Hasbro Children's Hospital Pediatric Trauma Program

Rhode Island Hospital, Trauma Resident Handbook (pending 2020 edition)

Guideline for C-Spine Evaluation in Pediatric Trauma Patients

Cervical spine injury should be assumed and systematically ruled out in all pediatric trauma patients. C-spine stabilization should be maintained until appropriate clinical and imaging evaluation has been completed [see Diagram A]. It must be recognized that the pediatric cervical spine **differs** from that of an adult and there may be spinal cord injury without radiographic abnormality (SCIWORA).

NOTE: Arrival in the emergency department without cervical immobilization does not indicate that the c-spine has been cleared.

Practitioners qualified to clear pediatric c-spine: limited to PEM Attending, Fellow, EM PGY 3 or higher resident; Pediatric Surgery/Trauma Attending, Fellow, Surgery PGY 4 or higher resident, NP or PA; Neurosurgery Attending, Fellow, NSG PGY 3 or higher resident, NP or PA; Orthopedic Attending, Fellow, ortho PGY 4 or higher Resident, NP or PA.

Documentation: Removal of the c-spine precautions and associated orders should be made immediately by the responsible practitioner in the medical record. Documentation of spine clearance should be in the form of a significant event note or in a practitioner's H&P or consult and should be done at the earliest possible timepoint.

Please reference ED dot phrase for documentation.

Use of NEXUS criteria to minimize unnecessary radiation:
Cervical spine radiography is indicated for patients with neck trauma unless they meet ALL of the following criteria:

- A normal level of alertness (GCS 15)
- No evidence of intoxication
- No focal neurologic deficit
- No painful *distracting injuries*
- No posterior midline cervical spine tenderness
- No torticollis
- Age >3 years
- Cooperative

Note: Children 3 years or under or those with neurodevelopmental delay **MAY** not be able to provide a reliable exam. A lower threshold for imaging must be maintained in this group, **HOWEVER**, clinical clearance is possible if an adequate exam **IN A CALM CHILD** can be performed.

Regarding **distracting injury**: In the absence of an observable injury which is life threatening or requires immediate operative intervention; if, after the primary and secondary assessment, the patient is able to answer questions clearly, exhibits a decrease in anxiety, and is able to cooperate with an exam, then the patient **does not** have a distracting injury that would prevent c-spine clearance.

Determination that a child may forgo imaging is at the discretion of the Team Leader. If in doubt, consider imaging. This guideline does not replace sound clinical judgement taking into consideration all aspects of the patient's condition.

Exam: Clearance of a c-spine in a pediatric patient, with or without imaging, requires palpation for midline tenderness as well as extension, flexion, and bilateral lateral rotation without complaint of pain by the patient

Guidelines for Cervical Spine Imaging in the Pediatric Trauma Patient:

Age	< 5 Years	5-13 Years	15 Years and older
Initial Imaging	Lateral and AP views (no odontoid views)	Lateral, frontal, and open mouth (+/- swimmer's view)	3 Views Radiograph or CT*
If cannot be cleared radiographically or concern persists	Tailored CT of the level in question + one level above and below	Tailored CT of the level in question + one level above and below	Tailored CT of the level in question + one level above and below
If concern for SCIWORA or ligamentous injury	MRI of entire cervical spine	MRI of entire cervical spine	MRI of entire cervical spine

*For patients 15 years or over who are unable to be cleared clinically and have been involved in a high speed MVC or have head or face trauma, c-spine CT should be used rather than radiographs

Other situations where c-spine CT without preceding c-spine radiographs may be appropriate include:

1. Unresponsive patients
2. Patients with polytrauma including the head and face, of any age, depending on severity
3. Patients over 15 years of age who fail clinical clearance and are undergoing CT for other indication, allowing for clinical judgement

Tailored CT c-spine is also an appropriate follow up to c-spine radiographs

1. when x-rays are abnormal or equivocal
2. when the lower c-spine is not imaged on radiographs and on repeat exam clearance is still not possible, CT may be needed to image the full c-spine for collar removal

C-spine evaluation in presence of neurological changes:

Patients with persistent neuropraxia or a mechanism of axial loading (such as spear tackle or dive injury) should undergo MRI after c-spine imaging. They should also have an urgent spine consult in the setting of persistent deficit and persistent suspicion for clinical spine injury, especially severe pain.

Those with an initial presentation with neuropraxia (bilateral upper extremity or multi-extremity paresthesia or weakness) which has now resolved can be placed in a Miami J or equivalent collar and discharged home with spine follow up as an outpatient.

Those with a unilateral upper extremity deficit, or "stinger," which has resolved do not need a spine consult. They can be placed in a Miami J collar and follow up with spine as an outpatient.

Persistent c-spine pain without deficit despite negative imaging:

Patients in the ED who can otherwise be discharged home but have persistent c-spine pain on exam can be discharged in a Miami J collar and follow up with spine as outpatient.

Patients being admitted can be observed. If pain persists, MRI can be obtained to help with clearance. Spine should only be consulted if there is a high level of concern for c-spine injury.

C-spine Clearance after Admission:

Cervical spine evaluation and collar removal must be done by, or under the in-person supervision of, a qualified practitioner. Telephone and remotely entered computer orders for collar removal are not permitted. For those patients who have been referred to the Spine Service, c-spine clearance is at the discretion of the Spine attending or the attending's qualified designee. Once the spine is "cleared," either the trauma service or the spine service can remove the cervical collar after communicating with the other service (e.g. trauma can remove the collar after discussion with spine, and spine can remove the collar after advising trauma of their intent.)

C-spine Precautions in the Operating Room:

For those patients going to the operating room with c-collar in place, cervical spine immobilization must be maintained by the surgical team and anesthesiology staff according to operating room best practices. At the conclusion of the procedure(s), the c-collar must be replaced unless specifically directed otherwise by a Spine or Trauma attending.

Consultation guidelines for inpatient pediatric spine trauma patients:

It is understood that patients who sustain traumatic injury to their spine will require consultation by the Orthopedic Surgical service or the Neurosurgical service or both.

1. The first consultation call should be made to the service which is "covering spine". Neurosurgery and Orthopedic Surgery services will cover alternating weeks and the schedule of which service is on call is readily available on the intranet under the Administration tab.
2. At the discretion of the consulting spine attending, it may be appropriate to involve both Neurosurgery and Orthopedic services. Physical examination or mechanism alone may be enough to necessitate consultation of both services given the increased incidence of SCIWORA in the pediatric population.
3. It is understood that communication between attendings of both services is the preferred mode of communication.

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