Guideline 9.1.6 – First Aid Management of Suspected Spinal Injury

Guideline

Who does this guideline apply to?

This guideline applies to adults, children and infants.

Who is the audience for this guideline?

This guideline is for use by bystanders, first aiders and first aid providers. This guideline is equally applicable to healthcare professionals working in the pre-hospital setting.

1.0 | Summary of Recommendations

The Australian and New Zealand Committee on Resuscitation (ANZCOR) makes the following recommendations in managing those who have, or may have, a spinal injury [all Good Practice Statements]:

1. ANZCOR recommends rescuers perform cardiopulmonary resuscitation (CPR) for those who are unresponsive and not breathing normally (ANZCOR Guideline 8). This should continue until ambulance or rescue personnel take over.

2. ANZCOR recommends that manual inline restriction of motion of the spine be undertaken wherever practicable for possible spinal injury.

3. ANZCOR recommends that a soft cervical collar only be used to indicate that there is a possibility of spinal injury, and this provides less restriction of motion than manual inline restriction of motion.

4. ANZCOR recommends that semi-rigid collars be used if manual spinal motion restriction is

impossible, and only for extrication/transport for the shortest time possible by providers trained and equipped to use these devices. Appropriate circumstances may include extrication from a mountain.

5. ANZCOR recommends that long back boards (spinal boards, including proprietary scoops) only be used to move persons provided that this does not significantly slow moving the person and rescuer from danger and only for the time to move the person

6. ANZCOR notes that head blocks that restrict motion of the head more than the body and frequently increase motion of the cervical spine when the body moves, with the risk of shearing force on the spine, should not be used.

7. ANZCOR recommends that first aid providers do not rely on spinal motion restriction devices to prevent significant motion of the cervical spine, particularly in the unconscious person. Manual inline restriction of motion from a neutral position should be used wherever possible.

2.0 | Introduction

The spine is made up of 33 separate bones, called vertebrae, extending from the base of the skull to the coccyx (tailbone). Each vertebra surrounds and protects the spinal cord (nerve tissue) as well as forming a flexible column. Fractures or dislocations of the vertebrae may result in primary injury to the spinal cord. The direct mechanical primary injury from the traumatic impact can compress or sever the nerve tissue. This may be worsened by secondary injury caused by ongoing bleeding into and around the spinal cord, as well as continued swelling at the injured site and surrounding area.

The possibility of spinal injury must be considered in the overall management of all trauma. The risk of worsening the spinal injury in the prehospital period is less than previously thought, yet to minimise the extent of the secondary injury, caution must be taken when moving a person with a suspected spinal injury.

Spinal injuries can occur in the following regions of the spine:

- the neck (cervical spine)
- the back of the chest (thoracic spine)
- the lower back (lumbar spine).

The cervical spine is most vulnerable to injury, which must be suspected in any person with injuries above the shoulders. More than half of spinal injuries occur in the cervical region.

Suspected spinal injuries of the neck, particularly if the person is unconscious, pose a dilemma for the rescuer because correct principles of airway management often cause some motion of the cervical spine; however, maintenance of an open airway takes precedence over restriction of motion of the cervical spine, and manual inline restriction of motion minimises this movement.[1]

3.0 | Recognition

The most common causes of spinal cord injury are:[2]

- falls, especially falls in the elderly population
- a motor vehicle crash, car, motorcycle or bicycle as an occupant, rider, or pedestrian.

And more rarely:

- an industrial accident (i.e. workplace)
- a dive or jump into shallow water or water with obstacles or being "dumped" in the surf
- a sporting accident (e.g. rugby, falling from a horse)
- a significant blow to the head
- a severe penetrating wound (e.g. gunshot).

The symptoms and signs of a spinal injury depend on two factors: first, the location of the injury and second, the extent of the injury – whether there is just bone injury or associated spinal cord injury, and whether the spinal cord injury is partial or complete. It will be difficult to elicit symptoms and signs in persons with an altered conscious state.

3.1 | Symptoms

Symptoms of spinal injury include:

- pain in the injured region
- tingling, numbness in the limbs and area below the injury
- weakness or inability to move the limbs (paralysis)
- nausea
- headache or dizziness
- altered or absent skin sensation.

3.2 | Signs

Signs of spinal injury include:

- head or neck in an abnormal position
- signs of an associated head injury
- altered conscious state
- breathing difficulties
- cold and clammy skin
- change in muscle tone, either flaccid or stiff
- loss of function in limbs
- loss of bladder or bowel control
- priapism (erection in males).

4.0 | Management

The priorities of management of a suspected spinal injury are:

1. Ensure the safety of yourself, the injured person and onlookers.
2. Send for an ambulance.
3. Management of airway, breathing and circulation.
4. Spinal care.

An awareness of potential spinal injury and careful handling of the person with attention to spinal alignment is the key to harm minimisation.

4.1 | The Conscious Person

Tell the person to remain still, but do not physically restrain if uncooperative. Those with significant spinal pain will likely have muscle spasm, which splints their injury. Keep the person comfortable until help arrives.

If it is necessary to move the person from danger (e.g. out of the water, off a road), care must be taken to support the injured area and minimise motion of the spine in any direction.

4.2 | The Unconscious Person

Airway management takes precedence over any suspected spinal injury. It is acceptable to gently move the head into a neutral position to obtain a clear airway. If the person is breathing but remains unconscious, ANZCOR suggests that they be placed in the recovery position (refer to ANZCOR Guideline 3) [CoSTR 2020, weak recommendation, very low certainty of evidence].[3,4]

The person should be handled gently with no twisting. Aim to maintain spinal alignment of the head and neck with the torso, both during the turn and afterwards. In persons needing airway opening, use manoeuvres which are least likely to result in motion of the cervical spine. Jaw thrust and chin lift should be tried before head tilt.

5.0 | Restriction of Spinal Motion Techniques and Devices

The clinical importance of prehospital immobilisation in spinal trauma remains unproven.[5] There have been no randomised controlled trials to study immobilisation techniques or devices on persons with suspected spinal cord injury. All existing studies have been retrospective or on healthy volunteers, manikins or cadavers.[5] The experimental studies demonstrate that spinal restriction devices do limit cervical spine motion to an extent,[6,7] but it should be noted that this is in individuals not experiencing pain from the cervical spine. There are several studies demonstrating adverse effects of semi-rigid and rigid collars as well as long back boards (spinal boards), as noted below.

Prehospital spinal immobilisation has never been shown to affect outcome and the estimates in the literature regarding the incidence of neurological deterioration due to inadequate immobilisation may be exaggerated.[8]

Manual inline restriction of motion:

Manual inline restriction of motion (also called manual inline stabilisation) applies to the whole spine. Care of the cervical spine is of particular importance. This is best achieved by the rescuer placing their hands on the shoulders with thumbs extending anteriorly over the clavicles and fingers behind the neck. The head is immobilised between the forearms of the rescuer. If this is not possible, one of the first aiders should hold the head between their hands on either side of the skull and direct any movement of the injured person. The head should be maintained pointing in the same direction as the rest of the body and in a neutral position, i.e., not flexed or extended.[1] In the conscious person, this should be the most comfortable position. It should also be noted that the anatomy of the head and spine in children under the age of eight is different from that of adults because the head is relatively larger than the body compared to that of an adult. This can mean that some padding is needed under the shoulders to maintain the neutral position and avoid flexion of the cervical spine when the child is lying down. Restriction of spinal motion for the rest of the spine is achieved by "log rolling" the person when transferring on or off a stretcher, use of a

scoop-type stretcher and lying flat till care has been handed over to a healthcare professional.

5.1 | Cervical Collars

The use of semi-rigid cervical collars by first aid providers is not recommended [CoSTR 2015, weak recommendation, low quality evidence].[3] This has been confirmed in the context of paramedic use of collars in a recently published study.[9] ANZCOR recommends the use of a soft collar as a warning that there may be a cervical spine injury. ANZCOR notes that soft collars are inferior to manual inline restriction of motion. Again, it should be noted that the need to move a person to safety takes precedence over restriction of spinal motion, which should be the best possible in the circumstances.

ANZCOR recommends all rescuers in the pre-hospital environment review their approach to the management of suspected spinal injury with regards to semi-rigid cervical collars. Consistent with the first aid principle of preventing further harm, the potential benefits of applying a cervical collar do not outweigh harms such as increased intracranial pressure, pressure injuries or pain and unnecessary motion that can occur with the fitting and application of a collar.[3,5,9,11-19] In suspected cervical spine injury, ANZCOR recommends that the initial management should be manual support of the head in a natural, neutral position, limiting angular motion as detailed above [Good Practice Statement]. ANZCOR recognises that there may be highly specialised circumstances requiring the use of extraction devices, such as Ski Patrol rescue. However, this is beyond the scope of this guideline, and it is still advised to remove these devices as soon as practicable after extrication.[10] In healthy adults, padding under the head (approximately 2cm) may optimise the neutral position.[6,7]

The potential adverse effects of semi-rigid and rigid cervical collars, extrication devices, long back boards or head blocks increase with duration of use and include:

- unnecessary motion of the head and neck with the sizing and fitting of the collar[9,11]
- pressure injury[12,13]
- discomfort, pain (and agitation)[9,12,14,15]
- restricted mouth opening and difficulty swallowing[16]
- airway compromise should the person vomit[16]
- raised intracranial pressure[17-19] (harmful in cases of head injury)
- delay in transport to hospital.[9]

5.2 | Long Back Boards

Rigid boards (long spine boards/spine board) placed under a person can be used by first aiders should it be necessary to move that person with suspected spinal injury, particularly if the person is unconscious.[20] This is most common in organised first aid providers such as Ski Patrols or first aiders for other sports. It should be noted that head blocks restrict motion of the head more than the body when used with long back boards, despite the use of straps on the body, and this results in increased motion of the cervical spine. The person should not be left on a long back board any longer than is needed for the move. Healthy subjects left on long back boards develop pain in the neck, back of the head, shoulder blades and lower back. The same areas are at risk of pressure injuries.[12,13]

Paralysed or unconscious persons are at a higher risk of developing pressure injuries due to their lack of pain sensation. Strapping the person to long back boards and extrication devices has been shown to restrict breathing further[21] and should only be used in specialised settings for short periods by personnel with proper training.

A padded long back board, air mattress or bead filled vacuum mattress may be more comfortable for the injured person and is used by some ambulance services and organised first aid providers.

5.3 | Log Roll

The log roll is a manoeuvre performed by a trained team to roll a person from a supine position onto their side, and then flat again, to examine the back and/or to place or remove a spine board.[20]

5.4 | Techniques for rescue in water

In an aquatic environment where the person is floating face down, there are two techniques to turn the person to the face-up position to enable clearing the airway and checking breathing, as well as maintaining spinal alignment:[22]

1. The extended arm roll-over in shallow water.

2. The vice grip roll-over technique in water deep enough to allow the rescuer to be submerged under the person.

These techniques should only be undertaken by rescuers trained in their use.

5.5 | Children

After car crashes, conscious infants should be left in their rigid seat or capsule until assessed by ambulance personnel, only if it is safe to do so. If there is any risk of fire, increased temperature inside the car, fuel leak, water ingress, etc., removal to safety takes precedence over restriction of spinal motion If possible, remove the infant seat or capsule from the car with the infant/child in it. However, the combined weight and restricted access may render this impossible and removal of the child to safety takes precedence. It should also be noted that some child restraints maintain an upright position, which is unsuitable for an unconscious child. Management of the unconscious child should follow ANZCOR Guideline 3. Children under eight years of age may require padding under their shoulders (approximately 2.5cm) for neutral spinal alignment.[23]

About this Guideline

Search date/s	31 July 2024, evidence update March 2025
Question/PICO:	From ILCOR CoSTR (FA 7311) Dec 2024: *Population:* Adults and children with possible traumatic cervical spinal injury. *Intervention:* Cervical spinal motion restriction performed by a (trained) first aider. *Comparators:* No cervical spinal motion restriction, or another type of cervical spinal motion restriction. *Outcomes:* Any clinical outcome. *Study Designs:* Randomized controlled trials (RCTs) and non-randomized studies (non-randomized controlled trials, interrupted time series, controlled before-and-after studies, cohort studies) and case series were eligible for inclusion. Case reports and studies performing a single measurement of the outcome (e.g. feasibility study, proof-of-concept study) were excluded. Grey literature and social media and non-peer reviewed studies, unpublished studies, conference abstracts and trial protocols were not eligible for inclusion as there was an abundant evidence base from published studies. All relevant publications in any language were included as long as there was an English abstract. *Timeframe:* 1999-2024, earlier references included when identified from yield of this search
Method:	Scoping Review
Primary reviewers:	Finlay Macneil, Fran Williamson, Hugh Grantham
Other consultation	James Smyth

Major changes to superseded Guideline	None
Minor changes to superseded Guideline	Recent extensive scoping review
Worksheet	[ILCOR FA 7311 Extracted data table]
Approved:	April 2026
Guidelines superseded:	ANZCOR GL 9.1.6, 2016

Further Reading

ANZCOR Guideline 2 Priorities in an emergency

ANZCOR Guideline 3 Recognition and First Aid Management of the Unconscious Person

ANZCOR Guideline 4 Airway

ANZCOR Guideline 8 Cardiopulmonary Resuscitation

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Referencing this guideline

When citing the ANZCOR Guidelines we recommend:

ANZCOR, 2026, Guideline 9.1.6 – First Aid Management of Suspected Spinal Injury, accessed 29 September 2026,
https://www.anzcor.org/home/first-aid/guideline-9-1-6-management-of-suspected-spinal-injury