Introduction

Preamble
Determination of the stability of cervical, thoracic and lumbar spines is a problem encountered by those responsible for the acute care of trauma patients. Several specific and recurrent issues are of particular concern for medical, economic and legal reasons. In 2000, the Eastern Association for the Surgery of Trauma (EAST) updated their evidence based clinical practice management guidelines for cervical spine trauma. These Guidelines were developed with consideration given to those guidelines as well as current literature (see reference list). The EAST association does not offer any practice management guidelines for the clearing of thoracic and lumbar spines. The guidelines for the clearance of thoracic and lumbar spines presented within this protocol were developed in consultation with Orthopedic and Neurosurgical services.

For the review of this protocol, current literature has been reviewed and new knowledge incorporated into the protocol. Please refer to updated reference list.

Guiding Principles
1. The spine clearing guidelines may be initiated by Trauma Team Leaders, Emergency physicians, Orthopedic, Neurosurgery, and Trauma Surgery staff/residents/fellows and TNICU staff intensivists/fellows.

2. Spine clearing guidelines should be initiated for all neurosurgical and trauma patients who have sustained any injury consistent with the potential for a spine injury and presents with associated risk factors.

3. Principles of immobilization to achieve least possible neck movement are utilized until physical and/or radiographic findings definitively rule out injury. (See section C)

4. Excluded from these guidelines are patients with obvious spinal cord injury evidenced by neurologic deficits.
5. Patients presenting with risk factors for potential spine injury should have the TNICU Spine Tracking Tool added to the patient chart. (See Appendix A)

6. Radiographic tests are ordered as appropriate following the guidelines provided in this protocol.

7. The most responsible physician or their resident/fellow designate must clear the spines through a written order in the chart, dated and timed.

8. The spines should be cleared within 48 hours of patient arrival and/or imaged adequately such that the plan of care can be instituted within this time frame.

A. Medical Guidelines for Clearing Cervical Spines

A dedicated high resolution axial CT of the cervical spine at 0.6mm intervals or less should be included in all patients at risk for a cervical fracture. This includes any patient presenting with a mechanism of injury consistent with the potential for c-spine injury and has risk factors present:

- Neck pain, tenderness, muscle spasm
- Altered mental status, GCS <14, ,
- Clinical evaluation complicated by drugs, alcohol
- Head injury or craniofacial trauma
- Distracting pain
- A penetrating injury potentially involving the spine
- High energy trauma mechanism

1. Patients with obvious neurological deficit attributable to cervical spinal cord injury are excluded from initiation of this protocol.

2. Awake, alert, non-intoxicated, neurologically normal patients with no distracting injuries who have no neck pain or tenderness even with full range of motion of neck and palpation of cervical spine do not require radiographic studies. Cervical spines may be cleared based on a clinical examination and the collar may be removed.

3. Patients who complain of neck pain require high resolution axial CT images of 0.6 mm or less from occiput – T1. Neck pain irrespective of the results of CT imaging, will require neurosurgical or spine consultation. Potentially an MRI with STIR sequence may also be required.

4. Patients who have altered mental status require high resolution axial CT images of 0.6 mm or less from occiput – T1. Potentially an MRI with STIR sequence may also be required.

5. The evaluation of spine radiographic studies for the purpose of clearing the cervical spines in the obtunded patient requires expert radiographic interpretation by a staff radiologist, spine surgeon, or neurosurgeon. Most commonly, clearance of the C-spine in this context will await final radiographic interpretation by the staff radiologist. Where this is not possible due to time constraints (i.e. a difficult airway or specific positioning needs in a patient going to the operating room), a neurosurgery consult should be obtained to assist in clearance of the C-spine.
6. If no abnormalities are found, the cervical spines are considered cleared and the collar may be removed.

7. If an area of suspicion is noted, consultation with the Neurosurgery Service is necessary.

8. If a fracture is identified anywhere in the spinal column, the remaining levels must be axially imaged to rule out contiguous fractures which occur in 10-20% of trauma patients.

B. Medical Guidelines for Clearing Thoracic and Lumbar spines

Any patient presenting with mechanism of injury consistent with spine injury and has risk factors present should have this protocol initiated. Risk factors include:
- Back pain, tenderness, muscle spasm
- Altered mental status, GCS <14,
- Clinical evaluation complicated by drugs, alcohol
- Distracting pain
- A penetrating injury potentially involving the spine
- High energy trauma mechanism

1. Patients with obvious neurological deficits attributable to spinal cord injury are excluded from this protocol.

2. Awake, alert, non-intoxicated, neurologically normal patients with no distracting injuries who have no thoracic-lumbar pain or tenderness even with deep palpation of thoracic-lumbar spines do not require radiographic studies. Thoracic and lumbar spines may be cleared based on the clinical examination.

3. For all other patients lumbar and thoracic spine can be screened from reconstruction of the torso (chest and abdominal CT). If an area of suspicion is noted, consultation with the Orthopedic or Neurosurgery Service is necessary.

4. If a fracture is identified anywhere in the spinal column, the remaining levels must be axially imaged to rule out contiguous fractures which occur in 10-20% of trauma patients.

C. Management of Patients with Uncleared Spines

1. All patients with possible spine injuries are to be managed following principles of immobilization until physical and/or radiographic findings definitively rule out injury. Effective methods of immobilization place the spine in neutral position and prevent all motion of the axial spine.

2. Cervical collars are used to immobilize cervical spines. The use of sandbags may also necessary to restrict lateral movement of the neck.

3. If clearing of the c-spines is expected to be delayed greater than 24 hours or if the patient is complaining of neck discomfort related to the collar, the “Stiff Neck” or extrication collar should be removed and replaced with low pressure Aspen collars.

4. Strict logrolling procedures are to be followed at all times. Only an MD or RN can immobilize the neck and direct mobilization procedure, repositioning or transfers.
5. Head of bed elevation is contraindicated unless otherwise specified. Orders to raise the head of the bed for treatment of intracranial hypertension may be obtained by a spine (orthopedic or neuro) surgeon providing thoracic and lumbar spines have been cleared. Reverse trendelenberg may be used for patients with elevated intracranial pressure or difficulty breathing.

6. Strict attention must be given to skin care and patient positioning. Patients should be repositioned every two hours while maintaining proper log-rolling technique and spine alignment.

7. Patients should receive Sequential Compressive Devices if there are no contraindications (e.g. lower extremity injuries) preventing application.

8. Clearance requires a written order by the physician indicating that spines (cervical, thoracic and lumbar) have been cleared, cervical collar and logrolling are discontinued. Verbal orders for spine clearance will not be accepted.

References


8. Steill IG, Clement CM, McKnight RD, Brisson R, et al. The Canadian C-Spine Rule versus the NEXUS Low Risk Criteria in Patients with Trauma. NEJM, 2003; 349: 2510-8


### Cervical, Thoracic, and Lumbar Spine Clinical Assessment

**Awake, alert, no neck pain/tenderness, no distracting injuries, not intoxicated, neurologically intact**

| Cervical Spine Cleared No Imaging Required | ____________________________ (date/time and print name here) |
| Cervical Spine Cleared No Imaging Required | ____________________________ (date/time and print name here) |

| Thoracic & Lumbar Spine Cleared No Imaging Required | ____________________________ (date/time and print name here) |

| Cervical Spine Radiologic Assessment |
| For patients with any of the following: |
| ☐ Neck pain, tenderness or step deformity |
| ☐ Altered mental status, distracting injury or high energy mechanism |
| ☐ Suspect injury based on plain radiography or neurologic deficit |

**CT Cervical Spine Reviewed By** |

(please check) |

☐ radiology staff |

☐ neurosurgery staff |

☐ Trauma team |

**CT Cervical Spine Reviewed Cervical Spine Cleared and Collar Removed** |

(please check) |

☐ radiology staff |

☐ neurosurgery staff |

☐ Trauma team |

**Cervical Spine Injury Suspected/Documented** |

(please check) |

☐ radiology staff |

☐ neurosurgery staff |

☐ Trauma team |

**Cervical Spine Management Plan**

| Spine service consulted: yes/ no  date ____________________________ |
| Plan for definitive management documented in medical record: yes/ no  date ____________________________ |

**Thoracic and Lumbar Spine Radiologic Assessment**

**CT Thoracic & Lumbar Spine done:**

(please check) |

☐ radiology staff |

☐ neurosurgery staff |

☐ Trauma team |

**CT Thoracic & Lumbar Spine Reviewed By** |

(please check) |

☐ radiology staff |

☐ neurosurgery staff |

☐ Trauma team |

**Thoracic & Lumbar Spine Cleared and Log Roll Precautions Discontinued** |

(please check) |

☐ radiology staff |

☐ neurosurgery staff |

☐ Trauma team |

**Thoracic & Lumbar Spine Injury Suspected/Documented** |

(please check) |

☐ radiology staff |

☐ neurosurgery staff |

☐ Trauma team |

**Thoracic & Lumbar Spine Management Plan**

| Spine service consulted: yes/ no  date ____________________________ |
| Plan for definitive management documented in medical record: yes/ no  date ____________________________ |
SUMMARY: CERVICAL / THORACIC / LUMBAR SPINE CLEARING GUIDELINES

- Spine clearing guidelines should be initiated for all neurosurgical and trauma patients who have sustained any injury consistent with the potential for a spine injury and presents with associated risk factors.
- The most responsible physician or their resident/fellow designate must clear the spines through a written order in the chart, dated and timed.
- Patients presenting with risk factors for potential spine injury should have the TNICU Spine Tracking Tool added to the patient chart. (See Appendix A)

CERVICAL SPINE CLEARANCE
A dedicated high resolution axial CT of the cervical spine at 0.6mm intervals or less should be included in all patients at risk for a cervical fracture. This includes any patient presenting with a mechanism of injury consistent with the potential for c-spine injury and has risk factors present:
- Neck pain, tenderness, muscle spasm
- Altered mental status, GCS <14, ,
- Clinical evaluation complicated by drugs, alcohol
- Head injury or craniofacial trauma
- Distracting pain
- A penetrating injury potentially involving the spine
- High energy trauma mechanism

- Awake, alert, non-intoxicated, neurologically normal patients with no distracting injuries who have no neck pain or tenderness even with full range of motion of neck and palpation of cervical spine do not require radiographic studies. Cervical spines may be cleared based on a clinical examination ("clinical clearance") and the collar may be removed.

- Patients who complain of neck pain require high resolution axial CT images of 0.6 mm or less from occiput – T1. Neck pain irrespective of the results of CT imaging, will require neurosurgical or spine consultation.

- The obtunded patient or any patient that cannot be cleared clinically requires high resolution
- Patients who have altered mental status require high resolution axial CT images of 0.6 mm or less from occiput – T1. Potentially an MRI with STIR sequence may also be required.

- The evaluation of spine radiographic studies for the purpose of clearing the cervical spines in the obtunded patient requires expert radiographic interpretation by a staff radiologist, spine surgeon, or neurosurgeon. Most commonly, clearance of the C-spine in this context will await final radiographic interpretation by the staff radiologist. Where this is not possible due to time constraints (i.e. a difficult airway or specific positioning needs in a patient going to the operating room), a neurosurgery consult should be obtained to assist in clearance of the C-spine.

THORACIC AND LUMBAR SPINE CLEARANCE
Any patient presenting with mechanism of injury consistent with spine injury and has risk factors present should have this protocol initiated. Risk factors include:
- Back pain, tenderness, muscle spasm
- Altered mental status, GCS <14, ,
- Clinical evaluation complicated by drugs, alcohol
- Distracting pain
- A penetrating injury potentially involving the spine
- High energy trauma mechanism
- Awake, alert, non-intoxicated, neurologically normal patients with no distracting injuries who have no thoracic-lumbar pain or tenderness even with deep palpation of thoracic-lumbar spines do not require radiographic studies. Thoracic and lumbar spines may be cleared based on the clinical examination.

- For all other patients lumbar and thoracic spine can be screened from reconstruction of the torso (chest and abdominal CT). If an area of suspicion is noted, consultation with the Orthopedic or Neurosurgery Service is necessary.

- If a fracture is identified anywhere in the spinal column, the remaining levels must be axially imaged to rule out contiguous fractures which occur in 10-20% of trauma patients.
## Revision History

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