

CERVICAL SPINE (SUSPECTED) INJURY: PATIENT MANAGEMENT - CHW PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

Quick reference **C-Spine Management** [FLOWCHART](#)

- The potential for cervical spine injury must be considered in all injuries.
- If there is a risk immobilise the spine, see [fitting of collars section](#).
- Radiographs and examination can clear the spine in many patients
- Unconscious patients need more detailed imaging.
- If one spinal injury exists image the rest of the spine to look for another injury.
- Within 4 hours of arrival change to an Aspen collar and remove from the spine board to reduce the risk of pressure areas.
- For admitted patients fill in the form Spinal Precautions Orders so the care can be continued on the ward. **Spinal Precautions Orders form:**
http://chw.schn.health.nsw.gov.au/o/forms/ctcper/spinal_precaution_orders.pdf

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure & Guideline Committee	Original endorsed by SCHN HCQC
Date Effective:	1 st November 2012	Review Period: 1 year
Team Leader:	Nurse Practitioner	Area/Dept: Orthopaedics

CHANGE SUMMARY

- This is a new guideline and replaces previous guidelines in Emergency and PICU.

READ ACKNOWLEDGEMENT

- Clinical staff caring for patients with (suspected) spinal injuries should read and acknowledge this document.

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Management of Cervical Spine Injuries – Flowchart

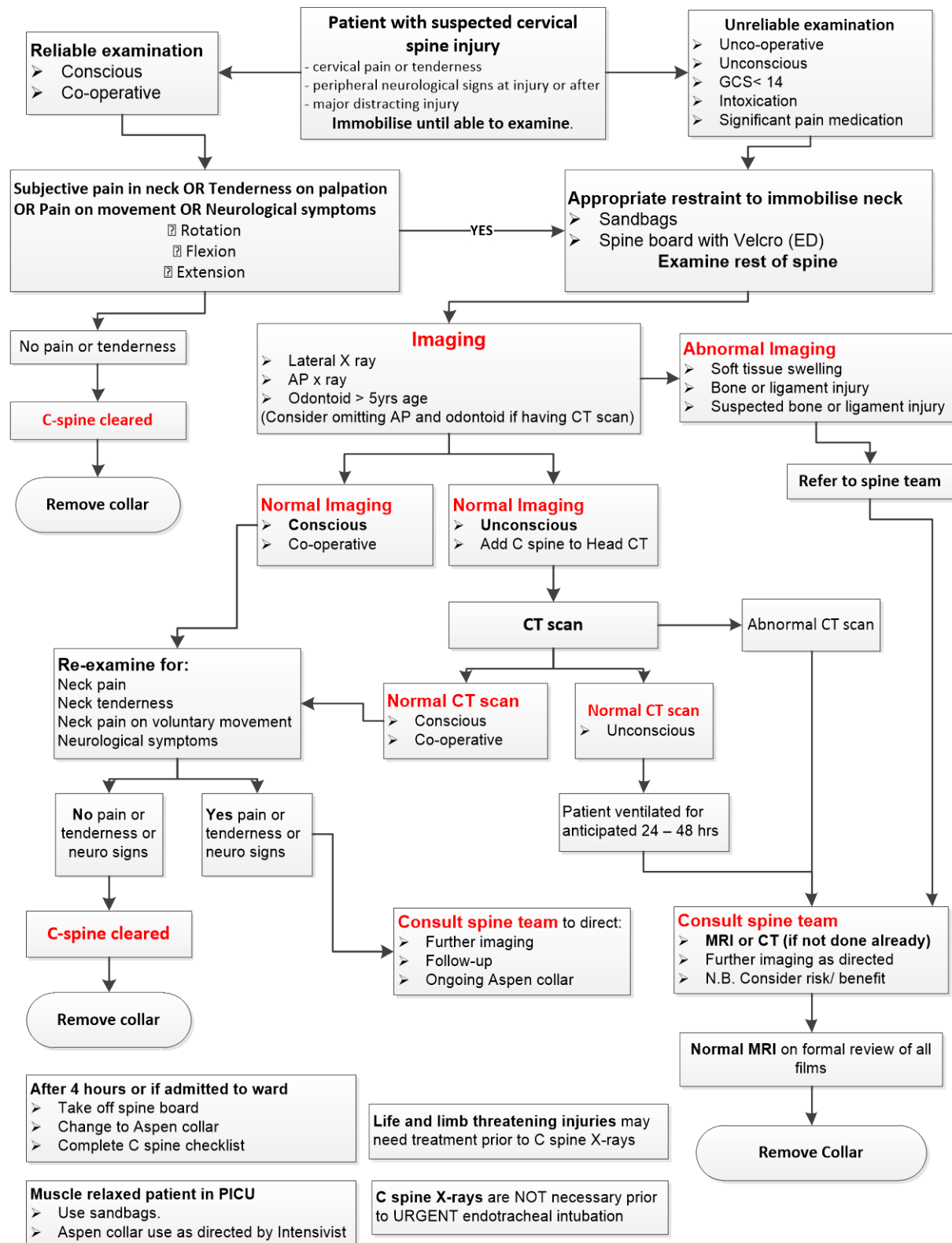


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Introduction

Cervical spine injury in children is uncommon but the potential consequences are significant. Therefore immobilisation, assessment and clearing where possible of the cervical spine is an important step in the care of trauma patients. Clearing the cervical spine involves ruling out any bony or ligamentous injury that may cause instability of the spine, which, if missed, could result in additional cervical cord or nerve root injury. Note that spinal team on call alternates between orthopaedic surgeons and neurosurgical teams.

Immobilisation

Who to immobilise

Determining the risk for spinal cord injury in the paediatric trauma patient requires synthesising the history, presentation, and physical examination. Risk factors for cervical spine injury are shown in Table 1. Any child demonstrating any of these risk factors should be considered for cervical spine immobilisation and radiographic evaluation.

Table 1: Risk Factors for Cervical Spine Injury

Mechanism of injury	high-speed MVA
	bicycle or pedestrian hit by car
	fall greater than body height
	forced hyperextension injury
	acceleration-deceleration injury of head
History of neurologic symptoms including transient symptoms	weakness, paraesthesia, burning sensation related to neck movement
Examination	Unconscious patient
	Significant trauma to head or face
	Midline cervical pain
	Midline cervical tenderness, deformity
	Abnormal peripheral neurologic findings
Unreliable examination	Major distracting injury
	Drug or alcohol intoxication
	Developmentally young child
	Inconsolable child

When to immobilise and try to clear cervical spine

The cervical spine is immobilised as part of airway assessment with cervical spine control. This is the A for Airway at the start of the ABCDE primary survey as part of EMST teaching (Early Management of Severe Trauma).

How to immobilise

The amount of immobilisation depends on the amount of cooperation there is from the patient. Older children often need only neck immobilisation. Younger children may need their body immobilised at shoulder and hip level.

If a child is thrashing around, start with manual immobilisation of the head and neck, shoulders and the hips. Sometimes holding an agitated child can be calming. In a larger child consider whether attempted immobilisation is likely to increase cervical spine movement. If this is the case immobilisation does not occur until the situation is under control. Calming the child in a quiet voice, presence of a parent and treatment of pain are often effective.

Initial immobilisation includes:

- a rigid cervical collar –initially a Stiff neck collar is used, this is fitted to the child based on length of neck and circumference. (see section on sizing and fitting collars)
- If the child continues to move this is supplemented with:
 - in line manual immobilisation
 - sand or fluid bags or foam blocks attached to a board behind the head
 - Hook and loop tape between the foam blocks increases immobilisation if needed. The child is never taped to the mattress as if the child vomits they cannot be placed on their side to clear their airway.
 - spine board if the child is unconscious or is uncooperative.
 - This board comes in three sizes infant, pre-school child and older child. Younger children have a large head and relatively small chest which force the neck into a position of kyphosis and anterior angulation on a flat board. Therefore the boards for younger ages have an occipital dip to keep the spine in a neutral position. Alternatively a pad should be used under the body.
 - The plastic spine boards are of a uniform material and do not cause interference in the CT scanner. Laminated wooden boards do cause interference (Fig 1).
 - Extrication boards and scoops from the ambulance service may restrict access to the child and cannot be used in the CT scanner. Therefore the child with major trauma should be transferred from these on arrival.
 - Transfer from one bed to another of patients at high risk of a spinal injury needs to take place carefully to minimise spinal movement. If possible a Jordan Frame should be used.

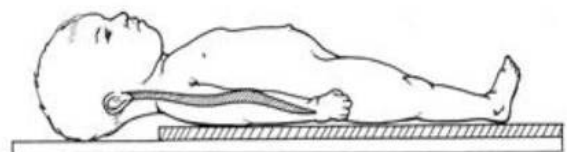
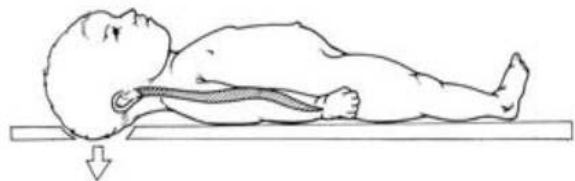


Fig 1. Achieving a neutral position neck in an infant.

Sizing and Fitting Neck Collars

StifNeck Collar

Several different manufacturers make semi-rigid collars. Some are adjustable. The most commonly seen in the CHW Emergency Department is the Laerdal Stifneck extrication collar, which comes in a range of shapes and sizes. The most appropriate should be chosen before fitting as follows.

Measure (roughly as finger-breadths) the distance between the angle of the jaw and the clavicle with the head in the correct degree of flexion/extension in the midline and the shoulders relaxed. This measurement corresponds to the distance between the black measuring "post" on the right of the collar (look inside and see how it matches up with the angle of the jaw) and the bottom of the rigid part of the collar (not the foam liner).



Fig 2 Measure the patient



Fig 3. Measure the collar

- Different widths exist to accommodate different neck circumferences but there are few choices for children and most babies will end up in the (pink) infant collar, and most smaller children in the (blue) paediatric collar.
- Be prepared to get it wrong with your first estimate and try a different size.
- If the collar is flat-packed, assemble it before attempting to size it.
- With the patient's head held by another person in secure manual in-line immobilisation, slide the flat back portion of the collar behind the head and neck.



Fig 4. Slide back portion behind head

- Then swing the front of the collar down and across the front of the chest so that it fits beneath the chin before closing the hook and loop tape.

Fig 5. Swing front portion into place

- Apply sandbags or head blocks and tape before allowing release of the manual immobilisation.



Aspen Collars

- The patient's head should be in a neutral position with arms by the side of the body.
- Assess the skin condition of the neck
- Place sizing guide on the highest point of the shoulder muscle (trapezius) and flat against the side of the head.
- Draw an imaginary line from the bottom of the chin back to the sizing guide and select the proper size collar.
- Pre form the collar by rolling the back panel and the front panel like a hand towel-sides inward.
- The second nurse maintains neutral neck alignment and immobilizes the cervical spine while the collar is being applied.
- Apply the posterior section first, pushing down on the back panel with one hand and pull with the other hand until the back panel is centred between the ear and the top of the shoulder muscle.
- The end of the hook and loop tape strap should reach the same position on both sides (confirms that the collar is level) and should be centred between the ear and the top of the shoulder muscle.
- Flare the sides of the front panel outward.
- Place the chin piece directly under the chin (the chin should not extend beyond the edge of the plastic).
- Hold firmly, push sides of front panel up over the shoulder muscles and around the neck
- While holding the collar front panel with one hand, centre the back panel and attach both sides to the front
- To ensure all slack is removed undo one hook and loop tape strap at a time, and pull the strap laterally until all slack is removed
- The patient's chin should be flush with the collar and the inner trach bar should not be touching the thyroid cartilage (Adams apple).

- All slack should be removed from the collar back and the back panel should be centred (identified by symmetrical hook and loop tape straps).
- Sandbags are placed either side of the patient's neck (to provide additional support), patient is to be nursed supine using full c-spine precautions until complete clearance is achieved.

Assessment of the Cervical Spine

History

History is obtained about the injury mechanism any likely hyperflexion or hyperextension. Also ask about any persistent or transient peripheral neurological symptoms since the injury. Ask the child and carers and the ambulance staff who often have information from the scene.

Examination

Examination includes a careful neurologic examination including motor, sensory, reflex examination of the peripheral nervous system. If the child is cooperative, the neck is then examined for midline tenderness at each level.

The neurologic examination is coupled with a thorough secondary survey, appreciating the presence of painful distracting injuries.

Log Roll

After this assessment the patient is log rolled with the cervical collar in place and the spine is assessed for tenderness, swelling or bruising and visible or palpable signs of step deformity. The tone of the anus is inspected –a patulous anus suggesting spinal injury. While the child is in this position the rest of the back and the back of the head is inspected. The renal angles are examined for tenderness or bruising. A rectal examination is performed if there is suspicion of a major pelvic injury with bowel involvement (for blood) or urethral injury in males (position of prostate in adolescents).

A log roll is performed by 5 people –one examining, one holding the head to minimise neck movement, three holding the shoulders, hips and legs respectively. Rolling is usually done away from the side of major injury to reduce pain.



Clearing the cervical spine

A streamlined, multidisciplinary approach can facilitate rapid clearance of the cervical spine. Every effort should be made to clear the child off the spine board and to remove the Stiff neck collar or replace it with a Aspen collar within 4 hours to make the child more comfortable and decrease the risk of pressure areas. (See section on fitting collars)

In whom can a Cervical spine be cleared?

This is done when the child is old enough to effectively communicate pain, mental status is normal, there is no evidence of intoxication, and there are no distracting injuries or neurologic deficits. In the patient without neck pain, in whom there is a low suspicion of injury and these criteria are present, clinical clearance without radiographic evaluation may also be performed by an experienced registrar or consultant.

Examination

Examine the child for neurological deficit and ask about pain. In the absence of these features, the collar is then removed and the cervical spine is gently palpated at all levels looking for midline tenderness. Paraspinal muscular pain and tenderness is often elicited and is not indicative of spinal column injury. If this examination is normal the patient is asked to actively move their head and neck through the range of motion - flexion, extension, lateral rotation. If these movements do not cause pain or neurological symptoms the cervical spine may be clinically cleared.

In the child with persistent cervical tenderness in whom the index of suspicion is low and admission is not planned spinal services should be contacted. The child may be discharged in a rigid cervical collar (Aspen collar), with planned follow up 10 – 14 days later. When this child returns repeat cervical examination and flexion/extension radiographs help to clear the cervical spine.

Radiographic evaluation

Radiographic evaluation of the cervical spine is needed if the child has

- neck pain
- a major distracting injury
- any neurological abnormality
- an abnormal mental status
- intoxication
- Ineffective communication because of age or other circumstances.

If the above features are not present and the risk of the mechanism of injury is low you can proceed to clearance of the cervical spine (see above).

Plain radiographs

Include:

- a lateral view –can be done on the trauma bed if the child is unstable. If the child is unstable or proceeding to a CT scan this view should be done as a minimum if the clinical condition allows it.
- an antero-posterior (AP) view,
- An odontoid view in children old enough to cooperate with the examination (> 5years). This involves removing Stiff neck collar to allow mouth to open and may require medical staff to do this.

During and after radiographs, spine precautions are maintained until these are reviewed. Radiographs are reviewed by an experienced registrar, fellow or consultant as follows:

- Lateral view
 - Adequacy of view to visualise C7/T1 junction,
 - Soft tissue swelling, accept 5mm at C1 and width of C6 vertebra at that level,
 - Alignment of cervical vertebral bodies –anterior, posterior and laminal lines looking for step deformity or acute angulation,
 - Position of odontoid process,
 - Gap between odontoid and C1 (<3mm),
 - Gap between C1 and the skull,
 - cervical vertebra integrity,
 - Laminae and spinous process integrity.
- AP view
 - Alignment of spinous processes.
- Odontoid AP view
 - Adequacy of view to visualise the odontoid behind front teeth,
 - Position of odontoid,
 - Symmetry of space between odontoid and lateral mass of C1 on either side,
 - Alignment of lateral masses of C1 and C2

If the plain radiographs are adequate and normal the patient's neck is re-examined as above. Clearance of the cervical spine is not given if there is:

- Persistent pain or tenderness
- Inadequate views on the radiographs
- Abnormality on the radiograph

In these instances the case is discussed with the spine team.

Cervical spine CT

CT should be used when:

- plain radiographs fail to fully visualise the cervical spine
- focal neck persists
- there is a neurologic deficit
- local deformity exists

CT scan should include cuts from C1 –T1. Spinal services- should be contacted and informed

MRI

Should be used when:

- SCIWORA (spinal cord injury without radiographic abnormality) is suspected
- a patient is unable to be evaluated because they are unconscious

Unconscious trauma patient

The unconscious trauma patient cannot have the spine cleared clinically because the symptoms of pain are absent. Intubation carries the risk of movement of the cervical spinal injury causing further damage.

Immobilisation and assessment within the limits of the patient's state follow the same process as noted above. If there is delay beyond four hours the StifNeck collar is replaced with an Aspen Collar.

Imaging should proceed rapidly if the patient is stable enough. These include:

- Lateral cervical radiographs from the trauma bed which provide valuable rapid information on alignment and allow further detailed imaging to be defined.
- Cervical spine CT C1-T1 should be performed. This can be combined with cerebral CT scans.

The unconscious patient who demonstrates no abnormalities on imaging is taken off the spine board, nursed with spinal precautions, and maintained in an Aspen collar with repeat neurological examination for the next 24 hours.

If the patient has a return to normal mental status, the conscious pathway is followed and assessment and evaluation performed again.

If the patient remains unconscious, an MRI is performed when other clinical imperatives permit. MRI is the test of choice for evaluating injury in the obtunded or comatose child. In the absence of a good neurologic examination MRI is cost effective and efficacious. Normal MRI findings in the unconscious patient with unremarkable plain radiographs and CT scans permit cervical spine clearance.

Under certain circumstances (traumatic brain injury with labile intracranial hypertension for example) where cervical spine injury has not been excluded, it may be appropriate to remove the cervical collar in a muscle-relaxed patient where there are concerns about cerebral venous drainage. Sand-bagging/taping continues. This should take place at the discretion of the intensivist. "Spinal Team should be notified as soon as possible if clinical situation changes and collar has to be removed in a patient who otherwise has not had cervical spine clearance".

Under these circumstances the collar must be replaced when the patient is moved.

In all patients when an abnormality is detected or suspected the appropriate spinal team on call should be notified.

Transferring the patients to the ward

Checklist with spinal precaution orders is completed before transfer by the emergency, surgical or spinal team. The patient is removed from the spinal board and the Aspen collar replaces the StifNeck collar before transfer to a ward area.

Accepting the patient in the ward

The transferring nurse reads through the checklist with the accepting ward nurse to ensure all relevant information is documented. This includes clearance status, sitting/ mobilising restrictions and further investigations required. If this is unclear or incomplete the patient is nursed with full spinal precautions and the surgical or spinal team is contacted to clarify the situation.

If the Aspen collar size is incorrect. After consulting with the surgical or spinal team the collar is changed to an appropriate size by an accredited nurse.

On occasion the rapid transfer of a patient from the Emergency Department to Operating Theatre or imaging will mean that the child is still in a StifNeck or on a spinal board when they arrive in the ward and the clearance status of the patient may not be clear. If this occurs the patient should be removed from the spine board and the collar replaced with an Aspen collar by an accredited nurse and the surgical or spinal team should be contacted to clarify the situation.

Reference list

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