



PAEDIATRIC ACUTE CARE GUIDELINE

Cervical Spine Trauma

Scope (Staff):	All Emergency Department Clinicians
Scope (Area):	Emergency Department

This document should be read in conjunction with this DISCLAIMER
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Cervical Spine Trauma

Background

- All children with serious trauma should be treated as though they have a cervical spine injury.
- Early C-spine immobilisation is required if there is any suspicion of potential injury.
- Common mechanisms of injury include motor vehicle accidents, falls, pedestrians vs vehicles and diving accidents.
- Imaging paediatric patients should be managed with the lowest possible radiation exposure due to the potential of radiation-induced malignancy.

General

- Spinal cord injuries are rare in children but the consequences of missing injuries are devastating.
- Children < 8 years old are more prone to sustaining high (C1-C3) injuries due to, more horizontal orientation of facet joints, ligament laxity, increased head : torso ratio, weak cervical musculature and a high fulcrum for flexion (C2-C3 in infants). However, 50% of cervical spine injuries in < 8 year olds are in the lower cervical spine.
- Children > 8 years old have more vertically orientated facet joints, with the fulcrum of flexion at C5-C6 by 15 years of age. Injury patterns in this age group are similar to those seen in adults.
- Spinal Cord Injury WithOut Radiological Abnormality (SCIWORA) occurs when acute spinal cord injury with deficit (sensory or motor) is seen in the setting of normal radiological alignment on X-ray and/or CT. MRI is the investigation of choice in this setting.

Assessment

- Clearing the cervical spine – no clinical or radiological assessment will have a 100% sensitivity. With clinical judgement and common sense we can be reasonably assured of not missing a clinically important injury. Input and judgement of a Senior Clinician is usually valuable.
- CT scan +/- MRI and urgent Orthopaedic review should be the initial assessment of choice in patients with abnormal neurological findings and all unconscious patients.
- MRI is recommended for all patients with abnormal neurological findings.
- CT scan of the c-spine should be strongly considered in patients requiring a CT for other purposes (especially CT head).
- CT scans are indicated in the case of suspicious or inadequate plain X-rays.
- CT is sensitive for bony injuries but not for ligamentous injuries.
- MRI is highly sensitive for spinal cord, soft tissue and ligamentous structures but has a low sensitivity for bony injuries. It has the advantage of being free of ionising radiation but is often more difficult to arrange than CT scan.
- Plain radiology has the advantage of a lower dose of radiation but has limited sensitivity (<90%). It should be the initial assessment tool of choice in cases assessed as relatively lower-risk.



Clinical C-spine Clearance

NEXUS

The cervical spine can be cleared clinically with a 99.6% sensitivity and a 99.9% negative predictive value for clinically significant injury using the NEXUS criteria.

All five of the following criteria must be met

- no posterior midline cervical spine tenderness
- no focal neurological deficit
- normal level of alertness
- no evidence of intoxication
- no clinically apparent painful distracting injury

In a child with suspected cervical spine injury, failure to meet any one of the five criteria mandates imaging.

Pain-free range of motion and mechanism of injury should also be considered when deciding on the need for imaging of the cervical spine.

There were a relatively small number of children in the < 2 year age group in this study and caution must be used in applying the NEXUS criteria in this age group.

Canadian C-spine Rule

The Canadian C-spine rule excluded children under 16 years of age, but there is some evidence that the following 'dangerous mechanism' criteria are as relevant to children as it is to adults.

High mechanism (**imaging indicated**)

- Fall from height ≥ 1 metre (5 stairs)
- Axial load to the head (e.g. diving)
- MVA high speed ($> 100\text{km/hr}$), rollover, ejection
- Motorised recreational vehicles
- Bicycle struck or collision

Management

- Priority of treatment should be given to life-threatening airway, respiratory or circulatory problems, along with early attention to spinal immobilisation.
- There is little evidence to support spinal immobilisation devices such as hard cervical collars. They are not without complications and over-zealous attempts to restrict spontaneous movement in an uncooperative child should be avoided.
- Change to a [Philadelphia Collar](#) early to avoid prolonged periods in a hard collar

Initial management

Immobilisation of the spine

1. Who to immobilise?

Any child with a history of trauma with one or more of the following:

- Neurological deficit or history of transient neurological symptoms
- Neck pain, focal neck tenderness
- Inability to access due to impaired conscious state, distracting injuries or intoxication
- Inconsolable children
- Significant mechanism of injury:
 - Motor vehicle collision $> 60\text{km/hr}$, or rollover or ejection from vehicle
 - Fall greater than body height
 - Pedestrian / cyclist hit $> 30\text{km/hr}$
 - Axial load to the head (e.g. diving)
 - Bicycle – head speed, struck, collision or thrown over the handlebars
- Physical signs of neck trauma (ecchymosis, abrasion, deformity, swelling or tenderness)
- Significant trauma to the head or the face

2. How to immobilise?

Sizing a one piece Hard Collar:
Measure the distance from the top of the patient's shoulder to the angle of the jaw with your hand
On the collar, measure from the bottom of the rigid plastic to the "measuring point" – adjust the collar to correspond with the same size as the angle of jaw to shoulder
Apply the collar and check that it fits correctly: • The neck should not be overextended • The mouth should not be able to be fully opened

- In-line cervical stabilisation (head hold – hands on either side of the head) should be maintained until an appropriately sized semi-rigid collar is applied
- Because of the proportionately larger occiput, padding may be required under the torso of younger children to maintain neutral alignment.
- Be wary if the child is agitated and distressed by the collar, as overzealous immobilisation may increase leverage on the neck and increase the risk of further injury.
- If the child's condition is aggravated by the collar, try the following:
 - address pain, fear and anxiety
 - check sizing and fitting
- If this fails, remove the collar, attempt to maintain in line manual cervical stabilisation and obtain senior advice. It is usually safer to remove the collar and allow a child to obtain a position of comfort than it is to forcibly apply a collar in a combative child.
- Sand bags and tapes are no longer recommended in the hospital setting, although towel bollards can be used as a reminder for the patient to limit head movement.

Further management

- Prolonged use of hard collars put patients at risk of developing pressure areas
- Children should not be in a hard collar for longer than 4 hours
- If the cervical spine cannot be cleared within this time frame, then change to a [Philadelphia Collar](#)
- If the cervical spine cannot be cleared from plain X-Rays, apply a [Philadelphia Collar](#) prior to CT scan

Nursing

Patient Transfers – when transferring a patient from the ED trolley to the ward bed:

- Receiving ward staff will assume control of the patients head prior to the transfer/logroll
- The transfer/logroll will be coordinated by the staff member in control of the patient's

head

- ED staff will assist with the transfer/logroll as required

Tags

accident, board, c-spine, cervical, cervical spine trauma, collar, cord, dislocation, fall, fracture, head, immobilisation, injury, MVA, neck spain, orthopaedic, radiology, resus, resuscitation, sci, sciwora, spinal, spine, X-Ray, xray

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