Spinal Clearance Clinical Guideline

Scope

Site	Department, division or operational area	Applicable to
Royal Perth Hospital (RPH) only	Surgical Division: State Major Trauma Unit (SMTU), Emergency Department (ED), Intensive Care Unit (ICU), Ward 5G	Medical, Nursing, Allied Health

Overview

This clinical guideline serves to provide a standardized approach for the evaluation and management of patients with potential traumatic spinal injuries in the acute trauma setting. The guideline aims to ensure that spinal injuries are promptly and efficiently identified, appropriately referred and treated, and safely ruled out when they are not present.

Links within document

- Appendix I: Spinal clearance flowchart

Background

Spinal injuries are relatively uncommon yet high-stakes occurrences in trauma surgery. Cervical spine injuries are identified in approximately 2–5% of patients who present following significant blunt trauma, with thoracic and lumbar injuries accounting for a smaller proportion. These injuries frequently result from high-energy mechanisms such as motor vehicle collisions, falls from height, or direct blows. While younger adults, particularly males, remain the most commonly affected demographic due to occupational and vehicular risks, older adults are an increasingly recognised at-risk group, particularly those with osteoporosis or pre-existing spinal degenerative conditions. In this elderly patient group, these injuries are frequently associated with low energy, falls from standing.

Improved imaging modalities, coupled with validated clinical decision rules, have enhanced the early detection and management of spinal injuries, contributing to more timely interventions and reductions in missed injuries or delayed diagnoses.

Early diagnosis of spinal injuries is critical because timely recognition allows for protective measures and appropriate interventions, minimising the risk of damage to the spinal cord and surrounding structures. Prompt stabilisation of fractures or dislocations can minimise the risk of displacement that might compress neural elements, improving long-term functional outcomes and enabling faster rehabilitation. Delays in diagnosis can result in serious harm, as undetected injuries may worsen with movement, causing paralysis, chronic pain, and complications associated with prolonged immobilisation. Prolonged immobilisation due increases the risk of secondary issues, including pressure ulcers, respiratory problems, and deep vein thrombosis, impairing recovery and driving up healthcare costs.

Assessment

The spinal assessment is part of the standard approach to any trauma patient, and part of the standard primary and secondary survey assessments (as per Advanced Trauma Life Support (ATLS) / Early Management of Severe Trauma (EMST) principles).

Two clinical criteria / rules provide an evidence-based approach to the spinal assessment, with view to rationalised immobilisation, and early clearance of the spine where safe. These are:

NEXUS criteria

All blunt trauma patients presenting to RPH with a potential cervical spine injury are assessed by the five NEXUS criteria.

- Midline posterior bony cervical tenderness
- Altered mental status (GCS 14 or lower / disorientation)
- Focal neurologic deficit
- Intoxication (alcohol (n.b. the study cut off was 0.08%), narcotic analgesia)
- Painful distracting injury (including visceral injury, long bone fracture, extensive burns or lacerations).

In awake and orientated patients, the assessment is uncomplicated and includes a clinical examination and applying the NEXUS criteria. The results of this assessment determine whether the patient's cervical spine can be 'cleared' of injury or whether they require any radiological imaging.

If none of the above are present and there is painless range of motion of the neck to 45º in both right and left lateral motion, C-spine immobilisation is no longer necessary.

Presence of any of the five NEXUS criteria in a patient with a suspected blunt cervical spine injury on assessment warrants CT radiological imaging, which has 100% sensitivity in detecting cervical spine bony injuries[9].

The Canadian C spine rules

The presence of **any** of these three high risk factors in alert, stable patients mandates cervical spine imaging:

- Age equal to or greater than 65 years
- Dangerous mechanisms of injury
- Sensory neurologic deficit.

This validated tool with 99.4% sensitivity at identifying clinically important injuries[7] has been incorporated into the flow management diagram.

High risk mechanisms (not exclusive)	Fall from greater than 1 metre/3 feet or 5 steps
	Axial loading
	High speed motor vehicle accident (greater than100km/hr) ejection or rollover
	Bicycle or motorised recreational vehicle accident

Clearance of the cervical spine:

Using the clinical evidence base from the NEXUS study the spine may be cleared in patients who are alert and oriented, without intoxication, without midline cervical tenderness, without distracting injuries, and with no neurological deficits.

For symptomatic patients: imaging is indicated, usually in the form of a CT c-spine. As a single imaging modality, the CT c-spine has the highest sensitivity for the exclusion of cervical spine injuries. However, the accuracy of the scan is greater for bony injuries, and reduced for ligamentous injuries. In situations where the CT scan does not adequately explain the clinical picture, an MRI may also be indicated.

For intoxicated patients / patients who are temporarily not able to be assessed: spinal clearance may be deferred to a later part of the clinical journey if this does not have other impact, eg need for semi-urgent endotracheal intubation, high risk of aspiration, high risk of respiratory deterioration from a chest wall injury, etc., due to the spinal immoblisation. In situations of where this delay is judged unwise, the clinical team should capture the decision making in the clinical notes, and manage the patient as if they are un-assessable – see below.

Radiological Spinal Clearance in the obtunded patient: The incidence of ligamentous injury in the setting of a negative CT is low (less than 5%) and the incidence of severe missed ligamentous injury in patients with intact neurology is almost negligible. Conversely prolonged spinal immobilisation in intubated ICU patients is associated with considerable morbidity. The consensus amongst the spinal, trauma and intensive care specialities balances this very low risk versus the benefits of early mobilisation.

In instances where the following criteria are met, ICU patients can have their C-spine cleared under the supervision of either the treating ICU Consultant and/or Trauma consultant.

- CT C-spine is reported by a Consultant Radiologist/Accredited Registrar with
  - No fracture abnormalities detected on a 3 view C-spine radiology series
  - No evidence of joint disruption, haematoma or soft tissue abnormalities
  - No evidence of ankylosed spine
- No clinical evidence or documented evidence of suspected cord injury

Mechanism of Injury is **not** one of the Nexus criteria and should not alter decision to radiologically clear the cervical spine.

Protocol does allow for clinical judgement and consultant input to determine spinal clearance.

In the event of these criteria not being met, further imaging (e.g. magnetic resonance imaging [MRI]) may be indicated to exclude soft tissue injuries.

Clearance of the cervical spine cont'd

Other considerations:

Patients in need of endotracheal intubation: In the absence of spinal clearance, provisions should be made for spinal immobilisation during intubation, as per standard ATLS/EMST trauma practice. However, every effort should be made to clear the spine where possible. Communication with the duty anaesthetist around the spinal clearance status is important for patients presenting to theatre in the early part of their trauma admissions.

Employment grade of personnel clearing spines: medical staff clearing the spine should be suitably experienced / qualified. Employees with this responsibility include the ED physicians and their teams, the Trauma Surgeons and their teams, the Spinal and Orthopaedic Surgeons and their teams, The Intensive Care Specialists and their teams, but are not limited to this list, and other experienced personnel may similarly be involved. Regarding radiology reports, these should be issued by a Specialist Radiologist or an Accredited Radiology Registrar.

Management

Spinal clearance flowchart

See Appendix I: RPBG Flowchart for the Management of Cervical Spine Injuries in Trauma.

References

1. British Society of Skeletal Radiologists. (2021). Cervical Spinal Clearance in the Trauma Patient. BOAST-Cervical-Spine-Clearance.pdf accessed March 2025
2. Inaba K, Byerly S, Bush LD, Martin MJ, Martin DT, Peck KA, Barmparas G, Bradley MJ, Hazelton JP, Coimbra R, Choudhry AJ, Brown CV, Ball CG, Cherry-Bukowiec JR, Burlew CC, Joseph B, Dunn J, Minshall CT, Carrick MM, Berg GM, Demetriades D; WTA C-Spine Study Group. Cervical spinal clearance: A prospective Western Trauma Association Multi-institutional Trial. J Trauma Acute Care Surg. 2016 Dec;81(6):1122-1130. doi: 10.1097/TA.0000000000001194. PMID: 27438681; PMCID: PMC5121083.
3. The Alfred. (2009). The Alfred Spinal Clearance Management Protocol. Spinal clearance: (alfredhealth.org.au) accessed March 2025
4. Eastern Association for the Surgery of Trauma. (2015). Cervical Spinal Collar Clearance in the Obtunded Adult Blunt Trauma Patient. Journal or Trauma 78(2); 430-441http://journals.lww.com/jtrauma/Fulltext/2015/02000/Cervical_spine_collar_clearance_in_the_obtunded.31.aspx

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RPH Trauma Service

Related policies, practice standards, clinical guidelines

RPBG Policy Hub

- Patient with Acute Spinal Injury CPS

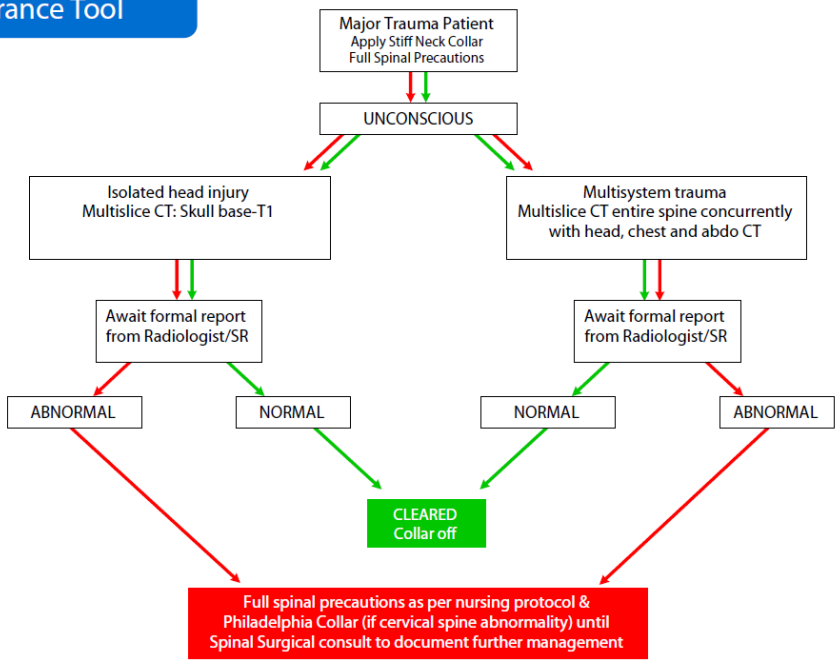
Related national standards

ACSQHC NSQHS Standards 2nd Edition (2021)
Standard 6: Communication; Action 6.10: The health service organisation ensures that there are communication processes for patients, carers and families to directly communicate critical information and risks about care to clinicians; Action 6.11: The health service organisation has processes to contemporaneously document information in the healthcare record, including: Critical information, alerts and risks; Reassessment processes and outcomes; Changes to the care plan.

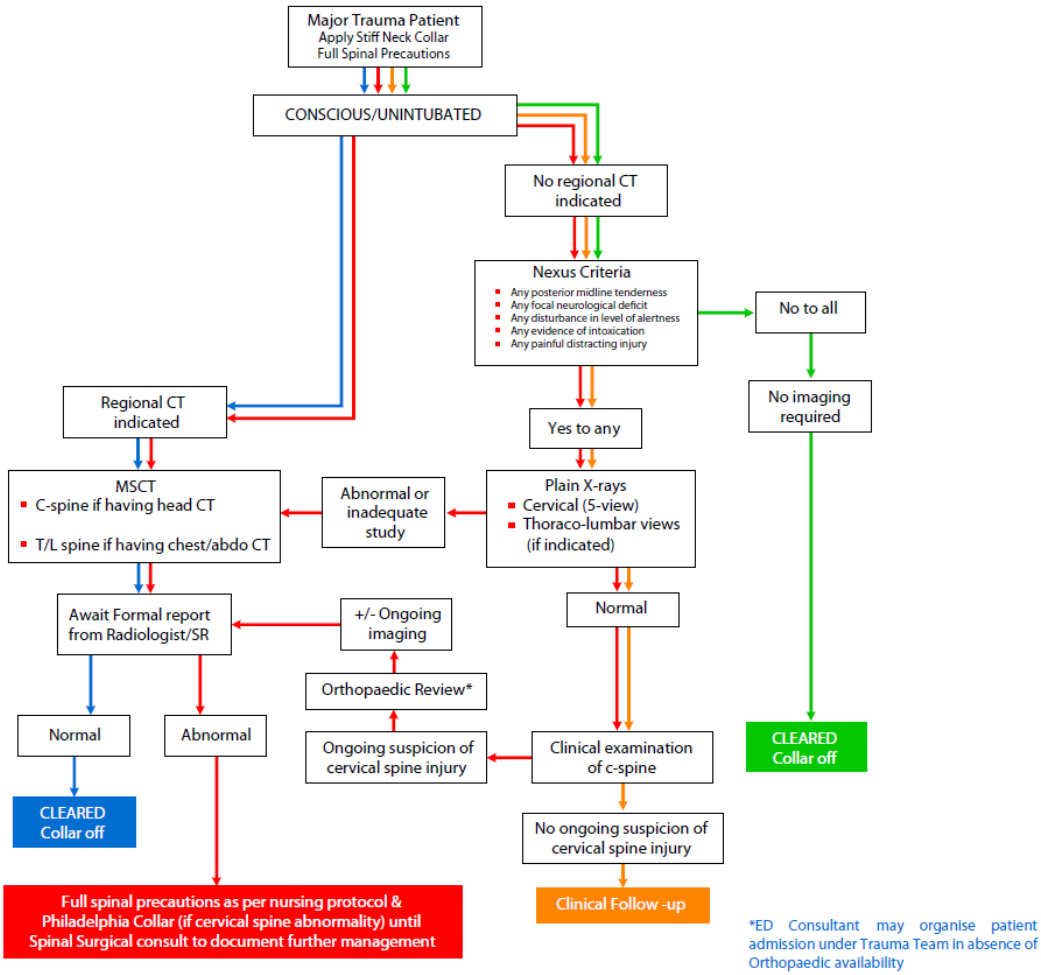
Appendix I: Spinal clearance flowchart

RPH Spinal Clearance Tool

UNCONSCIOUS



CONSCIOUS



*ED Consultant may organise patient admission under Trauma Team in absence of Orthopaedic availability