Rural Healthcare Quality Network

Hospital Peer Review

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Hospital Peer Review is a monthly newsletter sponsored by the Rural Healthcare Quality Network to alert Critical Access Hospitals regarding findings from the Peer Review Program. Summarized are a few of the key findings and best practices that would be helpful for other critical access hospitals to be knowledgeable about. This newsletter is edited by Myron Bloom, Medical Director and he can be reached at drmbloom@msn.com.

Use of X-rays to diagnose Cervical Spine Injuries Part 1: Who Needs Imaging?

Because failure to diagnose acute cervical spine injury (CSI) could lead to neurologic disability, cervical spine x-rays are often ordered for fear of missing something (anticipatory regret) even when the clinical suspicion of CSI is considered to be low. Actual CSI is relatively rare, seen in only 2 to 3 percent of patients x-rayed for blunt trauma to the spine. Since the other 97 to 99 percent of cervical spine x-rays are normal, this approach is costly and subjects patients to excess radiation exposure.

Researchers involved in the National Emergency X-Radiography Utilization Study (NEXUS) prospectively studied the use of x-rays for CSI in 34,069 patients with blunt trauma seen at 21 emergency departments. The study included a broad range of patients, with an age range of one to 101 years, and intoxicated patients were included. The NEXUS criteria correctly identified 810 out of 818 patients (99.0 percent) with C-spine injury, and 576 out of 578 patients (99.7 percent) with clinically significant injury, but with only a12.9% specificity (high false positive rate).

Panacek, E.A. et al. "Test performance of the individual NEXUS low-risk clinical screening criteria for cervical spine injury." *Annals of Emergency Medicine* 38(1), pp. 22-25.

A protocol for reducing unnecessary x-rays for patients with blunt trauma to the spine requires criteria for identifying patients at low risk for cervical spine injury. To accomplish this, NEXUS researchers identified five low-risk criteria. They concluded that cervical spine x-rays are indicated for trauma patients unless they meet all of the following criteria: no posterior midline cervical spine tenderness, no evidence of intoxication, normal level of alertness (for example, no disorientation or failure to remember or recall items), no focal neurologic deficit, and no painful distracting injuries (for example, long bone fracture or large burns that would impair the patient's ability to note spinal injuries).

Overall, these criteria were more than 99% sensitive for CSI and almost 100 percent sensitive for clinically significant CSI among NEXUS patients. All but 8 of the 818 NEXUS patients with CSI and all but 2 of the 578 patients with significant CSI were identified by using these five criteria for identifying blunt trauma patients who are at low risk for CSI. But all of the criteria are needed if the decision instrument is to retain high sensitivity. Eliminating any single criterion would have resulted in the failure to identify some injuries

Table 1. The NEXUS Low-Risk Criteria.*

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

- No posterior midline cervical-spine tenderness,†
- No evidence of intoxication,‡
- A normal level of alertness,§
- No focal neurologic deficit,¶ and
- 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: a 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. This 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.

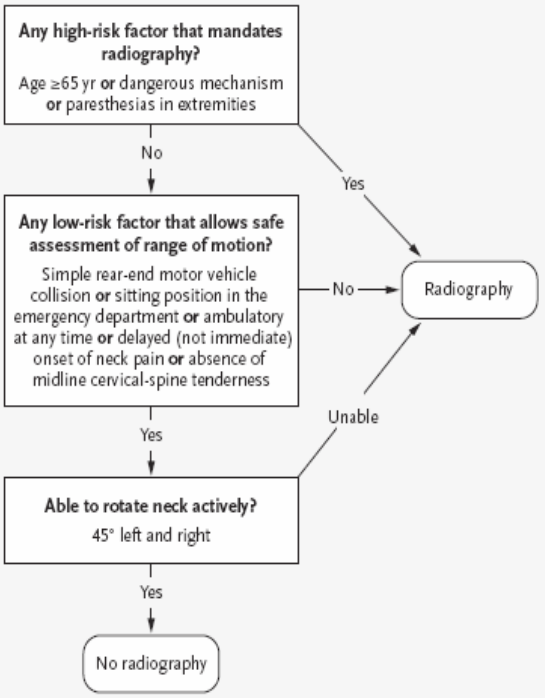

Figure 1. The Canadian C-Spine Rule.

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 ≥3 ft or 5 stairs; an axial load to the head (e.g., diving); a motor vehicle collision at high speed (>100 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.

Stiell IG, et al. The Canadian C-Spine Rule versus the NEXUS low-risk criteria in patients with trauma. N Engl J Med 2003;349:2510-8.

The Canadian C-Spine Rule shown in Figure 1 on the right was prospectively validated in 8,283 Canadian patients and was compared to the NEXUS criteria in a large clinical trial conducted in the same hospitals and with the same physicians as the original Canadian C-Spine Rule study. In this study compared to the NEXUS criteria, the Canadian C-Spine Rule appeared more sensitive (99.4 versus 90.7 percent) and more specific (45 versus 37 percent) in the selected population which excluded children and intoxicated patients. The comparison study used different wording than NEXUS used in its original study. Among the 8,283 patients, 169 (2.0 percent) had clinically important cervical-spine injuries. In 845 (10.2 percent) of the patients, physicians did not evaluate range of motion as required by the CCR algorithm because they were afraid to move the patient's neck. In an analyses that excluded these indeterminate excluded cases, the CCR was more sensitive than NEXUS (99.4 percent vs. 90.7 percent, P<0.001) and more specific (45.1 percent vs. 36.8 percent, P<0.001) for injury, and its use would have resulted in lower radiography rates (55.9 percent vs. 66.6 percent, P<0.001). But reducing unnecessary films is a goal trumped by concerns for patient safety (they feared rotating 10%).

Either decision rule may do, but perhaps the very cautious ED practitioner could 1st apply the NEXUS rule to determine if C-spine films are indicated then confirm that there is no need to do films by executing the Canadian C-spine Rule protocol? Part 2 will address what studies to do.