

Fractures, sprains and strains

Keep the injury still to reduce pain.

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](#).

Guidelines

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

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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.

References

Systematic reviews

Borra, V., Berry, D. C., Zideman, D., Singletary, E., & De Buck, E. (2020). Compression Wrapping for Acute Closed Extremity Joint Injuries: A Systematic Review. *Journal of Athletic Training*, 55(8), 789-800.

Centre for Evidence-Based Practice, Belgian Red Cross-Flanders. (2019). Evidence summary Broken and dislocated limbs – Sling. Available from: <https://www.cebap.org/knowledge-dissemination/first-aid-evidence-summarie/s/>

Centre for Evidence-Based Practice, Belgian Red Cross-Flanders. (2019). Evidence summary Broken and dislocated limbs – Splint. Available from: <https://www.cebap.org/knowledge-dissemination/first-aid-evidence-summarie/s/>

Centre for Evidence-Based Practice, Belgian Red Cross-Flanders. (2019). Evidence summary Broken and dislocated limbs – Splint versus sling. Available from: <https://www.cebap.org/knowledge-dissemination/first-aid-evidence-summarie/s/>

Centre for Evidence-Based Practice, Belgian Red Cross-Flanders. (2020). Evidence summary Sprains and strains – Elevation. Available from: <https://www.cebap.org/knowledge-dissemination/first-aid-evidence-summarie/s/>

Centre for Evidence-Based Practice, Belgian Red Cross-Flanders. (2020). Evidence summary Sprains and strains – Ice. Available from: <https://www.cebap.org/knowledge-dissemination/first-aid-evidence-summarie/s/>

Singletary, E. M., Zideman, D. A., De Buck, E. D., Chang, W. T., Jensen, J. L., Swain, J. M., ... & Hood, N. A. (2015). Part 9: first aid: 2015 international consensus on first aid science with treatment recommendations. *Circulation*, 132 (16_suppl_1), S269-S311. DOI <https://doi.org/10.1161/CIR.0000000000000278>

Singletary, E. M., Zideman, D. A., Bendall, J. C., Berry, D. C., Borra, V., Carlson, J. N., ... & Douma, M. J. (2020). 2020 International Consensus on First Aid Science With Treatment Recommendations. *Circulation*, 142(16_suppl_1), S284-S334. DOI [10.1161/CIR.0000000000000897](https://doi.org/10.1161/CIR.0000000000000897)

Singletary, E.M., Zideman, D.A., Bendall, J.C., Berry, D.C., Borra, V., Carlson, J.N., Cassan,, Lee, C.C. (2020). 2020 International Consensus on First Aid Science With Treatment Recommendations. *Resuscitation*, 2020 Nov;156:A240-A282. DOI [10.1016/j.resuscitation.2020.09.016](https://doi.org/10.1016/j.resuscitation.2020.09.016)

Zideman, D.A, Singletary, E.M., De Buck, E., Chang, W.T., Jensen, J.L., Swain, J.M., ... & Yang, H.J. (2015). Part 9: First aid: 2015 International consensus on first aid science with treatment recommendations. *Resuscitation*, 95. e225-e261. DOI [10.1016/j.resuscitation.2015.07.047](https://doi.org/10.1016/j.resuscitation.2015.07.047)

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[Severe bleeding](#)

[Psychological first aid](#)

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