hypoglycaemia

Providing sugar under the tongue (sublingual) resulted in a more significant rise in blood glucose after 20 minutes than giving the sugar orally. However, this was in a specific setting and included children with hypoglycaemia and symptoms of malaria or respiratory tract infection. On the other hand, giving glucose by inside cheek absorption (buccal) route resulted in a lower blood glucose concentration than giving it orally. For dextrose gel (where glucose is given through a combination of oral swallowing and via cheek absorption), results showed no clear benefit compared to oral glucose administration (taking glucose tablets or glucose solutions). Most studies did not report on time to resolution of symptoms, resolution of hypoglycaemia as defined by blood glucose levels above a certain threshold, time to resolution of hypoglycaemia, adverse events or treatment delay.

The evidence is of very low certainty due to limitations in study design, few studies and the small number of participants in the studies, and because half of the studies were performed with healthy volunteers rather than in people with characteristic hypoglycaemia.

Seizure

Key action

Protect the person from harm.

Introduction

A seizure is caused by a disruption in the brain's electrical activity and can cause unresponsiveness, muscle twitching, loss of bodily control or blank staring. The severity varies from person to person with some experiencing seizures of greater intensities. Several conditions can cause seizures, including a head injury, infection, poisoning, fever or a condition called epilepsy which is usually treated with medication. Babies and young children are particularly prone to seizures if they experience a sudden rise in temperature. While a seizure is usually not harmful and passes after a short time, it may cause the person to injure themselves further (e.g., hit their head on the ground if they collapse).

Guidelines

- First aid providers should not force anything between the person's teeth.*

Good practice points

- The person experiencing a seizure may be placed on the floor to prevent injury.
- Once the seizure has ended, first aid providers should check the person's breathing and treat them accordingly.

Chain of survival behaviours

Prevent and prepare

- Encourage those who look after a person prone to seizures to recognise what regular seizure activity looks like for that individual, as well as their prescribed treatment and first aid action plan. If the seizure activity is abnormal or the recommended intervention from a healthcare professional is ineffective, the caregiver should access help immediately.
- Refer schoolteachers and other caregivers to first aid learning (where appropriate) to build their confidence and comfort in emergencies. (Kaleyias et al., 2005; Berhe et al., 2017).
- Raise awareness among caregivers that a fever can cause seizures in babies and children. Prevention includes treating the fever and dressing babies and children appropriately for their environment.
- In contexts where malaria is prevalent, one of the most common causes of seizures in children is a fever caused by malaria. Therefore, malaria prevention (e.g., insecticide-treated mosquito nets or mosquito repellents) may be effective at preventing episodes in settings where anti-epileptic treatment is unavailable (Ba-Diop et al., 2014).

Early recognition

People with epilepsy may experience a warning sign before an epileptic seizure, known as an «aura», causing them to feel strange or experience a particular taste or smell. Other than epilepsy, a seizure may also be the result of a head injury, disease, infection, poisoning or fever (especially in babies and children). Conversely, there may be no apparent reason for the seizure.

Seizures may look different from one individual to the next.

Signs of a seizure include:

- sudden loss of responsiveness
- sudden collapse
- involuntary muscle movements such as twitching, jerky movements, stiffness, arching of the back, clenched jaw
- noisy, difficult breathing
- saliva foaming around the mouth.

Following the active stage of a seizure the person may:

- fall into a deep sleep
- start to breathe normally or deeply
- become responsive again, often after a few minutes
- be unaware of what has happened.

Someone who experiences an absence seizure may:

- have a blank stare
- have mild twitching
- be unaware of their surroundings.

First aid steps

1. Protect the person from harm by moving any nearby objects that may hurt them. Avoid moving the person unless they are in immediate danger (e.g., they are in oncoming traffic).

2. Place soft padding (e.g., a cushion or sweater) under the person's head to protect it. Remove eyeglasses and loosen any restrictive clothing from around their neck. Do not restrain the person.

3. Access emergency medical services (EMS) in any of the following cases:
   - **a.** the person has hurt themselves
   - **b.** it is the person's first seizure
   - **c.** the seizure lasts more than five consecutive minutes
   - **d.** the person does not regain responsiveness after the seizure
   - **e.** the person is experiencing repeated or different types of seizures than usual or the seizures have increased in frequency
   - **f.** the person is pregnant or diabetic
   - **g.** the person has a high fever
   - **h.** the person is under the influence of alcohol or drugs
   - **i.** when in doubt.

4. Note the start and stop time of the seizure, as well as if it reoccurs. Communicate this information to EMS if available.

5. When the seizure is over, check the person's breathing and keep checking this regularly. Remove the padding from under their head if it may interfere with their breathing.
   - **a.** If they are breathing normally, move them onto their side and ensure their airway is open.
   - **b.** If they have abnormal breathing, see Unresponsive with abnormal breathing adolescent and adult or baby and child.

Babies and children

In addition to the steps above, check the baby or child's temperature. If they are too hot, cool them by removing any excess clothing and expose them to fresh, cool air. Treat any fever if necessary.

NOTE

- Do not force anything between the person's teeth.
- If you do not know the person, look for any medical information they may have on them, such as a medical bracelet with details of their condition, before accessing help.
- If present, ask a family member or caregiver if the person has any anti-seizure medication. There are many ways this medication can be administered, including orally, a spray in the nose, an injection or rectally. Assist the caregiver if you feel comfortable doing so.
- Protect the person's dignity. For example, move bystanders along or cover any signs of accidental urination.
- If the person has a mild seizure, stay calm and keep the person safe. Stay with them until the seizure has passed.
- Be aware that, once the seizure is over, a person may be confused or aggressive. Mind your own safety and avoid touching the person excessively.

Access help

- A person with epilepsy may wish to manage their condition independently and request that you do not access help. If they are with a companion (e.g., partner, parent or caregiver), listen and support what this person says as they are more familiar with the condition than you are. If the person having a seizure is alone, check for a medical bracelet or necklace before accessing help.
- A seizure that lasts longer than five minutes is called "status epilepticus". It is a severe condition and requires immediate medical assistance – access help right away.

Education considerations

Context considerations

- In schools or other environments involving children, educate peer groups and teachers on seizures and epilepsy to reduce the stigma surrounding these conditions. Ensure they know how to keep children with epilepsy safe and comfortable.

Learner considerations

- New parents or caregivers may benefit from learning about seizures in babies and children.

Facilitation tips and tools

- Address any misconceptions about epilepsy and seizures to reduce stigma and prejudice. Conduct activities that incorporate accurate information about the causes of epilepsy and seizures.
- Focus on building learners' confidence to help someone having a seizure.
- Facilitate a discussion to understand what learners already know about seizures and build on this knowledge. Be aware that there is a difference between knowledge, understanding and confidence to act.
- Discuss learner's experiences with seizures and address any barriers to providing care.
- Acknowledge common mistakes when caring for a person experiencing a seizure, such as trying to:
  - open the person's mouth
  - put something in the person's mouth
  - restrain the person.
- Explain that these actions may injure the person and that it is best to let the seizure run its course.
- Acknowledge that it can be frightening to see someone having a seizure for the first time but reassure that there are simple things learners can do to protect the person from harm.

- Create scenarios to allow learners to explore some of the social considerations relevant to seizures such as bystanders watching, the person passing urine while having a seizure, bystanders insisting on incorrect help like CPR, concerns about helping or touching another gender in public.
- Use group discussion to explore how people describe seizure. If appropriate, use video sensitively to support learners' ability to identify the signs and symptoms of seizures.

Learning connections

- Seizures in babies and children are often caused by fever.
- After the active stage of a seizure, the person will usually be unresponsive and breathing normally.
- Make a connection to providing emotional support to the person having a seizure. The first aid provider should provide reassurance and comfort by letting the person know they are there and will not leave them alone.
- Make a connection to managing the scene. For example, bystanders may gather to see what is happening. This can be embarrassing for the person having a seizure. The first aid provider should protect the dignity of the person and have any bystanders clear the area.

Scientific foundation

Systematic review

The Centre for Evidence-based Practice (CEBAP) conducted two evidence summaries on a certain position for someone having a seizure and on putting an object in the mouth in case of epilepsy, updated in 2020. Concerning a certain posture, no studies could be identified.

There is limited evidence from two observational studies in favour of not having an object forced between the teeth during seizure episodes. It was shown that forcing an object between the teeth resulted in a statistically significant increase of orofacial injuries, compared to not doing this. Evidence is of very low certainty and results cannot be considered precise due to limited sample size and low number of events.

Non-systematic reviews

ILCOR did a scoping review on the positioning of people with medically induced altered level of responsiveness not requiring CPR. There were no definitive guidelines from that comprehensive review (Douma et al., 2020).

Education review

We considered 20 papers from an educational lens and chose two for their insights into learning, specifically from the perspective of schoolteachers (Berhe et al., 2017; Kaleyias et al., 2005). Findings from these two papers also represented those from other studies.

The most relevant finding was that knowledge, skills and attitude gaps regarding epilepsy still exist in educational professionals, many of whom may be required to support a student with epilepsy in their class in addition to educating other students on the condition. Additionally, the papers identified some critical misconceptions that could affect the quality of care someone with epilepsy might receive. Some teachers were unclear about what epilepsy is and how it can affect a person. Some thought it might be contagious, while others believed it caused problems in school or it meant students with epilepsy were less intelligent than others. Many teachers did not know or feel confident to give first aid to someone having a seizure and were afraid of it happening in their classroom. Conclusions from both papers highlighted the need for increased awareness of the condition and causes of epilepsy, emphasis on myth-busting and first aid, to support the person having a seizure.

We also reviewed another paper (Ba-Diop et al., 2014), with insight on this topic specific to Sub-Saharan Africa. It highlighted the significantly higher prevalence of epilepsy in Sub-Saharan Africa compared to Asia, Europe and North America and the stigma attached to the condition in this region. It also noted the fact that nearly 60% of people with epilepsy do not receive anti-epileptic treatment, mainly for social and economic reasons.

Feeling faint

Key action

Help the person get into a safe and comfortable position and ask them to do physical counterpressure manoeuvres to increase blood flow to their brain.

Introduction

Fainting is a temporary loss of responsiveness due to a fall in blood supply to the brain. More often, the person does not become completely unresponsive and usually becomes fully responsive immediately after. Usually, a person will experience a short period of feeling faint before they faint. This is the ideal time to provide first aid - before they collapse. Feeling faint and fainting are common occurrences and may happen as a response to a variety of conditions including stress, pain, hunger or exhaustion. It can also occur if a person stands still for a long time, especially in warm temperatures.

Guidelines

- First aid providers should assist the person who is feeling faint in doing physical counterpressure manoeuvres.**
- While in a safe and comfortable position, a person feeling faint can perform counterpressure manoeuvres on their own to lessen the feeling.*
- Lower-body physical counterpressure manoeuvres (such as leg crossing and tensing, or squatting), rather than upper-body and abdominal physical counterpressure manoeuvres, should be used to lessen the faint feeling.*

Good practice points

- A person who is feeling faint should be helped into a safe and comfortable position, such as sitting or lying on the floor, so they cannot fall.
- If counterpressure manoeuvres are not possible, the first aid provider may ask the person to lie down and raise the person's legs (30-60 degrees) which may increase blood flow to the person's brain and may improve the person's condition.
- If the person faints, it should be brief with almost immediate recovery. If the person becomes unresponsive, the first aid provider should immediately check their breathing. See Unresponsiveness.
- The first aid provider should speak to the person to find out why they may feel faint (e.g., low blood sugar or fatigue) and address their needs (once they have recovered from feeling faint).
- Water may be offered to the person if they are responsive and able to swallow.

Chain of survival behaviours

Prevent and prepare

- Take precautions to avoid the conditions that may cause you or others to feel faint. Ensure you have enough to eat and drink, get enough rest and avoid standing for long periods.
- Stay hydrated. (See Dehydration.)
- Maintain a regular temperature.

Early recognition

The person may have just experienced something shocking or painful. They may be hungry, tired or have been standing for a long time.

Suddenly the person may become pale or ashen. They may tell you that they feel faint.

First aid steps

1. Help the person to sit or lie down in a safe and comfortable position, where they cannot fall.
2. Ask the person to do physical counterpressure manoeuvres to improve blood flow to their brain (see below). Alternatively, you could offer to raise their legs for them if they lie down.
3. Reassure the person and observe them closely for changes in their level of response or breathing. If possible, try to establish why they feel faint and whether there is anything further you can do to help them.

CAUTION

- A person who recovers from feeling faint should resume their activity only gradually as they may feel faint again.
- If the person faints and falls, be alert to potential injury they may sustain. See Head injury or Fractures, sprains and strains.
- A person who faints should become responsive again very quickly. If the person is unresponsive, check their breathing and provide first aid accordingly. See Unresponsiveness.

NOTE

Physical counterpressure manoeuvres include:
Lower-body counterpressure manoeuvres may be more effective than upper-body manoeuvres.
- Squatting: Have the person squat.
- Leg tensing: Have the person cross their legs and tense the leg, abdominal and buttock muscles. The person can also try raising their legs if seated or lying down.

If squatting or leg exercises are not possible, arm tensing may be used.
- Arm tensing: Have the person tense and release their arm muscles by gripping one hand with the other and pulling their arms in opposite directions. See figure 5 page 301.

Figure 5: Physical counterpressure manoeuvres

Resuscitation.2020.09.016.

Access help

- Feeling faint and fainting does not usually require medical care.
- If the person does not become responsive immediately after fainting, they may be experiencing something more severe (e.g., a heart attack). Access help immediately.
- In a public place, you could ask bystanders to help you to protect the person's dignity for example, by blocking the view of people passing by.

Recovery

- The person should get some fresh air.
- After the first episode, the person should try to recognise the signs of fainting as early as possible. In that way, in the future, they can quickly get into a comfortable and safe position and consider using counterpressure manoeuvres.

Education considerations

Context considerations

- Feeling faint is a common occurrence, particularly in warm temperatures or in areas with little fresh air. Ask learners for examples of when they felt faint. What was the temperature? Were they hungry? Tired? Stressed?

Learner considerations

- Individuals who regularly interact with pregnant women should learn how to support and lay the woman on her left side if she is feeling faint.

Facilitation tips

- Brainstorm situations where someone might feel faint. For example, if facilitating a group of teachers, their students may be at a greater risk of fainting if doing physical activity or standing for a long period of time on a hot day.
- Emphasise the difference between someone feeling faint or becoming unresponsive and breathing normally. That someone who is feeling faint (or faints) should be able to tell you that they feel faint. If they can't do this, then they should be treated as unresponsive.
- Encourage learners to consider what might happen to someone who faints and how they can respond. For example, what should they do if the person faints and hits their head on a hard surface?
- The science behind fainting could be explained to learners by putting a little bit of soy sauce in a clear bottle of water. The soy sauce will sink to the bottom. Explain this is what happens in the body - the blood goes down toward the feet. Then lie the bottle down and then raise the bottom of the bottle and the soy sauce will start to flow up to the 'head' of the bottle. Explain this is also what happens in the body - that sitting or lying down and using counterpressure movements helps the blood to move up the body again to the brain.

Learning connections

- Feeling faint may be caused by a health condition to which first aid providers should be alert, such as Diabetic emergency, heart attack (see Chest pain), Stroke, Head injury, Dehydration or Hyperthermia or Poisoning.
- Fainting can lead to unresponsiveness. Connect this topic to Unresponsive and abnormal breathing and Unresponsive and breathing normally.

Scientific foundation

Systematic reviews

A systematic review was carried out by ILCOR (Jensen et al., 2020; Soar et al., 2019; Singletary et al., 2020). Two randomised controlled trials and six prospective cohort studies were included in the analysis regarding the use of physical counterpressure manoeuvres compared with no use of these manoeuvres in adults and children with signs and symptoms of faintness or presyncope of suspected vasovagal or orthostatic origin.

For prevention of fainting, one randomised controlled trial demonstrated benefit with the use of handgrip physical counterpressure manoeuvres, while the observational studies failed to show benefit of handgrip and arm-tensing manoeuvres. Two randomised controlled trials showed benefit in symptom improvement when using handgrip manoeuvres. One observational follow-up study found symptom improvement in association with the use of squatting and abdominal tensing. One randomised controlled trial reported improvements in systolic blood pressure and heart rate using handgrip manoeuvres. Four observational studies did not report consistent changes in heart rate, and two pooled observational studies reported increased systolic and diastolic blood pressures when using lower-body manoeuvres. No adverse events were reported in any of the included studies. Overall, the level of certainty of the evidence was judged to be low or very low across all outcomes.

One observational study and one randomised controlled trial compared upper-body to lower-body physical counterpressure manoeuvres. In the observational study, benefit was found for the use of lower-body manoeuvres (lower body muscle tensing) compared with control or no use of counterpressure manoeuvres. The randomised controlled trial did not find greater improvement in symptoms of presyncope with the use of lower-body compared with upper-body manoeuvres.

Fever

Key action

Assist the person to take paracetamol or acetaminophen to control their fever.

Introduction

When the body temperature is above 38°C (100.4°F), the person has a fever. Fevers are a common and normal response to fight infection and in most circumstances, are not harmful (El Radhi, 2012). While they can affect people of all ages, they are more common in children. Fever has the potential to cause a seizure in children because their bodies cannot yet regulate their temperature. First aid providers should consider the possible causes of a high temperature (e.g., infection or disease) and help the person access medical care if necessary.

Guidelines

- Paracetamol may be given to the person with a fever who is feeling really unwell.*

Good practice points

- Sponging the person with fever using lukewarm water may help to decrease the temperature faster, as long as it does not upset the person or make them feel cold and start to shiver. Cold water should not be used. It can cause the blood vessels to constrict and prevent the body from giving off heat or cause the person to start shivering and inappropriately to produce more heat.
- People with fever should rest and drink fluids to replace the fluid loss caused by sweating.
- People with fever should dress lightly and the first aid provider should avoid layering them with excessive blankets or coverings.
- Access emergency medical care if a person with a fever also has any of the following signs and symptoms:
  - a rash
  - a change in mental status
  - difficulty breathing
  - severe abdominal pain
  - sensitivity to light and vomiting
  - signs of Shock.
- A baby, child or adult should receive medical care as soon as possible if:
  - the baby with a fever is under three months of age
  - the child has a temperature higher than 39° C (102.5° F)
  - the person with fever is over 65 years of age
  - the person with fever has cancer, a weakened immune system, sickle cell disease, or is taking medications which affect their immune system
  - the fever does not decrease with paracetamol or lasts more than three days
  - additional symptoms occur that worry you.
- Depending on the local context (e.g., areas where malaria is present), people with fever should seek medical care, even if they have no other symptoms.
- A high fever may cause a child to experience a seizure. While the seizure could be an indication of a more serious infection, such as meningitis, it is often the result of an increase in temperature only. See Seizure.

Chain of survival behaviours

Prevent and prepare

- Know the causes of fever in children and take any available precautions, such as vaccinations or medication against particular illnesses in areas where there is a risk.

Early recognition

If possible, check the person's temperature. A fever above 39°C (102.5°F) can be harmful and may indicate a serious infection or disease. Consider this as you assess the person.

In the early stages of fever, the person may have a high temperature but tell you they feel cold, or they may be shivering or have chattering teeth or goose pimples.

The person may experience:
- a high temperature above 38°C (100.4°F)
- hot, flushed skin and sweating
- headache or other aches and pains
- loss of appetite
- fatigue.

First aid steps

1. Advise the person to rest and dress lightly.
2. Offer the person fluids to drink to replace lost fluids from sweating.
3. In many cases, medication is not necessary. If the person is feeling unwell, you can control their fever by giving them the recommended dose of paracetamol (or acetaminophen). You can also sponge the person with lukewarm water, as long as this does not upset them.
4. Monitor the person's condition and be aware of any additional signs and symptoms that occur.

CAUTION

- Do not overheat the person with layers of clothing or blankets.
- Do not use cold water to sponge the person as this may cause them discomfort and may stop their body from releasing some heat.

Access help

Sometimes a fever can indicate a more serious condition. Access emergency medical services immediately if the person has a fever combined with any of the following:
- a rash
- a change in mental status
- difficulty breathing
- severe abdominal pain
- sensitivity to light and vomiting
- signs of shock.

Access medical care if:

- a baby with a fever is under three months of age
- a child has a temperature higher than 39° C (102.5° F)
- the person with fever is over 65 years of age
- the person with fever has cancer, a weakened immune system, sickle cell disease, or is taking medications which affect their immune system
- the fever does not decrease with paracetamol or lasts more than three days
- additional symptoms occur that worry you.

Education considerations

Context considerations

- The use of paracetamol or acetaminophen for a fever depends on local laws, regulations and processes, including liability protection. Depending on the national context, educators may need to adapt their programme accordingly.
- Many endemic illnesses cause fever (e.g. malaria). Consider the endemic illnesses in your country or region and draw on these to help learners understand how fever works and how best to deal with it.
- If a person has a small fever without any discomfort, it may not be necessary to give them paracetamol.

Facilitation tips

- Misconceptions and unfounded fears about fever exist among people who care for children. In some cases, this fear can lead to aggressive and dangerous practices, including overdosing with antipyretics and sponge bathing with alcohol (Clark, 2014). Take time to explore and dispel myths and misconceptions with learners.
- Since fever can indicate a more serious illness or trigger a seizure, it is important for learners to understand their role in looking out for signs that indicate the need to access medical care.
- Include education that addresses managing a person's fever, even if they say they feel cold. Ask learners to reflect on their experience with having a fever and feeling chilled at the same time – how did their body react? For example, were they sweating and shivering at the same time? What did they need to feel better? Caution that while the goal is to bring the person's temperature back down, this needs to happen gradually. Highlight the importance of monitoring the person's temperature to ensure they do not become too cold (e.g., by removing too many layers or sponging with cold water).
- Discuss clothing in the context of your country and climate – what clothing or layers will make the person most comfortable and not cause them to overheat or feel cold?
- Consider which fluids will best keep the person hydrated and cool (e.g., a baby should have their breast or bottle milk while an adult will benefit more from cool water).

Facilitation tools

- Set out containers with different temperatures of water. Have learners test the different samples and see if they can determine what lukewarm water feels like. If you are short on time, provide a sample of lukewarm water and allow learners to familiarise themselves with the water's temperature.

Learning connections

- Fever in children is often caused by an infection or disease. Explore connections to topics such as Earache, meningitis, or any endemic diseases that result in fever.
- Fever in young children can result in a Seizure as their bodies are not yet able to regulate temperature properly.

Scientific foundation

In 2020, the Centre for Evidence-Based Practice (CEBaP) conducted two evidence summaries for this topic.

Systematic reviews

Paracetamol versus placebo

There is limited evidence from one Cochrane systematic review in favour of paracetamol compared to placebo for treating fever in children. The review showed that paracetamol resulted in a statistically significant increase in fever relief at the second hour, compared to placebo or physical interventions (such as tepid cooling). However, this relief could not be demonstrated in the first hour. A statistically significant difference in adverse events, using paracetamol compared to placebo or physical methods, could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to the low number of events and large variability of results.

Physical methods versus placebo

There is limited evidence from two experimental studies, extracted from one Cochrane systematic review, neither in favour of sponging, nor placebo. The first study, using tepid water sponging compared to placebo, could not demonstrate a statistically significant increase in resolution of fever within one hour. The second study showed that tepid water sponging resulted in a statistically significant increase in resolution of fever within two hours, compared to placebo. Evidence is of low certainty and results of these studies are imprecise due to limited sample size and large variability of results.

Physical methods combined with antipyretics versus antipyretics

There is limited evidence from one systematic review in favour of antipyretics only. In making this conclusion, we place a higher value on adverse effects.

Regarding effectiveness, it was shown that using physical methods combined with antipyretics resulted in a statistically significant increase in resolution of fever after one hour, compared to antipyretics only. A statistically significant increase of resolution of fever after two hours, using physical methods combined with antipyretics compared to antipyretics, could not be demonstrated. In addition, a statistically significant increase of children with a temperature fall of 1.5°C by one hour or by two hours, using sponging with tepid water combined with paracetamol compared to paracetamol only, could not be demonstrated. Also, a statistically significant decrease of temperature after 30 minutes, using tepid massage combined with antipyretics compared to antipyretics only, could not be demonstrated. It was shown that using antipyretics only resulted in a statistically significant decrease in temperature after 120 minutes, compared to using tepid massage combined with antipyretics. However, in another study a statistically significant decrease of temperature after 120 minutes, using tepid massage combined with antipyretics compared to antipyretics only, could not be demonstrated.

Concerning the adverse events, it was shown that sponging with tepid water combined with antipyretics resulted in a statistically significant increase of adverse events, compared to antipyretics only. It was also shown that alcohol combined with paracetamol or ice water combined with paracetamol resulted in a statistically significant increased number of children with a poor comfort score. Evidence is of low certainty and results are considered imprecise due to limited sample size and large variability of results.

Abdominal pain

Key action

Reassure the person and make them comfortable.

Introduction

Abdominal pain is a broad term meaning pain felt anywhere in the belly. Acute abdominal pain can be caused by a variety of conditions such as gas, constipation, overeating, period pain or a stomach bug. Occasionally abdominal pain is the result of a more serious disorder affecting the organs in the abdomen, like kidney stones, an inflamed appendix, or an inflamed gallbladder.

Guidelines

- In case of pain after eating a meal, it may help to keep moving instead of lying down or staying seated. If a person with pain after a meal decides to lie down, it may help to let them lie on their right side.*
- A hot water bottle or heated wheat bag held against the lower abdomen may relieve period pain.**

Good practice points

- The first aid provider should reassure the person and help them to be more comfortable.
- Paracetamol may be effective to relieve mild period pain. Non-steroidal anti-inflammatory drugs (ibuprofen, diclofenac, naproxen, etc.) may also be effective on period pain, however, they may have side effects (e.g., upset stomach or conflict with other medications). The person should take painkillers with fixed regularity on the days with pain according to the recommended dose and time interval. Aside from period pain, the person should not take ibuprofen, painkiller or laxatives for abdominal pain.
- A hot water bottle or heated wheat bag held against the abdomen may relieve abdominal pain.
- Abdominal massage with essential oils (aromatherapy) may relieve period pain.
- If the person has heartburn, it may help to lie down on their back with their upper body raised.
- The person should be kept well hydrated, but should avoid coffee, tea or alcohol as these can make the pain worse. Also, advise them to avoid fizzy drinks.
- Emergency medical services (EMS) should be accessed if the person:
  - vomits blood
  - has chest pain
  - was involved in an accident
  - has sharp and severe abdominal pain
  - shows signs and symptoms of shock
  - has blood with bowel movements (this can appear as black, tarry bowel movements or red blood)
  - experiences high fever (higher than 40°C for babies, children and older)
  - is bleeding while pregnant
  - has an altered level of responsiveness.

- First aid providers should access medical care if:
  - the pain does not subside
  - abdominal pain is accompanied by severe diarrhoea and repeated vomiting, which can lead to dehydration especially in older people or young children
  - the person has a fever (higher than 38°C).

- If period pain disrupts daily life every month, the symptoms progressively worsen, the medication is not as effective as usual, or severe period pain starts after age 25, the person should seek medical advice.
- To prevent stomach bugs and to avoid infecting others, personal (and group) hygiene should be practised. See Hand hygiene.

Chain of survival behaviours

Prevent and prepare

- Keep hydrated.
- Practise food hygiene.
- Practise hand hygiene.
- Avoid contaminated or rotten food.
- Take part in regular physical activity.

Early recognition

Abdominal pain is identified by pain in the abdomen. To help decide if the abdominal pain is an emergency and determine the first aid that will be most effective, establish what type of pain it is by asking questions such as:

- Is the pain sudden or severe?
- What does the pain feel like?
- How long have you had the pain?
- What do you think may be causing the pain?
- Do you have gas or feel constipated?
- Are you having or expecting your period?
- What have you eaten recently and how much?
- Are you experiencing any other symptoms? If so, what are they?

Common types of abdominal pain

- Period pain - throbbing or cramping pains in the lower abdomen.
- Gas - pain that sometimes moves throughout the abdomen, bloating or cramping.
- Stomach bug - (sometimes intense) pain accompanied by nausea, bloating, vomiting.
- Inflamed appendix - sudden abdominal pain that often begins around the belly button area and moves to the right lower part of the abdomen, progressively getting worse.

First aid steps

1. Reassure the person and help make them comfortable.
2. Access emergency medical services if the person:
    - vomits blood
    - has chest pain
    - was involved in an accident
    - has sharp and severe abdominal pain
    - shows signs and symptoms of Shock
    - has blood with bowel movements (this can appear as black, tarry bowel movements or red blood)
    - experiences high fever (higher than 40°C for babies, children and older)
    - is bleeding while pregnant
    - has an altered level of responsiveness.
3. Give the person a hot-water bottle or a heated wheat bag to hold against their abdomen.

NOTE

- If the abdominal pain is accompanied by vomiting or diarrhoea, ensure the person keeps hydrated by drinking small sips of water regularly.
- If the pain is period pain, help the person take the recommended dose of painkiller.
- If the person is experiencing pain following a meal, advise them to keep moving instead of lying down or staying seated. If the person needs to lie down, advise them to lie on their right side.

Access help

- Sudden, severe abdominal pain can occasionally indicate a more serious disorder, such as appendicitis. This condition can quickly worsen and requires an operation, so it is important to access EMS.
- Medical care should also be accessed if the pain does not subside, abdominal pain is accompanied by severe diarrhoea and repeated vomiting, which can lead to dehydration especially in older people or young children or the person has a fever (higher than 38°C).
- In older people and females, severe stomach pain could indicate a heart attack and may need to be seen by a medical professional. See Chest pain.

Recovery

- Drink water regularly to stay hydrated.
- If taking a painkiller for period pain, the person should take it on the days with pain with fixed regularity according to the recommended dose and time interval. Taking painkiller before the pain has developed reduces overall discomfort.

Education considerations

Context considerations

- In contexts with limited resources, emphasise that most situations do not need much equipment (if any). Having the person rest with their feet raised and placing a heat pack on the abdomen will help to relieve the pain.
- Research the local regulations on who can administer painkillers (for period pain only) and ensure the education follows those regulations.

Facilitation tips

- Consider teaching this topic to school nurses, parents, teachers, camp councillors.
- Adapt this topic to the most common conditions relevant to the learner.
- Incorporate prevention education around food hygiene and hand washing.
- Explore different causes of abdominal pain and focus on which instances are considered an emergency and when medical care is required.
- Draw on learners' own experiences of abdominal pain, including pain caused by anxiety, to contextualise their learning.

Learning connections

- Make links to other topics such as Dehydration, vomiting and diarrhoea and ensure learners understand any relevant human functions such as indigestion.

Scientific foundation

The Centre for Evidence-Based Practice (CEBaP) developed and updated several evidence summaries in 2020.

Posture

Ten studies were included in an evidence summary concerning a specific posture immediately after having a meal. There is limited evidence in favour of the sitting position or alternately sitting and standing after having a meal. It was shown that sitting or alternately sitting and standing resulted in a statistically significant improved gastric emptying, compared to laying on the back or a head-down tilted position. A statistically significant faster gastric emptying time, when standing, lying on a left side position or lying down compared to sitting, could not be demonstrated.

A statistically significant decreased retention of the feeds and a decreased number of reflux episodes, when lying down with head and upper body slightly raised or when lying in a head-down tilted position, compared to lying flat on the back, could not be demonstrated.

When comparing different side-lying positions, it was shown that the right side position resulted in a statistically significant decreased gastric volume and a faster gastric emptying time, compared to the left side position. All evidence is of low certainty and results cannot be considered precise due to limited sample size and lack of data.

Physical activity

Four experimental studies were included in an evidence summary concerning physical activity after having a meal. There is limited evidence in favour of being active (walking) after having a meal. It was shown that physical activity resulted in a statistically significant faster gastric emptying time and reduced reflux in people with gastroesophageal reflux disease, compared to no physical activity. A statistically significantly decreased reflux in healthy volunteers could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to limited sample size, lack of data and large variability in results.

Heat application for period pain

Two randomised controlled trials were found in an evidence summary about heat application for dysmenorrhea (period pain). It was shown that using a heat patch (placed on the lower abdomen) resulted in statistically significant pain relief, compared to unheated (no patch). Evidence is of moderate certainty.

Massage for period pain

It was shown in one randomised controlled trial that massage resulted in a statistically significant reduction of period pain intensity and pain duration. However, in two other smaller randomised controlled trials, a statistically significant decrease in period pain and cramps could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to limited sample size and lack of data.

The same two studies also measured the effect of aromatherapy massage, which resulted in a statistically significant decrease in period pain and cramps, compared to no massage. Evidence is of low certainty and results cannot be considered precise due to limited sample size and lack of data.

Additional information

Gastrointestinal distress is often due to an irritation in the digestive system and can cause abdominal pain and vomiting. It is a common problem when travelling to tropical locations.

Sudden abdominal pain may be a sign of an inflamed appendix (appendicitis). It typically begins around the belly button area and moves to the lower part of the abdomen, progressively getting worse. The person may also experience a low fever. If vomiting, constipation or diarrhoea accompanies the pain, this is an indication that the person should access medical care.

Certain viruses, such as the norovirus, can cause nausea, bloating and diarrhoea. Stomach conditions that cause vomiting or diarrhoea can lead to dehydration, especially in children and older adults. Gastroenteritis, a stomach bug that causes diarrhoea, nausea, vomiting and abdominal pain, is one of the most commonly documented. Individuals can also contract illnesses when participating in recreational water activities. This occurs when swimmers swallow water in which a stool has been released before chlorine or another disinfectant kills the infective organisms.

Pain in the abdomen usually has a minor cause, such as food poisoning. However, sometimes complaints about stomach pain may have nothing to do with the stomach itself — pain can come from another part of the body (e.g., upper belly pain may indicate a heart attack).

Abdominal pain can be a result of eating or drinking contaminated food or water. Hand hygiene is critical as infection can pass directly from person to person through dirty hands. Occasionally abdominal pain is the result of a more serious disorder affecting the organs in the abdomen, like an inflamed appendix, gallbladder or kidney stone. Abdominal pain accounts for 5% to 10% of all presentations in the emergency department (Natesan et al., 2016).

Period pain (dysmenorrhea) is a throbbing or cramping pain in the lower abdomen. Globally, the prevalence of period pain varies from 20% to 90% (De Sanctis, 2015). Many women have period pain just before and during their menstrual periods. Often the pain is also felt in the back or legs and can be severe enough to affect education, social activities and work negatively. Approximately 60% to 80% of young women between the ages of 12 and 24 suffer (Nakame et al., 2019; Proctor, 2003) while around 35% of female schoolchildren with dysmenorrhea use it as a reason for failing school. About 42% of working women cannot work during their menstrual periods (De Sanctis et al., 2015; Marjoribanks et al., 2003).

Before or during menstruation, other symptoms can appear, such as headaches, painful breasts, bloating, nausea, diarrhoea, dizziness or fatigue. Sometimes women are also somewhat quicker to be sad or irritated before and during menstruation. However, menstrual cramps will pass by themselves.

Contractions in the uterus cause menstrual cramps. Every month an egg is released from one of the two ovaries and the uterine lining becomes thicker so that a fertilised egg can settle in there. If pregnancy does not occur, the uterus contracts to release the mucous membrane, resulting in blood. There is no clear link between the amount of blood loss and pain.

Emergency childbirth

Key action

Support the person to give birth, providing comfort to both the woman and baby.

Introduction

Childbirth is a natural process which usually takes several hours. This allows time to access the support of a midwife or to transport the woman to a birthing facility. In some cases, an "emergency birth" takes place very quickly and not in the place where it was planned. Childbirth happens naturally without intervention so for an emergency birth, the first aid provider's role is to support the woman through the process. There are three phases starting with contractions and the woman's waters breaking, the second phase during which the woman pushes the baby out, and the third stage when the woman pushes the afterbirth out (including the placenta).

Guidelines

- Support the woman to contact her chosen birthing partner, as their continuous support during labour contributes to a positive childbirth experience.**
- During the first stage of labour, being in an upright position (sitting, standing or walking) may help to shorten the duration of labour.*
- During labour, massage of the lower back may reduce pain intensity.*
- During labour, relaxation, yoga, or listening to music may reduce pain intensity and improve the overall birthing experience.*
- Skin-to-skin contact between the mother and the baby may improve breastfeeding, infant and maternal outcomes.*

Good practice points

- The first aid provider should manage the scene to protect the dignity and safety of the woman, as well as taking care to comfort them and give emotional support.
- The woman should be supported to move into the positions she is most comfortable, even if the amniotic sac is broken (waters have broken).
- The woman may drink or eat something during labour if she wants to.
- Hygiene measures should be taken where possible such as wearing gloves and using clean cloths or towels both under the mother and to wrap the new-born in.
- As soon as the baby is delivered, the first aid provider should check both the woman and the baby for their responsiveness, breathing and for any bleeding.
- If the baby is responsive (e.g., crying) and breathing normally, there is no immediate need to cut the umbilical cord and the baby should be dried and kept warm to prevent hypothermia.
- If the baby is unresponsive, the first aid provider should rub the baby dry and tap the soles of its feet. If the baby remains unresponsive and doesn't start breathing, CPR should be provided as soon as possible. If the presence of the umbilical cord makes this difficult, it should be cut. If possible, the umbilical cord should be tied twice (a hands width apart) with a ribbon and cut in between the ribbons - with the first ribbon about a hand-width from the belly of the baby.

Chain of survival behaviours

Prevent and prepare

- Know how to contact a locally available midwife or other community healthcare provider who can arrive quickly and provide support in an emergency.
- Encourage women expecting a baby to carry contact phone numbers of chosen birthing partners as well as their preferred midwife or birth attendant.

Recognise

Talk to the woman to try to determine whether she is starting labour (which may take several hours) or whether she is having an emergency birth.

The following signs indicate that labour has started, and the baby has entered the birth canal:

- painful contractions occurring at increasingly short intervals
- abdominal discomfort
- localised back pains
- the woman's waters break
- sticky discharge.

In this instance, support the woman to notify her chosen birthing partner and preferred birth attendants, or to support her transportation to her chosen birth facility.

Childbirth might be imminent, when:

- the contractions quickly become more intense and painful
- the contractions come in short intervals (one contraction every five minutes)
- the woman's waters break.

If it becomes clear that the baby will arrive very soon or the woman is in too much pain to travel, prepare to support the woman through the emergency birth.

First aid steps

Initially, the first aid provider's key priority is the woman in labour. Once the baby is being born, the first aid provider has two people to care for: the woman and the baby.

1. Access help (such as medical facilities, EMS or a midwife) in line with the woman's wishes and listen to their instructions. Support the woman to contact her chosen birthing partner.
2. In the first phase of childbirth, create a comfortable, private and protected space for the woman. Help her move into a position of comfort. This may be sitting, standing or moving around.
3. Massage her lower back or offer relaxation methods such as yoga or listening to music as this may reduce her pain and anxiety and improve the overall birthing experience.
4. In the second phase of childbirth, help the woman to find a comfortable position, preferably upright. If she prefers to lie on her back, put a small pillow under the right hip. In this way, you prevent the baby from pressing on important blood vessels.
5. If possible, wash your hands well with soap and water and place a clean cloth under the woman where the baby will be born. When the woman is ready to push, ensure she is in a supported position.
6. Watch the baby's head as it comes out and ensure it is supported. Newly born babies are slippery, so be very careful.

7. Use a clean cloth to dry off the baby. Wrap the baby in a clean cloth and cover the baby's head to keep it warm. Keep the mother warm as well and place the baby on the mother's chest or abdomen as soon as possible.

8. In the third phase of childbirth, support the woman as she delivers the afterbirth. Keep the afterbirth as a healthcare professional will need to check it is complete. Check to see if the mother is bleeding. Mild bleeding from the birth canal is normal. If bleeding is severe, help the woman to lie down and keep her warm (see Shock) until medical help arrives.

CAUTION

- Hygiene measures should be taken where possible such as hand washing and wearing gloves and using clean cloths or towels both under the woman and to wrap the new-born baby in.
- Do not pull the baby's head and shoulders during delivery.
- Do not push on the woman's stomach during labour or after delivery.
- If the umbilical cord is wrapped around the baby's neck during delivery, check that it is loose and carefully ease it over the baby's head to prevent the baby from strangulation.
- Do not pull on the umbilical cord. The afterbirth usually comes out by itself within about 30 minutes of the delivery.
- If the baby is responsive and breathing normally, there is no immediate need to cut the umbilical cord, which should be performed by a medical professional, if possible.

NOTE

The woman may drink or eat something during labour if she wants to. This will help her keep up her strength.

Unresponsive and abnormal breathing baby

- If the baby is quiet, open their airway and check for breathing. If the baby is breathing abnormally (gasping, taking irregular breaths or not breathing), place the baby on a firm surface and begin CPR as described in Unresponsive and abnormal breathing (baby and child).
- If CPR is difficult because of the umbilical cord, cut the cord. To do this, if possible, tie a ribbon or string around the cord in two places a hand width apart so blood can no longer flow through the cord. Then cut the cord in between the two ribbons.

Access help

- EMS may be appropriate in many cases of childbirth, or the woman may have a preferred midwife or birth attendant. Consider contacting another local midwife or other community health worker if these are not available.
- Phone EMS, medical facilities (or another healthcare provider) as they will be able to tell you what to do and support you.
- Tell EMS (or chosen healthcare provider) about any changes in the woman or baby's condition.

Education considerations

Context considerations

- Childbirth has very strong social and cultural references and expectations. Programme designers should adapt the learning to address local cultures and contexts.

Learner considerations

- Childbirth can be unpredictable, so parents-to-be in any context should consider learning this topic. Emphasis on the natural process of birth is important to reduce their anxiety.
- In remote areas where it is difficult to travel or there is no accessible maternity service nearby, the partner and family members of a pregnant woman might also consider learning about this topic.
- In many countries, taxi drivers are a key learner audience for this topic.
- Learners more likely to do emergency childbirth in a car could learn and practise childbirth in the car. The mother could lie on the seat, with one foot on the floor and the other on the seat, with the knee and hip bent.
- Encourage community health workers and volunteers to understand this topic in the context of first aid, and to develop links with their local clinical team.
- People with varying gender identities can give birth (e.g., a man with a uterus). Be sensitive to gender identities in discussing this topic according to the needs of the audience and respecting all opinions without making value judgements.

Facilitation tips and tools

- Emphasise accessing medical help as soon as possible and supporting the woman through the childbirth process.
- Help learners understand the three phases of childbirth. Using pictures or diagrams can be helpful.
  1. Contractions and waters breaking.
  2. The birth itself.
  3. The expulsion of the afterbirth (placenta and umbilical cord).
- A woman who goes into childbirth unexpectedly might be very anxious. Allow learners to practise reassuring her, making her comfortable and helping her to breathe. Reassure learners by emphasising that during this time, if it is possible, they should be following the instructions of EMS (or another healthcare provider).
- A unique aspect of this first aid topic is the changing focus for the first aid provider, who initially needs to focus on the woman and her wellbeing, but then needs to care for two people once the baby is born. Primacy must be given to the woman until the baby is born.
- Use different learning materials and styles including discussion and storytelling to develop confidence in learners. Encourage those who have experienced childbirth (even if not as an emergency) to share their experiences with those who have not experienced it.
- If possible and appropriate, invite a midwife to the education session to talk to learners and answer their questions.

Learning connections

- A new-born baby may be or become unresponsive with abnormal breathing.
- A woman may experience severe bleeding during childbirth, and this may develop into shock.
- Emphasise hand hygiene.

Scientific foundation

Systematic reviews

No scientific evidence is available, which address specific issues of emergency birth, so the Centre for Evidence-Based Practice (CEBaP) extrapolated from “normal” deliveries.

Birth companion

There is evidence from one Cochrane systematic review including 26 clinical trials in favour of continuous support by a chosen birth companion. In making this evidence conclusion, a higher value was placed on subjective rating or feelings about the birth experience over the other outcomes.

It was shown that continuous support by a chosen birth companion resulted in a statistically significant decrease of the occurrence of negative ratings or feelings about the birth experience, compared to standard care.

In contrast, it was shown that continuous support by a chosen birth companion did not result in a statistically significant difference in the use of any analgesia or anaesthesia, synthetic oxytocin and the occurrence of spontaneous vaginal birth, compared to standard care.

Furthermore, a statistically significant decrease of caesarean birth or admission to special care nursery, using continuous support by a chosen birth companion compared to standard care, could not be demonstrated. Evidence is of moderate certainty and results cannot be considered precise due to the large variability of results and the low number of events.

Massage during delivery

There is low-certainty evidence from one systematic review in favour of massage (of the lower back).

- It was shown that massage resulted in a statistically significant reduced pain intensity in the first stage of labour, compared to usual care. However, a statistically significant difference could not be demonstrated for pain intensity in the second and third stage of labour, or the use of pain relief.
- It was shown that massage resulted in a statistically significant reduced anxiety in the first phase of the labour, compared to usual care. However, a statistically significant difference could not be demonstrated for anxiety in the second and third stage of labour.
- It was shown that massage resulted in a statistically significant reduced risk of resuscitation of the new-born, compared to usual care. However, a statistically significant difference could not be demonstrated for admission to a neonatal intensive care unit.
- It was shown that massage resulted in a statistically significant reduced risk of perineal trauma, compared to usual care. However, a statistically significant difference could not be demonstrated for postpartum haemorrhage.

Relaxation

There is limited evidence from ten randomised controlled trials included in one Cochrane review in favour of relaxation, yoga or music.

Low-certainty evidence from two randomised controlled trials showed that relaxation resulted in a statistically significant reduced pain intensity (latent phase) and increased satisfaction with pain relief, compared to usual care. However, a statistically significant difference in pain intensity (active phase), pain intensity (total score), satisfaction with childbirth experience, length of labour, assisted vaginal birth, Caesarean section, use of pharmacological pain relief, anxiety, or fatigue in labour, compared to usual care, could not be demonstrated in four studies.

Low-certainty evidence from two randomised controlled trials showed that yoga resulted in a statistically significant reduced pain intensity (latent phase), increased satisfaction with pain relief in labour (latent phase), increased satisfaction with childbirth experience, reduced length of labour, decreased use of pharmacological pain relief, compared to usual care or supine position. However, a statistically significant difference in the use of pharmacological pain relief or need for augmentation with oxytocin compared to usual care, could not be demonstrated in one study.

Low-certainty evidence from two randomised controlled trials showed that music resulted in a statistically significant reduced pain intensity (latent or active phase or transition) and reduced anxiety (transition) compared to usual care or blank CD.

However, a statistically significant difference in Caesarean section, anxiety (latent or active phase), assisted vaginal birth, admission to special care nursery, use of pharmacological pain relief or length of labour, compared to usual care or blank CD could not be demonstrated in one study.

Restriction of oral fluid and food intake

Moderate-certainty evidence from one Cochrane systematic review could not demonstrate a statistically significant improvement in health-related maternal or foetal outcomes, using any or complete restriction of oral fluid and food compared to some fluid and food or freedom to eat and drink.

Heat or cold application

CEBaP identified low-certainty evidence (downgraded for risk of bias and imprecision due to the low number of events and wide confidence intervals) from one Cochrane systematic review neither in favour of heat nor cold application. It was shown that warm compresses resulted in a statistically significant decreased risk of 3rd or 4th-degree tears, compared to hands-off or no warm compresses. However, a statistically significant difference in intact perineum, perineal trauma not requiring suturing, perineal trauma requiring suturing, 1st, 2nd, 3rd or 4th-degree tear or episiotomy, using warm compresses compared to hands-off or warm compresses could not be demonstrated. In addition, a statistically significant difference could not be demonstrated for 1st-degree tear or episiotomy using cold compresses compared to no compresses.

Body position

First phase of labour

CEBaP identified moderate-certainty evidence (downgraded for risk of bias) from one Cochrane systematic review, showing that an upright position (sitting, standing or walking) seems to have better maternal outcomes than a lying position during the first phase of labour.

It was shown that **upright and ambulant positions** resulted in a statistically significant decreased duration of first stage labour, a decreased risk of caesarean birth and a decreased risk of maternal pain, compared to recumbent positions and bed care (Lawrence 2013). However, a statistically significant difference in spontaneous vaginal birth, operative vaginal birth, maternal satisfaction, maternal comfort, maternal anxiety, duration of second stage of labour, augmentation of labour using oxytocin, artificial rupture of membranes, estimated blood loss >500 mL, perineal trauma, using upright and ambulant positions compared to recumbent positions and bed care, could not be demonstrated.

It was shown that **sitting** resulted in a statistically significant decreased duration of first stage labour and a decreased risk of operative vaginal birth, compared to lying down, lying on the back or laying on the side. However, a statistically significant difference in spontaneous vaginal birth and caesarean birth, using sitting position compared to the lying down positions, could not be demonstrated. Furthermore, a statistically significant difference in duration of first labour, and caesarean birth when sitting compared to bed care, could not be demonstrated.

It was shown that **walking** resulted in a statistically significant increase in spontaneous vaginal birth, a decreased duration of first stage labour and a decreased risk of operative vaginal and caesarean birth, compared to recumbent/supine/lateral positions. Furthermore, a statistically significant difference in duration of first labour, spontaneous vaginal birth, operative birth and caesarean birth, using walking compared to bed care, could not be demonstrated.

A statistically significant difference in the duration of first labour, spontaneous vaginal birth, operative birth and caesarean birth, when **sitting, standing, squatting, kneeling or walking** compared to lying down on the back or side, could not be demonstrated.

There is low-certainty evidence from one Cochrane systematic review showing that a statistically significant difference in foetal distress, use of neonatal mechanical ventilation, Apgar scores and perinatal mortality, using upright and ambulant positions compared to recumbent positions and bed care, could not be demonstrated.

Second phase of labour

During the second stage of labour, the effects are less straightforward. Delivery appears to proceed faster in an upright position, with less assisted births and a lower risk of abnormal heart rhythms in the foetus. But this is at the expense of perineal tearing and a higher risk of a lot of blood loss than with a lying position.

CEBaP identified moderate-certainty evidence (downgraded for risk of bias) from one Cochrane systematic review showing that any upright position resulted in a statistically significantly decreased risk of assisted delivery and duration of the second stage of labour, compared to the supine position.

In contrast, it was shown that any upright position resulted in a statistically significantly increased risk of second-degree perineal tears and episiotomy and an increased risk of blood loss greater than 500mL, compared to the lying on the back. Furthermore, a statistically significant difference in any analgesia or anaesthesia during the second stage of labour, caesarean section, 3rd and 4th-degree tears and the need for blood transfusion, using any upright position compared to lying on the back, could not be demonstrated.

In addition, CEBaP identified low-certainty evidence (downgraded for risk of bias and imprecision due to the low number of events) from one Cochrane systematic review showing that any upright position resulted in a statistically significant decreased risk of abnormal foetal heart rate, compared to the supine position. However, a statistically significant difference in perinatal mortality, using any upright position compared to the supine position, could not be demonstrated.

Early skin-to-skin contact

There is low-certainty evidence from one Cochrane systematic review in favour of skin-to-skin contact between the mother and the baby, immediately after the baby is born, which would improve breastfeeding, infant and maternal outcomes. It was shown that skin-to-skin contact resulted in a statistically significant increased number of mothers breastfeeding 1-4 months post-birth, increased duration of breastfeeding, increased number of mothers exclusively breastfeeding at hospital discharge to one-month post-birth, increased number of mothers exclusively breastfeeding 6 weeks to 6 months post-birth, increased success of first breastfeeding, increased successful first breastfeeding (IBFAT 10-12 or BAT 8-12), increased mean variation in maternal breast temperature 30-120 min post-birth, and reduced breast engorgement (pain, tension, hardness) three days post-birth, compared to standard care.

However, a statistically significant difference in the number of mothers with a breastfeeding status day 28 to 1-month post-birth, number of mothers breastfeeding 1-year post-birth, number of babies suckled during the first 2 hours post-birth, using skin-to-skin contact compared to standard care could not be demonstrated. It was shown that skin-to-skin contact resulted in a statistically significant increased SCRIP score first six hours post-birth, increased blood glucose (mg/dL) at 75-180min post-birth, increased infant axillary temperature 90-150min post-birth, increased number of infants who did not exceed parameters for stability, increased number of infants who did not cry >1 min during 90 min, decreased amount of crying in minutes during a 75-minute observation period, compared to standard care.

However, a statistically significant difference in respiratory rate 75-120min post-birth, heart rate 75-120min post-birth, number of infants transferred to the neonatal intensive care unit, infant body weight change (grams) day 14 post-birth, infant hospital length of stay in hours, using skin-to-skin contact compared to standard care could not be demonstrated.

It was shown that skin-to-skin contact resulted in a statistically significant reduced maternal state anxiety 8 hours to 3 days post-birth, increased PCERA dyadic mutuality and reciprocity 12m post-birth, increased mother's most certain preference for same post-delivery care in the future, compared to standard care.

However, a statistically significant difference for PCERA maternal positive affective involvement and responsiveness 12m post-birth, maternal parenting confidence at 1-month post-birth, maternal pain 4 hours post-caesarean birth, using skin-to-skin contact compared to standard care could not be demonstrated.

Cutting or clamping the umbilical cord (technique)

CEBaP could not identify any scientific studies on the umbilical cord cutting technique.

There is moderate-certainty evidence (downgraded for imprecision due to limited sample sizes and wide confidence intervals) from one Cochrane systematic review, neither in favour of early cord clamping (i.e. within 60 seconds of the birth of the infant) nor late cord clamping (after 60 seconds of the birth of the infant). There is insufficient evidence available to cord clamping for preterm babies who need resuscitation immediately after birth because these cases were mainly excluded or withdrawn from the Cochrane review.

Non-systematic reviews

A few scientific studies are available which focus on the risk of umbilical cord prolapse after the waters have broken (occurring approximately 0.4% of births) (Dekker, 2018). The outcomes of umbilical cord prolapse have improved within the past 10-20 years and more recent studies (from 2002-2012) show that deaths of babies related to umbilical cord prolapse have become extremely rare, mainly associated with prematurity.

Furthermore, there are no studies that test whether bed rest reduces the risk of cord prolapse in women with term PROM ("premature" rupture of membranes before the start of labour past 37 weeks of gestation) (Evidence-Based Birth).

Sore throat

Key action

Advise the person to take the recommended dose of paracetamol to relieve their pain.

Introduction

A sore throat is characterised by a dry, scratchy pain in the throat when swallowing. It can be caused by several conditions including a viral or bacterial infection (also known as a cold) and generally does not need medical treatment. However, a bacterial infection can be serious. A typical viral sore throat usually lasts up to seven days. Individuals between the ages of 5 to 24 are most likely to get a sore throat, especially during the early spring or winter months (Rughani, 2019). Sometimes a sore throat can be severe enough to cause the airway to swell. In these instances, the person should access medical care.

Guidelines

- Paracetamol can reduce the pain caused by a sore throat.**
- Drinking a hot drink may relieve the pain.*
- Medicated lozenges (containing benzocaine, hexylresorcinol or flurbiprofen) or mouth sprays (containing chlorhexidine gluconate and benzydamine hydrochloride) may relieve the pain.*
- Antibiotics should only be given if prescribed by a medical professional.*

Good practice points

- Nonsteroidal anti-inflammatory drugs (such as ibuprofen) can be used as a second-line treatment for sore throat, should paracetamol be ineffective.
- The first aid provider should encourage the person to drink water in small amounts.
- Harsh or high-pitched breathing sounds, the inability to swallow, severe pain or drooling are signs and symptoms of potential airway swelling that should receive urgent medical care.
- If a first aid provider suspects the person has a swollen airway, they should help the person rest in a comfortable position and access medical care.

Chain of survival behaviours

Prevent and prepare

- Avoid people who are sick with an infectious illness such as the flu or strep throat.
- Wash your hands with soap and water or use hand sanitizer to prevent the spread of the common cold (Allan & Arroll, 2014).
- Avoid smoking and smoky environments.

Early recognition

A person with a sore throat may:

- complain of a painful or dry, scratchy throat, especially when swallowing
- have swollen neck glands, redness at the back of the throat, swollen tonsils or whitish spots in the throat
- experience difficulty eating and drinking.

The person may also have pain in their ear, see Earache or Fever. Children in particular may experience vomiting or Abdominal pain.

First aid steps

1. Advise the person to take the recommended dose of paracetamol to relieve their pain.
2. Encourage the person to drink lots of water in small amounts. A hot drink may relieve their pain.
3. Consider advising the person to take medicated lozenges or mouth spray to soothe their throat.

Access help

- The first aid provider should access medical care if someone with a sore throat:
  > has difficulty breathing
  > also experiences fever, dehydration, a painful neck or a rash
  > is not able to drink
  > has severe pain
  > does not see any improvements after multiple days
  > is unable to manage ay secretions (e.g., drooling)
  > develops an earache
  > experiences a sore throat frequently.

Education considerations

Context considerations

- It can be difficult for people to identify the cause of a sore throat (viral, bacterial or environmental). Early actions, such as giving the ill person a drink, can help to eliminate some causes and help the learner to identify if the condition is more serious.
- Encourage learners to look for other signs and symptoms, and to consider causes, such as whether the person has been near another person who has a cold or flu, as this will help to inform treatment.
- In some contexts, local pharmacies can provide advice and treatment if the cause is viral and help identify if the cause is more serious and requires medical attention.
- Follow your national regulations on who can administer non prescribed painkillers as their regulations overrule these guidelines.

Facilitation tips and tools

- Pictures which illustrate signs of more serious medical conditions can be helpful for learners to understand if the person needs medical treatment.
- Emphasise that while most sore throats are usually not serious, they may be a symptom of a more severe condition and learners must recognise the situations in which to access medical care.
- Draw connections to other topics within first aid when exploring sore throat such as recognising signs of a serious illness, assessment skills (e.g., asking about the history of the person's symptoms). (See General approach.)

Scientific foundation

Systematic reviews

We identified four relevant evidence reviews on this topic, one by the British National Institute for Health and Care Excellence (NICE), two systematic reviews, and two evidence summaries from the Centre for Evidence-Based Practice (CEBaP).

Medication options

For their guideline on acute sore throat, NICE performed an evidence review that included self-care interventions to relieve the symptoms, such as paracetamol or ibuprofen, medicated lozenges and mouth sprays (2018).

No systematic reviews or randomised controlled trials were identified that compared non-medicated lozenges, non-medicated mouthwashes or any other non-pharmacological interventions with placebo or another intervention in people with acute sore throat.

Three randomised controlled trials found that aspirin, paracetamol and diclofenac potassium were all more effective than placebo at improving pain and reducing fever in adults with an acute sore throat, although it's not clear whether the improvements were clinically meaningful (low- to moderate- certainty evidence).

Results from six randomised controlled trials found statistically significant improvements in pain scores with medicated lozenges (containing benzocaine, hexylresorcinol or flurbiprofen) compared with placebo, although the absolute improvements were small and may not be clinically meaningful for some lozenges (low- to moderate-certainty evidence). In one randomised controlled trial that provided evidence on the effectiveness of a chlorhexidine gluconate and benzydamine hydrochloride mouth spray, the intensity of the clinical signs was statistically significantly decreased, and the reported health state was statistically significantly improved. No differences were observed in their quality of life (moderate- to high-certainty evidence).

A CEBaP evidence summary from 2020 on the use of paracetamol in case of sore throat identified eight randomised controlled trials. It was shown that paracetamol resulted in a statistically significant decrease of pain intensity (when swallowing), and a statistically significant increase in pain relief and change in the swollen throat, compared to placebo. A statistically significant change of sore throat (ordinal outcome), sore throat or time point or spontaneous pain, using paracetamol compared to placebo, could not be demonstrated in two studies. Evidence is of moderate certainty and results cannot be considered precise due to limited sample size and/or lack of data.

The Cochrane review (Spinks, 2013) determined that antibiotics can be used to treat a sore throat. While most people usually recover within five to seven days, some develop complications. A severe (but rare) complication is rheumatic fever, affecting the heart and joints. Additionally, antibiotics reduce the duration of strep throat symptoms (streptococcal infection) by an average of one to two days. However, these medications can also cause diarrhoea, a rash and other unfavourable side effects, and communities can build a resistance to them. The review concluded that the benefits do not outweigh the multiple and at times serious, side effects. The NICE guideline states additionally that antibiotics do not help throat pain caused by a virus (NICE, 2018).

Non-medication options

A CEBaP evidence summary found limited evidence in favour of consuming a hot drink (CEBaP, 2020). One uncontrolled before and after study showed that having a hot drink resulted in a statistically significant decrease in the symptoms of sore throat. A statistically significant decrease in symptoms of a sore throat when having a drink at room temperature, could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to limited sample size and lack of data.

Non-systematic reviews

Limited evidence states that frequently gargling with warm water and salt may help to reduce episodes of upper respiratory tract infection (Allan and Arroll, 2014).

We also reviewed two papers on the condition epiglottis, a type of airway swelling, that has decreased over the last 20 years because of immunisation; however, it is still prevalent in un-immunised populations. Unimmunised people are at risk: children, people in areas with no immunisations, people over 45 with outdated immunisations. Inflammation of the epiglottis and surrounding tissues can lead to a narrowing of the airway and produce specific stridor (high-pitched, abnormal breathing sounds). People with epiglottis could initially have a sore throat, fever and breathing difficulty. They also characteristically do not have a cough. First aid providers should help the person to take the position in which they are most comfortable and help them access medical care immediately (Lindquist et al., 2017; Adil et al., 2015).

Earache

Key action

Advise the person to take the recommended dose of an over-the-counter painkiller (e.g., paracetamol).

Introduction

An earache is pain in the outer, middle or inner ear, usually caused by an infection or build-up of pressure behind the eardrum. Earache is most common in children.

Guidelines

- If trained and it is safe to do so, first aid providers may give the person paracetamol for pain relief.*

Good practice points

- A source of heat can be held against the affected area and may reduce pain.
- Advise the person not to pick their ear.
- Medical advice should be sought when there is fever, fluid draining from the ear, vertigo, loss of or decreased hearing associated with ear pain.
- The person should seek medical advice if the symptoms don't get better (or get worse) within 48 hours.

Chain of survival behaviours

Prevent and prepare

- Teach children to avoid putting objects in their ears, such as cotton swabs or buds, or pencils.
- People using noisy equipment should use ear defenders to reduce noise below 85 decibels.
- Be alert to earache in people who use a hearing aid or who listen to music through headphones.
- Be alert to earache in people who spend a lot of time in the water, have an abscess or infection in their gums or have had a cold or flu.
- Keep ears warm and dry where possible.

Early recognition

- The person may complain of pain, hearing changes or sensation of fullness in their ear.
- The ear may be hot or sensitive to touch.

First aid steps

1. Help the person to take the recommended dose of an over-the-counter painkiller (e.g., paracetamol) to reduce pain.

2. Give them a warm compress such as a hot water bottle wrapped in a towel to hold against their ear to reduce pain.

Access help

- Seek medical advice if there is discharge coming from the ear, hearing loss, vertigo or fever. Seek medical advice if the earache does not improve within 48 hours.

Education considerations

Learner considerations

- Individuals who look after children or spend time in water contexts (e.g., public swimming pool) could benefit from learning about earaches.

Scientific foundation

Systematic Reviews

As a scientific foundation for this topic, three evidence summaries from the Centre for Evidence-Based Practice (CEBaP) and an additional systematic review were used.

An evidence summary about using paracetamol in case of earache resulted in the identification of a Cochrane systematic review, which included one randomised control trial. It was shown that paracetamol resulted in a statistically significant decrease in pain in the ear compared to no paracetamol. Evidence is of low certainty and results cannot be precise due to limited sample size.

An evidence summary about heat or cold application in case of earache, as well as an evidence summary about posture in case of earache, could not identify any studies.

Additional information

Earache is an infection of the middle ear that causes inflammation and a build-up of fluid behind the eardrum. An earache can develop from inflammation of the outer, middle or inner ear and is often caused by an infection in case of a cold or flu (Pukander, 1983). An ear can become painful if an object is stuck in the ear canal. Pain from a tooth, such as an abscess can also cause an earache. An earache can cause temporary hearing loss and infection can cause pus to gather in the middle of the ear, causing the eardrum to rupture.

Acute earache predominantly occurs in children. Canadian research shows that babies between six and 15 months old are most commonly affected (Casselbrant and Mandel, 2003). It's estimated that around one in every four children experience at least one middle ear infection by the time they're 10 years old. Medical care should be sought when there is fever, ear drainage, vertigo, loss of hearing or decreased hearing associated with ear pain (Worral, 2011).

An outer ear infection is one of the more common diseases and is also frequently encountered in primary and paediatric care. More than 90% of the cases are due to bacteria (Wiegand et al., 2019). An outer ear infection is thought to affect 10% of people at some stage and can present in acute, chronic, or necrotising forms. The inflammation may be associated with eczema of the ear canal, and is more common in humid environments, in people with narrow ear canals, who swim regularly or use a hearing aid, and after mechanical trauma, such as from ear cleaning or earphones that go into the canal.

Outer ear infection ranges in severity from a mild infection of the external auditory canal to a life-threatening infection. Pain relief is an essential part of the treatment of outer ear infection (Wiegand et al., 2019) The treatment should be done by a general practitioner. Individuals should not clean their ears with cotton swabs, because they may damage them and encourage bacterial invasion.

It has been estimated that in around 80% to 85% of children with an earache, the fever and pain resolve within two to three days. After seven days, the absence of all symptoms and signs (except for middle ear effusion) can be expected. The use of nasal drops or spray containing xylometazoline has no effect on earache and is not recommended (Coleman et al., 2008).

Headache

Key action

Advise the person to take the recommended dose of an over-the-counter painkiller (e.g., paracetamol).

Introduction

Headaches are a common condition. Typical symptoms include a mild to painful throbbing or tight sensation in the head, pain behind the eyes (especially when looking at bright lights), dizziness, and in more extreme cases nausea or vomiting. A migraine is a type of headache that is often reoccurring. Usually, a headache does not have a serious cause and will pass, however, in some cases, it can indicate a more serious condition. First aid providers should seek to understand the probable cause of the headache.

Guidelines

- If a person experiences a tension-type headache or an acute migraine headache, the first aid provider should advise them to take 1000 mg of paracetamol or nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen.**

Good practice points

- Paracetamol and other painkillers should only be used if a headache results from minor causes such as tiredness or stress.
- Applying an ice pack or cold compress to the head or back of the neck may provide relief from migraine symptoms.
- Bright lights (e.g., from an office or phone screen) may make a headache or migraine worse. If the individual with either condition is sensitive to light, they should sit or lie in a dark or dimly lit room to increase comfort and reduce the pain.
- Individuals with a headache should get fresh air, enough sleep, regularly drink water (see Dehydration) and take time to relax.

Chain of survival behaviours

Prevent and prepare

- Understanding the causes of headaches can help to prevent their occurrence. Headaches can be caused by:
  - Stress
  - Poor sleep
  - Flu or cold
  - Meningitis
  - Hyperthermia
  - Head injury
  - Dehydration
  - Alcohol consumption
- The use of painkillers such as paracetamol is most effective when taken at the early stages of the onset of pain. Taking a painkiller at the first sign of a headache may prevent a more severe one from developing.

Early recognition

A person may have a headache if they:

- have pain behind their eyes
- feel a tightness around their head
- have painful throbbing in their head
- have an increased sensitivity to noise or light
- are nauseous.

The condition may indicate another more severe condition if the headache is accompanied by:

- fever
- vomiting
- skin rash
- memory loss
- neck pain or stiffness
- coordination problems
- problems with eyesight
- drowsiness or sleepiness

NOTE

The pain caused by a headache can range in frequency and severity.

First aid steps

1. Reduce anything that may worsen the headache (such as direct sunlight or noise).
2. Advise the person to take 1000 mg of paracetamol.
3. Advise them to rest in a dark, quiet room. It might help to put an icepack or cold compress on their head or neck.

Access help

Sometimes headaches can indicate a more serious disorder. Access emergency medical care if the headache is severe and is accompanied by:

- vomiting
- a sore or stiff neck
- a rash, as this may indicate meningitis
- memory loss
- double or blurred vision
- fever
- signs of a Stroke.

Or if the severe pain:

- follows a Head injury
- becomes worse very fast
- occurs during exertion (e.g., exercise) or a change in posture
- started suddenly within the last three months of pregnancy
- does not go away even after taking painkillers or reducing potential causes.

Recovery

- Continue taking painkillers for frequent tension headaches if it is safe to do so.
- Follow any recovery instructions from the healthcare professional.

Education considerations

Context considerations

- Areas with limited resources may not have painkillers readily available. Emphasise rest, hydration, relaxation techniques and a cool cloth on the forehead or neck as effective first aid support for mild headaches.
- Follow your local regulations on who can administer non prescribed painkillers as the regulations overrule these guidelines.

Facilitation tips

- Plan to facilitate the topic of headaches after other critical first aid skills so that learners are better able to contextualise what a headache might indicate.
- Emphasise that while most headaches are usually not serious, they may be a symptom of a more severe condition and learners must recognise the situations in which to access medical care.
- Use scenarios as a way to connect headaches to other illnesses and injuries within first aid. For example, run two to three scenarios where the person's headache is caused by something different. Learners must identify what the cause is and provide appropriate care.

Learning connections

- Use this topic to practise assessment skills such as asking about the history of the person's symptoms. (See General approach.)
- Draw connections to other topics within first aid when exploring headaches such as recognising signs of meningitis, Head injury and Stroke.

Scientific foundation

Systematic reviews

We used a 2020 evidence summary by the Centre for Evidence-Based Practice (CEBaP), as well as an additional systematic review from 2010 on the topic of headaches.

CEBaP identified a Cochrane systematic review, including 23 randomised controlled trials, on the use of paracetamol for tension-type headaches, and selected five relevant randomised controlled trials from a second Cochrane review about the use of paracetamol for acute migraine headaches.

There is limited evidence in favour of using paracetamol for acute migraine headaches. It was shown that 1000 mg paracetamol resulted in a statistically significant decrease of acute migraine headache, adverse events, functional disability and use of rescue medication compared to placebo. Evidence is of moderate certainty and results cannot be considered precise due to the low number of events and large variability of results.

In addition, there is high-certainty evidence in favour of using paracetamol for tension-type headache. It was shown that 1000 mg paracetamol resulted in a statistically significant decrease of tension-type headache and use of rescue medication, compared to placebo. A statistically significant decrease of tension-type headache and use of rescue medication, using 500-650 mg paracetamol compared to placebo, could not be demonstrated.

A systematic review from 2010 (Verhagen et al., 2010) evaluated the effectiveness of NSAIDs in people with tension-type headache. The evidence showed that NSAIDs are more effective than a placebo medication for short-term pain relief. When comparing NSAIDs and paracetamol there was a significant difference in favour of using NSAIDs. The review found no significant differences between the different types of NSAIDs, but ibuprofen showed fewer short-term side effects.

This review also concluded there is insufficient evidence for or against the effectiveness of the preventive medication, physiotherapy, (spinal) manipulation or cognitive behavioural treatment in people with tension-type headache.

Non-systematic reviews

One randomised controlled crossover clinical trial evaluated the benefits of cooling the blood that passes through the carotid arteries versus no cooling treatment. An adjustable wrap containing two ice packs targeting the carotid arteries at the neck (where they come close to the skin's surface) was used as the cooling mechanism. A total of 55 participants completed the study successfully. They observed maximum pain reduction at 30 minutes, with a 31.8 ± 15.2 per cent decrease in pain in the treatment arm (where cooling was applied) compared to a 31.5 per cent ± 20.0 per cent increase in pain at the same time interval in the control arm (no cooling). The study found that a frozen neck wrap, applied at the onset of a migraine, targeting the carotid arteries in the neck, significantly reduced the pain for participants with a migraine ($p<.001$) (Sprouse-Blum et al., 2013).

Hiccups

Key action

Comfort and reassure the person.

Introduction

A hiccup is a sudden contraction of the muscles (diaphragm) that help a person to breathe in, that repeats several times per minute. During a hiccup, the muscle contraction causes the person to take in a quick breath. This breath in is then interrupted by the epiglottis closing over the windpipe and causing a "hic" sound. Short hiccup spells are commonly experienced by healthy children and adults. Adult males are more likely to experience episodes of hiccups (Lee et al., 2016).

Good practice points

- Home remedies such as holding the breath for a couple of seconds, doing the Valsalva manoeuvre for a short time, sipping ice-cold water, swallowing some granulated sugar, biting into a lemon or tasting vinegar may be effective and may be attempted.
- The use of gripe water is not recommended.
- A person with hiccups should seek medical advice if hiccups last longer than 48 hours or if they have other symptoms in combination with hiccups, such as chest pain, weakness in their limbs or face, headache or trouble keeping balance.

Chain of survival behaviours

Prevent and prepare

- Giving babies a break from feeding and burping them may reduce the amount of air in their stomach and could help prevent hiccups.
- Eating slowly and avoiding alcohol may help reduce the likelihood of hiccups.

Early recognition

- A person with hiccups will take a short breath inward followed by a "hic" sound. This can occur between 2 and 60 times per minute.

First aid steps

1. Comfort the person and reassure them that hiccups usually pass after a few minutes.
2. If they can, encourage them to perform the Valsalva manoeuvre (take a deep breath in, close the nose and mouth and gently blow out) for a short time.

There are other methods to stop hiccups which may be more suited to some contexts.

- Drink a glass of ice-cold water.
- Suck a sugar cube or an ice cube.
- Bite into a lemon.
- Hold your breath for a couple of seconds.

Access help

- Generally, hiccups pass within a few minutes. Seek medical advice if the hiccups last longer than 48 hours or if the person has other symptoms in combination with hiccups, such as chest pain, weakness in their limbs or face, headache or trouble keeping balance.

Education considerations

Learner considerations

- This topic may be useful for some audiences such as school nurses, new parents or other people who care for children.

Facilitation tips

- Define what a hiccup is and how it happens and discuss different safe home remedies.

Scientific foundation

Systematic reviews

The Centre for Evidence-Based Practice (CEBaP) developed an evidence summary concerning techniques to stop hiccups, but no studies could be identified.

Non-systematic reviews

Hiccups are classified based on their duration. Short hiccup spells are commonly experienced by healthy children and adults. Hiccups resolve spontaneously or maybe with simple home remedies and do not require medical attention. Short hiccup bouts are mostly associated with gastric distention, like drinking carbonated beverages or ingestion of spicy, very hot or very cold food, or alcohol intake. In the foetus, hiccups are normally present after the eighth week of gestation during behavioural active phases and tend to persist after birth in babies (Launois et al., 1993).

Babies often get hiccups when feeding. Hiccups do not normally harm a baby and will go away once the baby is one year old. Usually, a baby will have the hiccups for only a few minutes. Taking a break from feeding, to burp the baby, may reduce the amount of air in their stomach - can and prevent hiccups. No scientific evidence has been found for the use of gripe water (a mixture of herbs and water traditionally used to treat colic and other stomach problems). It is not recommended for babies (Adhisivam, 2012).

The purpose of some home-remedies is the attempt to interrupt the reflex arc thought to maintain repetitive diaphragmatic contractions. This is most often attempted by breath-holding, the Valsalva manoeuvre (a particular way of breathing that increases pressure in the chest) or breathing into a paper bag. Other home remedies to stop hiccups on a short term include sucking an ice cube, sucking a sugar cube with vinegar, chewing a piece of lemon, stop breathing and scaring someone with hiccups. These home-remedies are in general not harmful and may be effective only in shortening acute hiccups and not in the treatment of persistent or recurrent hiccups (Brañuelas Quiroga et al., 2016; Goldstein, 1999).

Prolonged hiccups are rare in healthy people. However, hiccups lasting more than 48 hours are not uncommon in people with advanced disease. They are disabling and may induce depression, weight loss and sleep deprivation. A wide variety of pathological conditions can cause chronic hiccups including myocardial infarction, brain tumour, renal failure, prostate cancer and abdominal surgery (Brañuelas Quiroga, 2016; Juan Rey, 2010). Any hiccup episode lasting longer than 48 hours is described as chronic and needs medical attention (Petroianu, 2005).

Environmental

Hyperthermia

Key action

Rapidly cool the person to reduce their body temperature.

Introduction

Hyperthermia is a condition in which the body reaches abnormally high temperatures because it cannot regulate its internal temperature. It is caused when the body produces or absorbs too much heat or both. Hyperthermia can be mild (heat exhaustion) or severe (heatstroke). A person can experience hyperthermia through intense physical activity or from being in a very hot environment. Children and the elderly are most at risk. If left untreated, heatstroke can lead to a seizure or a coma, and be life-threatening.

Guidelines

- In the case of an adult experiencing hyperthermia due to intense physical activity, the first aid provider should consider immersing the person from the neck down in cold water (1-26° C/33.8-78.8°F) until a core body temperature of less than 39°C (102.2°F) is reached. If this is not possible, they may cool the person using any other active cooling technique (e.g. with a wet sheet, water or icepacks placed in the armpits, neck and groin area).*

Good practice points

- The person should stop all physical activity and be removed from the hot environment to a cool place.
- For people with hyperthermia due to intense physical activity, first aid providers can also consider using any other immediate active or passive cooling techniques available to them (e.g. cold-water immersion of hands or feet, icepacks, cold showers, fanning, ice-sheets and towels).
- If the person has hyperthermia due to intense physical activity and they are responsive enough, they may have something cool to drink. This may include water or a water and sugar and salt solution (e.g. homemade oral rehydration solution or sports drink). See Dehydration.
- The first aid provider should access emergency medical services (EMS) if the person:
  - shows unusual behaviour, confusion or becomes unresponsive
  - has a seizure
  - has a body temperature above 39°C (102.2°F)
  - stops sweating
  - cannot drink without vomiting.

Chain of survival behaviours

Prevent and prepare

- Wear appropriate clothing for the temperature and activity.
- Limit physical activities during the hottest part of the day.
- Take frequent breaks to drink water.
- In places where there is a high risk of hyperthermia, consider how to make cooling methods available so there is no delay in first aid when hyperthermia occurs.

Early recognition

The person's condition will depend on how much the body has overheated.

Mild to moderate hyperthermia (heat exhaustion)

- Normal or mildly higher temperature
- Cool, pale, clammy skin
- Excessive sweating
- Thirsty
- Headache
- Muscle cramps
- Rapid, weak pulse
- Fainting or dizziness

Severe hyperthermia (heatstroke)

- The person has stopped sweating (indicating they are severely dehydrated)
- High body temperature (above 40°C/104°F)
- Dry, flushed, hot skin
- Nausea
- Muscle spasms
- Pain throughout the body
- Unusual behaviour or signs of confusion
- Seizure or possible loss of responsiveness

First aid steps

1. Advise the person to stop all physical activity. Help them to rest in a cool place and to remove any excess clothing.

2. If the person is showing signs of severe hyperthermia, (see signs above), immediately start cooling them down. Immerse them in cold water (1-26° C/33.8-78.8°F) for around 15 minutes, or until their temperature has dropped to less than 39°C (102.2°F). If this is not possible (e.g., cold water is unavailable or the person is confused and refuses), cool the person using any other active cooling technique (e.g., place a cool, wet sheet on the person or wet them with cold water and place ice packs on their neck and groin areas). Fanning them may also increase the cooling action.

3. Access EMS.

4. If the person is showing signs of mild to moderate hyperthermia, (see signs above), cool them off using any technique available such as immersing their hands and feet in cold water, applying ice-packs to their neck and groin area, encouraging them to have a cold shower, or fanning them. Give them some water to drink. Sports drinks or cold tea may also be helpful.

5. Monitor the person's temperature and level of response. Try to reduce their temperature to less than 39°C.

Access help

- If the person shows signs of severe hyperthermia, access emergency medical care immediately. Severe hyperthermia can be life-threatening.
- A person with mild to moderate hyperthermia will usually recover without medical care. Monitor them closely in case their condition does not improve or worsens. And access medical care if in any doubt.

Recovery

Keep the person cool and encourage them to rest. In most cases, people with mild to moderate hyperthermia will recover fully.

Education considerations

Context considerations

- Programme designers should consider any cultural or legal implications involved with removing the person's clothing and emphasise the importance of dignity to learners.
- In areas where ice or cold water is not readily available, identify the cooling methods that may be available to them such as removing the person from the heat, wetting them, fanning them, encouraging rest and removing any excess clothing.

Learner considerations

- Athletes and older adults are important learner audiences on which to focus. Athletes may have greater exposure to heat and older adults are at a higher risk of hyperthermia.

Facilitation tips

- Focus on prevention and help learners to recognise the warning signs of hyperthermia so they can take preventative action before it happens.
- The key action is to cool the person quickly, so the first aid provider needs to prioritise readily available cooling methods.
- Emphasise the temperature that the body should be reduced to 39 °C (102.2°F) and not less.

Learning connections

- Combine this topic with other first aid emergencies (such as breathing difficulties or seizures) so learners can recognise and differentiate the symptoms of hyperthermia.
- Dehydration is common in people with hyperthermia.

Scientific foundation

Systematic reviews

The International Liaison Committee on Resuscitation (ILCOR) first aid task force completed a systematic review on different techniques for cooling of heatstroke and exertional hyperthermia (Douma, 2020), and the Centre for Evidence-based Practice (CEBaP) developed evidence summaries about the reduction of activity and drinking (2020).

Coldwater immersion (14°C–15°C/57.2°F–59°F)

The following studies all relate to adults with exertional hyperthermia. In seven non-randomised controlled trials, a faster rate of core body temperature reduction was found with cold water immersion of the torso compared with passive cooling (low certainty of evidence). In three controlled trials, no significant mean difference in the rate of core body temperature reduction was found with cold water immersion of the torso compared with temperate-water immersion (20°C-26°C/68°F-78.8°F) (very low certainty evidence). One controlled trial showed no significant mean difference in the rate of body temperature reduction with the use of cold water immersion (14°C/57.2°F) of the torso compared with the use of colder-water immersion (8°C/46.4°F) (low certainty evidence). Two controlled trials showed no significant mean difference in the rate of body temperature reduction with the use of cold water immersion (14°C/57.2°F) of the torso compared with ice-water immersion (2°C-5°C/35.6°F-41°F) (very low certainty evidence).

Coldwater immersion (10°C–17°C/50.0°F–62.6°F) of hands and feet

In six controlled trials, a faster rate of core body temperature reduction was found with cold water immersion of hands and/or feet (10°C-17°C/50.0-62.6°F) compared with passive cooling in adults with exertional hyperthermia (moderate certainty evidence).

Colder-water immersion (9°C–12°C/48.2°F–52.6°F)

The following studies in this paragraph relate to adults with exertional hyperthermia. In three non-randomised controlled trials, a faster rate of core body temperature reduction was found with the use of colder-water immersion of the torso (9°C-12°C/48.2°F-52.6°F) compared with passive (moderate certainty evidence). One controlled trial did not show a significant mean difference in the rate of core body temperature reduction with the use of colder-water immersion (9°C/48.2°F) up to the waist compared with passive cooling (low certainty evidence). One controlled trial showed a faster rate of core body temperature reduction with the use of colder-water immersion of the torso (11.7°C/53.0°F) compared with temperate water (23.5°C/74.3°F) (moderate certainty evidence). One controlled trial showed no significant mean difference in the rate of core body temperature reduction with the use of colder-water immersion of the hands or feet (10°C-12°C/50.0°F-52.6°F) compared with the use of colder-water immersion of the torso (low-certainty evidence).

Ice-Water Immersion (1°C–5°C/33.8°F–41.0°F)

In one small cohort study where ice-water immersion of the torso (5°C-10°C/33.8°F-41°F) together with the administration of intravenous normal saline at room temperature 0.9% were compared with applying ice-packs to the armpits in adults with exertional heatstroke, showed no deaths in either group (very low-certainty evidence). In four non-randomised controlled trials in adults with exertional hyperthermia and one cohort study on people with exertional heatstroke, a faster rate of core body temperature reduction was shown when comparing ice-water immersion of the torso (1°C-5°C/33.8°F-41°F) with passive cooling (low-certainty evidence). The same was found in two non-randomised controlled trials comparing ice-water torso immersion (2°C/35.6°F) with temperate-water immersion (20°C– 26°C/68.0°F –78.8°F) (moderate-certainty evidence). In one small cohort study in adults with exertional heatstroke where ice-water immersion (5°C-10°C/33.8°F-41.0°F) combined with the administration of intravenous 0.9% normal saline was compared with applying icepacks to the armpits (low certainty evidence).

Evaporative cooling (mist and fan)

Two controlled studies in adults with exertional hyperthermia showed no significant mean difference in the rate of core body temperature reduction with evaporative cooling compared with passive cooling (low-certainty evidence). Two controlled trials showed no significant mean difference in the rate of core body temperature reduction with evaporative cooling compared with the use of ice-packs applied to the neck, armpit and groin (one trial, low-certainty evidence), or compared with the use of commercial ice-packs applied to the neck, armpit and groin (one trial, low-certainty evidence). One controlled trial showed no significant mean difference in the rate of core body temperature reduction with the use of evaporative cooling and commercial icepacks to the neck, armpit and groin compared with evaporative cooling alone (low-certainty evidence). One controlled trial showed no significant mean difference in the rate of core body temperature reduction with the combined use of evaporative cooling and commercial icepacks to the neck, armpit and groin, compared with passive cooling (low-certainty evidence).

Commercial icepacks

Two controlled trials in adults with exertional hyperthermia showed no significant mean difference in the rate of core body temperature reduction with the use of commercial icepacks to the neck, groin and armpits compared with passive cooling (low-certainty evidence). One controlled trial in adults with exertional hyperthermia showed no significant mean difference in the rate of core body temperature reduction with the use of commercial icepacks to the whole body compared with passive cooling (low-certainty evidence). One controlled trial in adults with exertional hyperthermia showed a faster rate of core body temperature reduction when applying commercial ice-packs to the cheeks, palms, and soles compared with passive cooling, as well as when compared with applying commercial ice-packs applied to the neck, groin and armpit (moderate certainty evidence).

Fan alone
Two controlled trials in adults with exertional hyperthermia showed no significant mean difference in the rate of core body temperature reduction with the use of fanning alone compared with passive cooling (low-certainty evidence).

Cold shower (20.8°C/69.4°F)
In one non-randomised controlled trial in adults with exertional hyperthermia, a faster rate of core body temperature reduction was found with cold showers compared with passive cooling (moderate-certainty evidence).

Hand-cooling devices
Three controlled trials in adults with exertional hyperthermia showed no significant mean difference in the rate of core body temperature reduction with the use of hand-cooling devices compared with passive cooling (low certainty evidence).

Cooling vests and jackets
Two controlled trials in adults with exertional hyperthermia showed no significant mean difference in the rate of core body temperature reduction with the use of the Arctic Heat cooling jacket compared with passive cooling (low certainty evidence). Five controlled trials in adults with exertional hyperthermia compared the use of various cooling vests with passive cooling. None of the studies showed a significant mean difference in the rate of core body temperature reduction when compared with passive cooling (very low certainty evidence).

Reflective blankets
One controlled trial in adults with exertional hyperthermia showed no significant mean difference in the rate of core body temperature reduction with the use of reflective blankets compared with passive cooling (low certainty evidence).

Physical activity
There is limited evidence from one observational case-control study in favour of reducing physical activity. The study showed that decreasing activity resulted in a statistically significant decrease in the risk of heatstroke during heat waves. Evidence is of very low certainty and results cannot be considered precise due to lack of data. (CEBaP, 2020.)

Drinking fluids
There is limited evidence from one observational case-control study in favour of taking in extra liquids. The study showed that taking in extra liquids resulted in a statistically significant decrease in the risk of heatstroke during heat waves. Evidence is of very low certainty and results cannot be considered precise due to a lack of data. (CEBaP, 2020.)

Dehydration

Key action

Give the person plenty of fluids to drink.

Introduction

Dehydration is a shortage of water in the body and occurs when a person loses more fluid than they take in. It can result from a range of conditions (vomiting, diarrhoea, heat stress, fever, etc.), vigorous activity in hot and humid environments or when wearing excess clothing. These conditions cause a significant loss of water in the forms of sweat and other body fluids. They also cause the person to lose electrolytes, which are essential for the body to function normally. When the body is dehydrated, it can experience cramps, changes in mental capacity or even shock (which can be life-threatening if left untreated), especially in small children or older adults.

Guidelines

- First aid providers should motivate people with mild dehydration to drink enough fluids (e.g., water or diluted apple juice in children older than 6 months).**
- In more severe cases, first aid providers should rehydrate the person using either commercially prepared oral rehydration salts (ORS) or a pre-prepared salt package that complies with the World Health Organisation's recommendations for ORS solutions.**
- First aid providers could use 3 to 8 percent carbohydrate-electrolyte drinks for exertion-related dehydration. If these are not available or not tolerated, alternative beverages include water, 12 percent carbohydrate-electrolyte solution, coconut water, two per cent milk, tea-based carbohydrate-electrolyte drinks or caffeinated tea.*
- Breastfeeding for babies should be continued.**

Good practice points

- Breastfed babies generally receive less milk each time they feed, and therefore require breastfeeding more frequently than bottle-fed babies.
- Bottle-fed babies should receive normal amounts of milk (powder dissolved in water, not in oral rehydration solution), supplemented with oral rehydration solution.
- Emergency medical services (EMS) should be accessed if the person's responsiveness is altered (trouble waking up, confusion) or they become unresponsive.
- First aid providers should seek medical advice if they are in doubt, or if the person:
  - is a baby, child or older adult
  - loses more fluid than they take (e.g., severe vomiting)
  - urinates very little or not at all and the urine has a dark colour
  - has fever or signs of heat exhaustion. (See Hyperthermia.)

Chain of survival behaviours

Prevent and prepare

- In hot weather, regularly check on older adults and babies to ensure they remain cool and drink plenty of fluids.
- Ensure babies and young children continue to take breast or bottle milk (or other drinks) when they have fever or diarrhoea or are vomiting, as the risk of dehydration is high.
- Avoid doing any vigorous activity outside during the hottest part of the day.

- Train and acclimatise your body in the lead up to significant sports activity.
- In hot weather, dress appropriately, take frequent breaks in a shaded area, drink plenty of (cool) fluids and avoid activities that over-exert yourself.
- Carry plenty of fluids if travelling in remote areas with limited water supply.
- Practise good food and hand hygiene, and only consume potable (clean) water to avoid vomiting and diarrhoea (one of the main causes of dehydration).

Early recognition

The person may be in a hot environment, be doing vigorous physical activity during a heatwave, or may not have adequate access to fluids.

The person may have:

- Diarrhoea or vomiting
- Fever
- Altered responsiveness
- headache
- dizziness
- less or no sweat (e.g. under the armpits)
- absence of tears
- dark coloured urine
- weak radial pulse
- dry mouth and tongue
- delayed time to skin re-colouration
- abnormal breathing pattern
- fatigue (in the elderly)

In babies and young children look for:

- Dry mouth and tongue
- Crying without tears
- Sunken eyes
- Unusually tired or sleepy
- A dry diaper for three hours or more

First aid steps

1. Reassure the person and give them plenty of fluids to drink.
    a. In mild cases of dehydration, water is sufficient.
    b. In more severe cases, give the person an oral rehydration solution. If this is unavailable, give the person apple juice, coconut water or water.
    For children:
        i. Babies and young children who are breastfed should continue to do so. The frequency of feeding should be increased.
        ii. Babies receiving milk formula should drink regular amounts of milk, supplemented with oral rehydration solution. The formula should be dissolved in water, not in oral rehydration solution, as the latter may cause diarrhoea and worsen dehydration further.
        iii. Children between the ages of 2 and 5 years should have 10 ml/kg (the caregiver will need to estimate their weight) of water, rehydration solution, apple juice, coconut water or water.

2. Seek medical advice if:
    a. the person's condition does not improve quickly
    b. they are a baby, child or older adult
    c. they are losing more fluid than they can take in (e.g., because of vomiting or diarrhoea)
    d. they urinate very little or not at all and the urine has a dark colour
    e. has fever or signs of heat exhaustion
    f. you are in doubt.

NOTE

Oral rehydration recipe:

- Half a teaspoon of salt
- Six teaspoons sugar
- One litre of drinking water

Access help

- Access EMS if the person's mental status changes (e.g., confusion) or they become unresponsive.

Self-recovery

- To avoid a case of new dehydration, continue to drink fluids regularly. Eat fruit and vegetables regularly.

Education considerations

Context considerations

- Depending on the availability and access to potable (clean) water, you may need to include information on water sterilisation methods (e.g., boiling or chlorination) and the risks of drinking contaminated water.
- Include information on the importance of drinking fluids which rehydrate the body, such as water and juice.
- Advocate for the use of breast milk for babies as a safe form of hydration which does not rely on potable (clean) water. If milk formula is the only available source of milk, emphasise the need for the water to be potable (clean) to avoid infections that cause vomiting and diarrhoea.

Learner considerations

- If facilitating a group of new parents, only include the content relevant to caring for a baby. Build learners' confidence in their ability to identify potential causes of dehydration in babies (fever, vomiting, diarrhoea, overdressing, etc.) and their ability to prevent and recognise it.
- If facilitating a group of learners who have caring responsibilities for older people, discuss the risks of dehydration and ways to reduce the risks.

Facilitation tips and tools

- Ask learners to identify those most at risk of dehydration in their own lives and how to help to prevent it.
- Help learners recognise that dehydration can also occur in cold settings when people wear too many layers or overexert themselves.
- Provide learners with visual, written or verbal information about how to recognise dehydration.
- Recommend that learners prepare for dehydration by having access to drinking water, and store-bought or home-made ORS.

Learning connections

- Explore this topic alongside Abdominal pain, vomiting and diarrhoea or Hyperthermia and make connections to the leading causes of dehydration.

Scientific foundation

Systematic reviews

The following evidence was reviewed by the Centre for Evidence-Based Practice (CEBaP) in 2020. In addition, evidence from the International Liaison Committee on Resuscitation (ILCOR) about the use of carbohydrate-electrolyte solutions is also cited.

Signs or symptoms

In a diagnostic evidence summary from CEBaP, four systematic reviews were included.

There is limited evidence in favour of certain individual signs and symptoms to detect the presence or absence of dehydration. It was shown that fatigue in the elderly may be clinically helpful in the detection of the presence and absence of dehydration. Furthermore, it was shown that a prolonged capillary refill, weak radial pulse, absence of tears, dry oral mucous membrane, abnormal respiratory pattern, dark coloured urine, dry armpits, headache and dizziness may be helpful in the detection of the presence, but not the absence of dehydration.

In addition, it was shown that dry mucous membranes and sunken eyes may be clinically helpful in the detection of the absence, but not the presence of dehydration.
Finally, the clinical helpfulness of prolonged capillary refill, decreased skin elasticity, cold extremities, increased heart rate, poor overall appearance, absence of tears, dry mucous membranes, dry mouth, dry lips, being unable to spit, polypnea, sunken eyes, thirst and urine voiding frequency, to detect the presence or absence of dehydration, could not be demonstrated.

Evidence is of very low certainty and results cannot be considered precise due to low sample sizes, large variability in results and lack of data.

In addition, there is limited evidence in favour of using certain composite measures to detect the presence or absence of dehydration. It was shown that displaying at least three of the following clinical signs can be helpful in detecting the presence and absence of moderate (>5%) or severe (>10%) dehydration caused by acute diarrhoea:

- lack of tears
- sunken eyes
- dry mucous membranes
- poor overall appearance
- decreased skin elasticity
- deep and rapid breathing
- weak radial pulse.

Similarly, using the Gorelick scale (measuring lack of tears, dry mucous membranes, poor overall appearance and delayed time to skin-recolouration) can be helpful in detecting the presence and absence of moderate (>5%) or severe (>10%) dehydration.

On the other hand, the Clinical Dehydration scale (measuring general appearance, degree of sinking of the eyes, degree of dryness of the tongue, presence or absence of tears) can be clinically helpful to detect the presence, but not the absence, of severe (>6%) dehydration.

Furthermore, the clinical helpfulness of the WHO dehydration scale to detect moderate (5-10%) to severe (>10%) dehydration, and the clinical helpfulness of the Clinical Dehydration Scale or the Gorelick scale to detect moderate (3-6 % or >5 %) dehydration, could not be demonstrated.

Evidence is of very low certainty and results cannot be considered precise due to low sample sizes, large variability in results and lack of data.

Oral rehydration solution (commercial or home-made)

A 2016 evidence summary by CEBaP included one Cochrane systematic review. Since this review has been declared stable (new trials are unlikely to change its conclusions), this review and evidence summary have not been updated.

The 17 studies included in this Cochrane systematic review showed no difference between using an oral rehydration solution or intravenous therapy for treating dehydration due to gastroenteritis in children. Low-certainty evidence showed that oral rehydration therapy did not result in a statistically significant difference in weight gain, hyponatremia or hypernatremia, duration of diarrhoea or total fluid intake at 6 hours and 24 hours, compared to intravenous therapy. However, the use of oral rehydration therapy did result in a statistically significant decrease in length of hospital stay, but also resulted in a statistically significant failure to rehydrate, compared to intravenous therapy.

No studies were identified that compared the effectiveness of home-made (maize-based) oral rehydration solution to that of standard (reduced osmolarity) oral rehydration solution. However, one study was found about the feasibility of preparing maize and salt-based home-made oral rehydration solution compared to glucose-based oral rehydration solution. The study compared if oral rehydration solution compositions were within safe ranges, with sodium levels between 51-120 mmol. It was shown that making maize and salt oral rehydration solution resulted in a statistically significant decrease of making solutions with too high sodium levels (higher than 120 mmol/l), and a statistically significant increase in making solutions with a safe composition (sodium levels between 51-120 mmol/l), compared to making glucose-based oral rehydration solution. A statistically significant increase of oral rehydration solution with too low sodium levels (lower than 50 mmol/l), when making maize and salt oral rehydration solution compared to glucose oral rehydration solution, could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to the low number of events and/or large variability of results.

Apple juice

There is limited evidence from one randomised controlled trial in favour of using diluted apple juice and preferred fluids in children older than six months with mild gastroenteritis. It was shown that intake of diluted apple juice (half-strength), followed by intake of fluids of the child's preference, resulted in a statistically significantly decreased risk of treatment failure and intravenous fluid requirement in low-risk children without signs of dehydration, compared to oral rehydration solution. A statistically significantly decreased risk of unscheduled healthcare visits, hospitalisation, extended symptoms and rate of vomiting or diarrhoea, when using diluted apple juice and preferred fluids, compared to oral rehydration solution, could not be demonstrated. Evidence is of moderate certainty.

In addition, there is limited evidence in favour of using ORS in addition to water. It was shown that intake of apple juice in addition to an ORS, resulted in a statistically significantly increased duration of diarrhoea and amount of stool loss in children with mild dehydration, compared to water in addition to oral rehydration solution. A statistically significant increase in body weight when using an oral rehydration solution and apple juice, compared to oral rehydration solution and water, could not be demonstrated. Evidence is of moderate certainty.

Breastfeeding

A 2020 evidence summary by CEBaP identified one randomised controlled trial and four case-control studies that provide limited evidence in favour of continuing breastfeeding in case of dehydration. Studies showed that stopping breastfeeding resulted in a statistically significant increased risk of dehydrating diarrhoea or increased risk of diarrhoea evolving to dehydration. Evidence is of very low certainty and results cannot be considered precise due to lack of data.

There is moderate-certainty evidence from one randomised controlled trial in favour of the combination of providing an oral rehydration solution and breastfeeding. This combination resulted in a statistically significant decrease in the number of times stools were passed in hospital and in the total volume of oral rehydration solution required for rehydration, compared to giving oral rehydration solution only. However, this study could not demonstrate a statistically significant decrease in stool output, vomitus volume and duration of diarrhoea when giving the combination of oral rehydration solution and breastfeeding.

Oral carbohydrate-electrolyte solutions

In 2015, ILCOR completed a systematic review on the use of carbohydrate-electrolyte solutions for people with exertion-related dehydration (Singletary, 2015 and Zideman, 2015). An update of this review is ongoing and will be available in the future. The review included 12 studies that showed that drinking 5% to 8% (8 studies) or 3% to 4% (3 studies) carbohydrate-electrolyte solutions facilitates rehydration after exercise-induced dehydration. Evidence also showed that participants generally tolerated ingesting these solutions. In the absence of shock, confusion, or inability to swallow, it was deemed reasonable for first aid providers to assist or encourage individuals with exertional dehydration to orally rehydrate with carbohydrate-electrolyte drinks. Other beverages such as a 12% carbohydrate-electrolyte solution (one study), coconut water (three studies), milk (one study), tea-based carbohydrate-electrolyte drinks (two studies) and Chinese tea with caffeine (one study), have also been found to promote rehydration after exercise-associated dehydration, but they may not be as readily available. Evidence is of low to very low certainty.

Hypothermia

Key action

Gradually warm the person using the most appropriate equipment available.

Introduction

Hypothermia is a condition in which the body's core temperature drops below 35°C (95°F) and cannot function properly: the blood circulation reduces significantly, especially in the small vessels in the skin. It can occur when a person is exposed to extreme cold, such as in mountainous regions in the winter. Other factors that intensify the risk of hypothermia are living in homes that lack heating, the use of alcohol or drugs or pre-existing mental health conditions (BMJ, 2014). Some conditions reduce people's ability to recognise when they have lost a significant amount of heat.

Good practice points

- People experiencing hypothermia should be treated with care, removed from the cold source and have any wet clothes removed. If the person is moderate to severely hypothermic, clothes should be cut off to minimise their movement.
- A person experiencing hypothermia, who is responsive and shivering vigorously, should be warmed passively using a sleeping bag. If no sleeping bag is available, a blanket (e.g. fleece, 100% polyester) can be used, if possible, in combination with a thermal isolation blanket. The head and body should be covered to minimise convective and evaporative heat loss. Alternative equipment may be used including warm, dry clothing or reflective or metallic foil.
- If the person is not shivering, the first aid provider should actively warm them preferably using an electric heating blanket. As an alternative, hot water bottles, heating pads or warm stones may be used. Do NOT apply warm stones directly to the skin to avoid burning the person. Do NOT rub the person's skin, as this may damage the skin and underlying muscles.
- Care should then be taken to insulate the person by placing a barrier between them and the ground (e.g., a tarp and sleeping bag) to minimise conductive heat loss.
- If the person is responsive and able to swallow, the first aid provider should give them a warm sugary drink (e.g., chocolate) or some high-energy food.
- For all cases of hypothermia, emergency medical services (EMS) or equivalent should be accessed and the person's airway, breathing and circulation should be monitored.

Chain of survival behaviours

Prevent and prepare

- Wear appropriate cold-weather clothing.
- Keep clothing dry. If clothing gets wet, change into dry clothing as soon as possible.
- In cold weather, check on those in insecure housing, or without heating to ensure they have ways to keep themselves warm.
- Eat high-energy foods and drink high-calorie drinks, as well as water, to prevent dehydration.
- Avoid alcohol.
- If possible, take regular breaks from the cold to allow the body to warm up.
- When planning to visit a remote, cold area, check how to access local emergency services and take appropriate signals and contact details with you.
- Ensure someone knows when you are venturing to a remote place, the route you plan to take, and when you expect to return.

Early recognition

Symptoms will depend on the temperature and whether the person is experiencing mild or severe hypothermia. Take into account the surrounding environment, for example, if the person is in a cold environment or wearing wet clothing, they are at a higher risk of hypothermia.

The person may have the following:

- shivering
- poor coordination
- slow movements
- mild confusion
- skin becomes paler, ashen or loses its colour
- bluish colouring to lips, ears, fingers and toes.

As their condition worsens, they may show the following:

- no shivering
- disorientation, lack of memory
- exposed skin becomes blue and swollen
- the person may become incoherent or behave irrationally
- coordination continues to worsen; the person cannot walk or use their hands.

First aid steps

1. Remove the person from the cold or protect them from cooling down further.
2. Have the person remove any wet clothes (or help them if they are unable to do so). Carefully dry off the person if they are wet. Cover them with a blanket.
3. If a person is responsive and shivering, let them warm up using a sleeping bag, or alternatively a blanket. If they can swallow, give them a warm, sugary drink (e.g., hot chocolate) or some high-energy food.
4. If the person is in an altered state of responsiveness and is not shivering, gradually warm them using an electric heating blanket, or alternatively hot water bottles, heating pads or warm stones.
5. Reassure them and monitor their breathing and level of response.

CAUTION

- Do not rub the person's skin, as this may damage it and the underlying muscles further.
- Do not apply warm stones directly to the skin as this may burn the person.

NOTE

- If the person becomes unresponsive, open their airway and check for breathing. See Unresponsiveness.
- If in a limited resource setting, create a heat source (campfire) to warm the person and build a shelter to protect them from the cold. Ensure there is a layer, such as a blanket, between the person and the ground.

Access help

For all cases of hypothermia, the first aid provider should access emergency medical care immediately.

Recovery

Most healthy people with mild to moderate hypothermia will recover fully. However, if signs and symptoms continue or additional ones appear, seek medical care.

Education considerations

Context considerations

- Learners in or visiting cold climates may benefit from learning how to prevent hypothermia and frostbite, (including winter conditions in any setting, and specific settings such as the mountains).
- Include information on accessing help in rural or remote environments. (See Remote context.)
- Programme designers should consider that hypothermia can also occur in the home (e.g., older people who are unable or choose not to turn on the heat in cold weather, or people who slip on icy steps and cannot help themselves up).
- Hypothermia can even occur in warm temperatures if a person is wet and inactive.
- In some contexts, learners may benefit from learning about reducing the risk of experiencing an avalanche, including familiarisation with local avalanche warning signs and safe behaviours to follow (e.g., avoid closed ski slopes).

Facilitation tips

- Make learning contextual; facilitating a session outside in cold conditions can reinforce the reality of what a learner may experience in this type of emergency.
- Plan to include environmental conditions at the end of a session as this will allow you to integrate other first aid education (e.g., preventative actions to take or additional symptoms to look for when in a cold environment).
- Recommend individuals review any medication with their healthcare provider as some medical conditions and medications affect the body's ability to regulate its temperature.

Facilitation tools

Scenarios or games can be used to reinforce key learning points, such as a focus on early recognition. For example:

- Divide learners into small groups and set the scene (e.g., going on an overnight hiking trip). Ask them to write a list of what they will take and what they must do to prepare as a group.
- Add in a complication such as a change in the weather or the group must cross a river and the water is cold.
- Encourage the group to assess what is happening and decide what they will do. Refer them back to their equipment and preparation lists.
- You can also include complications that allow learners to use other first aid skills. For example, one of the group members sprains their ankle and cannot walk on it. Now learners must provide care for the ankle, decide how they will prevent the person from getting hypothermia and determine how they will evacuate the area.

Learning connections

- In some contexts, this topic could be combined with Frostbite.
- Communicate that hypothermia can occur as the result of cooling a Burn. First aid providers should focus their cooling efforts on the burn site (rather than the entire body) and monitor the person during the cooling process.

Scientific foundation

Systematic reviews

We looked at the systematic evidence summary from the Centre of Evidence-Based Practice (CEBaP).

Body-to-body contact

There is limited evidence from two non-randomised controlled (within-subject) trials neither in favour of using a blanket or insulated bag in combination with body-to-body rewarming nor using a blanket or insulated bag alone. In two studies, a difference in the rate of rewarming, afterdrop temperature and length of afterdrop could not be demonstrated when combining body-to-body contact with using an insulated bag or a blanket, compared to an insulated bag or blanket alone. Evidence is of low to very low certainty and results cannot be considered precise due to limited sample size and lack of data.

Heating pads

There is limited evidence from one non-randomised controlled (within-subject) trial in favour of using a blanket in combination with heating pads. It was shown that using a blanket in combination with heating pads resulted in a statistically significant increase of the rectal rate of rewarming, compared to using a blanket alone. Evidence is of low to very low certainty and results cannot be considered precise due to limited sample size.

Heating pads versus body-to-body

When comparing the use of heating pads in combination with using a blanket to body-to-body contact in combination with using a blanket, a difference in the rate of rewarming, afterdrop temperature and length of afterdrop could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to limited sample size.

Electric blanket

There is evidence from two randomised controlled trials in favour of using an electric blanket. It was shown that using an electric blanket resulted in a statistically significant increase of rewarming rate, thermal comfort and satisfaction with their care, as well as a statistically significant decrease of pain scores, shivering and anxiety levels, compared to a blanket alone. However, in the smallest of the two studies, a statistically significant decrease of shivering, using an electric blanket compared to a blanket alone, could not be demonstrated. Evidence is of moderate certainty.

Charcoal heater (heat pack)

There is limited evidence from one randomised controlled trial and two non-randomised controlled trials neither in favour of using an insulated bag (with or without a vapour barrier) in combination with a heat pack (on the head or torso) nor using only an insulated bag (with or without a vapour barrier). A statistically significant difference in rewarming rate, afterdrop, length of afterdrop, afterdrop recovery time, total recovery time, when comparing a charcoal heater with an insulated bag to an insulated bag alone, could not be demonstrated. Evidence is of moderate to low certainty and results cannot be considered precise due to limited sample size and lack of data.

Heat pack (torso) vs heat pack (head)

There is limited evidence from one non-randomised controlled trial neither in favour of using an insulated bag with a vapour barrier in combination with a heat pack wrapped around the upper torso nor using an insulated bag with vapour barrier in combination with a heat pack wrapped around the head. A statistically significant difference in rewarming rate, afterdrop and length of afterdrop, when comparing a charcoal heater placed on the upper torso compared to wrapped around the head, could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to limited sample size and lack of data.

Warm water immersion

There is inconclusive evidence from two randomised and one non-randomised controlled trials concerning the immersion of arms and legs (only) in warm water (42 or 45 °C) compared to using a blanket or an insulated bag. Evidence is of low to very low certainty and results cannot be considered precise due to limited sample size and lack of data.

There is limited evidence from two randomised and two non-randomised controlled trials in favour of immersing the whole body, excluding the head, arms and legs, in warm water. It was shown that warm water immersion resulted in a statistically significant increase of rewarming rate and a statistically significant decrease of rectal afterdrop and length of afterdrop, compared to a blanket. However, a statistically significant difference in oesophageal afterdrop, when comparing warm water immersion to using a blanket, could not be demonstrated.

In addition, it was shown that warm water immersion resulted in a statistically significant increase of (maximum) rewarming rate and a statistically significant decrease of the rectal afterdrop, the length of afterdrop and the time from the start of rewarming to the cessation of shivering, compared to an insulated bag. However, a statistically significant difference in rewarming rate, tympanic afterdrop, tympanic length of afterdrop, when comparing warm water immersion to using an insulated bag, could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to limited sample size, lack of data and large variability of results.

Warm water immersion (excluding extremities) vs body-to-body

There is limited evidence from one non-randomised controlled trial in favour of immersing the whole body excluding head, arms and legs, in warm water. It was shown that warm water immersion resulted in a statistically significant increase of rewarming rate and a statistically significant decrease of length of afterdrop. However, a statistically significant difference in afterdrop temperature, when comparing warm water immersion to using a blanket and body-to-body contact, could not be demonstrated. Evidence is of very low certainty and results cannot be considered precise due to limited sample size.

Warm water immersion (excluding extremities) vs heating pads

There is limited evidence from one non-randomised controlled trial in favour of immersing the whole body excluding head, arms and legs, in warm water. It was shown that warm water immersion resulted in a statistically significant increase in rewarming rate and a statistically significant decrease in afterdrop temperature and length of afterdrop. Evidence is of very low certainty and results cannot be considered precise due to limited sample size.

There is limited evidence from three randomised and one non-randomised controlled trial in favour of immersing the whole body, excluding the head, in warm water. Compared to using a blanket, it was shown that warm water immersion resulted in a statistically significant increase of oesophageal, rectal and tympanic rewarming rates, and a statistically significant decrease of oesophageal, rectal and tympanic afterdrop temperature, as well as of oesophageal, rectal and tympanic length of afterdrop.

Compared to using a blanket and vapour barrier, it was shown that warm water immersion resulted in a statistically significant increase of oesophageal and rectal rewarming rates. However, a statistically significant difference in oesophageal and rectal afterdrop temperature, when comparing warm water immersion to using a blanket and vapour barrier, could not be demonstrated.

Compared to shivering only, it was shown that warm water immersion resulted in a statistically significant decrease in tympanic length of afterdrop, as well as a statistically significant improvement in thermal sensation, thermal comfort sensation, shivering sensation, simple reaction time, two-choice reaction time and cognitive performance. However, a statistically significant difference in rectal and tympanic afterdrop temperature and rectal length of afterdrop, when comparing warm water immersion to shivering only, could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to limited sample size.

Warm water immersion (whole body) vs heating pads

There is limited evidence from one non-randomised controlled trial neither in favour of immersing the whole body, excluding the head, in warm water nor using only heating pads.

A statistically significant difference in rectal and tympanic afterdrop temperature and rectal and tympanic length of afterdrop, using whole-body warm water immersion compared to using heating pads, could not be demonstrated. Evidence is of low certainty and results cannot be considered precise due to limited sample size and lack of data.

Warm water (45°C) vs warm water (42°C)

There is limited evidence from one non-randomised controlled trial in favour of immersing only the arms and legs in warm water at 45 °C. Evidence is of low certainty and results cannot be considered precise due to limited sample size.

Warm water immersion (excluding extremities) vs warm water immersion (extremities only)

There is limited evidence from one randomised controlled trial in favour of immersing the whole body excluding the head, arms and legs, in warm water. Evidence is of low certainty and results cannot be considered precise due to limited sample size.

Warm water immersion (whole body) vs warm water immersion (extremities only)

There is limited evidence from one randomised controlled trial in favour of immersing the whole body, excluding the head, in warm water. Evidence is of low certainty and results cannot be considered precise due to limited sample size.

Warm water immersion (whole body) vs warm water immersion (excluding extremities)

There is limited evidence from two randomised controlled trials in favour of immersing the whole body, excluding the head, in warm water. Evidence is of low to very low certainty and results cannot be considered precise due to limited sample size.

Exercise

There is limited evidence from one randomised and one non-randomised controlled trial in favour of shivering while covered only by a blanket or wearing a pile suit. Evidence is of low certainty and results cannot be considered precise due to limited sample size.

Exercise (pile suit) versus insulated bag (with a vapour barrier)

There is limited evidence from one randomised controlled trial in favour of using only an insulated bag with a vapour barrier. In making this evidence conclusion, we place a higher value on afterdrop over the length of afterdrop, rate of rewarming and total recovery time. It was shown that using only an insulated bag with a vapour barrier resulted in a statistically significant decrease in oesophageal afterdrop, compared to exercising while wearing a pile suit. Evidence is of low to very low certainty and results cannot be considered precise due to limited sample size and large variability of results.

Exercise (pile suit) vs heat pack

There is limited evidence from one randomised controlled trial in favour of using an insulated bag with a vapour barrier in combination with a heat pack wrapped around the torso. In making this evidence conclusion, we place a higher value on afterdrop over the length of afterdrop, rate of rewarming and total recovery time. It was shown that using an insulated bag with vapour barrier in combination with a heat pack wrapped around the torso resulted in a statistically significant decrease in oesophageal afterdrop, compared to exercising while wearing a pile suit. Evidence is of low to very low certainty and results cannot be considered precise due to limited sample size and large variability of results.

Frostbite

Key action

Gently immerse the affected area in warm water until it is rewarmed (usually 30 minutes).

Introduction

Frostbite is damage to the skin and other tissues caused by extreme cold. When it is cold (at or below 0ºC) or there are strong winds, the human body tries to preserve its core body temperature by narrowing the blood vessels close to the skin. In extreme cases, this can reduce the blood flow in some areas of the body to dangerously low levels resulting in frostbite. The fingers and toes are the most vulnerable. Frostbite can lead to permanent damage, but this can be avoided if it is recognised and treated quickly.

Good practice points

- Warming of frozen body parts should be done only if the appropriate resources are available, medical care is more than two hours away and there is no risk of refreezing.
- Warming should be achieved by immersing the affected area in warm water between 37ºC and 39ºC (98.6ºF and 102ºF) until the affected body part takes on a red or purple appearance and becomes soft and pliable to the touch (usually in 30 minutes).
- Other heat sources (e.g., fire, space heater, oven, heated rocks) should be avoided because of the risk of burns.
- During warming, consider giving the person a high dose of ibuprofen (400-800 mg) or if not available, a low dose of acetylsalicylic acid (75-80mg). This may improve healing.
- After warming, the frostbitten area should be protected from refreezing and the person should seek medical care as soon as possible.
- Topical aloe vera may be applied to the frostbite.
- Affected body parts should be dressed in sterile gauze until the person can reach medical care. If fingers or toes are affected, the gauze should be placed between them.

Chain of survival behaviours

Prevent and prepare

- Ensure feet, hands and face are kept warm and covered in cold conditions.
- Pack appropriate equipment and clothing for the weather conditions, including emergency items if conditions worsen.
- Take shelter from extreme cold or strong cold winds.

Early recognition

- Early frostbite may be marked by flushed skin, sensation changes such as burning, prickling or numbness, or pain in the exposed cold area. The skin flushing can decrease as the skin cools, and it can appear paler from decreased blood flow. Skin becomes cold, hard to the touch, waxy, and blisters can form. As frostbite progresses, the skin dies and turns dark blue or black.

First aid steps

1. Protect the person from hypothermia. Do this by helping them move to a warmer place, removing wet clothing and keeping them warm and dry.
2. Carefully remove jewellery if this is possible without causing any damage to the skin.
3. Gently warm the affected area by putting it in warm (body temperature) water until it is rewarmed (usually 30 minutes). Avoid rubbing or aggressively handling the affected area as this may damage the skin.
4. Dress the affected area with sterile gauze. If multiple digits are affected, place gauze between each digit.
5. Consider giving the person a high dose of ibuprofen (400-800 mg) or if not available, a low dose of acetylsalicylic acid (75-80mg). This may improve healing.

CAUTION

- Only warm a frostbitten area if you have the appropriate resources, there is no risk of refreezing, and medical care is more than two hours away.
- Do not put the affected area near direct heat like a space heater or hot stove.
- Avoid breaking blisters that may occur.

Access help

- Always access medical care in the case of frostbite.

Education considerations

Context considerations

- It may be useful to explore preparedness and safe behaviour in very cold climates relevant to the learners, for example, being stuck somewhere remote with a broken-down vehicle in winter, working in wilderness areas, or doing winter sports such as skiing.
- Consider covering this topic with learners who are more vulnerable, such as elderly people and people who are homeless.

Facilitation tips and tools

- As frostbite is relatively uncommon, help learners recognise it by including images in your education material.
- Help learners to identify how they would get medical help in an emergency in the extreme cold.

Learning connections

- A person with frostbite may also be experiencing Hypothermia.

Scientific foundation

Systematic review

An evidence summary was conducted by the Centre for Evidence-Based Practice (CEBaP) on active warming for frostbite, but no relevant controlled studies were identified.

A Cochrane systematic review protocol was identified on interventions for frostbite injuries (Lorentzen, 2018).

Non-systematic review

While conducting the evidence summary on active warming for frostbite, CEBaP identified the recently updated guidelines from the Wilderness Medical Society on the prevention and management of frostbite (McIntosh 2019). These guidelines are based on case series and animal studies and contain some recommendations:

- Field rewarming by warm water bath immersion can and should be performed if the proper resources are available and medical care is more than two hours distant. Other heat sources (e.g., fire, space heater, oven, heated rocks) should be avoided because of the risk of thermal burn injury.
- Rapid rewarming by water bath has been found to result in better outcomes than slow rewarming.
- Field rewarming should only be undertaken if the frozen part can be kept thawed and warm until the person arrives at medical care. Water should be heated to 37° to 39° C. Circulation of water around the frozen tissue will help maintain the correct temperature.

Use of medication

Low dose acetylsalicylic acid (75-80mg) and high dose ibuprofen (400-800 mg) appear to be associated with improved healing, although data is poor. However, the risk of acetylsalicylic acid and ibuprofen is very low and providing acetylsalicylic acid or ibuprofen may be considered for significant frostbite. (Heggars et al., 1987; McIntosh, 2019.)

Aloe vera

There is limited evidence but topical aloe vera may be beneficial when applied to the frostbite. (Heggars et al., 1987; McIntosh, 2019; McCauley, 1983.)

Altitude sickness

Key action

Take the person to a lower altitude as quickly and safely as possible.

Introduction

Altitude sickness occurs when people at a high altitude do not have enough oxygen in their blood because the air pressure is too low. As altitude increases, the air becomes thinner and less oxygen is inhaled with each breath. The term altitude sickness includes acute mountain sickness, high altitude pulmonary oedema (affecting the lungs and breathing) and high-altitude cerebral oedema (affecting the brain, behaviour and alertness). These illnesses are also called AMS, HAPE and HACE respectfully. Individuals most affected by altitude sicknesses are those who travel to a high altitude quickly (e.g., tourists), especially if they have pre-existing medical conditions. However, trained mountaineers can also develop symptoms when they reach very high altitudes, such as in the Himalaya region.

Guidelines

- People experiencing AMS, HACE and HAPE should stop their ascent immediately and start to descend safely, with support, until their symptoms lessen.**
- If the person has prescribed medication for altitude sickness with them (such as acetazolamide or dexamethasone), the first aid provider may assist them in taking it based on the label instructions.*
- Where local laws, regulations or protocols permit, specially trained first aid providers may give medications (such as acetazolamide or dexamethasone) to individuals experiencing altitude sickness.*
- For first aid providers trained in its use, oxygen may be administered to individuals experiencing AMS, HACE and HAPE.*

Good practice points

- People experiencing altitude sicknesses should be kept from getting cold or overheated.
- Gradual ascent to higher altitudes may be a more effective method of prevention than a fast ascent.
- Adequate hydration should be maintained (though not forced). The person should drink regularly (every 20-30 minutes) and enough (more than they would normally drink).

Chain of survival behaviours

Prevent and prepare

- Check how to access local emergency services and pack appropriate signals and contact details when going to high altitudes.
- Ensure you have the right equipment with you to make a safe descent.
- Eat high-energy foods and drink high-calorie drinks, as well as water, to prevent dehydration.
- Ensure someone knows the route you plan to take if you are venturing to a remote place, and when you expect to return.
- Avoid alcohol.

Early recognition

People may start to experience symptoms around 2400 m (roughly 8000 feet). Twenty-five per cent of travellers experience AMS above 3500 m (11,483 feet), with 50 per cent experiencing it above 6000 m (19,685 feet). Be aware of the signs of altitude sickness if travelling above this altitude. (Hackett & Shlim, 2019.)

Several altitude sickness diagnostic-scoring systems exist. The Lake Louise Criteria for Altitude Sickness (Roach et al., 2018) are as follows:

Acute mountain sickness

If the person chooses to remain at a certain altitude, AMS may improve with rest, hydration and medication. However, the symptoms will improve faster by descending to a lower altitude. There is also the risk that AMS will progress to HAPE or HACE.

- Headache and at least one of the following symptoms: fatigue or weakness; dizziness or light-headedness; gastrointestinal symptoms (nausea or vomiting, loss of appetite); difficulty sleeping; shortness of breath.

High-altitude pulmonary oedema

HAPE is when fluid collects in the lungs (pulmonary oedema) and causes extreme shortness of breath. It is life-threatening and requires immediate, safe descent.

- At least two of the following symptoms: difficulty breathing while resting; coughing; weakness or decreased physical performance; chest tightness or congestion and;
- At least two of the following signs: crackling or wheezing heard in one or both lungs when breathing; bluish colouring to the skin, lips and fingers; rapid breathing and elevated heart rate.

High-altitude cerebral oedema

HACE is when fluid collects on the brain, causing confusion, coma, and if untreated, death. It is life-threatening and requires immediate, safe descent.

- Change in responsiveness, behaviour, normal movement or coordination in a person either with or without acute mountain sickness.

First aid steps

1. Help the person move to a lower altitude as quickly and safely as possible. Encourage them to drink water.

2. If the person has prescribed medication for altitude sickness, help them take it.

3. Have the person rest at a lower altitude until their symptoms resolve. If local regulations permit, and you are trained to do so, administer oxygen to the person. You may do this upon arrival at a lower altitude, or if necessary while descending with the person.

4. Access EMS if the person's condition doesn't improve.

NOTE

Monitor the person's temperature to ensure they do not get too cold or too hot. See Hypothermia or Hyperthermia.

Access help

- Access help if the person is unable to descend on their own and it is unsafe for other group members to transport them to a lower altitude. Help may take many forms, including other hikers, search and rescue, formal evacuation teams or military assistance.
- Access EMS if the person's condition does not improve.

Recovery

- If a person with AMS is asymptomatic, they may continue to ascend. They should monitor themselves for signs and symptoms of AMS, HAPE and HACE.
- Once descended to a lower altitude, a person with HAPE or HACE should not re-ascend until their symptoms have resolved and they have been examined by a medical professional.

Education considerations

Context considerations

- Altitude sickness can affect a variety of groups ranging from hikers, climbers, seasonal employees and tourists. There are many towns and cities across the world that are at a high altitude. We advise first aid programme developers to work with local authorities and tour companies to publicly display educational material informing people of the signs and symptoms, the importance of staying hydrated and how to get help.
- Refer to local guidelines and include any context-specific information in the programme.
- Engage local medical experts, mountain rescue groups and tour operators when developing content for this topic.
- Follow local laws and regulations concerning helping people with prescribed medications and administering oxygen.
- Use posters and other media in high altitude areas with tourists to raise their awareness of altitude sickness.

Facilitation tips

- Emphasise how to prevent and recognise the symptoms of altitude sicknesses as often, the person affected may not realise they have it.
- Use visual materials (pictures and videos) to illustrate signs and symptoms of the different types of illness that high altitudes can incur.

Learning connections

- Being at high altitudes can cause someone to Feel faint; make connections to this topic.
- Symptoms of AMS may appear similar to those of Dehydration.

Scientific foundation

Systematic review

The Centre for Evidence-Based Practice (CEBaP) developed an evidence summary on the practice of descending if someone is experiencing altitude sickness and a summary about drinking adequate amounts of water as a protective factor for altitude sickness. A Cochrane systematic review looked at pharmacological interventions for altitude sickness, including oxygen provision.

Descent

One study showed that 193 mbar (equal to descending 2250 m or 7382 feet) resulted in a statistically significant decrease in the clinical score of mountain sickness and AMS cerebral score immediately after treatment, compared to resting at ambient pressure (i.e., not descending). In addition, this study showed that 20 mbar (equal to descending 250 m or 820 feet) resulted in a statistically significant decrease in the AMS cerebral score immediately after treatment, compared to resting at ambient pressure (i.e. not descending). However, the study could not demonstrate a statistically significant decrease in the clinical score and AMS cerebral score 12 hours after descending 193 or 20 mbar. The evidence is very low certainty, and results cannot be considered precise due to limited sample size and lack of data.

Oxygen

The Cochrane systematic review identified one small study with 13 participants about the use of oxygen (Simancas-Racines 2018). The low-quality study describes the improvement in AMS with the use of three litres of oxygen per minute for ten minutes. It found that treatment with oxygen significantly improved the symptoms of AMS and improved the person's oxygenation.

Other medication interventions

The Cochrane systematic review also identified studies on the use of medicines to relieve the symptoms of AMS. Studies related to administration of medicines found some benefits in terms of reduction of symptoms with the use of acetazolamide (two studies, 25 participants, low-certainty evidence), and dexamethasone (one study, 35 participants, moderate-certainty evidence), without an increase in side effects. The effects from two additional trials comparing gabapentin with placebo and magnesium with placebo on symptom severity at the end of treatment were uncertain (low-certainty evidence).

Hydration

Five observational studies were identified, looking at several risks or protective factors for AMS, including water intake. A statistically significant increased risk of AMS in case of low water intake compared to higher water intake could not be demonstrated in three studies, including two studies that conducted a multivariate analysis. Two other studies did find a significantly increased risk of AMS in case of low water intake (compared to high water intake), but these studies did not correct for confounding factors in a multivariate analysis. Evidence is of very low certainty and results cannot be considered precise due to limited sample size or a low number of events and lack of data.

Non-systematic review

Based on a small randomised controlled trial with 34 healthy mountaineers, gradual ascent to higher altitudes seemed a more effective method of prevention than a fast ascent (Bloch, 2009).

Motion sickness

Key action

Stop travelling if possible, to allow the person time to recover and take corrective action.

Introduction

Motion sickness is caused when the brain's estimate of motion is different from what the person is actually experiencing. The person's eyes, balance centre of the inner ear and general perception of their body's position and movement conflict with the messages the brain receives. The sensitivity to motion sickness varies in individuals, but most people will experience it if the cause is strong enough. Pregnant women, children older than two years and those with migraines are most susceptible. First aid care is often ineffective, and providers should emphasise prevention instead.

Guidelines

- Eating a light meal or taking in ginger before travelling may help prevent motion sickness.*
- Controlled breathing and distracting the ill person with an activity (e.g. listening to music) may help to reduce symptoms of motion sickness.*
- Looking straight ahead through the windshield, looking outside and fixing the gaze on a central point on the horizon, as well as restricting one's view may help to prevent motion sickness. Sitting in a chair with a high backrest, sitting facing in the direction of travel, wearing a P6 acupressure or P6 acustimulation wristband, and having control over the movement of the vehicle (driving oneself) may also help prevent motion sickness.*

Good practice points

- Stopping the means of transport may decrease nausea.
- Getting fresh air during travel - with a window open and air on the face - may reduce symptoms of motion sickness.
- Those that have used medications such as antihistamines to relieve motion sickness in the past should continue to use them if they are found to be effective.

Chain of survival behaviours

Prevent and prepare

There is some evidence to show the following ways for preventing motion sickness:

- Eat a light meal before travelling.
- Drive the vehicle yourself, if possible.
- Take 1 to 2 grams of ginger (e.g. tea or biscuits) before or during travel.
- Sit in a chair with a high backrest during travel and sit facing forward.
- Look outside and fix the gaze on a central point on the horizon.
- Wear a P6 acupressure or P6 acustimulation wristband while travelling.

Additionally, people might find it helpful to:

- Take mint or peppermint before or during travel.
- Some people find it easier to sleep through travel (unless driving oneself).
- Get fresh air during travel.

Early recognition

The person is travelling in conditions that induce motion sickness, such as a winding road or rough waves on the water.

- Initially, the person's skin may become pale or ashen.
- The person may feel dizzy or have a headache.
- As symptoms progress, the person may experience nausea or vomiting.

First aid steps

1. Stop travelling if possible, to allow the person time to recover and take corrective action.
2. If it is not possible to stop travelling, tell the person to face forward and to look straight ahead at a fixed point on the horizon.
3. If possible, provide fresh air and encourage the person to take slow and regular breaths.
4. Try to distract the person, (e.g., play some music).

Access help

Usually, motion sickness passes without the need to access help.

Education considerations

Context considerations

- Include the types of transport and related first aid care that are relevant to learners and their environment.
- Some areas may have safety considerations that prevent learners from stopping their vehicle. The first aid education should acknowledge and discuss these considerations in a learning activity.

Learner considerations

- People who travel with children (teachers, parents, coach drivers) may find it useful to learn about motion sickness.

Facilitation tips

- Focus on prevention in this topic as first aid is limited in its effectiveness and people may react differently to the various preventative suggestions.
- Ask the learners for their experience of motion sickness as this will help to establish relevant context.
- Inform learners that people who take certain medications (e.g., antidepressants, asthma medications and even ibuprofen) may be more susceptible to motion sickness. Also inform them that some medications (e.g., antihistamine) may make the person drowsy and diminish the reflexes needed for safe driving.

Scientific foundation

Systematic reviews

The Centre for Evidence-Based Practice (CEBaP) developed evidence summaries on the use of controlled breathing and travel activities for motion sickness, as well as on several preventative interventions.

First aid care

Controlled breathing

There is limited evidence from three randomised controlled trials in favour of controlled breathing. Evidence showed that controlled breathing resulted in a statistically significant increase in time to moderate nausea and a decrease in the mean symptoms of motion sickness, compared to spontaneous breathing. Evidence is of very low certainty and results cannot be considered precise due to limited sample size.

Activities

There is limited evidence from one randomised controlled trial in favour of listening to music, and from one non-randomised controlled trial in favour of distraction. The randomised controlled trial study showed that listening to music resulted in a statistically significant increase in time to moderate nausea in people experiencing mild nausea due to motion sickness. The non-randomised controlled trial showed that distraction resulted in a statistically significant decrease of subjective misery (measuring nausea, vomiting, dizziness, headache, (cold) sweat and stomach awareness). When looking at counting compared to not counting to treat motion sickness, two randomised controlled trials could not demonstrate a statistically significant decrease in motion sickness symptoms. In three experimental studies, it was shown that reading or watching a video resulted in a statistically significant increase in motion sickness perception. All evidence is of very low certainty and results cannot be considered precise due to limited sample size, lack of data and large variability of results.

Prevention

View

There is limited evidence in favour of:

- Looking outside: three studies showed that looking outside resulted in a statistically significant decrease in symptoms, compared to looking at the inside environment. However, this could not be shown in a fourth study. Similarly, one study showed that looking at the horizon resulted in a statistically significant decrease in motion sickness compared to not looking outside. However, this decrease could not be demonstrated when comparing looking at the horizon to looking outside. Finally, in one study, it was shown that keeping the eyes open resulted in a statistically significant decrease in motion sickness, compared with keeping the eyes closed.
- Performing a task on a high-mounted tablet: in one non-randomised controlled trial, people were asked to sit down in the passenger seat of a car and perform a task on a tablet that was either mounted at eye-height (high visual display, offering considerable peripheral out-the-window views) or onto the glove compartment (low visual display). The high visual display resulted in a statistically significant decrease in symptoms, compared to the low visual display.
- Restricting one's field of vision or fixating on a central point: when compared to an unobstructed view, no fixation point or inside view only, restricting the field of vision or fixating on a central point resulted in a statistically significant decrease in mean illness rating and subjective symptoms of motion sickness and nausea, based on six studies.

In addition, a statistically significant decrease in mean illness rating when looking inside or outside, compared to wearing a blindfold, or when having an unobstructed view compared to a narrowed forward view, could not be demonstrated by three studies. All evidence is of very low certainty, and results are imprecise due to limited sample size and lack of data.

Seating

There is limited evidence in favour of using a high backrest and sitting in a forward orientation, from one experimental study each. One study showed that sitting with a high backrest resulted in a statistically significant decrease in mean illness rating, compared to a low backrest. Another study showed that forward orientation resulted in a statistically significant decrease in motion sickness, compared to backward orientation.

Additionally, there is limited evidence neither in favour of sitting in the middle rear seat nor sitting behind the driver. Results from one study could not demonstrate a statistically significant decrease in mean illness rating when seated in the central rear seat compared to sitting directly behind the driver. Furthermore, there was no demonstration of a statistically significant decrease in mean illness rating when seated in the first row of a multi-purpose vehicle, compared to sitting in the second row. All evidence is of very low certainty, and results are imprecise due to limited sample size and lack of data.

Driving oneself

There is limited evidence from three experimental studies in favour of driving oneself. One study showed that having control over the vehicle's movement resulted in a statistically significant decrease in motion sickness symptoms and mean well-being score, compared to having no control. It also showed that being or moving as if you were the driver (i.e. actively tilting your head instead of passively following the motion, thereby imitating the driver), resulted in a statistically significant decrease in total symptom score, compared to being a passenger or moving as if you were a passenger. Evidence is of low certainty and results are imprecise due to limited sample size.

Eating and drinking

There is limited evidence from four experimental studies in favour of eating before travelling. One study showed that eating a zero-fat meal resulted in a statistically significant decrease in nausea, compared to eating a high-fat meal. A second study showed that compared to eating an entirely carbohydrate-based meal, or no meal at all, having a high-protein meal resulted in a statistically significant decrease in the subjective symptoms of motion sickness.

A third study compared eating breakfast to going without it while a fourth compared eating either a high protein and low carbohydrate meal or a low protein and high carbohydrate meal to just drinking water. In both cases, the intervention resulted in a statistically significant decrease in the symptoms of motion sickness. However, a statistically significant decrease in the symptoms of motion sickness when comparing an entirely carbohydrate-based meal, or a meal with both moderate carbohydrate and protein portions, to no meal or drinking water only, could not be demonstrated.

There is limited evidence from one experimental study in favour of taking ginger before travelling. Results showed that 1000 or 2000 mg dose of ginger had a statistically significant decrease in nausea during and after the illusion of the body in motion, compared to a placebo.

There is limited evidence from one experimental study neither in favour of drinking water or milk, nor nothing at all. When comparing drinking milk or water to not drinking anything, a statistically significant decrease in subjective symptoms of motion sickness could not be demonstrated.

All evidence is of very low certainty and results of this study are imprecise due to the limited sample size and lack of data.

Wrist bands

There is limited evidence from seven experimental studies in favour of wearing P6 acupressure or P6 acustimulation wristbands. When analysing this evidence, we placed a higher value on the outcome of subjective symptoms of motion sickness over peak total symptoms score or nausea (as it is one of the many symptoms of motion sickness). Studies showed that P6 acupressure or P6 stimulation resulted in a statistically significant decrease in subjective symptoms, compared to the control, dummy point acupressure or a placebo. Another study showed that P6 acupressure had a statistically significant increase in time to moderate nausea, compared to the control. When comparing the use of P6 acupressure or P6 acustimulation to a placebo, the evidence did not demonstrate a statistically significant decrease in symptom severity, peak total symptoms score, subjective symptoms or nausea. Evidence is of very low certainty and results are imprecise due to limited sample size, lack of data and large variability of results.

Drowning

Key action

Provide flotation and get the person out of the water as soon as possible so you can support their breathing.

Introduction

Drowning is the process of experiencing breathing difficulties due to being under or in water or other liquid. Drowning results in a lack of oxygen reaching vital organs such as the brain and heart. The drowning process begins when the person's airways lie below a surface of a liquid. Initially, the person attempts to hold their breath but then - unable to breathe air in - breathes liquid into their airways (Szpilman, 2012). If there is no rescue and they remain unable to breathe air, the person becomes unresponsive and their breathing and circulation systems fail.

Drowning is a leading cause of unintentional injury-related death worldwide. There are an estimated 320,000 annual drowning deaths worldwide (WHO, 2020). Global estimates may significantly underestimate the actual public health problem related to drowning. Incidence, circumstances and those at risk of drowning vary considerably worldwide. However, low- and middle-income countries account for over 90% of unintentional drowning deaths. Most drowning accidents occur in ponds, ditches, lakes, rivers and the sea. The drowning mortality rate for men is twice as high as for women overall (WHO, 2020).

Guidelines

- Rescue equipment such as throw ropes or ring buoys (life belts) can be used effectively by first aid providers to assist a person at risk of drowning.*
- Cardiopulmonary resuscitation (CPR) should be started without delay on a person who is unresponsive and has abnormal breathing (e.g., taking irregular or noisy breaths, or they have stopped breathing altogether) as soon as they have been removed from the water.**
- Rescue breaths should be provided as part of CPR to a person who has drowned and is unresponsive with abnormal breathing.*
- If an automated external defibrillator is easily accessible, it may be used on a drowned person who is unresponsive with abnormal breathing, but its use should not interrupt CPR. The pads should be applied to skin that has been dried.*
- In-water resuscitation (consisting of early rescue breaths and airway management) is NOT recommended for first aid providers. In-water resuscitation should only be attempted by rescuers who are specifically and repeatedly trained and practised in contact-rescue techniques and only in safe conditions.*
- Submersion duration should be used as an indicator when making decisions about search and rescue resource management or operations.**

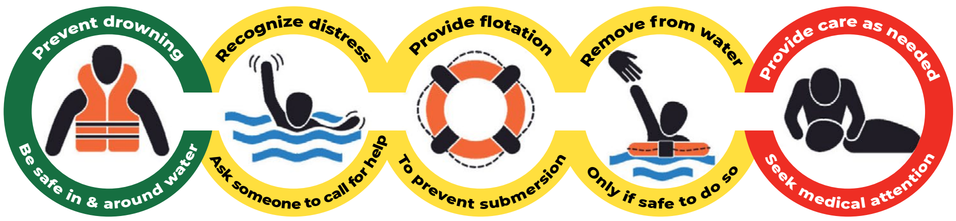
Good practice points

- The first aid provider should be alert to danger and always prioritise their own safety.
- Drowning causes a breathing problem so first aid providers resuscitating a person who has drowned must prioritise upper airway management and early rescue breathing.
- Attempted rescue by a layperson should be made from land or boat, without entering the water, by reaching with something rigid (e.g. a pole or tree branch) or throwing a rope or buoyant object. The first aid provider should not touch the drowning person because there is a risk they may be pulled into the water.
- In the case that a first aid provider is already in the water and attempting a rescue, they should have some knowledge of the aquatic environment and use a flotation aid.
- The possibility of a spinal injury should not delay the removal of an unresponsive person from the water.

- A person who is unresponsive and breathing normally should be positioned or transported in the recovery position - lying on their side with their head positioned to allow free drainage of fluids from their mouth. Any pressure on their chest that may cause breathing difficulty should be avoided.
- If the person is unresponsive and has abnormal breathing, two to five initial rescue breaths may be given before compressions.
- If the first aid provider is trained and oxygen is available, the provider may give oxygen to a person who has drowned and is breathing normally.
- Supplemental oxygen for resuscitation of a person who has drowned may be used, but doing so should not delay CPR, including opening the airway and providing rescue breaths and chest compressions as needed.
- Manual methods to remove material in the airway of a person who has drowned should only be used when the airway is blocked by vomit or debris that is preventing breathing. Manual methods include using fingers to remove a visible foreign object from the person's throat, or positioning the person to enable fluid or vomit to drain out.
- Education on this topic should help the learner to understand the drowning process and the importance of rescue breaths during CPR. Airway management skills should also be included.
- Parents, caregivers and habitual swimmers should be encouraged to have rescue equipment with them that they know how to deploy or use effectively.
- Swimming courses should include all domains of the Drowning Chain of Survival (prevent drowning, recognise distress, provide flotation, remove from water and provide care as needed) to improve water competencies.

Drowning chain of survival

First aid for drowning incidents are often linked to demanding rescues, which endanger the life of the first aid provider. It is important to act quickly to restore breathing to the drowning person. For this reason, a problem-specific "Drowning Chain of Survival" was developed to define the key steps to providing a rescue (Szpilman, 2014).



Prevent drowning

The following measures can be adapted locally to reduce risk factors or strengthen protective factors related to drowning.

- Advocate that people install barriers to control access to water (WHO, 2017).
- Acquire water competencies and advocate that individuals have or improve their water competencies (swimming, floating, life jacket use, local hazard recognition, rescue, CPR) (Stallman et al., 2017).
- Teach school-age children swimming and water competencies (WHO, 2017).
- Provide safe places (for example a day-care centre) away from water for pre-school children, with capable child care (WHO, 2017).
- Train bystanders in safe rescue and resuscitation (WHO, 2017).
- Encourage caregivers to conduct a risk assessment prior to trips to or at bodies of water (Denny et al., 2019).
- Encourage caregivers (e.g., parents or other family members, daycare providers, teachers, youth group leaders, water sports or swimming coaches) to provide constant and close supervision of young children and inexperienced swimmers around, near and in the water.
- Encourage communities to engage in water safety programmes to build a collective understanding of the dangers and preventative strategies for activities in, on or near water.
- Build resilience and manage flood risks and other hazards locally and nationally (WHO, 2017).
- Advocate that safe boating, shipping and ferry regulations are set and enforced (WHO, 2017).

Strategies

- Strengthen public awareness of drowning through strategic communications (WHO, 2017).
- Promote multisectoral collaboration (WHO, 2017). Work with other organisations to achieve greater reach and message harmonisation.
- Take part in or initiate a national water safety plan (WHO, 2017).
- Advance drowning prevention through data collection and well-designed studies (WHO, 2017). This could include evaluating the effectiveness of your own programmes.

Recognise distress

Drowning is a process that the first aid provider should try to recognise (and interrupt) as quickly as possible. Often the drowning person experiences a triggering incident, then loses control of their ability to breathe or move in the water. They may struggle and then submerge and breathe in water. The process is very quick, lasting from seconds to just a few minutes before the person can no longer surface.

The following may indicate a person is drowning:

- Behaviour or actions that do not correspond to the person's abilities (e.g., a child alone in the water or swimming in a deep area).
- They do not respond to the question "Are you OK?".
- Their mouth is below the water or they are gasping or spluttering.
- They appear to be struggling to breathe.
- Their head is underwater or they are face down.
- Their body position has changed from being horizontal (swimming position) to vertical (they may appear to be climbing an invisible ladder).
- They are pushing their arms down like a watermill on the surface of the water.
- The person is trying to swim in a particular direction but making no progress.
- The person is not moving in any direction but bobbing up and down.
- The disappearance of a person last seen in the water.

NOTE

- Drowning is often quiet. A person who is in distress may not wave or call for help. Quick recognition is crucial for a positive outcome following a drowning incident.

As soon as it is recognised that a person is in distress, the first aid provider should ask for help from other bystanders, lifeguards or emergency services. If possible, someone should stay on the scene and constantly observe where the drowning person is in the water.

Provide flotation

If the drowning person is responsive, the first aid provider should provide flotation to keep the person's airway above water. This buoyancy buys time for their removal from the water.

The first aid provider should stay out of the water, providing flotation from a position of safety. The human motivation to help, especially of relatives and friends, exposes the first aid provider to a significant danger of drowning that can cause death (Franklin & Pearn, 2011). Their primary focus should be on maintaining their own safety.

Flotation can be provided by reaching out to the person with an object (e.g. a pole, tree branch or towel) or by throwing something that floats (e.g. a buoy, floating boxes, life-jacket or anything else that floats).

In situations where the first aid provider is already in the water (such as on a surfboard or kayak) and has appropriate characteristics (good aquatic competence and experience, physical fitness) and some type of flotation aid, they may attempt a rescue before calling for help.

Remove from the water

The best way to remove a person will depend on the situation including the condition of the person to be rescued, available equipment, type and accessibility of the water body, and availability of other bystanders.

The first aid provider could pull the person to land or a boat using rescue equipment such as a pole, rope, or flotation aid and then pull the person out of the water.

If the person cannot be reached with rescue equipment a water vessel or equipment (such as a boat, jet ski, surfboard, canoe or kayak) could be used to reach the person.

Swimming to reach the drowning person is associated with high levels of danger for the first aid provider - no matter if trained or untrained. Whenever possible, this should be avoided. However, if the situation develops in such a way that swimming to the drowning person is necessary, the rescuer should take a flotation aid.

If the drowning person is responsive they are likely to panic and may pull or grab onto any person or thing approaching them. For this reason, it is important to always provide flotation to the drowning person (see above) and use a flotation aid to protect yourself.

If the person is unresponsive, the same principles apply in that the first aid provider should protect their own safety and could attempt rescue using a boat or water sports equipment (canoe, kayak, stand up paddleboard, surfboard, etc.).

Provide care

Once the person has been removed from the water and is on land or a boat, check for a response, and open their airway and check for breathing. Treat the person according to their condition.

Responsive and breathing

1. Help the person to rest in a comfortable position, preferably sitting or lying on their side.
2. Carry out further assessment of their condition, see General approach.
3. Keep the person warm by covering them with dry clothing and protecting them from the cold ground.
4. Monitor the person closely in case the person develops breathing difficulties.

CAUTION

- Breathing difficulties can develop, so if possible, advise that someone stays with the person to monitor their condition for around 8 hours.
- If the person is experiencing breathing difficulties or coughing a lot, access medical care.

Unresponsive and breathing normally

1. Move the person onto their side and tilt their head back (or into a neutral position if it is a baby) to maintain an open airway and help fluids drain. This is called the recovery position. A baby can be held in this position in your arms. See Unresponsive and breathing normally.
2. Access EMS and follow their instructions.
3. Keep the person warm by covering them with dry clothing and protecting them from the cold ground.
4. 4Monitor the person closely as their condition may deteriorate rapidly. The person may vomit or experience worsening breathing.

Unresponsive and abnormal breathing (e.g., taking irregular or noisy breaths, or they have stopped breathing altogether)

1. Immediately ask a bystander to access EMS, or if you are alone, access EMS yourself. If using a phone, activate the speaker function.
2. Open the person's airway and give two to five initial rescue breaths. Blow steadily for one second until you see their chest or abdomen rise.
3. If there is no response, give 30 chest compressions without delay; push down on the centre of their chest at a fast and regular rate (100–120 compressions per minute).
4. Give two rescue breaths. Blow steadily into their mouth or mouth-and-nose for one second until you see the chest or abdomen rise.
5. Continue with cycles of 30 chest compressions and two rescue breaths until emergency help arrives or the person shows signs of life (such as coughing, opening their eyes, speaking or moving purposefully) and starts to breathe normally.

NOTE

- The person is likely to vomit. Be prepared to roll them onto their side to clear their airway.
- While performing CPR, be alert to any signs of life such as movement or coughing. If you see any signs of life, pause CPR for up to ten seconds to see if the person can breathe on their own.
- If you are unwilling or unable to give rescue breaths, give chest-compression-only CPR at a rate of 100–120 compressions per minute.
- If an automated external defibrillator is available, ask a bystander to bring it as quickly as possible. Dry the person's skin where the pads will be applied, and follow the voice prompts of the defibrillator. (See Unresponsive and abnormal breathing when a defibrillator is available.)
- Always access medical care for someone who has experienced a drowning incident and received CPR.

Education considerations

Context considerations

- Examine local health or accident data to work out which populations are most at risk of drowning in your region, for example young children, adolescents, or perhaps those with an underlying health condition or in a certain sociodemographic.
- Ensure an adequate risk assessment is carried out in advance of outdoor education activities. Draw up and apply a safety plan based on the risk assessment. The plan should include clear criteria for when to stop the educational activity because of risks or threats to learner safety such as lightning if outdoors, or an inadequate number of supervisors or lifeguards if near water. Evaluate the plan after the session.
- Using a mixture of both context-based learning (on a beach, poolside, lakeside, etc.) and more formal learning environments (online, a classroom, etc.) can be useful and complementary, allowing flexibility (e.g. for poor weather or accessibility). Teaching water competencies in a relevant context can allow learners to experience the local hazards and learn how to deal with risks in a realistic environment (e.g. children discover their beach or public pool; communities experience the dangers of the local pond or waterway). Some water competencies or elements of them are well suited to be taught in more formal environments either online or in-person.
- Prepare adaptable education sessions that can accommodate sudden changes in weather and water conditions. Teach learners to be aware of changing weather conditions, including fast moving or changing tides, and how to recognise and respond urgently to such changes to avoid increased risk of drowning.

Learner considerations

- Learning rescue techniques is encouraged from school-age, and knowledge and skills should continue to be refreshed and practised throughout a person's life if these skills are to be retained.
- Adjust the focus of education depending on the learner group. For example, education to caregivers who live near to water could focus on prevention strategies, rescue and CPR, while education to children may focus on self-rescue skills and providing flotation.
- Consider that some people with underlying health conditions (epilepsy, heart problems or autism) may be more at risk of drowning (Denny et al., 2019).
- Change caregivers' attitudes about the value of supervision by using context-specific examples.
- Some learner groups believe myths related to drowning so take time to sensitively dispel the myths and construct accurate knowledge. One common myth is that water is an airway obstruction you have to remove from the person (e.g. by swinging the person around by their legs, hanging them upside down or doing abdominal thrusts). In fact, there is no evidence that water acts as an obstruction. Rescue breaths and chest compressions can be started on an unresponsive person who is not breathing without delay.

Facilitation tips

- When appropriate, consider providing water safety messages as part of a broader practical programme aimed at developing water competence. Evaluate the programme to determine its effectiveness.
- Design programmes using behaviour change models, clearly identifying the risk factors you are trying to reduce.
- Design programmes with consideration of the local water hazards (including fast-changing weather conditions or tides) and cultural considerations such as myths that may affect behaviour change.
- Deliver water safety sessions using educators who can culturally identify with learners as this may make education more effective.
- Use hands-on (experiential) learning when and where safe to do so. (See the point above in 'context considerations' on risk assessment.) Give active opportunities to learners to practise how to develop competencies such as throwing a flotation aid.
- Ensure water safety messages are simple and visually engaging.
- Emphasise to learners that the motivation to go to a person in distress, especially of relatives and friends, exposes the first aid provider to a significant danger of drowning that can lead to death. The rescue should be provided at the lowest risk to the first aid provider. Flotation is essential to any water rescue.
- Practice safely throwing floatation devices (such as life jackets) or using locally available objects such as long tree branches to pull a person to shore. Education could include the use of improvised and purpose-made rescue equipment and should be repeated regularly.
- Where you are using a rescue device, discuss the dangers of the device such as the rescuer being pulled into the water, and how to avoid this happening.
- Emphasise that rescue breaths are the most important initial treatment to restore oxygen in the body and stop the drowning injury. Rescue breathing should begin as soon as possible (i.e. when the first aid provider reaches a safe place with a stable surface). Concerns of water in the airways should not delay rescue breaths - the rescue breaths will push any water in the airways down into the lungs.

Facilitation tools

- Consider using Media learning as part of a multi-approach to inform people of the risks, safe behaviours and how to access help.
- Use the Water Competencies checklist to ensure you include physical, cognitive and attitudinal elements to provide a holistic approach to water safety education.
- Find more facilitation tools in the Water context topic.

Learning connections

- Highlight and practise the connections to the unresponsive abnormal breathing topics for baby and child or adolescent and adult, raising awareness of the importance of rescue breaths combined with chest compressions for people who are not breathing as a result of drowning (as opposed to chest-compression-only CPR).
- A person who has been in the water may be at risk of Hypothermia.
- If relevant, pair this topic with other aquatic topics such as Decompression illness or Aquatic animal injuries.
- Consider any relevant education practice in the topics of Water context, Media learning and Online learning for adults or children.
- Consider pairing water competency education with environmental or WASH (Water, sanitation and hygiene) issues.
- Care for the person's mental distress, see Traumatic event.

Scientific foundation

Systematic reviews

Recognition of drowning by a lay-person

A systematic review on the recognition of drowning including the visual cues or signs a layperson can use to identify a drowning person was conducted and identified 23 studies (Pascual-Gomez & Petrass, 2020). The review highlights there is very limited empirical data describing how laypeople recognise a person is in the early stages of the drowning process. The review therefore also draws on limited data describing how lifeguards recognise drowning.

One study found that lifeguards are commonly taught to look for a specific set of behaviours that are considered to show drowning or distress situations, including splashing, frequent submersion, changes in body position, impairment of swimming effectiveness, and a lack of progress through the water.

Another study found that given the drowning person's rapid progression from distress to submersion, recognition of even earlier signs of distress is critical, for example, a swimmer moving slowly due to weakness, physical condition, or fatigue or moving into water beyond their skill level.

A separate study found that lay people were especially good at identifying even earlier events that can lead to drowning, for example, children performing dangerous activities, such as repeated submerging, horseplay, or going too far from shore. Lay people need to be educated on behaviours that characterise distress in the water or drowning.

Results indicate that a person shows some or all of the above behaviours in almost all instances of drowning. However, as these behaviours are common in water settings, it may be challenging for bystanders to recognise them.

No studies reviewed addressed the fact that some drowning people display no signs.

The review made recommendations based on the very-limited and limited evidence available as well as based on best practice and consensus expert opinion.

Water rescue equipment

A scientific review addressing the question of what the most effective types of aquatic rescue equipment for a layperson or bystander to use to rescue a drowning person was updated in 2019 (Beale-Tawfeeq, 2019). It reported a lack of evidence identifying which items can be recommended based on accuracy, buoyancy, the distance that they can be thrown, and ease with which they can be caught by the drowning person. Despite the limited data, the review puts forward the current recommendation of rescue equipment including throw ropes and lines and ring buoys for effective use by bystanders which seem to contribute to positive outcomes.

Bystander CPR

The International Liaison Committee on Resuscitation (ILCOR) Basic Life support task force carried out a scoping review on resuscitation and emergency care in drowning (Bierens et al., 2021). It included 65 studies, of which 19 observational studies were identified that discussed bystander CPR as an intervention following drowning. Statistically significant associations were found with improved neurological outcomes (two studies), survival (four studies), however other studies either found a positive trend towards survival, or no association. Three studies compared compression-only CPR with conventional CPR and all favoured conventional CPR with bystander ventilation in terms of neurological outcomes and survival. Based on this evidence, initiating conventional CPR which includes ventilation and compressions is recommended.

Automated external defibrillator use in drowning

The ILCOR scoping review (Bierens et al., 2021) searched for studies reporting impact on outcomes from the use of an on-site automated external defibrillator (defibrillator) in cardiac arrest due to drowning prior to the arrival of emergency medical services but no studies were identified.

Indirect evidence of defibrillator use was found from 15 observational studies. In four studies there was a range of defibrillator use in cases of suspected drowning prior to the arrival of EMS. In 12 studies it was uncommon to detect a shockable rhythm. Seven observational studies found that a shockable rhythm was not associated with the outcome of better survival. One study found there was an association between shockable rhythm and increased 30-day survival. One study found the use of defibrillators on boats in moderate sea conditions to seem feasible. One study with lifeguards reported the mean time from arrival to defibrillation was 62 seconds. There was one case of inappropriate shock delivered to a person in an asystole in one study, with no obvious consequences. There were no adverse events identified in any of the studies listed.

Oxygen use

The ILCOR scoping review also searched for studies about the pre-hospital use of oxygen following a submersion incident, but no studies were identified (Bierens, 2021). Indirect evidence from observational studies found associations between hypoxia, oxygen administration and worse outcomes. In the absence of specific research about the use of oxygen in drowning, ILCOR concluded that the existing treatment recommendation for oxygenation after the return of spontaneous breathing applies. This guides to avoid hypoxaemia and hyperoxia, using 100% inspired oxygen until arterial oxygen saturation or the partial pressure of arterial oxygen can be measured. If the person is breathing normally, supplemental oxygen with a target saturation of 94–98% for a person who has drowned may be used.

In-water resuscitation

Five studies were identified by the ILCOR scoping review on the topic of in-water resuscitation (Bierens et al., 2021). The evidence indicates that in-water resuscitation (composed of rescue breaths only) is very challenging and should only be attempted by highly-trained rescuers if it is safe to do so. Therefore, the emphasis for first aid providers should be on non-contact rescue rather than in-water resuscitation.

One clinical study used a protocol of giving up to one minute of ventilation before moving the unresponsive person to shore and in deep water required either the availability of a flotation aid or at least two rescuers. Initial survival, survival to hospital discharge and favourable neurological outcome were all rated higher for in-water resuscitation. The other four studies evaluated the capacity of lifeguards and laypeople to perform in-water resuscitation and rescue of a manikin. In-water resuscitation was technically difficult and physically demanding, particularly in open water. It increased the rescue time, number of submersions and breathing-in of water by the manikin. Some trained lifeguards and laypeople were unable to complete the rescue. ILCOR found that the use of ventilation adjuncts by well-trained lifeguards might facilitate in-water resuscitation.

Resuscitation on a boat

The ILCOR scoping review (Bierens, 2021) found seven studies that evaluated resuscitation on a boat. One case series looked at the outcome of survival from resuscitation on a boat (24 cases) and found no survivors. However, the CPR quality was reported to be sub-optimal. In the other case series, six resuscitations were attempted on a boat or lifeboat; there was only one survivor after one month. Four studies evaluated the capacity of lifeguards and fishermen to perform CPR in inflatable rescue boats or fishing boats. The studies showed that CPR was physically demanding but that resuscitation on a boat was feasible. The quality of the resuscitation was affected by the boat speed and the sea conditions with ventilations more affected than chest compressions. One simulation study showed that defibrillator use on rigid inflatable rescue boats on calm water was feasible.

Advanced airway management

In the ILCOR scoping review, no studies were identified that examined the effect of a particular airway management strategy over another or no intervention, in the management of a submerged person (Bierens et al., 2021). However, six observational studies indirectly examined airway management strategies in people following drowning events. In all studies, intubation was an indication of the severity of the injury, with the most severe cases being intubated during cardiac arrest or facilitated with anaesthesia. Two studies showed intubation was associated with worse outcomes and one study did not find an association between intubation and long term mortality. One study showed mobile medical team ventilation as associated with better outcomes.

Prognostic factors that predict drowning outcomes

In 2020 ILCOR updated the systematic review for prognostic factors that predict outcomes concerning drowning incidents such as duration of submersion, the person's age, the salinity of the water, and water temperature, compared with no factors (Olasveengen et al., 2020). The review recommended that submersion duration be used as a prognostic indicator when making decisions surrounding search and rescue resource management or operations.

Submersion duration

Studies were considered to look at survival with favourable neurological outcome for different lengths of time of submersion (short - less than 5-6 minutes, intermediate - less than 10 minutes, and prolonged - less than 15-25 minutes). All studies noted worse outcomes associated with submersion duration longer than 5 minutes. The 2020 update was consistent with the 2015 review which found that submersion durations of less than 10 minutes are associated with a very high chance of favourable outcomes, and submersion durations of more than 25 minutes are associated with a low chance of favourable outcomes.

For the duration of submersion, the review and meta-analysis identified:

- For short submersion intervals (less than five to six minutes) moderate-certainty evidence was identified from 15 observational studies for the critical outcome of favourable neurological outcome and a low-certainty of evidence. All studies noted worse neurological outcomes in people with submersion durations of more than five minutes. For the critical outcome of survival, low-certainty evidence was identified using six observational studies. All studies had an association between worse survival outcomes among people with prolonged compared to short submersion durations.
- For intermediate submersion intervals (less than ten minutes) there is moderate-certainty evidence based on nine observational studies for the critical outcome of favourable neurological outcome and low-certainty of evidence from two observational studies for the critical outcome of survival. All studies noted worse neurological outcome among patients with prolonged submersion durations compared with intermediate submersion durations.
- For prolonged submersion intervals (less than 15 to 25 minutes) there is low-certainty evidence for the critical outcome of favourable neurological outcome from three observational studies and very low-certainty evidence for the critical outcome of survival from a single study. Submersion of less than 20 or 25 minutes was associated with better neurological outcome versus longer submersion duration for adults and hypothermic children. Cases with a submersion interval of fewer than 15 minutes had a higher overall survival rate.

Age, salinity and water temperature

For age, salinity and water temperature there was very-low-certainty or contradictory evidence for the critical outcomes of favourable neurologic outcome and survival.

EMS response interval

For the critical outcome of survival, there is low-certainty evidence from two observational studies. EMS response intervals of less than ten minutes were associated with better survival outcomes.

Witnessed status

The review found that the definition of witnessed compared with unwitnessed drowning was inconsistently defined in the studies reviewed. It was often unclear if the term "witnessed" related to the submersion or the cardiac arrest.

For the critical outcome of survival with favourable neurological outcome, there is very-low-certainty evidence from three observational studies, showing better outcomes for witnessed drownings. However, the studies did not indicate submersion duration which has been identified as an independent indicator of prognosis.
For the critical outcome of survival, there is low-certainty evidence from four studies. The evidence is variable and contradictory, and one study could not be generalised.

Non-systematic reviews

Water rescue equipment

The scientific review outlined above by Beale-Tawfeeq (2019) addressing the question of the most effective types of aquatic rescue equipment for a layperson or bystander to use to rescue a drowning person also recorded some expert opinion. It recommended that teaching rescue skills should become a part of water safety classes and guidelines to reduce the rates of drowning. It also recommended that targeted interventions are needed to address rescue skills in multiple aquatic environments, particularly those that are high risk. And that the development of public-access safety programs may help improve drowning outcomes.

Finally, the review also reflected on the sentiment of "rescuer altruism" in a layperson or bystander when a person needs rescue from the water; they will initiate rescue despite the danger to themselves.

Lay-rescuers techniques in drowning incidents

A scoping review (Barcala-Furelos et al., 2021) to identify the safest techniques and equipment for an untrained bystander to use when attempting a water rescue included 22 studies. The review identified three types of techniques used by laypersons:

- non-contact techniques for rescue out the water: throw and reach
- non-contact techniques for in-water rescue using flotation aids
- contact techniques for rescue in the water: swim and tow with or without flippers

It stated that the safest technique for a lay-rescuer is the first one - to attempt non-contact rescue using a pole, rope, or flotation equipment without entering the water.

Despite the recommendation that an untrained person should not enter the water to rescue a drowning person, the literature shows a human tendency towards "altruism" in helping a drowning person. In most incidents, a rescuer entered the water and made contact with the drowning person, putting themselves at risk. This behaviour was especially manifested when the rescuer had a close bond with the drowning person. However, in many cases, witnesses took risks to help someone they didn't know, based on the principles of the Good Samaritan and the desire to "do the right thing".

The review suggests it may be difficult to prevent the impulse of lay-rescuers to enter the water but it is possible to encourage potential rescuers to carry some sort of flotation aid if they attempt a rescue. Studies in the review identified that the teaching of rescue techniques in school should be ongoing if the skills are to be retained in adult life.

Removal of fluid

There is no indication that water blocks the airway as a foreign body. Manoeuvres such as abdominal thrusts to relieve foreign body airway obstruction are therefore not recommended for people who have drowned (International Life Saving Federation, 2016). Such manoeuvres are unnecessary and may cause injury, vomiting, and delay CPR. Resuscitation with rescue breaths should begin immediately rather than attempting to remove fluids from the airways.

Little, if any fluid can be removed from the airways by drainage techniques (suctioning, abdominal thrusts or postural drainage). This is because the estimated amount of water breathed in is small and, after just a few minutes of submersion, it is absorbed into the circulation (Golden, Tipton & Scott, 1997). However, autopsy studies show large amounts of swallowed water in the stomach. Therefore procedures for foreign body airway obstruction should be used only if the airway is completely obstructed by a solid object.

Positioning of an unresponsive person who is breathing

Szpilman (2012) recommends placing the breathing person on their side in the recovery position, with their head positioned to allow free drainage of fluids. The position should be stable, without pressure on the chest.

Spinal injury in instances of drowning

A person who is drowning is at risk for a spinal injury only if they have also sustained a traumatic injury or been involved in a high impact activity (such as diving, water skiing, surfing, or being caught in moderate to severe surf breaks). Routine spinal immobilisation does not appear to be warranted solely on the basis of a history of submersion (Watson, 2001).

The International Life Saving Federation (2016) recommends that in the case of drowning as a result of a traumatic injury, if the person is unresponsive, management of their airway takes priority over any suspected spinal injury. The person can be handled to minimise spinal movement if possible. If the person is responsive, the principles of minimising movement apply and if removal from the water is necessary, then it should be done while maintaining alignment of the spine.

Education review

Prevention of drowning

A paper by Denny et al. (2019) summarised factors contributing to the incidence of drowning in the USA and then made recommendations to prevent drowning. These strategies to prevent drowning are particularly relevant to education and advocacy.

Factors contributing to drowning in the USA included the populations of young children 0-4 due to unsupervised access to bodies of water and adolescents who may overestimate their water competencies, undertake risky behaviour, or maybe affected by alcohol. Underlying health conditions such as epilepsy, cardiac arrhythmia and autism also increase the risk of drowning, with socio-demographics also a contributing factor.

The paper outlined that learning to swim is just one part of water competency. To prevent drowning, Denny et al. recommended that people need broader water competencies including knowledge of local hazards, understanding of one's limitations, ability to put on a life jacket, and all the first aid related to drowning (recognition, rescue, etc). Developing these skills takes time and developmental maturity. The paper highlighted some existing drowning prevention strategies such as the Haddon Matrix and ranks five major interventions as evidence-based: 4-sided pool fencing, life jackets, swim lessons, supervision, and lifeguards.

Denny et al. went on to identify the role of parents, medical providers, pool operators and policymakers in being informed of and promoting drowning prevention recommendations and legislation. The paper identified the most evidence-based interventions as being four-sided pool fencing, life jacket use, swim lessons, supervision and lifeguards and bystander CPR.

The World Health Organizations "Drowning Prevention: an implementation guide" (2017) also formed much of the foundation for the prevention content. The paper provides practical steps to preventing drowning.

Lifeline rescues

Pearn and Franklin (2009) carried out a study with 25 volunteers which tested their ability to throw a lifeline (rope) to a person simulating drowning 10 meters from the shore. The time and accuracy of achieving a successful lifeline throw were recorded for each of multiple attempts. The results indicated that more than half of fit adults cannot throw a lifeline accurately to a distance of ten meters even with multiple attempts and that, in the heat of the moment, one in five "rescuers" do not anchor the end of the rope, which is then lost when thrown. These results were compared to competitive or trained rescuers who can deploy a lifeline with extreme accuracy and great speed.

The study highlighted the importance of the safety of the rescuer and the use of non-contact rescue to maintain this. However, it emphasised that to be successful in non-contact rescues, people need training and practise in throwing a lifeline or buoy. Pearn and Franklin implied that a person's first time throwing a lifeline should not be in the midst of a life-threatening event.

Water competencies

Stallman et al. (2017) built on previous work on water competencies to use evidence to select essential water competencies. They argue swimming skills alone are not enough to address drowning prevention. Rather a broad range of competencies are required including:

1. Safe water entry competence
2. Breath control competence
3. Stationary surface competence (buoyancy or treading water)
4. Water orientation competence
5. Propulsion competence (swimming)
6. Underwater competence
7. Safe exit competence
8. Personal flotation device
9. Clothed water competence
10. Open water competence
11. Knowledge of local hazards competence
12. Coping with risk competence (awareness, assessment, avoidance)
13. Assess personal competence
14. 1Rescue competence (recognise and assist safely)
15. Water safety competence (attitudes and values)

Water context

See Water context for more scientific foundation.

Decompression illness

Key action

Access emergency medical services immediately and administer oxygen (if specifically trained).

Introduction

Decompression illness results from a reduction in the ambient pressure surrounding a person's body. It is commonly caused by pressure changes that occur in scuba diving, a very popular sport in many parts of the world. Decompression illness includes two conditions: decompression sickness and arterial gas embolism. Decompression sickness is thought to result from bubbles growing in the tissue and causing local damage. Arterial gas embolism results from bubbles entering the circulation, collecting together and travelling through the arteries and causing tissue damage by blocking blood flow to the small vessels.

Good practice points

- In the case of suspected decompression illness, specifically trained first aid providers should administer oxygen at the highest concentration available (such as a non-rebreather mask) which may reduce the symptoms substantially. The oxygen should be continued until medical care is accessed.
- First aid providers should access emergency medical services (EMS) immediately, as well as the Divers Alert Network (see Access help section below) and indicate the likelihood of decompression illness so that transport of the person to a recompression chamber can be arranged as soon as possible. Definitive treatment is usually oxygen therapy provided in a recompression chamber.
- In cases of cardiac arrest after resurfacing, CPR should be administered with rescue breaths. See Unresponsive and abnormal breathing (baby and child) or (adolescent and adult).
- In locations requiring extended or complicated transport to a recompression chamber, rapid transport to a nearby emergency department capable of resuscitation should be prioritised for stabilisation prior to transport to the chamber.

Chain of survival behaviours

Prevent and prepare

- Be aware of and actively reduce the risk factors including deep or long dives, cold water, hard exercise at depth and rapid ascents.

Early recognition

Symptoms of decompression illnesses usually appear 15 minutes to 12 hours after surfacing, but in severe cases, may appear before surfacing or immediately afterwards.

Decompression sickness
Symptoms include the following:

- unusual fatigue
- skin itch
- pain in joints and muscles of the arms, legs or body
- dizziness, vertigo, ringing in the ears
- numbness, tingling, paralysis
- shortness of breath.

Arterial gas embolism

Symptoms include the following:

- dizziness
- chest pain
- disorientation
- bloody froth from the mouth or nose
- paralysis or weakness
- convulsions
- becoming unresponsive.

First aid steps

1. If specifically trained, administer oxygen to the person. (See Oxygen administration.)
2. Access EMS. If possible, call the Divers Alert Network +1-919-684-9111.
3. Monitor the person's level of response, breathing and circulation until EMS arrives.

NOTE

- If the person becomes unresponsive, open their airway and check for breathing. (See Unresponsiveness.)
- If the person becomes unresponsive with abnormal breathing after resurfacing, CPR should be administered with rescue breaths. See Unresponsive and abnormal breathing (baby and child) or (adolescent and adult).

Access help

- Phone EMS immediately. They will be able to tell you what to do and arrange help.
- The Divers Alert Network is an international not-for-profit organisation with a helpline which can be reached 365 days a year, 24 hours a day, by phone: +1-919-684-9111. This network provides assistance with managing injured scuba divers, helps decide if recompression is needed, provides the location of the closest appropriate recompression facility and helps arrange transport for the person.

Education considerations

Context considerations

- In some countries, laws make it mandatory for professional diving operations to have oxygen readily available (e.g. diving training institutions). Therefore, the likelihood of oxygen being available is high at dive sites, and likely immediately available if called for by the first aid provider.
- Learners should be informed about any national first aid guidelines for decompression illness, including the local procedures for care in the country where they are diving.
- Programme designers should obtain information on local resources for diving emergencies and access to hyperbaric oxygen therapy facilities, to include in programmes.
- Decompression-related injuries can happen in open water as well as in deep swimming pools, so education on this topic may be applicable to learners without local access to open water.

Learner considerations

- This topic is usually targeted at professional responders (e.g., paramedics, lifeguards) who have a specific duty to respond, strong assessment skills, and access to resources such as oxygen. Consideration should be given to the technical nature of this topic and the programme designer should match the content to the skill level of the learners using appropriate terminology.

Facilitation tips

- Explain that decompression sickness is the result of rapid decompression after exposure to increased pressure. During a dive, the body tissues absorb nitrogen from the breathing gas in proportion to the surrounding pressure (which is elevated during diving). As long as the diver remains at pressure, the gas presents no problem. But if the pressure is reduced too quickly, the nitrogen comes out of solution and forms bubbles in the tissues and bloodstream. Diving tables provide scientific protocols to decompress safely, with a low chance of bubbles forming. However, decompression sickness can still occur despite following accepted guidelines.
- Explain that an arterial gas embolism happens if a scuba diver surfaces without exhaling. Air trapped in the lungs expands on the ascent and may rupture lung tissue (called pulmonary barotrauma), which releases gas bubbles into the arterial circulation. The bubbles are distributed and may impair the circulation wherever they become lodged. Because the brain receives the highest proportion of blood flow, it is the main organ where bubbles lodged in small arteries can interfere with circulation.
- Emphasise that if learners will be responding to suspected decompression illness hours after the person has resurfaced (and is presumably in a different environment), they will need to use a detailed assessment process to identify the symptoms as being related to decompression illness and not another condition.
- This topic is best suited to be covered after foundational concepts of first aid so that learners are able to draw from a range of skills and knowledge.

Facilitation tools

- National Societies may contact the Global First Aid Reference Centre for water rescue and drowning prevention first aid training programmes.
- There is an opportunity in this topic to include critical thinking and application of learning:
  - Option 1: Explore using a scenario and role-play. This allows the learners to experience the varied roles among a team when responding and preparing for transport, exercise decision making, practise their communication skills, and apply first aid skills.
  - Option 2: Explore this topic using case-based learning. Have the learners create their own case study (and then have a peer review the case study) or solve a case which has already been developed.
  - Using either method you can further challenge the learners by extending the scenarios or cases over time so that they are required to identify the impact of time on the ill person's condition or add constraints which may require them to change their first aid action plan.

Learning connections

- Connect this topic to safety for the ill person and the first aid provider, assessment of the person (initial and continual), and accessing further support. (See General approach for more on each of these).
- Explore the safe administration and handling of oxygen (see Oxygen administration).
- There is the potential this condition will result in cardiac arrest (See Unresponsive and abnormal breathing (baby and child) or (adolescent and adult).

Scientific foundation

No formal reviews were made on this topic. The recommendations are based on expert opinion. The Diver Alert Network (DAN), a specific medical network dealing with diving-related problems, was also a source for the information presented in these guidelines.

Non-systematic review

A large retrospective case study showed that scuba divers experiencing decompression injury require less recompression treatment and have a greater likelihood of complete recovery if first aid includes normobaric oxygen (Blatteau, 2011).

Radiation injuries

Key action

Remove yourself and others from the area where there is radiation to prevent and reduce injuries from radioactive material.

Introduction

Radiation sources exist in a variety of fields including industry, medicine and research. Radiation injuries can occur when there is a radiation emergency and might not be obvious immediately. If not controlled, exposure to radioactive material can have serious consequences to our health. Radiation exposure can lead to external or internal contamination of the body with radiation. Acute exposure can quickly cause burns, or damage to the brain or circulation and digestion systems. It can also cause a person to develop cancer in the longer term.

Good practice points

- Avoid touching or approaching suspected radioactive materials or accident scenes.
- The injured person should be removed from the scene as quickly as possible with due precaution and care.
- To avoid accidentally ingesting radioactive material, people who have been in the vicinity of radioactive materials or scenes should wash their hands and face thoroughly before touching them, smoking, eating or drinking.
- First aid providers should stay more than 100 metres away from the smoke caused by a fire or explosion from a potentially dangerous radioactive source.
- Exposure to a sealed source does not require decontamination.
- The decontamination process should be handled by those specially trained to do so. Clothing worn by anyone who may have been exposed to radiation should be removed while waiting for specialists to arrive.
- Any person who may have been exposed to radioactivity must be examined by medical specialists as soon as possible.

Chain of survival behaviours

Prevent and prepare

- Be aware of sources of radiation such as:
  - uncontrolled (abandoned, lost, stolen or found) dangerous sources or materials (particularly items found near or around nuclear power stations or other nuclear facilities)
  - misuse of dangerous industrial and medical sources (e.g., those used in radiography)
  - public exposure and contamination from unknown origins
  - malicious threats or acts
  - transport emergencies.
- In places where radiation is known to exist, such as in nuclear or other industrial facilities, preparedness to deal with radiation injuries must form part of the emergency preparedness plan and employees should be trained specifically in how to behave and respond in an emergency (Turai & Veress, 2001).
- Ensure familiarity with safe operating procedures and that appropriate education on safe behaviour is made available.

Early recognition

It may be challenging to recognise a radiation emergency because people may not be able to see or smell hazardous levels. Therefore, the initial response is often carried out based on secondary indications such as the presence of radioactive material, people showing symptoms of exposure or readings from specialised instruments.

Signs that someone might have been exposed to radiation might include (Turai & Veress, 2001):

- burns, blister or ulcers
- nausea, vomiting, diarrhoea
- weakness, headaches, dizziness and or fatigue.

The first aid provider should protect their own safety and avoid touching or approaching suspected radioactive materials or accident scenes.

First aid steps

1. Direct the person to leave the scene as quickly as possible with due precaution and care. Avoid exposure to radiation without protective clothing.
2. Access emergency medical services (EMS).
3. Assess the person's level of response, breathing, and circulation and treat them accordingly as a priority. Then treat any other conditions such as burns.

Access help

- Depending on the type of radiation emergency, it may be necessary to access EMS as well as other specialised emergency services.
- Explain the radiation injury clearly to EMS so they are able to send the appropriate response.
- Radioactive materials can lead to a person having external or internal contamination and can have serious effects on the body in both the immediate and longer term. Any person exposed to radiation must be immediately assessed and then monitored over time by a doctor.

Recovery

- Radiation does not produce life-threatening early symptoms, immediate death or immediate burns, and exposure to radiation alone is not a medical emergency. However, the person must be taken for further assessment and medical assistance (Turai & Veress, 2001).

Education considerations

Context considerations

- First aid programme designers must determine whether to include this topic in their first aid programmes depending on its relevance in specific contexts, local regulations and public health policies.
- Consider the emergency preparedness plans and availability of specifically trained workers or responders when designing learning for this topic.

Learner considerations

- Learners for this topic are likely to specifically face the risk of radiation because of their place of work. Programme designers should work closely with learners and their employees to understand risks, local practice, access to medical care and emergency procedures that are in place.

Facilitation tips and tools

- Encourage learners to become familiar with the radioactive symbol and be aware of emergencies that are dangerous due to potential radioactivity.
- Consider using photographs to illustrate the look of a radiation injury and video to explain the effects of radiation.
- Emphasise that the person exposed to radiation does not present a health risk to the first aid provider. Therefore, the focus should be on responding appropriately to the first aid priorities of ensuring the person is responsive, breathing normally with normal circulation (Turai & Veress, 2001).

Scientific foundation

No formal reviews were made on this topic. The recommendations are based on expert opinion.

Mental distress

Traumatic event

Key action

Provide support (through listening, being empathetic, maintaining contact and connecting to other resources) to those who have experienced a traumatic event.

Introduction

A traumatic event involves exposure to a perceived or actual threat of death, serious injury or violence. Examples of such events include severe accidents, fires, robberies, physical attacks, terrorist attacks, natural disasters and any form of sexual and gender-based violence. The word "exposure" could be a direct experience, witnessing something traumatic or learning about a loved one experiencing such an event. A traumatic event is usually unexpected, unavoidable and dangerous.

How a person experiences and reacts to a traumatic event is extremely unique. Some may experience psychological distress and feelings of shock immediately after an event but eventually adapt well to daily life. Others may have persistent, intense post-traumatic stress reactions that disrupt their ability to function from day-to-day. Common reactions include intrusive behaviour, avoidance, dissociation, negative mood and arousal symptoms. Specific stressors (such as level of experienced pain), individual characteristics and conditions (such as the level of social support) impact a person's ability to cope.

Guidelines

- Providing support (through listening, being empathetic, maintaining contact and connecting to other resources) to those who have experienced a traumatic event may decrease post-traumatic stress.*
- Actively expressing emotions (expressive coping) may result in a decrease of post-traumatic stress.*
- Single session psychological debriefing may be harmful to those who have experienced a traumatic event.*

Good practice points

- The following interventions are recommended to support those who have experienced a traumatic event:
  - Engage in conversation.
  - Listen to the person's concerns.
  - Offer empathetic support.
  - Maintain contact as long as the first aid provider can and calm the person in distress.
  - Connect to additional support resources or networks.
- Providing psychosocial support may help during or in the immediate aftermath of a distressing event, even in the days, weeks, months and even years after an event has taken place.

Education considerations

Context considerations

- People can experience a crisis on a global, local and personal level.
- Programme designers should be aware of the support networks in their area and link to these resources in the educational material.

Learner considerations

- Consider the different types of vulnerabilities learners are most likely to encounter. For example, are learners most likely to provide support to young children? In this case, education should focus on the particular vulnerabilities of children and acknowledge the link to potential mental and emotional health challenges children may face later on in life as a result of a traumatic event. Conversely, if learners will interact more with older adults who have experienced multiple bereavements and traumas (including significant changes in their health), learners should be aware that this group of people may have increased loneliness, isolation, anxiety and depression.
- Each individual will come to the learning environment with their own set of experiences and personal history. It is likely that they have experienced elements of trauma, distress and loss. It is important for facilitators to acknowledge this at the beginning of the session and plan for any disclosures or emotional moments.

Facilitation tips

- Emphasise the importance of self-care. Learners must understand that supporting others in crisis can be overwhelming. They need to learn to recognise their own cues and have strategies in place to maintain their own emotional, mental and physical health.
- Communicate that, if written as an equation, vulnerability = threat - resilience. A person's vulnerability can be measured by the crisis they endure and whether this outweighs their capacity or resilience to cope with it.
- Facilitate a discussion on the types of trauma people may face. How can learners support individuals after a traumatic event? Does anyone have experience doing so?
- Help learners recognise that there are different types of loss. Some provide closure while others are left unresolved (ambiguous loss).
- Acknowledge the diversity and uniqueness of individual experiences and how these affect the way people respond to and cope with trauma.
- Facilitate a discussion on the stigmas of post-traumatic stress and how people behave differently to trauma.
- Provide information on local support networks and how learners can contact them.
- Have learners practise active listening. This involves listening to the verbal and nonverbal (such as facial expression and body language) cues of a person.
- Explain that during or immediately after a severely distressing event, many people react by going into what is commonly known as a state of shock; they may feel numb, in disbelief or like time stands still (IFRC, 2018). Physical reactions of an increased heartbeat, sweating, shaking, trembling or shortness of breath may also accompany these feelings. Some people feel dizzy or nauseous and may find it difficult to think clearly or grasp the situation at hand. These reactions can last for minutes or hours during or after an event but can have a more sustained effect on some. (Note this type of 'shock' is an emotional response and is different to clinical shock caused by a failure in the circulation system.)

Facilitation tools

- Have learners work together to build case studies in which they have to support individuals in coping with a traumatic event.
- Be sure to correctly define sexual and gender-based violence. For more information, see the additional resource Sexual and gender-based violence.
- Show video(s) explaining empathy and sympathy. Have learners discuss and attempt to use empathetic responses in different scenarios or conversations when supporting individuals.
- Have learners share their own experiences of being listened to. Explore the good qualities of an active listener and discuss some attitude or behaviours to be avoided when recalling personal experiences.

NOTE

A common tool used in psychological first aid is Look, Listen, Link.
See Psychological first aid for details of this.

NOTE

It is incredibly important to create and maintain a safe learning environment. Learners should feel safe to share and discuss their ideas and experiences without fear of judgement.

Scientific foundation

Systematic review

Critical incident stress debriefing

A single-session debriefing is when people are encouraged to share their emotions and thoughts after experiencing a traumatic event. Two meta-analyses found that a single session debrief neither prevented the onset of post-traumatic stress nor reduced psychological distress, compared to control groups (Rose et al., 2009; van Emmerik et al., 2002). As a result, the NICE guidelines from 2005 do not recommend using single-session debriefing after a traumatic event.

Communication and social support

An evidence summary developed by the Centre for Evidence-Based Practice (CEBaP) in 2019 identified seven cross-sectional studies about communication and social support (De Brier et al., 2020; Dockx et al., 2020). Evidence is of very low quality and results are considered imprecise due to limited sample size. The review could only identify associations and no causal relationship because of the nature of the study type:

- Evidence showed a statistically significant association between communication and post-traumatic stress in sexually assaulted women. Positive communication (defined as a mutual discussion, expression and negotiation between spouses) led to a decrease in post-traumatic stress, while negative communication (defined as a pattern where one partner attempts to discuss a problem while the other avoids or ends the discussion) led to an increase in post-traumatic stress.
- Among the two specific groups of neglected children and survivors of traffic accidents, evidence showed that good family and mother-child communication resulted in a statistically decreased risk of post-traumatic stress disorders.
- Evidence showed no statistically significant association between communication and post-traumatic stress for people who were kidnapped or their family members.
- Evidence showed a statistically significant association between talking about a terrorist attack and an increase in post-traumatic stress. Conversely, two smaller studies could not demonstrate a statistically significant association between talking with others and a decrease in post-traumatic stress for victims of intimate partner violence or a terrorist attack.

Communication-based coping strategies

In the same evidence summary, two cross-sectional studies were identified that looked at coping strategies (De Brier et al., 2020). The evidence is of very low quality and results are considered imprecise due to limited sample size. Again, the review could only identify associations, no causal relationships:

- There was a statistically significant association between expressive coping and a decrease in post-traumatic stress in sexually abused women.
- There was a statistically significant association between social-emotional coping after an occupational accident (e.g., explosion) and an increase in post-traumatic stress.

Psychological first aid

Psychological first aid is a method of helping people in distress to feel calm and supported in coping with their challenges. It addresses both the emotional and social needs of individuals, with the intention of helping people use their resources, enhance their resilience and make informed decisions. There are a limited number of studies that researched the effectiveness of psychological first aid as a complete programme. Two existing systematic reviews on psychological first aid both concluded that there is a lack of controlled studies to support it (Dieltjens et al., 2014; Fox et al., 2012). However, as it is unlikely to have adequate representation of randomised controlled trials using interventions for traumatic events, interventions need to be informed by good practices and psychological first aid is supported by expert opinion.

Non-systematic review

Psychological first aid intervention principles

Psychological first aid, provided by trained people, is widely supported by expert opinion and rational conjecture as a tool to help people who have experienced a traumatic event(s) (Shultz & Forbes, 2014).

Through observation and expert experience, there is a widespread consensus and support for the five intervention principles that should guide and inform any psychosocial support intervention and prevention efforts at the early to mid-term stages of an emergency. These principles facilitate survivors' short-term adjustment and long-term adaptation after a crisis (Hobfoll et al., 2007). The five principles involve the promotion of:

- calm
- hope
- connectedness
- a sense of safety
- a sense of self-efficacy and community efficacy

First aid for mental health problems

In 2019 the Belgian Red Cross-Flanders developed guidelines to provide first aid to people experiencing mental health problems based on a systematic review of scientific evidence (evidence summaries developed by CEBaP, as mentioned above), expert opinion and the preferences of the target population (Dockx, submitted for publication). The guidelines include specific recommendations to support people exposed to shocking events.

Sexual and gender-based violence (SGBV)

Within the scope of providing first aid, individuals may encounter situations where the injured people have experienced some forms of sexual and gender-based violence, such as genital injuries in both adults and children. Sexual and gender-based violence (SGBV) is a broad term referring to any harmful act that leads to – or is likely to lead to – physical, sexual or psychological harm or suffering to someone on the basis of their gender. Gender-based violence is a result of gender inequality and abuse of power, including but not limited to the imposition of sexual violence, domestic violence, trafficking, forced or early marriage, forced prostitution and sexual exploitation and abuse (IFRC, 2015). It was estimated that about one-third of women experience some type of SGBV in their lifetime (WHO, 2017). It is also crucial to consider SGBV committed against men, boys, and sexual minority groups despite the lack of data on its occurrence globally. SGBV can take different forms and happen in diverse situations and contexts across the world and is now a focus of humanitarian challenges (ICRC, 2015; IFRC, 2015).

Reactions to trauma

The IFRC Reference Centre for Psychosocial Support (2018) found that during or immediately after a severely distressing event, many people react with a feeling of shock (numb, in disbelief or like time stands still). They may also have physical reactions such as an increased heart rate, sweating, trembling or shortness of breath. Some people feel dizzy or nauseous and may find it difficult to think clearly or grasp the situation at hand. These reactions can last for minutes or hours during or after an event. In some cases, people may be severely impaired by their reactions. In other instances, people may remain relatively calm and actively stick to their routines, especially if they have already had the chance to develop practices for the emergency. Particularly in the first hours and days after the event, the reactions may vary a lot between people, but they also may change rapidly on an individual basis. A rapid change commonly appears as "loud" reactions like shouting or crying and "silent" reactions like feeling numb or being unable to recognize the full impact of the event.

Reactions after an initial state of shock vary depending on each person's perceived severity of the event. If the event was traumatic and frightening, the person might feel relieved that they survived, but also guilty, sad or angry if others were hurt or killed. Sometimes there can be fear that the frightening event will happen again, such as aftershocks after an earthquake or the possibility of further violence in a situation of armed conflict. In this state, it can be challenging to make decisions and to communicate clearly with others.

Many people have physical reactions in the first few days after a distressing event like physical pains and may lose their appetite or ability to sleep. If a person's life has changed dramatically due to a distressing event, it may be difficult to carry out everyday activities and focus on next steps. Some people may feel enormously angry with other people and the world. In contrast, others may experience a sense of deep sadness and grief or hopelessness about the future and lose interest in interacting with others or doing things they used to do. Withdrawal, disappointment, avoiding others and feeling misunderstood are also common reactions to a crisis.

Suicidal ideation

Key action

Engage the person in conversation, ensure safety and provide empathetic support.

Introduction

Suicidal ideation refers to the situation in which a person thinks about ending their own life. The presentation of suicidal ideation can vary from being fleeting and vague to very concrete. Concrete ideation involves method selection, planning and/or intention to complete suicide. A person could act upon ideation, undertaking an action in which they expect to end their own life. Depending on the fatality of the outcome, the action is considered a suicidal attempt or suicide. According to the World Health Organization (WHO, 2019), close to 800 000 people die due to suicide every year. It is a global phenomenon across countries. Yet, suicides are preventable with a comprehensive multi-sectoral prevention strategy.

Vulnerability for suicidality is determined by a complex interaction of biological, psychological and social factors. Exposure to stressful life events can contribute to the development of suicidal ideation. During or immediately after a severely distressing event, many people react by going into what is commonly known as a state of shock, where it feels like time stands still, along with feelings of numbness and unreality. This can be accompanied by physical and emotional reactions. In some cases, people may think of attempting suicide or even perform suicidal behaviour (Howarth et al., 2020).

Guidelines

- Having a confidant or someone to talk to may decrease the risk of suicidality.*
- Staying connected to and befriending the person at risk may decrease psychological distress in people with suicidal ideation*

Good practice points

- Psychological first aid may be used as a method of helping people with suicidal ideation.
- The following actions may help people with suicidal ideation:
  - assessing the risk of suicide and harm
  - listening non-judgmentally
  - engaging in the conversation
  - giving reassurance
  - encouraging professional support
  - encouraging other support
  - ensuring safety.

Education considerations

Context considerations

- Consider whether there is any stigma surrounding mental health and suicide within the context and adjust education accordingly, aiming to diminish stigma.
- Programme designers should consider the local statistics of suicide, (e.g., increased numbers of children or older adults feeling suicidal and completing suicide) and develop programmes specific to the groups with higher risk, being careful not to stereotype.

Learner considerations

- Children and young people may focus on recognising unusual behaviour in friends and how to appropriately inform a trusted adult. Often, they will be concerned about confidentiality and breaking 'trust'. Emphasise the importance of getting help.
- Programme designers should ensure the depth and level of training and the support available are appropriate to the first aid provider. This will vary among different countries and first aid education programmes.
- Avoiding stigmatising language (e.g. in English 'commit suicide' emphasises criminality).
- Consider the culture and faith of learners and adapt education appropriately.

Facilitation tips and tools

- Distinguish between suicide and self-harm.
- Create a safe space for learners where they can report if they are affected by this topic and can access any support they may need as a result. Develop ground rules with the group to ensure confidentiality, respect and sensitivity within the group.
- Have two facilitators present for sessions so that specific support can be offered to individuals if necessary.
- Explore and address myths or misconceptions the learners may have. These may include concerns about 'planting thoughts' or the types of at-risk people.
- Use case studies which explore the behaviours mentioned and risk factors (e.g. a person who has had significant life events). Focus on recognising signs of concern rather than on 'assessment'.
- Discuss how to have difficult conversations. What things can you say? What to avoid?
- Practise how to ask difficult questions to understand concerns and fears. Stress the importance of doing so.
- Use a video of a person's story as people often find it difficult to empathise. Ensuring a human approach is vital.
- Emphasise that it is the first aid provider's role to get assistance if necessary and that they should take any threat of suicidality seriously.

NOTE

A common tool used in psychological first aid is Look, Listen, Link.
See Psychological first aid for details of this.

Scientific foundation

Systematic review

An evidence summary developed by the Centre for Evidence-Based Practice identified 12 studies that looked at communication to people with suicidal ideation (Dockx et al., 2020). Evidence is of low quality and results cannot be considered precise due to the low number of events and large variability of results.

Appraisal of or having a confidant

There is limited evidence with benefit for appraisal of having a confidant (i.e. the perceived availability of someone to talk to about one's problems.). It was shown that appraisal of or having a confidant resulted in a statistically significant decreased risk of suicidality, compared to low appraisal of or not having a confidant.

Staying connected to and befriending

There is limited evidence in favour of staying connected to the person at risk such as through means of sending postcards. In one study, after hospital discharge, postcards were sent every few weeks or months. In these postcards, a doctor asked how the person was doing and whether they wished to drop them a note. It was shown that sending postcards resulted in a statistically significant decrease in suicidal ideation and suicide attempts, compared to not sending any postcards. A statistically significant decrease of suicidal death, when sending postcards compared to not sending postcards, could not be demonstrated.

There is limited evidence in favour of befriending. This involved using a trusting and non-judgmental approach to providing care and opportunities for people to talk about their life events in a calm, relaxing and safe environment. In the study, the people stayed in a respite centre for a time-limited four-night period. It was shown that this method resulted in a statistically significant decrease in psychological distress from pre to post and follow-up measurement.

Psychological first aid intervention principles

Psychological first aid is a method of helping people in distress to feel calm and supported in coping with their challenges. It addresses both the emotional and social needs of individuals, with the intention of helping people use their resources, enhance their resilience and make informed decisions. There are a limited number of studies that researched the effectiveness of psychological first aid as a complete programme. Two existing systematic reviews on psychological first aid both concluded that there is a lack of controlled studies to support it (Dieltjes et al., 2014; Fox et al., 2012). However, as it is unlikely to have adequate representation of randomised controlled trials using interventions for traumatic events, interventions need to be informed by good practices and psychological first aid is supported by expert opinion.

Non-systematic review

Guidelines for suicide developed via Delphi methodology

While randomised controlled trials provide a high quality of research evidence, it is highly infeasible and unethical to conduct such studies in developing guidelines in response to suicidality, and good-quality observational research is currently lacking. The Delphi method is a methodology of reaching expert consensus, and the following guidelines developed using Delphi methods. (Colucci et al., 2011; Kelly et al., 2008; Ross et al., 2014)

There are five basic actions when responding to suicide "**ALGEE**" (Mental Health First Aid Australia, 2014):

- **A**ssess the risk of suicide and/or harm.
- **L**isten non-judgmentally.
- **G**ive reassurance.
- **E**ncourage professional support.
- **E**ncourage other supports.

Psychological first aid intervention principles

Psychological first aid provided by trained persons is widely supported by expert opinion and rational conjecture as the tool to be provided by trained persons for people who have experienced a traumatic event (Shultz & Forbes, 2014).

Through observation and expert experience there is widespread consensus and support (IASC, 2007) for the five principles that should be used to guide and inform any psychosocial support intervention and prevention efforts at the early to mid-term stages of an emergency. These five principles facilitate survivors' short-term adjustment and long-term adaptation to the impact of disasters (Hobfoll et al., 2007) and they involve the promotion of:

- calm
- hope
- connectedness
- a sense of safety
- a sense of self and community efficacy.

First aid for mental health problems

In 2019 the Belgian Red Cross-Flanders developed guidelines to provide first aid to people experiencing mental health problems based on a systematic review of scientific evidence (evidence summaries developed by CEBaP, as mentioned above), expert opinion and the preferences of the target population (Dockx et al., 2020). The guidelines include specific recommendations to support people exposed to shocking events.

Signals of suicidal ideation

Many people experiencing suicidal ideation exhibit signals during the suicidal process which could be observed by others. Awareness and attentiveness by the first aid provider for signs of suicidal thoughts and warning signs of suicidal threat could contribute to the person getting the help they need in time.

Warning signs of suicidal threat include (Mental Health First Aid Australia, 2014; IFRC Reference Centre for Psychosocial Support, 2020):

- Threats of suicide or self-injury.
- Planning for suicide (e.g., searching for methods, acquiring means). The risk somebody takes their own life increases if somebody has a clear plan (how, where, when), has the means to execute the plan and or declares the intention to act.
- Talking, writing, online posting about death or suicide.
- Previous suicide attempts.

Other possible signals of suicidal ideation include (Mental Health First Aid Australia, 2014; IFRC Reference Centre for Psychosocial Support, 2020):

- Making arrangements, appearing to 'say goodbye', getting affairs in order.
- Affective changes such as pronounced negative feelings (e.g., hopelessness; stuck, feeling there is no way out; angry, vengeful; seeing no reason to live; inferior, feeling a burden to others; anxious) or pronounced fluctuations in mood.
- Changes in behaviour such as increased risk behaviour (e.g., recklessness, increased consumption of alcohol or other drugs), a sudden display of elation (as a plan has been finalised), sleep problems, or social withdrawal.

Risk and protective factors for suicide

Suicide risk is assessed based on the risk factors, protective factors, and circumstances of the suicide attempt if the person survives after such an attempt. Examples of risk factors for suicide include the following (IFRC Reference Centre for Psychosocial Support, 2020):

- presence of depression
- presence of psychosis
- sex (the risk ratio of male: female is 2:1)
- age (the older the age, the higher the risk)
- single, separated, divorced or widowed
- presence of alcohol or substance misuse
- previous history of a suicide attempt
- presence of a suicide plan
- lack of social support
- presence of chronic illness (e.g. chronic pain).

Examples of protective factors for suicide involve (IFRC Reference Centre for Psychosocial Support, 2020):
strong perceived social support

- close family relationship
- good coping and problem-solving skills
- having a sense of meaning and purpose in life
- ability and willingness to seek help
- access to resources.

Circumstances of an unsuccessful suicide attempt that indicate a higher risk:

- planning in advance
- precautions to avoid discovery
- no attempts to obtain help afterwards
- final acts (e.g. writing a suicide note or making a will, transferring savings to a close relative's account, asking someone to help to take care of small children)
- dangerous method (e.g., a lethal dose of drugs was used; the use of a violent method). The person's perception of the lethality of the method used should also be considered.

Professional help in the case of suicidal ideation should always be encouraged. A trained healthcare professional should conduct a thorough assessment of suicide risk and for the possibility of an underlying mental illness that can lead to the same.

Supporting a suicidal person can be stressful so first aid providers should guard their personal boundaries and take care of themselves. A first aid provider should do their best for the person they are helping. However, despite best efforts, some people will still die by suicide.

Acute grief

Key action

Support the person to experience their grief according to their context.

Introduction

Grief is a normal response to a critical event involving the loss of a loved one. It is often caused by bereavement, or a challenging, devastating, yet perhaps common experience – especially if the loss was sudden and unanticipated. Although the grief reactions usually become less intense over time, grieving processes do not involve a fixed number of stages or a standardised linear recovery pattern. Rather, they reflect highly unique experiences, symptoms, evolutions and durations. Grief fluctuates over time, with an individual balance of alternating behaviours that move between loss and recovery.

Despite the often painful and disruptive experience, most people adapt quite well to managing grief in daily life. However, bereavement increases the risk of lingering physical and mental health problems. People can become stuck in their grieving process, experiencing persistent intense loss reactions and disruptions to daily life. Witnessing or experiencing a loved ones' sudden decease, such as in an accident, severe disease or suicide, can be one of the most distressing and traumatising experiences in one's life. It is critical for first aid providers to support the bereaved at this vulnerable stage.

Guidelines

- Allowing parents time to hold or be with their children after death to say goodbye. Letting loved ones know how and why children died may be helpful to deal with their grief.*
- Talking about grief, communicating with people grieving, and providing emotional support may be helpful for the grieving person to deal with their grief. Communication avoidance may result in unresolved grief and anxiety.*

Good practice points

- It may be beneficial to keep relatives or friends updated regularly during the process of resuscitation and allow time alone with a deceased person.
- First aid providers should accommodate, or if comfortable facilitate, cultural or religious rituals, providing information and discussion of mourning or related issues, and look for follow-up care in the healthcare setting in facilitating the grieving process.
- Allowing family or caregivers time to hold or be with their children after death to say goodbye and letting loved ones know how and why children died, may be helpful to deal with their grief.
- Psychological first aid may be used as a method of helping people facing death and dying, especially in the acute stage.

Education considerations

Context considerations

- This educational content is intended to be very fluid and driven by learners' desires to understand the topics in their own context and environment. The role of the facilitator is to guide the learning journey safely. It is much less about steps and actions to take and more about uncovering attitudes and facilitating discussions.

Learner considerations

- Each individual will come to the learning environment with their own set of experiences and personal history. It is likely that they have experienced elements of trauma, distress and loss. It is important for facilitators to acknowledge this at the beginning of the session and plan for any disclosures or emotional moments.

Facilitation tips

- Work with a co-facilitator if possible, to provide the space for facilitators to be able to privately support a learner who is openly emotional, as well as to be able to check-in with each other emotionally and professionally (i.e., on the educational process). If you are unable to work with a co-facilitator, consider finding a break early in the session, and allowing participants to connect with you privately about their past experiences. This may allow you to meet participants in a safer space.
- At the beginning of a session, establish a plan of communication between the facilitator and learners. There may be some topics that are triggering, and learners need a way to communicate if they want to address the topic or perhaps take a break from the training or a moment to decompress.
- Emphasise the importance of self-care. Learners must understand that supporting others in crisis or who is experiencing loss(es) and grief can be overwhelming. They need to learn to recognise their own cues and have strategies in place to maintain their own emotional, mental and physical health.
- Provide information on local support networks and how learners can contact them.
- Have learners practise active listening. This involves listening to the verbal and nonverbal (such as facial expressions and body language) cues of a person.

Facilitation tools

- Have learners work together to build case studies in which they have to support individuals in coping with grief and loss. This also enables learners to make the learning relevant to their environment.
- Develop interactive activities that enable learners to openly explore the concepts of grief and loss with each other. Consider using "think, pair, share" activities where learners think about a concept on their own, discuss it in pairs, then share their learning with the larger group.
- Conduct the activity "Truth or Myth". Present learners with a series of common phrases on grief and grieving (e.g., You just need to cry, and you'll feel better.) and encourage them to consider the impact of the phrase and if it is "truth" or "myth".
- Conduct the activity "Yes, no, I don't know". Assign different areas in the learning environment as the "yes", "no" or "I don't know" area. Read a series of questions on grief and grieving and have learners physically move around the room to represent their answers. This activity facilitates group bonding and conversation on the subject matter.

Scientific foundation

Systematic review sources

We identified several systematic reviews on the different aspects of caring for acute or sudden bereavement, and an evidence summary from the Centre for Evidence-Based Practice (CEBaP) about communication with bereaved or grieving people.

Spending time alone with the deceased

A systematic review of the sudden death of children found consistencies across many studies showing that parents want time to hold and be with their deceased child to say goodbye. Some qualitative studies described that when parents desired but were unable to have a private and peaceful space to say goodbye to their child, it increased their regret and grief. However, a minority of bereaved parents strongly felt that they did not want to see their deceased child (Garstang et al., 2014).

Knowing the "how" and the "why"

Based on the same systematic review by Garstang et al. (2014), evidence found consistencies across many studies of child deaths that parents want to know how and why their child died. Studies revealed that the information of the child's death helps parents in making sense of the tragedy and facilitates the grieving process. Particularly when the death is unexpected, finding out the cause of death is important to help reduce parents' emotional stress. Information can also reassure parents that the child did not suffer and that everything possible was done to save their life. This knowledge can help to reduce any guilt parents might feel. Some bereaved parents tend to suspect that a lack of information means authorities are deliberately withholding knowledge from them.

Talking about grief

An evidence summary from CEBaP in 2019 found limited evidence demonstrating the benefits of talking about grief (Dockx et al., 2020). The evidence is of very low quality and results are considered imprecise due to a low number of events and lack of data. While we did not identify a causal relationship between the results, we did conclude specific associations between grief and speaking about it.

In bereaved parents of deceased children, evidence showed that there is a statistically significant association between a decrease in grief and positive communication about one's grief as time increased from the loss of the child. However, a statistically significant association between a partner's concern for their grieving partner, and actual grief of both partners, could not be demonstrated.

Studies also identified statistically significant associations between relationships outside that of a parent and child.

- In bereaved siblings, there was a statistically significant association between talking about loss and a decrease in grief and anxiety. There was also an association between satisfaction and the amount of time spent talking about the loss.
- In the bereaved children of a deceased parent, studies showed a statistically significant association between the remaining parent or caregiver's positive, emotional words and a decrease in the bereaved children's anxiety and depression, especially as time increases since the loss. Moreover, there is a statistically significant association between the decrease in unhealthy grief and the increase in mother communality. However, a statistically significant association between a decrease in depression and an increase in mother communality could not be demonstrated.
- In bereaved partners, a statistically significant association between increased disclosures of emotion at 4, 18- or 25-months post-bereavement and a decrease in distress could not be demonstrated. However, at 11 months post-bereavement, there was a statistically significant association between increased disclosure of emotions and an increase in distress.
- In bereaved students, a statistically significant association between more open family communication about grief and a decrease in feeling grief could not be demonstrated.

The same evidence summary demonstrated harm caused by avoiding communication. The evidence is of very low quality and results are considered imprecise due to a low number of events and lack of data. While we did not identify a causal relationship between the results, we did identify several specific associations:

- There was a statistically significant association between not talking to one's parents about a deceased sibling and both unresolved grief and anxiety.
- The evidence showed that increased partner-oriented self-regulation (when partners avoid talking about their loss and try to appear strong in each other's presence) resulted in a statistically significant increase in bereaved parents' grief seven months after a loss. There was also a statistically significant association between an increase in current partner-oriented self-regulation and an increase in grief.
- A statistically significant association between bereaved students' grief and communication avoidance could not be demonstrated.

Communicating and receiving emotional support

The evidence summary also identified studies that looked at communicating with grieving or bereaved people in general (not specifically grief-related communication). The evidence is of very low quality and the results are considered imprecise due to limited sample size and large variability. They could not infer any causal relationship from the results outlined below.

- In bereaved fathers of deceased children, results showed a statistically significant association between decreased grief and talking with friends.
- In bereaved children of a deceased parent, results showed a statistically significant association between both decreased anxiety and depression and an increase in parent-child communication.
- In bereaved adults, a statistically significant association between grief and communication within a family could not be demonstrated.
- In a healthcare setting, results showed that a phone call from the neonatologist led to a statistically significant decrease in loneliness, depression and feelings of guilt, compared to no phone call. However, a statistically significant decrease in anger and hostility with or without a phone call could not be demonstrated.

Psychological first aid

Psychological first aid is a method of helping people in distress to feel calm and supported in coping with their challenges. It addresses both the emotional and social needs of individuals, with the intention of helping people use their resources, enhance their resilience and make informed decisions. There are a limited number of studies that researched the effectiveness of psychological first aid as a complete programme. Two existing systematic reviews on psychological first aid both concluded that there is a lack of controlled studies to support it (Dieltjes et al., 2014; Fox et al., 2012). However, as it is unlikely to have adequate representation of randomised controlled trials using interventions for traumatic events, interventions need to be informed by good practices and psychological first aid is supported by expert opinion.

Non-systematic review

In addition to the evidence from the systematic reviews, we also identified best practices as described by Kent and McDowell (2004), and from bereavement care practice guidelines.

Good practice from bereavement care practice guidelines

There are some studies regarding the development or application of bereavement care practice guidelines. A systematic review further identified a large variation in the quality of these guidelines (Kent et al., 2020). Nonetheless, the guidelines from the review share the following core values:

- Work with respect and integrity.
- Provide dignity to bereaved individuals and their deceased loved one.
- Provide high-quality, collaborative, accessible and adequately resourced care.

Updating friends and family every 10–15 minutes on any resuscitation progress

The bereaved must not feel excluded during the resuscitation process. Studies suggested that frequent updates of the patient's situation during resuscitation reduced the feeling of helplessness. Meanwhile, the feeling of exclusion and helplessness and remaining uninformed may lead to anger in the grieving process. Studies also showed that witnessing the resuscitation may help the bereaved to cope better with grief over time (to which there is no evidence that viewing would interfere with the resuscitation process). However, a nurse needed to accompany the bereaved.

Spending time alone with the deceased

It is important to allow relatives and friends time alone with the body; to see, touch and talk to the deceased as much as they are comfortable. They should be prepared for what the deceased will look like before viewing the body, especially when the deceased has been severely injured or disfigured. Spending time with the body can facilitate grieving and reduce feelings of guilt, helplessness and isolation.

Accommodating cultural or religious rituals

Accommodation of cultural and religious rituals show respect for the deceased and the bereaved, which will facilitate the grieving process. In supporting a bereaved family, it is important to pay attention to how the family addresses the dead body and to be aware of and receptive to the cultural and religious differences of different families so that helper can facilitate the family to say goodbye to the deceased in a humane and dignified way (Morgan et al., 2006).

Providing information and discussing relevant issues

If appropriate, the bereaved may wish to discuss issues such as organ or tissue donation, post-mortem, funeral arrangement and attending support groups. Some studies revealed that the donation of organs or tissues makes the death meaningful and helps the bereaved family members accept their loss.

Providing a hospital contact number and name of support nurse or doctor for follow-up care

Follow-up care from the hospital allows the bereaved family an opportunity to get more information about the death and may also be a source of comfort.

Psychological first aid intervention principles

Psychological first aid, provided by trained persons, is widely supported by expert opinion and rational conjecture as a tool to help people who have experienced a traumatic event(s) (Shultz & Forbes, 20104).

Through observation and expert experience, there is a widespread consensus and support for the five intervention principles that should guide and inform any psychosocial support intervention and prevention efforts at the early to mid-term stages of an emergency. These principles facilitate survivors' short-term adjustment and long-term adaptation after a crisis (Hobfoll et al., 2007). The five principles involve the promotion of:

- calm
- hope
- connectedness
- a sense of safety
- a sense of self and community efficacy.

First aid for mental health problems

In 2019 the Belgian Red Cross-Flanders developed guidelines to provide first aid to people experiencing mental health problems based on a systematic review of scientific evidence (evidence summaries developed by CEBaP, as mentioned above), expert opinion and the preferences of the target population (Dockx, submitted for publication). The guidelines include specific recommendations to support people exposed to shocking events.

Supporting families in facing death and dying or ambiguous loss

Witnessing loved ones' sudden death or not knowing the whereabouts of loved ones can be one of the most distressing and traumatising experiences in one's life. It is critical for helpers to provide appropriate and adequate support for the families at this vulnerable stage. Unlike death, when the loved ones go missing or disappear, there is uncertainty about whether they are dead or alive and such uncertainty leads to an ambiguous loss for the family. The fact that the person may still be alive somewhere; the fact that no remains have been recovered means that the family cannot hold a burial ceremony and move forward with the grieving process as if the person is dead. This ambiguous loss sometimes remains unacknowledged which causes further distress to the families (ICRC, 2017).

Families who experience loss can react in a multitude of different ways. Below are just some of the ways people may respond to loss (Pernille et al., 2012).

- **Feelings**: The person who experiences a sudden loss may have a range of feelings, including shock, numbness, intense sorrow and pain, sadness, depression, dejection, anxiety, tense, denial, anger, irritability, guilt, self-blame, self-criticism, insecurity, helplessness, hopelessness, yearning, and nostalgia. Families with ambiguous loss may also feel emotionally isolated as they may believe that others do not understand their suffering (ICRC, 2017).
- **Thoughts**: Grief can cause worrying, feelings of disbelief, denial of what has happened, confusion, problems with memory and concentration, preoccupation and rumination over the loss, idea of the presence of the missing or dead family member. Some may also experience feelings of alienation, unfamiliarity with their surroundings, the experience of unreality, suicidal thoughts, depersonalisation and hallucinations.
- **Physical sensations**: Grief can cause physical sensations such as tightness and heaviness in the chest or throat, choking, nausea or stomach-ache, dizziness, headaches, numbness, muscle weakness, tension, or fatigue. It may make the person vulnerable to illness.
- **Behaviours**: Grief can cause avoidance of memories of the deceased, weeping, sobbing, crying, hypo-or hyperactivity, sleep problems (reduced or interrupted sleep or excessive sleep), and increased use of medication, alcohol or other drugs. Physical complaints such as headache, stomach-ache, nausea etc. may arise without identifiable physical cause. Sudden loss may trigger shock symptoms such as screaming, howling to shaking, difficulty in drinking or eating, crying spells and becoming more aggressive or irritable. Another extreme of the continuum of behaviour, such as staying numb, unresponsive to the outside world, inability to talk or move, and loss of interest in daily activities, may also arise. Families with ambiguous loss may also present obsessive thoughts and speech, as well as repetitive and rigid patterns of behaviour (ICRC, 2017).
- **Social behaviours**: Grief can cause social withdrawal or isolation. Families with ambiguous loss may feel unable to resume their familial and marital roles, rules and rituals, as they do not know whether the missing family member will ever return. In extreme cases, life seems to come to a standstill. They may also isolate themselves and refuse to reach out for help to avoid stigmatisation. Stigmatisation can be even more serious especially when the family member went missing in a violent conflict between two or more groups and others became sceptical that the family is connected to "rebel" groups (ICRC, 2017).

Children may have distinct reactions and changes too (Pernille et al., 2012; ICRC, 2017)

- Restlessness and change in activity level.
- Fearfulness and/or anger, especially when being left alone, or asking questions like "why did it happen?", "will this happen to me or others?".
- Regression to younger behaviours such as bedwetting despite having been toilet-trained, thumb sucking, and refusal to sleep alone.
- Clinging to parents or showing anxiety to separation or fear of strangers.
- Withdrawal and unwillingness to discuss the loss.
- Symptoms of illness such as nausea, loss of appetite, and diffuse aches and pains.
- Feeling guilty and placing blame on themselves.

Families of missing persons often require intensive psychosocial support during the difficult process of investigating disappearances. During the process of recovering and identifying remains, painful memories and intensive emotions may surface. Particularly when the families are asked to provide ante-mortem data and blood or saliva samples for obtaining conclusive proof of death of the missing person, are informed of their loved one's death, are present when the remains are recovered, and/or are asked to identify or claim the remains and personal belongings of their loved ones (ICRC, 2017).

GLOSSARY

Absence seizure	A type of seizure with less obvious signs and symptoms.
Acetylsalicylic acid	Acetylsalicylic acid is also known as Aspirin or ASA. It is a medication used to treat pain, fever or inflammation.
Active warming	The application of external heat sources to the skin (e.g., electric heating blanket).
AED	An automatic external defibrillator (AED) is a portable electronic device which can analyse the rhythm of the heart and if necessary, may deliver an electric shock to help the heart return to its normal rhythm.
Afterdrop	The continued cooling of the body temperature after rewarming has started.
Agonal breaths	A medical term used to describe when a person is gasping or struggling to breathe. It tends to be associated with life-threatening conditions such as a heart attack or stroke.
AMS	Acute mountain sickness is a mild form of altitude sickness.
Analgesics	Any type of medication that provides pain relief.
Angina	A diagnosed condition that can be treated with medication. The person's arteries which lead to the heart narrow, limiting blood flow and causing chest pain.
Antidote	A substance capable of preventing a product from exerting its toxic effects.
Antipyretics	Substances that work to reduce body temperature.
Apnoea	The breathing stops, usually for a short time during sleep.
Aspiration	To drain a blister by puncturing it, leaving the top layer of skin in place.
Blood pressure (diastolic and systolic)	Blood pressure is measured using two measurements. The systolic pressure is the force at which the heart pumps blood through the arteries. The diastolic pressure is the pressure of in the arteries between heartbeats when the heart rests.
Blunt force trauma	Blunt force trauma is physical trauma to a body part, either by a violent or high-velocity impact.
Borg Dyspnoea Scale	Borg Dyspnoea Scale is used to measure the breathing difficulty reported by a person to assess the severity of their disease.
Buccal glucose administration	Glucose is put inside the mouth on the lips or cheeks where it is absorbed into the bloodstream.

Bystander Effect	The phenomenon that the more people who are present at an emergency, the less likely anyone is to help, due to a diffusion of responsibility.
Carotid arteries	Major blood vessels in the front of the neck that supply blood to the brain, neck, and face.
Cervical spinal motion restriction	Cervical spinal motion restriction is the reduction or limitation of cervical spinal movement using a cervical collar, or sandbags with tape, combined with a long backboard. The definition may differ slightly according to the organisation.
Community efficacy	Community efficacy is the extended sense that one's group can cope with the traumatic event and its associated tasks.
CPR	Cardiopulmonary resuscitation (CPR) is a technique of using chest compressions, usually combined with rescue breaths, to pump blood around the body, with the aim of keeping a person's vital organs alive until defibrillation can take place.
Cross-reality	Cross reality is a mixture of virtual and real-world elements. For example, playing a character in a fictional story (virtual world) but having to physically give CPR to someone in the story (real world).
Defibrillation	An electrical shock to the heart to restore a normal rhythm using a defibrillator. Using a defibrillator device increases survival of people having sudden cardiac arrest due to fibrillation. Fibrillation is rapid, disordered and inefficient heart contractions. There are automated external defibrillator devices which are safe for first aid providers to use on a person who is unresponsive with abnormal breathing.
Deroofing	Remove the top layer of skin of a blister.
Diphoterine	A solution used to wash away chemicals spilt on the body and eyes.
Dose attenuator	A dose attenuator modifies electrical energy delivered by a defibrillator based on the person's size.
DR ABC	DR ABC is a commonly used tool in English to help learners remember how to assess a scene and person. The letters stand for Danger, Response, Airway, Breathing, Circulation.
Duty of care	Duty of care is a legal obligation imposed on an individual or company requiring that they adhere to a standard of reasonable care while performing any acts that could foreseeably harm others.
Dyspnoea	Difficult or laboured breathing, a feeling of shortness of breath, tightness in the chest and the feeling of suffocation.
Emergency medical services (EMS)	For the Guidelines, the term 'emergency medical services' (EMS) signifies that the first aid provider should quickly access the next available higher level of care. In some places, EMS may mean an ambulance service and hospital, while in others it may mean contacting a local health worker or travelling to a field hospital. Programme designers will need to adapt the language according to the local context in which it is used.
Encephalitis	An infection of the brain that is usually caused by a virus.

Endemic diseases	A condition or disease regularly found among a group of people or a certain area.
Epigastric pain	Pain or discomfort right below the ribs in the upper abdomen.
Epiglottis	The flap at the back of the throat which can close to stop food and drink from going down the windpipe.
Epithelium	Epithelium is a body tissue which covers the surfaces of internal organs and body parts.
Epithelialization	The process of a layer of tissue forming to cover exposed internal vessels or organs as part of the healing process.
Erythema	Increased blood flow to an area of skin due to injury or infection. The skin may become redder, purple, or darker.
ETCO2	ETCO2 indicates the amount of carbon dioxide in the air exhaled when breathing. A high level of carbon dioxide in the exhaled breath is an indicator of good breathing.
Extremity	Extremities of the body including arms, legs, fingers, and toes.
Flow fraction	The percentage of time that compressions are given.
Fraction	The proportion of resuscitation time without spontaneous circulation during which chest compressions were administered.
HACE	High altitude cerebral oedema is altitude sickness affecting the brain, behaviour and alertness.
HAINES positions	HAINES stands for 'high arm in endangered spine' and the positions are adapted recovery positions which raise the arm to support the head and spine.
Hanks' Balanced Salt Solution (HBSS)	Hanks' Balanced Salt Solution is a solution composed of salts and supplemented with glucose.
HAPE	High altitude pulmonary oedema (HAPE) is altitude sickness affecting the lungs and breathing.
Haemostasis	The process of stopping bleeding. The blood thickens and clots to keep blood inside the damaged tissues.
Hydrocolloids	Hydrocolloids are a type of dressings for wounds which maintain a moist and protected environment ideal for the healing process.
Hydrogel	Hydrogel dressings are used on wounds and provide a moist environment to promote healing.
Hyperlipidemia	A high concentration of fats or lipids in the blood.
Hypernatremia	High sodium levels in the body.
Hyperoxia	When the body or area of the body receives an excessive supply of oxygen.
Hyperventilating	Rapid or deep breathing usually caused by anxiety or a panic attack.

Hyponatremia	Low sodium levels in the body.
Hypopnea	The breathing is very soft and shallow, usually during sleep.
Hypoxic	Hypoxic means there are low levels of oxygen in the person's blood resulting in their organs and tissues not receiving enough oxygen to work properly.
In vitro studies	In vitro studies are studies done in a controlled environment such as a petri dish.
Ischemia	Ischemia is a condition in which the blood flow (and therefore oxygen) is restricted or reduced in a part of the body.
LAPSS	Los Angeles Prehospital Stroke Screen (LAPSS) is a method of identifying potential stroke with glucose measurement.
Larynx	Often called the voice box, the larynx is in the throat and holds the vocal cords.
Limited evidence	Limited evidence indicates that evidence is available and is a positive statement in support of the available science.
MASS	Melbourne Ambulance Stroke Screen is a scale including glucose measurement.
Mbar	Millibar, a metric unit of pressure.
Meningitis	An inflammation of the membranes surrounding the brain and spinal cord.
Meta-analysis	Examining many different research studies to find common results.
Morbidity of a disease	It is how many people have a disease in a particular society or population.
Mortality	The number of deaths within a particular society and within a particular period of time.
MRSA	MRSA is a type of bacterial infection, which is resistant to some types of antibiotics.
Myocardial revascularization	Myocardial revascularization is a medical procedure to improve blood flow to the heart (myocardium). Examples include angioplasty, stent or surgical coronary artery bypass grafting.
Narrowcasting	Narrowcasting is the transmission of television programs to a localised or specialised audience.
Necrotising fasciitis	Necrotising fasciitis is a rare but serious infection that affects the tissue beneath the skin and surrounding muscles and organs.
New-born	A new-born is a baby from birth to about one month old.
NIH	The National Institutes of Health (NIH), is part of the U.S. Department of Health and Human Services and is the nation's medical research agency.

No-flow time	No-flow time is the reported time from cardiac arrest to the start of bystander CPR.
Non-asphyxial cardiac arrest	Cardiac arrest due to cardiac disease origin.
Non-occlusive dressing	A dressing that does not seal the wound, allowing air and moisture to pass through it.
NSAIDs	Non-steroidal anti-inflammatory drugs.
Occlusive dressing	An occlusive dressing seals the wound and doesn't allow air or moisture to pass through it.
Oral glucose administration	Glucose is swallowed by mouth.
Oesophageal	This is all things related to the oesophagus which is the pipe that carries food from the mouth to the stomach.
P6	P6 is a point on the forearm that can be stimulated using techniques taken from acupuncture.
Paediatric defibrillator	A defibrillator that can analyse the heart rhythm of children. It also delivers the right level of energy in the electric shock for children.
Painkiller	Painkiller is an analgesic such as paracetamol/acetaminophen or ibuprofen.
Paracetamol	A painkiller which also reduces fever. Acetaminophen is the common name for the same product in some countries.
Pathophysiology	The abnormal state or function of part of the body due to disease or injury.
Perceived susceptibility	A person's subjective perception of the risks.
Perineal trauma	Perineal trauma or tearing is damage to the tissues and muscles in the vagina and anal area during childbirth.
Peripheral pulse	Peripheral pulse is a pulse at one of the peripheries of the body such as at the wrists or on the top of or just behind the feet.
Plaster	A sticking plaster is a small adhesive dressing, widely available in pharmacies. They are used on minor cuts and grazes that do not require a bandage.
Pleuritic pain	Pain when breathing in and out.
PPE	Personal protective equipment such as face mask or gloves.
Pressure immobilisation technique	A technique for immobilising and applying pressure to a leg or arm, to slow down the movement of the venom to vital organs.
Pruritus	The sensation of itchiness on the skin.
Radial pulse	A pulse that can be felt on your wrist.

Reciprocal learning	Involves individuals taking turns to coach each other on different knowledge or skills that they have already mastered.
Rhythm check timing	Rhythm check timing refers to the timing of the analysis of the heart rhythm. This can be done by a first aid provider taking the pulse immediately after the defibrillator has given a shock (or not).
Sciatica	Pain in the sciatic nerve (a nerve that starts in the lower back and extends down the legs).
Signs of life	Signs of life include things such as moving, crying or coughing.
Subcutaneous	An injection using a short needle to inject medication just under the skin.
Sublingual glucose administration	Glucose is put under the tongue where it is absorbed into the bloodstream.
Substernal pain	Pain just below or behind the sternum or breastbone (the bone in the centre of the chest).
Sucking or blowing chest wounds	An open chest wound in which air enters and exits with each breathing movement.
Tension pneumothorax	Tension pneumothorax can be caused by an open chest wound. Air enters the cavity (the pleural space) between the lung and the chest wall. The air builds up, creating pressure on the lung and reducing its ability to expand, making breathing difficult.
Thermal burns	Thermal burns are burns caused by heat such as fire, steam, or contact with something hot.
Thrombolysis	The use of medication to break down blood clots that have formed in the blood vessels.
Thrombolytic therapy	Thrombolytic therapy is a treatment to breakdown blood clots to improve blood flow.
Transcutaneous pulse oximetry	Transcutaneous pulse oximetry is a non-invasive method of measuring the oxygen level of the tissue below the skin.
Transthoracic impedance	Electrical activity in the chest that varies with changes in body size and composition.
Tympanic temperature	The tympanic temperature is that taken from the ear.
Umbilical cord prolapse	Umbilical cord prolapse means that part of the umbilical cord passes out of the uterus before the baby. This can result in pressure being applied to the cord as the baby is born, interfering with the supply of oxygenated blood reaching the baby during birth.
Uvula	The bit of flesh that hangs down at the back of the throat.
Valsalva manœuvre	The Valsalva manoeuvre involves taking a deep breath in, closing the nose and mouth, and gently blowing out. This increases pressure in the chest resulting in reduced cardiac output and lower blood pressure.

Ventricular fibrillation	Ventricular fibrillation is an abnormal heart rhythm in which the heart trembles and no longer pumps blood. This means blood circulation in the body stops, so it is a life-threatening condition. This type of heart rhythm (fibrillation) is most responsive to a shock from a defibrillator.
Visceral pain	Visceral pain is pain from inside the pelvis, abdomen or chest. The nerve supply is less specific than skin nerves, and the pain in these areas may be vaguer than skin pain.
Visual analogue scale	A scale used to rate the severity of breathing difficulties during a test.
Vital signs	Vital signs that a first aid provider may be able to monitor include the person's breathing or pulse rate.
Warmed actively	Warming the body using items that actively warm it such as an electric heating blanket.
Warmed passively	Warming the body using items that will help the body retain heat such as a sleeping bag.
Washout periods	Washout periods are the periods between administering treatments.
Wheal	Slightly protruding solid red pimple with no liquid that fades when the skin is pulled.

APPENDICES

Red Cross Red Crescent global survey on first aid 2018

In 2013 and 2015, the IFRC issued an advocacy report on "First Aid for a safer future". This report was welcomed by the National Societies and has been very useful for calling on decision-makers and authorities to take action to make "first aid for all" a reality.

In 2015, in order to update the data and have an accurate overview of first aid education in the world, the IFRC Global First Aid Reference Centre (Reference Centre) produced a "*Global survey on first aid education*" to gather information from all the Red Cross Red Crescent National Societies. Questions tackled the following main subjects: first aid in the national contexts, first aid education programmes, the number of people reached, and automated external defibrillation (AED). The questionnaire was circulated among the National Societies first aid coordinators and returned on a voluntary basis to the Reference Centre. At that time, 117 National Societies responded. A summary of the survey analysis was annexed to the IFRC 2016 *First aid and resuscitation guidelines*.

In 2018, the Reference Centre thought it timely to gather updated data. A questionnaire was shared via online software and a file that could be returned by email. Most of the items from the 2015 survey were kept and some added. If any National Society had any question or difficulty, they could contact the Reference Centre. While completing the questionnaire, National Societies could provide comments on specific topics or share examples taken from their experience. National Societies had the option of not answering all questions but were encouraged to do so as their views and experiences were very important for the analysis.

At the global level, the key information related to this survey are as follows:

- 101 National Societies responded to the survey (a little more than half of the 190 IFRC National Societies existing in 2018).
- Together, we estimate that these 101 National Societies represent a population of 4.9 billion, which gives an informed and useful picture of the state of first aid and first aid education within the Red Cross Red Crescent network.
- Together, the responding National Societies trained 16,215,735 people in first aid in 2017. This figure represents 0.33% of the total population of the 101 responding National Societies. By extrapolating this figure in line with the total population of all National Societies at that time, we can therefore consider that more than 23 million people were trained in first aid by all the Red Cross Red Crescent National Societies in 2017.
- There were some global increases:
  - Increase of 37.5% (more than a third) in the number of people trained by National Societies.
  - Increase of 35.15% in the number of people trained per responding National Society.
  - Increase of 0.08% in the number of people trained compared to the total population of the responding National Societies.

Key findings of the survey by IFRC region are as follows:

Africa region

- 31 National Societies from the Africa region responded to the survey (63% of the National Societies from this region).
- Together, these National Societies trained 3,296,536 people in first aid in 2017.
- In 2017, they had identified 6,622 active first aid trainers.
- The two above figures result in almost 500 people trained per active first aid trainer in these 31 National Societies from the IFRC Africa region, above the average of 100 people trained per active first aid trainer at the global level.
- Among the other first aid courses conducted by National Societies, two are provided in more than 75% of the responding National Societies at Africa region level:
  - > "Basic first aid course" (97% of the 31 responding National Societies)
  - > "First aid course for workers and employees" (94%).
- 87% of the Africa region National Societies organise refresher courses – 3% more than the global average. 93% of these are "face-to-face" courses. 15% involve the "blended-learning" methodology – 7% less than the global average.
- 75% of the responding Africa region National Societies declare that they have a quality management system in place to ensure the quality of their first aid education – 4% more than the global average.
- The most represented laws and regulations in the Africa region are in the area of "workers" and "nursing students", both represented in 42% of the 31 National Societies. The area of "medical students" comes third with 35% of the National Societies. Otherwise, no law and regulation listed in the survey are represented in more than 26% of the responding National Societies from the region.
- Laws are making first aid kits compulsory in private vehicles in 35% of the 31 responding National Societies, which is 7% less than the global average.
- Less than half of the 31 responding National Societies representatives (45%) from the Africa region agree with the statement considering that "the fear of potential legal problems (such as a lawsuit) is often a significant factor in whether people decide to attempt first aid in an emergency situation". This is 9% less than the average answers of the responding National Societies at the global level. On a related note, laws providing special protections against lawsuits or criminal prosecutions exist in 10% of the responding National Societies from the Africa region, which represents 12% less than the global average in the survey.
- For non-medical personnel, AEDs are allowed to be used and accessible in 10% of the Africa region responding National Societies – 29% less than the global average.
- In 61% of the responding National Societies from the region, Red Cross Red Crescent volunteers are allowed to use AEDs – 9% less than the global average.
- One of the survey questions required from respondents to anticipate the upcoming key external geopolitical challenges that could affect first aid education in their respective contexts. Two of the proposed answered were selected by more than 45% of the National Societies' representatives from the Africa region:
  - > "Public health crisis or epidemic" (74%).
  - > "Climate change" (61%).
- 94% of National Societies from the Africa region express their wish "that the IFRC creates an international first aid certification", which is the highest regional percentage and 13% above the global average.

Americas region

- 14 National Societies from the Americas region responded to the survey (40% of the National Societies from this region).
- Together, these National Societies trained 5,755,620 people in first aid in 2017.
- In 2017, they had identified 89,196 active first aid trainers.
- The two above figures result in 65 people trained per active first aid trainer in these 14 National Societies from the IFRC Americas region, the lowest regional average ratio and lower than the average ratio of 100 people trained per active first aid trainer at the global level (same number than in MENA Region).
- Among the other first aid courses conducted by National Societies, five are provided in more than 75% of the responding National Societies at Americas region level:
  - > "Basic first aid course" (100% of the 14 responding National Societies)
  - > "CPR/AED course" – cardiopulmonary resuscitation/automated external defibrillator (86%)
  - > "First aid course for workers and employees" (86%)
  - > "First aid course for children" (78%).
- 64% of the Americas region National Societies organise refresher courses – the lowest regional rate of the survey and 20% less than the global average. All of them involve "face-to-face" courses and almost a quarter (22%) use the "blended-learning" methodology – equal to the global average.
- 71% of the responding Americas region National Societies declare that they have a quality management system in place to ensure the quality of their first aid education – equal to the global average.
- "Nursing students" is the most represented area for laws and regulations in the Americas region, represented in 36% of the responding National Societies. Otherwise, no law and regulation listed in the survey are represented in more than 30% of the responding National Societies from the region.
- Laws are making first aid kits compulsory in private vehicles in 36% of the 14 responding National Societies, which is 6% less than the global average.
- Almost two-thirds of the 14 responding National Societies representatives (64%) from the Americas region agree with the statement considering that "the fear of potential legal problems (such as a lawsuit) is often a significant factor in whether people decide to attempt first aid in an emergency situation". This is 10% more than the average answers of the responding National Societies at the global level. On a related note, laws providing special protections against lawsuits or criminal prosecutions exist in 21% of the responding National Societies from the Americas region, equal to the global average in the survey.
- For non-medical personnel, AEDs are allowed to be used and are accessible in 43% of the Americas region responding National Societies – 4% more than the global average.
- In 79% of the responding National Societies from the region, Red Cross Red Crescent volunteers are allowed to use AEDs – 9% more than the global average.
- One of the survey questions required from respondents to anticipate the upcoming key external geopolitical challenges that could affect first aid education in their respective contexts. Two of the proposed answers were selected by more than 45% of the National Societies' representatives from the Americas region:
  - > "Public health crisis or epidemic" (50%)
  - > "Migration" (50%).
- 86% of National Societies from the Americas region express their wish "that the IFRC creates an international first aid certification", which is the second-highest regional percentage and 5% above the global average.

Asia-Pacific region

- 15 National Societies from the Asia-Pacific region responded to the survey (42% of the National Societies from this region).
- Together, these National Societies trained 3,990,999 people in first aid in 2017.
- In 2017, they had identified 39,205 active first aid trainers.
- The two above figures result in 102 people trained per active first aid trainer in these 15 National Societies from the IFRC Asia-Pacific region, almost equal to the average of 100 people trained per active first aid trainer at the global level.
- Among the other first aid courses conducted by National Societies, five are provided in more than 75% of the responding National Societies at Asia-Pacific region level:
  - "Basic first aid course" (100% of the 15 responding National Societies)
  - "CPR/AED course" – cardiopulmonary resuscitation/automated external defibrillator (93%)
  - "First aid course for children" (87%)
  - "First aid introduction" (80%)
  - "First aid course for workers and employees" (80%).
- 80% of the Asia-Pacific region National Societies organise refresher courses, which is 4% less than the global average. 90% of them consist of "face-to-face" courses and 33% use the "blended-learning" methodology – 11% more than the global average.
- 80% of the responding Asia-Pacific region National Societies declare that they have a quality management system in place to ensure the quality of their first aid education. This is the highest regional rate and 9% more than the global average.
- The most represented laws and regulations in the Asia-Pacific region are in the area of "workers" and "nursing students", both represented in 53% of the 15 National Societies. The area of "medical students" comes third with 47% of the National Societies. Otherwise, no law and regulation listed in the survey is represented in more than 40% of the responding National Societies from the region.
- Laws are making first aid kits compulsory in private vehicles in 27% of the 15 responding National Societies, the lowest regional percentage and 15% less than the global average.
- 60% of the 15 responding National Societies representatives from the Asia-Pacific region agree with the statement considering that "the fear of potential legal problems (such as a lawsuit) is often a significant factor in whether people decide to attempt first aid in an emergency situation". This is 6% more than the average answers of responding National Societies at the global level. On a related note, laws providing special protections against lawsuits or criminal prosecutions exist in 33% of the responding National Societies from the Asia-Pacific region, 11% more than the global average in the survey.
- For non-medical personnel, AEDs are allowed to be used and accessible in 53% of the Asia-Pacific region responding National Societies, which represents the second-highest regional rate and 14% more than the global average.
- In 87% of the responding National Societies from the region, Red Cross Red Crescent volunteers are allowed to use AEDs. This is the highest regional rate and 17% more than the global average.
- One of the survey questions required from respondents to anticipate the upcoming key external geopolitical challenges that could affect first aid education in their respective contexts. Two of the proposed answers were selected by more than 45% of the National Societies' representatives from the Asia-Pacific region:
  - "Climate change" (60%)
  - "Public health crisis or epidemic" (47%).
- 73% of National Societies from the Asia-Pacific region express their wish "that the IFRC creates an international first aid certification", which is 8% below the global average.

Europe region

- 33 National Societies from the Europe region responded to the survey (61% of the National Societies from this region).
- Together, these National Societies trained 3,079,271 people in first aid in 2017.
- In 2017, they had identified 24,312 active first aid trainers.
- The two above figures result in 127 people trained per active first aid trainer in these 33 National Societies from the IFRC Europe region, higher than the average of 100 people trained per active first aid trainer at the global level.
- Among the other first aid courses conducted by National Societies, five are provided in more than 75% of the responding National Societies at Europe region level:
  > "Basic first aid course" (97% of the 33 responding National Societies)
  > "First aid course for workers and employees" (91%)
  > "CPR/AED course" – cardiopulmonary resuscitation/automated external defibrillator (82%)
  > "First aid course for children" (76%).
- 94% of the Europe region National Societies organise refresher courses, which is the highest regional rate and 10% more than the global average. 87% of them consist of "face-to-face" courses and almost one third (29%) use the "blended-learning" methodology – 7% more than the global average.
- 73% of the responding Europe region National Societies declare that they have a quality management system in place to ensure the quality of their first aid education. This is just above the global average (71%).
- The most represented laws and regulations in the Europe region are in the area of "workers" and "professional drivers", respectively represented in 61% and 58% of the 33 National Societies. The area of "nursing students" comes third with 52% of the National Societies. Otherwise, no law and regulation listed in the survey is represented in more than half of the responding National Societies.
- Laws are making first aid kits compulsory in private vehicles in 58% of the 33 responding National Societies, by far the highest regional percentage and 16% more than the global average.
- 52% of the 33 responding National Societies representatives from the Europe region agree with the statement considering that "the fear of potential legal problems (such as a lawsuit) is often a significant factor in whether people decide to attempt first aid in an emergency situation". This is almost equal to the average of responding National Societies responding at the global level (54%). On a related note, laws providing special protections against lawsuits or criminal prosecutions exist in almost one third (30%) of the responding National Societies from the Europe region, 8% more than the global average in the survey.
- For non-medical personnel, AEDs are allowed to be used and accessible in 64% of the Europe region responding National Societies, which represents the highest regional rate and 25% more than the global average.
- In 67% of the responding National Societies from the region, Red Cross Red Crescent volunteers are allowed to use AEDs. This is almost equal to the global average (70%).
- One of the survey questions required from respondents to anticipate the upcoming key external geopolitical challenges that could affect first aid education in their respective contexts. Only one proposed answer was selected by more than 45% of the National Societies' representatives from the Europe region: "climate change" (67%). The second highest proposition is "public health crisis or epidemic", selected by 39% of the responding National Societies representatives.
- 73% of National Societies from the Europe region express their wish "that the IFRC creates an international first aid certification", which is 8% below the global average.

Middle East and North Africa (MENA) region

- 8 National Societies from the MENA region responded to the survey (47% of the National Societies from this region).
- Together, these National Societies trained 93,309 people in first aid in 2017.
- In 2017, they had identified 1,432 active first aid trainers.
- The two above figures result in 65 people trained per active first aid trainer in these 8 National Societies from the IFRC MENA region, the lowest regional average and lower than the average of 100 people trained per active first aid trainers at the global level (same number than in America Region).
- Among the other first aid courses conducted by National Societies, six are provided in 75% or more of the responding National Societies at MENA region level:
  > "Basic first aid course" (100% of the 8 responding National Societies)
  > "First aid introduction" (100%)
  > "CPR/AED course" – cardiopulmonary resuscitation/automated external defibrillator (88%); "First aid course for workers and employees" (88%);
  > "First aid course for police" (88%)
  > "First aid course for children" (75%).
- 75% of the MENA region National Societies organise refresher courses, which is 9% less than the global average. All of them consist of "face-to-face" courses and no "blended-learning" methodology is used by the responding National Societies.
- 38% of the responding MENA region National Societies declare that they have a quality management system in place to ensure the quality of their first aid education, which is 33% less than the global average.
- The most represented laws and regulations in the IFRC MENA region are in the area of "nursing students" and "medical students", respectively represented in 63% and 50% of the 8 National Societies. Otherwise, no law and regulation listed in the survey is represented in more than 40% of the responding National Societies.
- Laws are making first aid kits compulsory in private vehicles in 38% of the 8 responding National Societies, which is almost equal to the global average (42%).
- 75% of the 8 responding National Societies representatives from the MENA region agree with the statement considering that "the fear of potential legal problems (such as a lawsuit) is often a significant factor in whether people decide to attempt first aid in an emergency situation". This is the highest regional rate and 21% more than the global average. On a related note, laws providing special protections against lawsuits or criminal prosecutions exist in 13% of the responding National Societies from the Europe region, 9% less than the global average in the survey.
- For non-medical personnel, AEDs are allowed to be used and accessible in 13% of the MENA region responding National Societies, which represents 26% less than the global average.
- In 75% of the responding National Societies from the region, Red Cross Red Crescent volunteers are allowed to use AEDs. This is 5% more than the global average.
- One of the survey questions required from respondents to anticipate the upcoming key external geopolitical challenges that could affect first aid education in their respective contexts. Two of the proposed answered were selected by 25% or more of the National Societies' representatives from the MENA region:
  > "Climate change" (25%)
  > "Public health crisis or epidemic" (25%).
- 75% of National Societies from the MENA region express their wish "that the IFRC creates an international first aid certification", which is 6% below the global average.

Conclusion of the 2018 global survey

The 2018 Global survey on first aid highlighted some key global strengths, challenges and expected transformations for the years to come.

The strengths of the Red Cross Red Crescent network are reflected by the vast first aid education offer provided by National Societies as well as the outcome figures regarding the number of people trained globally: 16 million measured by the survey, more than 23 million estimated at the global level. Moreover, almost all National Societies include a basic first aid course in their training offer to the population of their respective countries.

First aid has been a historical activity of all National Societies and remains at the core of their work. Feedback indicates, first aid education could be affected by key challenges in the upcoming years: public health, climate change and migration, which are among the global challenges considered in the IFRC 2030 strategy.

National Societies push for better quality and better recognition of their action, either by developing internal quality management systems or through the creation of an international recognition award in first aid. National Societies also embrace change, which for instance can be seen through their growing interest in blended learning. The Reference Centre will support such changes in the coming years, in line with the IFRC move towards digital transformation.

Challenges still lie ahead and this survey highlights some of them:

- The number of active first aid trainers should adapt to match our ambitions for even more people trained in first aid in the coming years, taking into account the impact of blended learning on the training of these first aid trainers.
- Advocacy efforts should continue for fewer disparities among regions regarding the existing laws and regulations, among which the legal protection of laypeople providing assistance to a person in distress remains key.
- Specific attention should be paid to increasing the access to and use of AEDs while keeping this in balance with the various contexts and potential added value or not of such equipment.

In the coming years, the Reference Centre will strive, alongside and in support of National Societies for one person per household to be trained in first aid around the world. Also, for continuous quality improvement and recognition of the Red Cross Red Crescent impact in the first aid domain.

For more information, please refer to the report Red Cross Red Crescent global survey on first aid 2018.

Safe classroom checklist

Registration

- ❒ Registration policy includes a self-declaration from all participants that they have had no known exposure or shown any symptoms of infectious disease as recommended by public health.
- ❒ Registration is taken over the phone or online only.

Administration

- ❒ Payment for training can be completed online or over the phone to reduce physical interaction.
- ❒ Confirmation of registration and/or payment is provided electronically by email.
- ❒ Traffic patterns are clearly marked throughout the facility with safe entrance and exit paths to the classroom that allow the staff and clients to maintain physical distancing.
- ❒ There is a screening questionnaire in place for all learners and staff entering the training facility or classroom.
- ❒ There are strict class size limits to accommodate physical distancing requirements (two metres) which are outlined at registration.

Training

- ❒ Classroom set-up has marked training spaces for each participant which are a minimum of two metres or six feet apart to accommodate physical distancing during classroom activity.
- ❒ Instructors are required to wear a medical mask and gloves at all times if physical distancing cannot be maintained.
- ❒ Learners are required to wear a mask or face covering and gloves at all times if physical distancing cannot be maintained.
- ❒ Equipment and processes used in the classroom have been modified to allow for limited or in some cases no contact during competency assessments for certification.
- ❒ At a minimum, hand hygiene will be performed at the following times by all learners and Instructors:
  - ❒ Beginning and end of class
  - ❒ Before and after meals and snacks
  - ❒ Before and after skill practice sessions (when wearing gloves, hand hygiene should be performed before putting on gloves and after removing them)
- ❒ Handwashing stations have handwashing posters visible and hand hygiene protocols will be clearly listed. Hand sanitiser is available if handwashing is not possible.
- ❒ Knowledge evaluations will be collected from learners and put into an envelope. Envelopes will not be opened and reviewed or graded for 48 hours following the course.

Equipment

- ❒ Each learner has their own equipment for use in the classroom including manikins, training-defibrillators, first aid equipment, blankets, knee pads or mats (optional), required course documentation, pens, and any other material expected to be required by the participant during the course. Equipment for each participant is included in their personal training space.
- ❒ Lungs for manikins will be disposed of immediately after classroom use.
- ❒ New lungs will not be installed until just before learners are ready to use them.
- ❒ Disposal of all waste and non-reusable classroom supplies will be conducted at the end of each session.

CPR skills
(for adolescents and adults)

RESOURCES

The following steps are best suited for able-bodied learners. You may need to adapt them to the needs of people with diverse needs to achieve the aim of chest compressions and rescue breaths (to pump blood and oxygen around the body). If adapting, the ideal technique should allow the first aid provider to perform the principles of the method safely and effectively, be safe for the unresponsive person and be quick to start.

Performing chest compressions

Aim: To press down in the middle of the chest at a regular rate. You are acting as the heart, pumping blood around the body to vital organs including to the brain. This will buy time until the heart can have an electric shock from a defibrillator, which may help it to re-start.

1. Kneel by the unresponsive person and place the heel of one hand on the middle of their chest. This will be the lower part of their breastbone.
2. Place the heel of the other hand on top of the first hand. Interlock the fingers of your hands to ensure that pressure is not applied on the ribs, the abdomen or the lower tip of the breastbone.
3. Lean over the person and with straight arms press down vertically on the chest. Push hard to depress the chest by approximately 5cm (but no more than 6 cm).
4. Release the pressure without taking the hands off the chest. Allow the chest to come back up fully (recoil) before doing the next compression.
5. Compress the chest at a rate of between 100 to 120 compressions per minute (about two compressions per second). The time taken for compression and release should be the same.

Performing rescue breaths (with chest compressions)

Aim: To blow two breaths of air into the person's lungs following 30 compressions. The air you breathe into their lungs is loaded with oxygen which can help to keep vital organs alive. For first aid providers, the gold standard for CPR is a combination of chest compressions and rescue breaths at a ratio of 30 compressions to two breaths.

1. After 30 compressions open the person's airway by gently tilting their head back and lifting their chin.
2. Pinch the soft part of the person's nose (using your hand from the forehead).
3. Allow their mouth to open while maintaining the chin lift.
4. Take a breath and place your lips around the person's mouth making sure you have a good seal.
5. Blow into their mouth and watch their chest rise. If the chest does not rise you may need to adjust their head position.
6. Maintaining the head tilt and chin lift, take your mouth away from the person's mouth and watch the chest fall. If the chest rises and falls that is an effective rescue breath. Each breath should take one second.
7. Give a second breath. Do not attempt more than two breaths each time before returning to chest compressions.
8. Without delay return to do 30 chest compressions.
9. Continue the cycle of 30 chest compressions followed by two breaths.

CPR skills
(for baby or child)

The following instructions are best suited for able-bodied learners. You may need to adapt them to the needs of people with diverse needs to achieve the aim of chest compressions and rescue breaths (to pump blood and oxygen around the body). If adapting, the ideal technique should allow the first aid provider to perform the principles of the method safely and effectively, be safe for the baby or child and be quick to start.

Performing rescue breaths

Aim: To blow air into the baby or child's lungs. The air you breathe into their lungs is loaded with oxygen which can help to keep their vital organs alive.

For a baby younger than one year of age

1. Open the baby's airway by gently moving their head into a neutral position and lifting their chin.
2. Take a breath and cover the mouth and nose of the baby with your mouth, making sure you have a good seal.
3. Blow steadily into the baby's mouth and nose for about one second; sufficient to make the chest or abdomen visibly rise. Avoid excessively providing rescue breaths as the air will enter their stomach. If the chest does not rise, you may need to adjust the baby's head position.
4. Maintaining the head position and chin lift, take your mouth away from the baby's mouth and nose and watch their chest fall as air comes out. If the chest rises and falls that is an effective rescue breath.
5. Take another breath and repeat this sequence.

For a child over one year of age

1. Open their airway by gently tilting the child's head back and lifting their chin.
2. Pinch the soft part of the child's nose (using the hand from the forehead).
3. Allow their mouth to open while maintaining the chin lift.
4. Take a breath and place your lips around the child's mouth making sure you have a good seal.
5. Blow steadily into their mouth for about one second and watch their chest rise. If their chest does not rise, you may need to adjust the child's head position.
6. Maintaining the head tilt and chin lift, take your mouth away from the child's mouth and watch the chest fall. If the chest rises and falls that is an effective rescue breath.
7. Take another breath and repeat this sequence.

CPR skills

(for baby or child)

Performing chest compressions

Aim: To press down in the middle of their chest at a regular rate. You are acting as the heart, pumping blood around the body to vital organs including to the brain. This will buy time until the heart can have an electric shock from a defibrillator, which may help it to re-start.

For a baby younger than one year of age

Either technique can be performed, however, the two-thumb technique is preferred if there are two first aid providers.

Two thumb encircling hands technique

1. Encircle the baby's chest with both hands; spread your fingers around the thorax and place your thumbs together over the lower half of the sternum. Forcefully compress the sternum with your thumbs as you squeeze the thorax with your fingers for counter pressure.
2. Depress the sternum by at least one third the depth of the baby's chest.
3. Release the pressure without taking the thumbs off the chest. Allow the chest to come back up fully (recoil) before doing the next compression.
4. Compress the chest at a rate of between 100 to 120 compressions per minute. The time taken for compression and release should be the same.

Two-finger technique

1. Place the tips of two fingers of one hand in the middle of their chest (just below the nipples).
2. Press down vertically on the chest by at least one-third of the depth of the baby's chest.
3. Release the pressure without taking the tips of fingers off the chest. Allow the chest to come back up fully (recoil) before doing the next compression.
4. Compress the chest at a rate of between 100 to 120 compressions per minute. The time taken for compression and release should be the same.

For a child over one year of age

1. Kneel by the child and place the heel of one hand in the middle of their chest. (One or two hands can be used depending on the height and weight of the child. If using two hands, place the heel of the other hand on top of the first hand and interlock the fingers of your hands.)
2. Lean over the child and with a straight arm press down vertically on their chest. Push hard to depress the chest 1/3 of its depth.
3. Release the pressure without taking the hand off the chest. Allow the chest to come back up fully (recoil) before doing the next compression.
4. Compress the chest at a rate of between 100 to 120 compressions per minute. The time taken for compression and release should be the same.

Put the skills together to perform CPR

Following two to five initial rescue breaths, a compression-to-rescue-breath ratio of 30:2 (30 compressions and 2 rescue breaths) may be used on a baby or child who is unresponsive with abnormal breathing.

Choking skills

The following steps are best suited for able-bodied learners. You may need to adapt them to suit people with diverse needs in order to achieve the aims.

Adult and child

Back blows

Aim: To give the choking person firm blows between the shoulder blades, creating vibration and pressure in their airway which may dislodge the object and enable them to breathe again.

Give up to five back blows.

1. Stand behind the person placing one hand on their chest for support.
2. Bend the person forward.
3. Using the heel of your other hand, give up to five sharp back blows between the shoulder blades.
4. After each back blow, check to see if the airway is clear.

Abdominal thrusts

Aim: To squeeze the air out of the lungs, creating pressure in the airway which may dislodge the object and enable the person to breathe again.

If the five back blows are unsuccessful, give up to five abdominal thrusts.

1. Stand behind the person, bend them forward and wrap both your arms around their waist.
2. Make a fist and place it between the belly button and the base of the ribs. Place your other hand on top of your fist.
3. Pull sharply inwards and upwards giving up to five abdominal thrusts, checking to see if the airway is clear after each one.

If the airway is still blocked, access EMS immediately and continue alternating between five back blows and five abdominal thrusts.

Adaptation for obese or pregnant people

For obese or pregnant people, instead of abdominal thrusts, use chest thrusts. On adults or children, these are similar to abdominal thrusts but stand behind the person and place your fist against the centre of the person's breastbone. Then place your other hand on top of your fist and give quick thrusts into the chest.

Choking skills

Baby

Back blows

Aim: To give the choking baby a firm blow on their back between the shoulder blades, creating vibration and pressure in their airway which may dislodge the object and enable them to breathe again.

Give up to five back blows.

1. Sit or kneel holding the baby.
2. Place the baby face down on your lap (the head should be lower than the body) and support their chin with your hand. Be careful not to compress the area under the chin.
3. Using the heel of your other hand, give up to five sharp blows between their shoulder blades.
4. After each back blow, check to see if their airway is clear.

Chest thrusts

Aim: To squeeze the air out of the lungs, creating pressure in the airway which may dislodge the object and enable the baby to breathe again.

If the five back blows are unsuccessful, give up to five chest thrusts.

1. Support the baby's head and turn the baby to face upwards. The baby's back should now be on your forearm or lap. Their head should be lower than their body.
2. Place two fingers or thumbs in the middle of their chest just below the nipple line and give up to five chest thrusts (approximately one-third of the depth of the chest).

If the airway is still blocked, access EMS immediately and continue alternating between five back blows and five chest thrusts.

Assess the scene

Safety risks: the environment

Identify relevant environmental dangers.
A good way to identify dangers is to ask people to think about what they could look, listen and smell for. For example:

Look for...	Listen for...	See if they can smell...
• Exposed electrical wires • Fire or smoke • Risk of explosion (e.g., carbon monoxide) • Dangerous items (e.g., weapons, unexploded bombs) • Dangerous weather patterns (e.g., tornados) • Potential falling hazards (e.g., tree branches) • Potentially unsteady ground (e.g., building rubble) • Non-verbal cues from bystanders • Incoming traffic or unstable vehicles • Violent people • Strange-looking devices or things that look out of place (e.g., improvised explosives)	• Human shouting, screaming, or other alerting cues • Human footsteps or movements • Gas leaks (hissing sounds) • Gunshots • Flowing water • Thunder • Announcements and bystander conversations • Sirens, alarms or other auditory warning sounds • Incoming vehicles • Animal alert cues (e.g., barking dog)	• Gas (especially if in a closed or confined space) • Smoke • Chemicals • Gasoline (after traffic collisions) • Any non-familiar smell that seems suspicious

Safety risks: the person or bystanders

Identify the danger that the ill or injured person or bystanders could pose.
Acknowledge that most first aid emergencies will involve helping someone the first aid provider knows (family, friends, colleagues) as that is who they spend the most time with. The following points can be considered with that in mind, and also the possibility of helping a stranger.

The ill or injured person or bystanders may be a risk to the first aid provider if they:

- are emotionally affected by the situation
- are under the influence of alcohol or drugs and behaving unpredictably
- have a mental health disorder that may influence how they experience and react to situations
- believe the first aid provider is not going to act in their best interest
- are unable to communicate due to language differences or sensory disabilities
- are carrying a blood-borne, contact-borne or air-borne virus
- are armed with a weapon.

Assess the scene

Be aware that stressful situations may make it harder for everyone (including the first aid provider) to communicate.

Actions to take

Identify the actions to make it safe to help.
For example:
- Access professional help such as the police or fire service.
- Use strategies that lower the risk of cross-infection like wearing gloves (including improvised strategies like a plastic bag).
- Manage simple dangers to make them safe. E.g., extinguish a small fire.
- Ask bystanders to support with hazards, threats or communication difficulties.
- Verbally coach the ill or injured person to help themselves.
- Move the ill or injured person to a safer place.

Emphasise that the most important thing to do is maintain safety. If a scene is not safe, then they should not enter it.

Other observations

Explain that other than dangers to safety and how to overcome those, two other observations should be made during a scene assessment.

a. Identify the potential cause of illness or injury as this can provide clues as to the characteristics and severity of the person's condition.

b. Identify the number of ill or injured people as you may need to give this information to the EMS or local equivalent.

Facilitation tip

Create relevant role-play scenarios that allow learners to put all the elements of scene assessment into practice:
- Identify any dangers to themselves.
- Manage the danger.
- Identify the potential causes of illness or injury.
- Identify the number of ill or injured people.

Remember learners when creating scenarios, making them relevant and realistic. Aim to build confidence.

Assess the person

ABC DE is a commonly used tool in English to help people remember how to assess a person. There are many variations of this tool globally. Choose one that is widely recognised and that is going to be very easy to remember and apply.

If there is any concern about cross-infection, do this assessment by observing the person's chest or abdomen for signs of breathing.

Airway: Is the person's airway open?
- Talk to them and see if they can respond.
- Open their airway if they are unresponsive.
- Consider if they could be choking.

Breathing: Is the person breathing normally?
- Look at their chest or abdomen for movement.
- Listen for sounds of breathing.
- Feel for breaths on your cheek.

Circulation: Is the person's circulation system working properly?
- Look for signs of severe external bleeding.
- Consider if the person lost a lot of fluids (hyperthermia, burns etc).
- Consider whether the person is having a severe allergic reaction or heart attack.

The ABC check above covers the most life-threatening conditions. These should be identified and dealt with before moving onto the following (DE).

Disability: Is the person displaying any changes in their mental status or nervous system?
- Talk to the person and consider their mental status (confusion, aggression, disoriented).
- Observe them for any changes in the sensations in their extremities (arms, legs).

Examine: Do you need to examine an area of the person's body more closely?
- Explain to the person what you need to do and gain permission to examine them.
- Remove or cut clothing to expose part of the body if necessary.
- Look carefully at the signs of illness or injury.

Remember to talk to the person as they may be able to indicate what is wrong. Always act with empathy and respect. Tell them what you are doing before you do it.

Access help

What types of help are available in an emergency and when should I access them?

Identify the different types of help available.

Help can come in many forms.
Consider that medical help may include:

- Public emergency medical services, often consisting of an emergency phone number which can activate advanced first aiders, paramedics or medics who bring care to the emergency site and can transport the person to medical care.
- Alternative emergency medical services which, depending on the context could consist of a field hospital, a local health professional, an air-ambulance or Red Cross, Red Crescent service providers.
- Non-emergency medical services which may include things such as medical or health walk-in centres, a family doctor, a community nurse, community health and first aid volunteers, or phone or online medical support centres.
- Private medical services, for people with health plans or pre-existing medical conditions who contribute to a private fund.

Other types of help:

- Fire rescue or police and community safety professionals can help make the scene safer.
- There may be specialist search and rescue teams such as the coastguard, mining, or mountain rescue that may be relevant in certain contexts.
- Bystanders can help with making the scene safer, accessing other help, or with providing care. They can also help control the environment e.g. create shade or help with crowd control.

Facilitation tip

Use a range of relevant scenarios to establish which types of help they would access in any given situation.
Examples of case studies:

- A child has developed an earache and a slight fever at home.
- A man in his workplace is complaining of pain in his chest. He is sweating.
- A woman has fallen and hurt her wrist. You are not sure whether it is perhaps broken.
- There has been an explosion in a building across the road from you, where people live and work. There is smoke and part of the building has collapsed.
- A truck has crashed into a tree near your home. The driver has a cut on their head. The truck is carrying chemicals on the back of it.

Sexual and gender-based violence

Within the scope of providing first aid, individuals may encounter situations where the injured person has experienced some forms of sexual and gender-based violence, such as genital injuries in both adults and children. Sexual and gender-based violence (SGBV) is a broad term referring to any harmful act that leads to – or is likely to lead to – physical, sexual or psychological harm or suffering to someone on the basis of their gender. Gender-based violence is a result of gender inequality and abuse of power, including but not limited to the imposition of sexual violence, domestic violence, trafficking, forced or early marriage, forced prostitution and sexual exploitation and abuse (IFRC, 2015). It was estimated that about one-third of women experience some type of SGBV in their lifetime (WHO, 2017). It is also crucial to consider SGBV committed against men, boys, and sexual minority groups despite the lack of data on its occurrence globally. SGBV can take different forms and happen in diverse situations and contexts across the world and is now one a focus of humanitarian challenges (ICRC, 2015; IFRC, 2015).

The psychosocial reactions and needs of the survivors

While people affected by SGBV may suffer from physical consequences, such as contracting sexually transmitted diseases (e.g., HIV) or sustaining physical injuries, they may also endure psychosocial consequences that last for a long time and have debilitating effects. The ICRC (2017) and IFRC (2015) include the following psychosocial reactions and needs:

- Emotional reactions such as anxiety, fear, insecurity, anger, shame, self-hate, self-blame, numbness and hopelessness.
- Difficulties concentrating, hyper-vigilance, nightmares or intrusive memories, reliving distressing experiences and flashbacks of the incident(s).
- Behavioural consequences such as the inability to sleep, avoidance (i.e., some survivors may avoid certain situations that remind them of the traumatic event), social isolation and withdrawal, aggressive behaviour, changes in eating behaviour or substance abuse.
- Mental health consequences like depression, trauma-related symptoms, post-traumatic stress disorder, anxiety disorder, eating disorder, self-harm and substance abuse.
- Social consequences such as community stigmatization and isolation, rejection by partners, families or communities, loss of a job and financial income, as well as status in the society.

It is more likely that a survivor's psychological difficulties will manifest themselves as psychosomatic symptoms. Although survivors rarely talk openly about their experiences, they may seek treatment for physical symptoms (e.g., injuries, fatigue, headaches, back pain, abdominal pain, urinary tract infections, or sexually transmitted infections).

When providing care to someone affected by SGBV, first aid providers should be mindful of the following critical needs (IFRC, 2015):

- safety and protection
- care and understanding
- practical support
- connectedness with the family and community
- livelihood for their family
- self-efficacy
- hope for the future.

Sexual and gender-based violence

Facilitation tip

First aid education should take a survivor-centred approach; everything begins with the experiences of the survivor. These experiences determine the needs, which in turn determines the services required. A survivor-centred approach means that catering to the rights, needs and wishes of survivors is the top priority (IFRC, 2015). It is a participatory process that takes into account survivors' existing coping mechanisms, suggestions and expectations (ICRC, 2017). This process is based on the principles of safety, confidentiality, respect, and non-discrimination. Particularly, when we approach or interact with the survivors of SGBV, practical ways and responses that can help ensure their feelings, needs, rights are being accepted and respected should include the following (ICRC, 2017; IFRC, 2015):

- ensure confidentiality and privacy
- stay close and listen to their story
- avoid further traumatising survivors when they are reliving horrific experiences
- believe the affected person without questioning the story
- do not pressure the person to tell details nor do anything against their own will
- avoid further disempowering or stigmatising survivors
- do not judge or blame the person
- ensure safety and do not put the person in danger, such as by:
  - confronting their partner or calling the police without their consent
  - sending a child away unaccompanied or with the suspected offending person.
- be very clear about the available options and the decisions that need to be made
- do not promise anything, (e.g., "everything will be fine if you report to the police")
- refer the person to professional support and follow-up if needed.

This information is taken from the Traumatic event worksheet, where the full references are available.

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First aid

General approach

General approach

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Unresponsive and abnormal breathing when a defibrillator is available

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THE FUNDAMENTAL PRINCIPLES OF THE INTERNATIONAL RED CROSS AND RED CRESCENT MOVEMENT

Humanity
The International Red Cross and Red Crescent Movement, born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavours, in its international and national capacity, to prevent and alleviate human suffering wherever it may be found. Its purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace amongst all peoples.

Impartiality
It makes no discrimination as to nationality, race, religious beliefs, class or political opinions. It endeavours to relieve the suffering of individuals, being guided solely by their needs, and to give priority to the most urgent cases of distress.

Neutrality
In order to enjoy the confidence of all, the Movement may not take sides in hostilities or engage at any time in controversies of a political, racial, religious or ideological nature.

Independence
The Movement is independent. The National Societies, while auxiliaries in the humanitarian services of their governments and subject to the laws of their respective countries, must always maintain their autonomy so that they may be able at all times to act in accordance with the principles of the Movement.

Voluntary service
It is a voluntary relief movement not prompted in any manner by desire for gain.

Unity
There can be only one Red Cross or Red Crescent Society in any one country. It must be open to all. It must carry on its humanitarian work throughout its territory.

Universality
The International Red Cross and Red Crescent Movement, in which all societies have equal status and share equal responsibilities and duties in helping each other, is worldwide.

The International Federation of Red Cross and Red Crescent Societies (IFRC) is the world's largest humanitarian network, with **192 National Red Cross and Red Crescent Societies** and around **14 million volunteers.** Our volunteers are present in communities before, during and after a crisis or disaster. We work in the most hard to reach and complex settings in the world, saving lives and promoting human dignity. We support communities to become stronger and more resilient places where people can live safe and healthy lives, and have opportunities to thrive.

About the Global First Aid Reference Centre: The IFRC Global First Aid Reference Centre aims to develop first aid training in accordance with the Movement's recommendations and international scientific guidelines. The GFARC also focuses on supporting National Societies in delivering first aid training in their individual countries and facilitate network-wide information sharing, ensuring quality management of first aid and supporting first aid harmonization within the Movement.

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