

Trauma Clinical Guideline Cervical Spine Injury Evaluation

The Trauma Medical Directors and Program Managers Workgroup is an open forum for designated trauma services in Washington State to share ideas and concerns about providing trauma care. The workgroup meets regularly to encourage communication among services and to share best practices and information to improve quality of care. On occasion, at the request of the Governor appointed Emergency Medical Services and Trauma Care Steering Committee, the group discusses the value of specific clinical management guidelines for trauma care.

The Washington State Department of Health distributes this guideline on behalf of the Emergency Medical Services and Trauma Care Steering Committee to assist trauma care services with developing their trauma patient care guidelines. The workgroup has categorized the type of guideline, the sponsoring organization, how it was developed, and whether it has been tested or validated. This information will assist physicians in evaluating the content of this guideline and its potential benefits for their practice and patients.

The Department of Health does not mandate the use of this guideline. The department recognizes the varying resources of different services, and that approaches that work for one trauma service may not be suitable for others. The decision to use this guideline in any particular situation always depends on the independent medical judgment of the physician. It is recommended that trauma services and physicians who choose to use this guideline consult with the department regularly for any updates to its content. The department appreciates receiving any information regarding practitioners' experiences with this guideline. Please direct comments to 360-236-2874.

This is a trauma assessment and management guideline. The workgroup has reviewed the guideline, sought input from trauma care physicians and nurses throughout Washington State, and used that input to make changes. The guideline was endorsed by both the Emergency Medical Services and Trauma Care Steering Committee and the Department of Health Office of EMS/Trauma Section. This guideline has not been tested or validated.

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Cervical Spine Injury Evaluation

Goal: To provide guidance for determining if a trauma patient has a cervical injury.

All patients with history of trauma should have their cervical spine (c-spine) evaluated clinically or radiographically.

Reference [Figure 1](#). “Clinical Decision Rules” and Figures [2](#), [3](#), and [4](#) “Initial Evaluation and Management of the Cervical Spine Algorithm” with the following important additional information:

- A. Initial efforts in the acutely injured patient with known spinal cord injury (SCI) should focus on:
 1. **Primary survey and immobilization** of the cervical spine in rigid cervical collar with full spine precautions, which includes placing the patient on a flat surface and log-rolling the patient when needed.
 2. **Fluid resuscitation** in neurogenic shock should be to euvolemic state. The use of vasopressor medications may be needed because of decreased sympathetic tone.
 3. **Steroids** may be administered in spinal cord injury in consultation with a spine expert. If the decision is made to administer steroids: High-dose methylprednisolone is given to the patient with proven non-penetrating spinal cord injury within eight hours of injury.
 4. If steroids are started prior to patient arrival, continue steroids until able to discuss with spine expert.
- B. Adult patients (up to age 64) and pediatric patients 3-10 (who are able to cooperate and communicate) with mechanism of trauma may undergo **Clinical Clearance by using [Figure 1. Clinical Decision Rule](#)** and may not need imaging if they meet the criteria outlined in the **Cervical Spine Algorithm**. Providers may use either the [NEXUS criteria](#) or [Canadian C spine criteria](#), both of which have sensitivities in the high 90 percent range. Because of increased risk of injury and degenerative disease, **all patients age 65 or older should be imaged as recommended by the Canadian C-spine rule.**
- C. **If imaging is recommended:** computed tomography (CT) cervical spine is the test of choice in most adult patients and in all patients more than 64 years of age. Several studies suggest that c-spine radiography may not have adequate sensitivity to rule out spine fracture, especially in the elderly. Despite this, spine radiography may be used if the adult patient is more than 65 years of age and is considered low risk. The following low risk criteria outline a group in which plain c-spine radiography may be safe to use.
 1. No medical history of degenerative joint disease (DJD) or cervical spine hardware.
 2. Able to cooperate.
 3. Normal neurologic examination.
 4. No known thoracic, lumbar, or sacral (TLS) spine injury.
 5. Not requiring a head CT (if getting a head CT, use C spine CT instead of x-rays)
 6. Not high risk for CSI by the [High Risk Cervical Spine Criteria](#)
 - a. High energy mechanism (high speed more than 35 mph motor vehicle crash (MVC) or motorcycle crash (MCC), MVC with death at scene, fall from more than 10 feet.)
 - b. High risk clinical parameter (significant head injury, unconscious in emergency department (ED), focal neurologic symptoms referable to the cervical spine, pelvic or multiple extremity fractures).
- D. **If the patient has normal cervical spine imaging in the ED, and is alert, non-intubated**, with normal neurologic exam after imaging, he/she may be clinically cleared with palpation and active (not passive) range of motion. If the patient still has midline tenderness or midline pain with range of motion, use clinical judgment to determine the course of treatment. Potential options for this include removing the cervical collar and clearing the spine based on evidence that this may be safe, or the cervical collar maybe left in place for delayed imaging with flexion-extension films in seven to 10 days, or magnetic resonance imaging (MRI)/spine consult at the ED/trauma team’s discretion.

Flexion-extension X-rays **are not recommended** in the acute setting because lack of data and unknown sensitivity in existing studies.

- E. **If patient has normal cervical spine imaging in the ED but is obtunded or intubated**, please leave in full spine precautions with rigid cervical collar, maintain supine on a flat surface, and log-roll when needed until the patient receives further inpatient evaluation for clearance. These patients should not be cleared in the ED.
- F. **Pediatric patients** under the age of 3 or who cannot communicate/cooperate with the clinical clearance commands may not be clinically cleared. If trauma is suspected, c-spine should be immobilized and imaged according to [Figure 4. Pediatric Algorithm](#). Most pediatric c-spine injuries at the cervical vertebrae (C1-2) and therefore, if patient is getting a head CT it is recommended to extend through C2 and then plain radiography of the remainder of the cervical spine should be obtained.

If the patient does not need a head CT, plain films should be the starting test of choice for pediatric patients 10 years and under. Age 10 was chosen because while the American College of Radiology (ACR) recommends age 14 as a cut-off, other literature suggests that injury patterns start to approximate those of adults at age 10. Radiation exposure risk is decreased after this age as well.

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Figure 1.

Clinical Decision Rules

Reproduced from Stiell et al. "The Canadian C-Spine Rule versus NEXUS Low Risk Criteria In Patients With Trauma" NEJM 2003;349: 2510-8

The NEXUS Low Risk Criteria

Cervical-spine radiography is indicated for patients with trauma unless they meet all the following criteria:

- No posterior midline cervical-spine tenderness
- No evidence of intoxication
- A normal level of alertness
- No focal neurological deficit
- No painful distracting injuries

*Criteria are from Hoffman and colleagues.²⁶

¶ Midline posterior bony cervical-spine tenderness is present if the patient reports pain on palpation of the posterior midline neck from the nuchal ridge to the prominence of the first thoracic vertebra, or if the patient evinces pain with direct palpation of any cervical spinous process.

‡ Patients should be considered intoxicated if they have either of the following: a recent history provided by the patient or an observer of intoxication or intoxicating ingestion, or evidence of intoxication on physical examination such as an odor of alcohol, slurred speech, ataxia, dysmetria, or other cerebellar findings, or any behavior consistent with intoxication. Patients may also be considered to be intoxicated if tests of bodily secretions are positive for alcohol or drugs that affect the level of alertness.

§ An altered level of alertness can include any of the following: Glasgow Coma Scale score of 14 or less; disorientation to person, place, time or events; an inability to remember three objects at five minutes; a delayed or inappropriate response to external stimuli; or other findings.

¶¶ A focal neurologic deficit is any focal neurologic finding on motor or sensory examination.

- No precise definition of a painful distracting injury is possible. The category includes any condition thought by the clinician to be producing pain sufficient to distract the patient from a second (neck) injury. Such injuries may include, but are not limited to, any long-bone fracture; a visceral injury requiring surgical consultation; a large laceration, degloving injury, or crush injury; large burns; or any other injury causing acute functional impairment. Physicians may also classify any injury as distracting if it is thought to have the potential to impair the patient's ability to appreciate other injuries.

Any high-risk factor that mandates radiography?

Age \geq 65 years or dangerous mechanism or paresthesias

No

Yes

Any low-risk factor that allows safe assessment of range of motion?

Simple rear-end motor vehicle collision or sitting position in the emergency department or ambulatory at any time or delayed (not immediate) onset of neck pain or absence of midline cervical-spine tenderness

Yes

Unstable

Able to rotate neck actively?

45° left and right

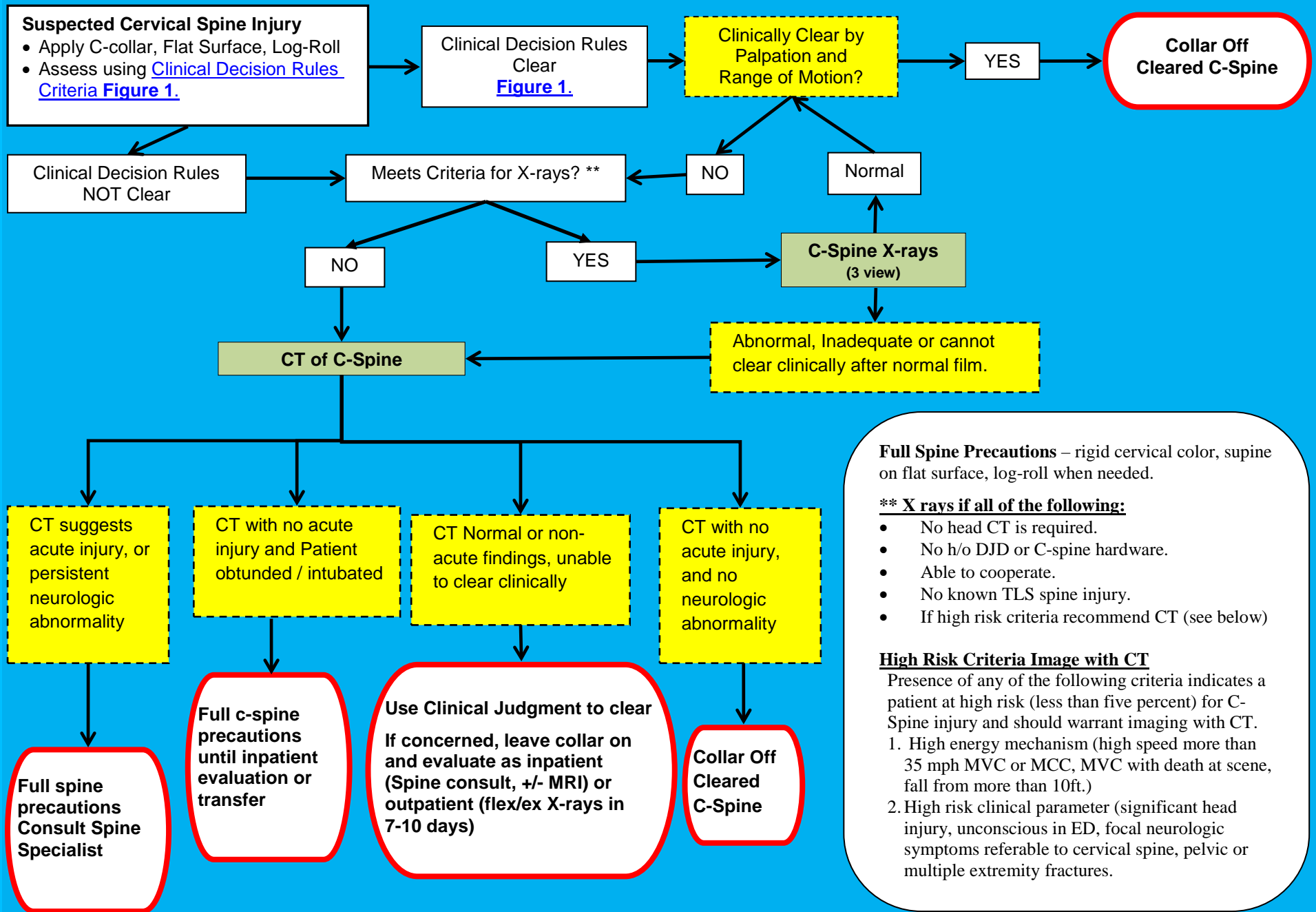
Radiography

The Canadian C-Spine Rule

For patients with trauma who are alert (as indicated by a score of 15 on the Glasgow Coma Scale) and in stable condition and in whom cervical-spine injury is a concern, the determination of risk factors guides the use of cervical-spine radiography. A dangerous mechanism is considered to be a fall from an elevation \geq 3 feet or 5 stairs; an axial load to the head (e.g. diving); a motor vehicle collision at high speed ($>100\text{km/hr}$ or with rollover or ejection); a collision involving a motorized recreational vehicle; or a bicycle collision. A simple rear-end motor vehicle collision excludes being pushed into oncoming traffic, being hit by a bus or a large truck, a rollover, and being hit by a high-speed vehicle.

Figure 2.

Cervical Spine Injury Algorithm Adult (age 11- 64)



Full Spine Precautions – rigid cervical collar, supine on flat surface, log-roll when needed.

**** X rays if all of the following:**

- No head CT is required.
- No h/o DJD or C-spine hardware.
- Able to cooperate.
- No known TLS spine injury.
- If high risk criteria recommend CT (see below)

High Risk Criteria Image with CT

Presence of any of the following criteria indicates a patient at high risk (less than five percent) for C-Spine injury and should warrant imaging with CT.

1. High energy mechanism (high speed more than 35 mph MVC or MCC, MVC with death at scene, fall from more than 10ft.)
2. High risk clinical parameter (significant head injury, unconscious in ED, focal neurologic symptoms referable to cervical spine, pelvic or multiple extremity fractures).

Figure 3.

Cervical Spine Injury Algorithm Older Adult (age 65 and up)

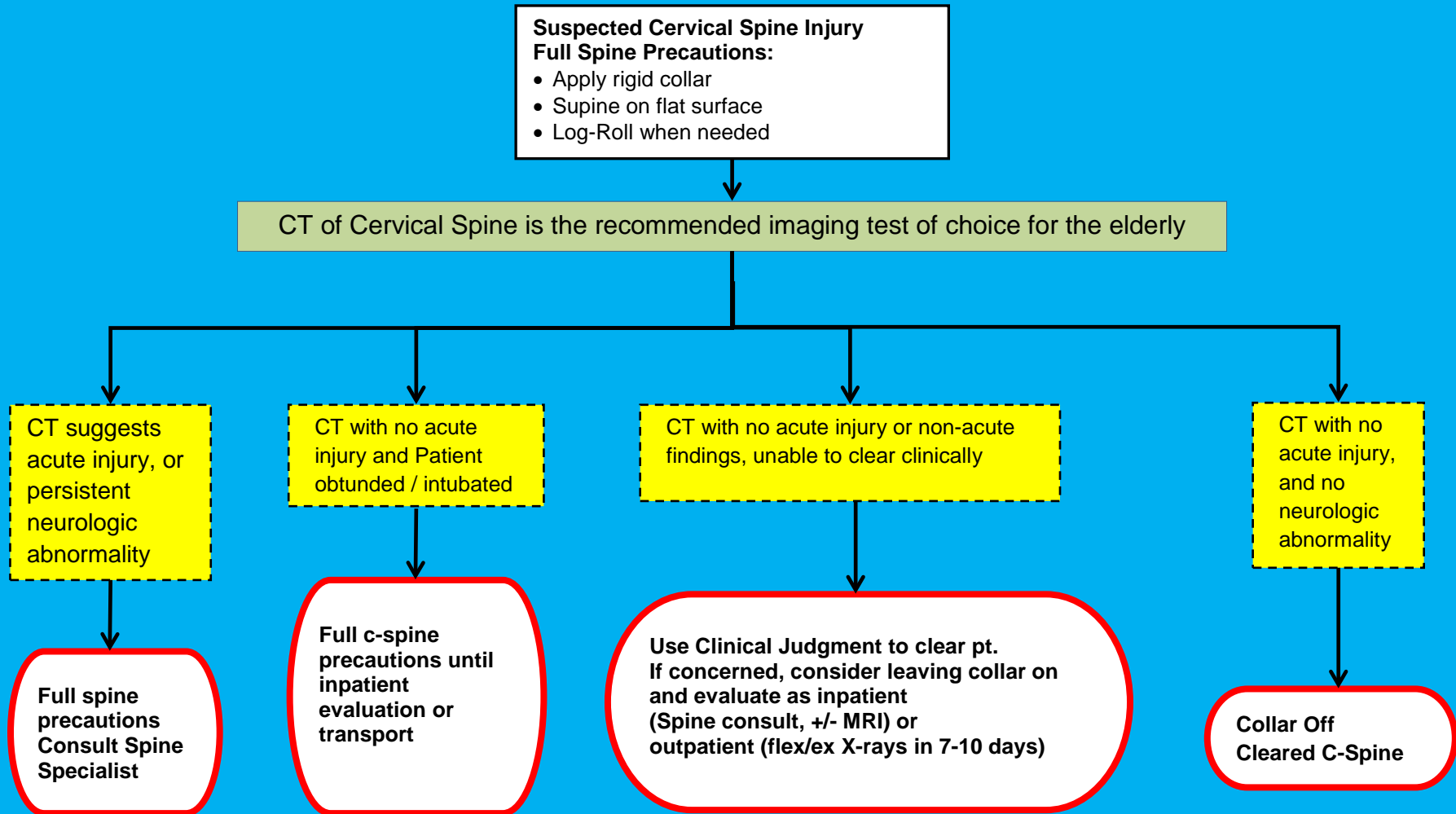


Figure 4. **Pediatric Cervical Spine Injury Algorithm (age 0-10)**

