

Adult Cervical Spine – Imaging and Clearance in Trauma

Type: Guideline	HDSS Certification Standard [optional]
Issued by: Regional Trauma Committee, Central Region Trauma Network	Version: 1
Applicable to: All Central Region DHBs	Contact person: Dr James Moore, Regional Clinical Leader, Trauma (Capital & Coast DHB)
Lead DHB: Capital & Coast DHB	

Purpose:

- This guideline provides an evidence-based approach to assessment of the cervical spine in the blunt trauma patient. The purpose is to have a consistent approach on which trauma patients require cervical spine precautions, which patients warrant cervical spine imaging, the type of radiological imaging required, and to provide guidance on the clearance of cervical spines.

Failure to diagnose unstable fractures or ligamentous injuries in the cervical spine can result in irreversible devastating neurologic consequences. Acute cervical spine injuries (bone, cord, ligaments) in blunt trauma occur in approximately 3% of the population, this rate increases to 8% in the unconscious / obtunded (GCS<3-8) population.

Scope:

- This is a central region-wide guideline for all healthcare professionals caring for patients presenting with a potential or actual c-spine injury. All patients with major trauma should be treated as though they have a cervical spine injury until proven otherwise.

Includes:

- All patients who present to the Emergency Department with neck pain or potential injury following trauma.

Excludes:

- Non-trauma patients

Definitions:

- Cervical collar – is an orthopaedic device used to physically and consciously acknowledge the potential for c-spine injury. Although available devices may limit movement within the c-spine, no device has been shown to immobilise it completely.

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- **Cleared** – In the context of ‘spinal clearance’ the term ‘cleared’ in this document and in the management of the trauma patient with potential or actual spinal injuries means that the spine has been ‘deemed free of clinically significant spinal injury’ after a clinical and / or radiological examination in accordance with this policy.
- **Canadian C-Spine Rule** – is a set of clinical criteria for evaluating the need for c-spine radiography. It is designed for alert and stable trauma patients with a Glasgow Coma Scale (GCS) 15 and aged 16 years or older. It is a validated tool that has been shown to be 100% sensitive and 42.5% specific in identifying clinically important injuries. The three high risk criteria necessitating radiography imaging for cervical spine injury include; age > 65 (higher incidence degenerative disease); dangerous mechanism or paraesthesia in the extremities. The remainder of the indications include low risk criteria and a physical examination to assess 45 degree rotation of the neck. Refer to Appendix 1.
- **NEXUS Criteria** – The National Emergency X-Radiography Utilization Study is the practical application of patient clinical assessments as indicators for c-spine radiography. The cervical spine can be cleared clinically with 99.6% sensitivity and a 99.9% negative predictive value for clinically significant injury using the NEXUS criteria. It has been validated in both adult and paediatric populations. In a patient with suspected cervical spine injury, failure to meet any one of the five criteria mandates imaging:
 1. No posterior midline cervical spine tenderness
 2. No focal neurological deficit
 3. A normal level of alertness
 4. No evidence of intoxication
 5. No clinically apparent painful distracting injuries.

The five NEXUS criteria must all be met to classify a patient as low probability for a cervical spine injury and allow an attempt at clinical clearance without cervical spine radiological investigation. Refer to Appendix 2.

- **Significant mechanism of injury** for the purposes of this policy includes:
 - Motor vehicle / Motor bike collision >100km/hr, or rollover or ejection from a vehicle
 - Fall from elevation > 1 metre / 5 stairs
 - Pedestrian / cyclist hit > 30km/hr
 - Axial load to the head (e.g. diving, or rugby scrum collapse/dangerous tackle)
 - Bicycle –struck or collision or thrown over the handlebars

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Roles and Responsibilities

- This guideline applies to all clinical staff involved in the care of trauma patients, including Emergency Department, Radiology, Intensive Care, Theatre and Ward staff
- The guideline will be reviewed and updated by the Regional Trauma Committee on the basis of current best evidence

WHICH PATIENTS SHOULD BE CONSIDERED AT RISK OF SPINAL INJURY?

Any patient with a history of trauma, especially if any of the factors below are present or if an assessment cannot be performed:

- Neurological deficit or history of transient neurological symptoms (any hand or foot weakness (motor assessment) / altered or absent sensation in the hands or feet (sensory assessment))
- Neck pain, especially focal midline neck tenderness
- Physical signs of neck trauma (ecchymosis, abrasion, deformity, swelling or tenderness)
- Significant trauma to the head or the face
- Inability to assess due to impaired conscious state
- Under the influence of drugs or alcohol
- Any significant distracting injuries (see Appendix 2)
- History of past spinal problems, including previous spinal surgery or conditions that predispose to instability of the spine
- Significant mechanism of injury

PRE-HOSPITAL CLEARANCE

Where possible, ambulance staff will clinically clear the cervical spine in the prehospital phase, however all trauma patients who arrive in the Emergency Department should have their spinal clearance status reassessed.

Where ambulance staff have been unable to clear the spine, their process is to place a lanyard around the patient's neck as a flag that the spine has not been cleared. Where there

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is concern about potential injury, then they will place a semi-rigid cervical collar. For patients considered at low clinical suspicion of injury, it is reasonable to continue to manage the patient with a lanyard, and to instruct the patient not to move their head. Some form of restriction of motion may be required (e.g. sandbags and log-rolling, or a properly fitted orthotic collar), and the patient with the uncleared spine should not be mobilised or allowed to move their neck around until clearance has taken place.

If clearance of the cervical spine has not occurred by the time the patient is transferred out of the Emergency Department, then a properly fitted orthotic collar should be placed. Lanyards or semi-rigid cervical collars should not move to areas of the hospital beyond the Emergency Department (or radiology whilst under Emergency Department care).

IMAGING

If the patient is unable to be clinically cleared using the approach outlined in this document, then radiological imaging should be undertaken.

X-rays

Plain radiology has the advantage of a lower dose of radiation but has limited sensitivity <90%.

Cervical spine x-rays are the initial assessment tool of choice in patients assessed clinically as **low-risk** for bony cervical spine injury. Adequate c-spine x-ray series consists of a lateral (with vertebrae C1 – C7, the C7 – T1 junction as well as all spinous processes visible), Antero-Posterior (C2 – C7 visible) and an odontoid peg view (with the entire peg as well as the articulation between the lateral masses and body of C2 visible).

Patients deemed to require radiological imaging of the cervical spine, who have an indication to undergo a computed tomography (CT) scan of another separate body region, should have a cervical spine CT from occiput to T1 with sagittal and coronal reformats as their investigation, instead of cervical spine X-ray.

Plain X-rays of the cervical spine do not have a role if the patient is assessed as having a high risk of injury.

Computed tomography (CT) scan

CT has been demonstrated to be 100% sensitive in identifying cervical spine bony injuries and is the gold standard cervical spine clearance. However it is limited in soft tissue assessment.

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Routine CT scanning utilises a limited resource and exposes a large number of low risk patients to radiation without benefit. However, if the risk of cervical spine injury is assessed as being **high**, the patient should proceed to have a CT of the cervical spine.

Magnetic resonance imaging (MRI)

MRI is more sensitive in identifying soft tissue injuries, however timing is important. The accuracy decreases over time as the swelling and oedema from the initial injury decreases. Best results in diagnosing soft tissue injury are when the MRI is undertaken within 72 hours of the injury.

The decision to undertake cervical spine MRI should be made by a Specialist.

CLEARANCE

Cervical spine clearance protocols aim to avoid missed injuries and balance this against the potential for increased morbidity associated with prolonging the time to spinal clearance or diagnosis of injury.

Early cervical spine clearance, not only improves patient outcomes, but also decreases potential immobilisation complications such as skin breakdown and pressures ulcers, compromised airway and raised intracranial pressure.

The decision to clear or treat a C-spine must be made WITHIN 24 HOURS OF PATIENT ADMISSION.

Spinal clearance involves the utilisation of an assessment framework for the evaluation of the spinal status of patients considered to be at risk of spinal trauma. The assessment process concludes with either the validation of the lack of injury via the appropriate history, examination and investigation, or from the diagnosis and subsequent management of an injury.

For the purposes of clearing the cervical spine, patients can be divided into two groups:

1. Conscious and cooperative
2. Unconscious / or intubated

1. Conscious cooperative patients

This is the most commonly encountered group of patients who present to the Emergency Department. They have a low incidence (less than 3%) of cervical spine injury and are able

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to cooperate with clinical assessment. Therefore, a focussed history and examination can be used to clinically clear their cervical spines using –

Nexus Criteria

Canadian Cervical Spine Rule

If the patient is unable to be assessed using these criteria then they will require radiological imaging.

2. Unconscious / Intubated patients

These patients are not able to have their cervical spines cleared clinically as a reliable clinical assessment cannot be made. These patients require radiological imaging to clear their C-spine.

WHO CAN CLEAR THE CERVICAL SPINE?

1. The conscious patient with NO radiological investigation can be cleared clinically by an Emergency Department clinician. C-spine clearance and ceasing of position and handling restrictions must be documented clearly in the patient's notes.

2. The conscious patient with NORMAL radiological investigation and no neurological deficits can be cleared by an Emergency Department clinician. C-spine clearance and ceasing of position and handling restrictions must be documented clearly in the patient's notes.

3. The unconscious or intubated patient with NORMAL radiological investigation (note: these patients should all have a CT C-spine): spinal precautions should be maintained until the imaging has been reviewed by the Radiology Consultant (or a senior, post-part II radiology registrar), and a report issued. If imaging confirmed by the Radiologist is reported to be normal and no clinical evidence of c-spine injury in available history and limb movement was noted prior to intubation, the cervical spine can be cleared and the Collar can be taken off.

If there is clinical concern regarding neurological deficient prior to intubation then consideration should be given to an MRI C-spine, with Orthopaedic consultation.

INJURED CERVICAL SPINE

The patient **WITH** a radiological identified spinal injury (with or without on-going neurological deficits); spinal precautions are to be maintained until an Orthopaedic opinion has been obtained.

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In this case the position and handling restrictions must be documented clearly in the patient's notes by the registrar or consultant responsible.

Documentation of C- Spine Clearance

C-spine assessment needs to be documented by use of the spinal assessment sticker (Appendix 3). Similarly, if there is a change in cervical spine status (e.g. the spine has now been cleared), then the spinal assessment sticker should be completed and attached to the clinical notes.

If the c-spine is cleared documentation needs to state how and by whom.

If the c-spine remains uncleared documentation needs to state why it remains unclear, how immobilisation is to be maintained and the plan to facilitate appropriate clearance or otherwise.

Implementation and monitoring compliance with/effectiveness of document

- Criteria for measuring effectiveness include the proportion of major trauma patients with:
 - Documented clinical clearance of cervical spine
 - Utilisation of the spinal assessment sticker
 - Clearance or decision to treat cervical within 24 hours of admission
- Audit of above criteria (utilising the audit tool in Appendix 4) planned to be undertaken annually in each central region DHB with reporting to the Regional Trauma Committee, Central Region Trauma Network

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- New Zealand Major Trauma National Clinical Network: Position Statement on In-hospital clearance of potential cervical spine injury. Available at www.majortrauma.nz/resources (accessed 12 September 2018)

Related Documents:

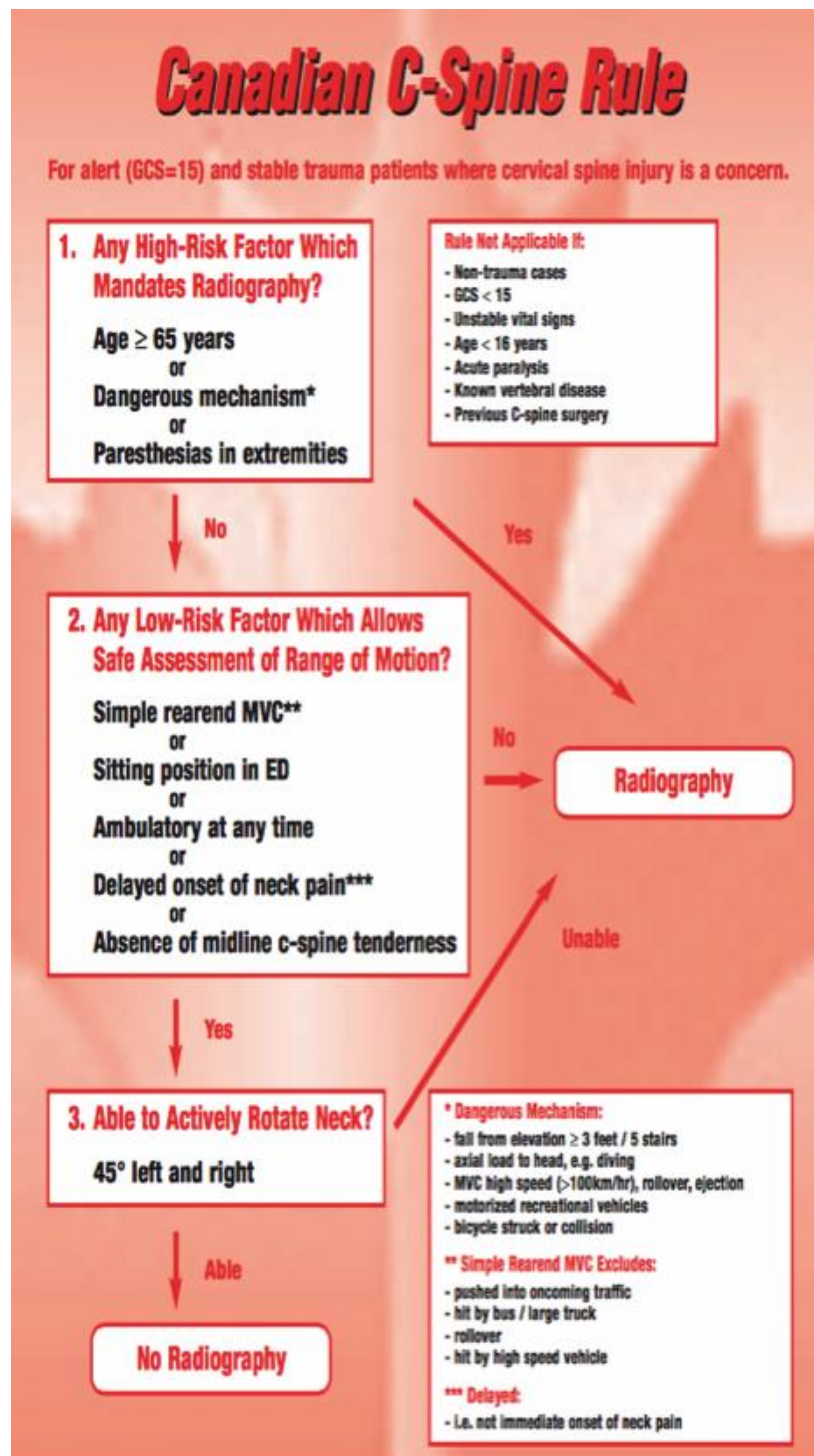
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Appendix 1 – Canadian C-Spine Rule



Note: Dangerous mechanism includes axial load to the head e.g. from rugby scrum collapse or dangerous tackle.

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Appendix 2: NEXUS criteria

1. Midline cervical spine tenderness

Present if the patient indicates the existence of neck pain on palpation of the posterior midline neck region from the nuchal ridge to the third thoracic prominence, or palpation of any cervical spinous process.

2. Focal neurologic deficit

Motor or sensory examination indicates the presence of a focal neurologic deficit e.g. segmental weakness, numbness or paraesthesia.

3. Intoxication

The patient is considered to be intoxicated if:

- The patient or an observer reports a recent history of intoxication or consumption of intoxicating substances
- Evidence exists of intoxication on physical examination e.g. odour of alcoholic beverage, ataxia, slurred speech, dysmetria, other cerebellar signs or any behaviour suggestive of intoxication
- Tests of bodily fluids are positive for drugs or alcohol which affects mental alertness

4. Painful distracting injury

Any non-spinal related condition causing sufficient pain to distract the patient from a possible cervical spine injury. Suggestions include:

- Any long bone fracture
- A visceral injury requiring surgical consultation
- Extensive laceration, crush or degloving injury
- Considerable burns
- Any other injury producing functional impairment
- Any other injury thought to impair the patient's ability to appreciate cervical spine pain

5. Altered mental status

An altered state of mental alertness can be demonstrated by:

- GCS < 15

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- Disorientation to time, place, person or event
- Inability to recall 3 objects at 5 minutes
- Delayed or inappropriate response to stimulus

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Appendix 3: Spinal Assessment sticker



SPINAL ASSESSMENT

SELECT

☐

SPINE NOT ASSESSED
Action required to complete: _____

OR

☐

SPINE ASSESSED & THERE IS NO INJURY
No requirement for spinal precautions

OR

☐

SPINE ASSESSED & THERE IS AN INJURY
STABLE ☐ or **UNSTABLE** ☐

!

CARE PLAN
(select from below)

Cervical spine collar:
No ☐ Yes ☐ Collar type: _____

Log Rolls:
No ☐ Yes ☐

Bed Tilt allowed
No ☐ Yes ☐ Max degrees: ____°

Name (PRINT) _____

Signature _____

Designation
(RMO/SMO only) _____

Date _____

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Appendix 4: Audit Tool

Audit Tool: Cervical Spine Clearance

Name of Auditor: _____

DHB: _____

Signature: _____

Audit Date: ____ / ____ / ____

Criteria	1	2	4	5	6	7	8	9	10	total
1. If the cervical spine has been clinically cleared, is there clear documentation of this occurring in the Emergency Department notes? (Yes/No/NA)										/5
2. If the cervical spine has not been able to be clinically cleared, has radiological clearance been undertaken in accordance with these guidelines? (Yes/No/NA)										/5
3. Has a decision been made to either clear or treat an actual or potential cervical spine injury within 24 hours of admission to hospital? (Yes/No)										/5
4. Has the cervical clearance status been documented in the clinical notes, utilising the 'Spinal Assessment sticker' (Appendix 4 of this policy) (Yes/No)										/5

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Action Plan

Recommendations	By whom?	By when?	Date completed	Signed

Please report annual audit to the Regional Trauma Committee by the end of each calendar year

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