



HEALTHCARE

# RISK MANAGER

VOLUME 14/NUMBER 3/2008  
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## Cervical Spine Trauma: CT VS. Radiography, A Risk Management Perspective

By: Leonard Berlin, M.D., F.A.C.R.



Evaluation of patients with suspected spine trauma is a controversial topic that involves several specialties, including emergency medicine, trauma surgery, orthopedics, and neurosurgery, as well as radiology. Several questions remain controversial; which patients need imaging, how much imaging is

necessary, and exactly what sort of imaging is to be performed.

Conservative estimates in the literature indicate that more than one million blunt trauma patients who have the potential for sustaining a cervical spine injury are seen in emergency departments in the United States each year. One such case is documented below.

### Case Study:

A 37-year-old male injured in an automobile accident, was placed in a stabilizing neck collar and taken by paramedics to a hospital emergency department. The patient appeared to be conscious but inebriated. He admitted to the ED physician that he had been drinking, but denied having lost consciousness or experiencing pain. Physical examination disclosed no neurologic deficits. Sensory and motor function of all extremities appeared to be normal.

The ED physician followed a hospital protocol for cervical spine trauma that called for an initial cross-table lateral view of the cervical spine with the neck collar in place. This radiograph was obtained and interpreted by a radiologist as normal. At that point, in keeping with the hospital's protocol, a radiology technologist carefully removed the neck collar and proceeded to obtain AP, open-mouth, lateral, and two oblique views of the cervical spine, all with the patient lying on the radiology table. The radiologist interpreted this study as, "Limited examination because of patient's inability to cooperate for positioning and holding still. No obvious fracture or dislocation is seen."

The patient was admitted to the hospital for observation. Within a few minutes the patient was examined by a hospital-employed house physician, who found no abnormalities. Later that night the patient reported to a nurse that his arms and legs were "beginning to feel numb" and he was having difficulty in moving them. The nurse noted this in the patient's chart but did not notify the house physician or the attending physician.

The following morning the attending physician examined the patient and found "profound sensory and motor loss" below the patient's neck, and immediately ordered a CT scan. The CT scan was obtained and interpreted by a radiologist as disclosing fractures of C5-C6 facets on the left, with anterior subluxation of C5 upon C6. The patient underwent surgery, where the cervical spine subluxation was reduced and a fusion performed. The patient recovered from the surgery, but remained permanently quadriplegic.

Three months later, the patient filed a medical liability lawsuit against the hospital, the ED physician, the attending physician, the house physician, and the radiologist who had interpreted the initial cervical spine radiographs, alleging that a prompt diagnosis would have led to "immediate neurosurgical intervention and avoidance of the quadriplegia that ensued." In addition, the lawsuit specifically alleged that the radiologist had been negligent for failing to "order and obtain a CT scan" at the time he had rendered his interpretation of the cervical spine radiographs.

During the discovery period a plaintiff's radiology expert witness testified at a deposition that the defendant-radiologist who had interpreted the initial cervical spine radiographs breached the standard of care for failing to call for an immediate CT scan. The expert stated that the standard of radiologic care in the United States regarding evaluation of

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## CT VS. Radiography for Initial Evaluation of Cervical Spine Trauma *(continued from page one)*

cervical spine injuries had “changed over recent years, moving from plain radiographs to helical CT,” because it was “common knowledge within the radiological community” that “a great many cervical spine fractures are missed on plain radiography and are seen only by CT.” When cross-examined by the attorney representing the defendant-radiologist, the plaintiff’s radiology expert acknowledged that he could find no abnormalities on the radiographs of the patient’s cervical spine, but then added, “That was all the more reason for the defendant-radiologist to have ordered a CT scan.”

The defendant-radiologist and a defense radiology expert testified that the standard of care did not require a radiologist interpreting cervical spine radiographs to order a CT examination, unless that radiologist observed a suspicious finding that needed further analysis. Both stated that it was the duty of the examining physician, not the radiologist, to order a CT scan if that physician felt it was clinically indicated.

When the discovery proceedings came to an end, the claims managers of the involved medical liability insurance companies concluded that there would be virtually no chance for the defense to prevail at a jury trial. They therefore settled the lawsuit for a very large amount on behalf of the radiologist, ED physician and hospital.

### Discussion

The question of which patients should undergo radiologic imaging and if so, what radiologic modality should be employed, have challenged radiologists and non-radiologists alike for decades. While the determination of indications for imaging of patients who have sustained cervical spine trauma is normally addressed by non-radiologic clinicians, the determination of the type of radiologic imaging that should be obtained has historically fallen within the purview of the radiologist. As imaging has become more sophisticated, particularly with the many advances in CT and MR that have been made, recommendations for the kind of radiologic examination that should be obtained have changed accordingly.

Traditionally the primary radiologic study of patients who had sustained cervical spine trauma consisted of a single cross-table lateral view, along with AP, lateral, and open-mouth radiographs, sometimes supplemented by oblique views. However, plain radiographs have been shown to detect less than half of spine fractures that are ultimately discovered by CT. Well-positioned and optimally-exposed radiographs of the cervical spine will disclose the majority of clinically significant cervical spine fractures, but unfortunately, such high-quality examinations are frequently impossible to obtain in trauma victims.

A 1999 review article on cervical spine trauma suggested that it may be more appropriate to perform CT of the cervical

spine in lieu of a full radiographic examination. While acknowledging that plain film radiography remained the generally-accepted modality of choice for initial evaluation of suspected cervical injury, researchers pointed out that frequently multiple radiographs had to be obtained because of difficulty in adequately visualizing the proximal and distal cervical regions. The use of helical CT for the initial evaluation of suspected cervical trauma, contended these researchers, offered two advantages. It allowed for faster exclusion of injuries and expedited patient management, while at the same time detecting a greater number of fractures and important injuries that were missed by radiography.

Pointing out that 10,000 persons sustain spinal cord injury in the United States each year at an estimated annual cost to society of \$3.4 billion, and acknowledging how difficult it is to predict the presence of cervical spine fractures in the absence of radiologic imaging, other researchers concluded that CT is the standard of care for evaluation of trauma patients with injuries to the head, chest, abdomen, and pelvis. They also advocated that CT be accepted as the screening method of choice for initial evaluation of high-risk and moderate-risk patients who have undergone cervical trauma. They did not believe that CT is cost-effective for screening low-risk patients, where the fracture risk was less than 4%.

### Current Guidelines

Relative to the question of whether radiography or CT should be performed in cases of cervical spine trauma, the ACR Practice Guideline for the Performance of Spine Radiography in Children and Adults, October 1, 2007 revision, states “In some institutions, computed tomography (CT) has replaced radiography in the initial assessment of patients at high risk for cervical spine injury.”

Another ACR publication that addresses the choice of radiologic imaging in cervical spine trauma is the ACR Appropriateness Criteria, 2008 version of which can be found on the ACR website. Its section on suspected spine trauma states, “The pooled sensitivity of radiography for detecting patients with cervical spine injury is 52% while the combined sensitivity of CT is 98%....Radiography is reserved for evaluating patients where suspicion of cervical spine injury is low. Thin-section CT, and not radiography, is the primary screening study for suspected cervical spine injury.

Adult patients who satisfy any of several ‘low-risk’ criteria for cervical spine injury established in large multi-institutional studies need no imaging. Patients who do not fall into this category should undergo a thin-section CT examination that includes sagittal and coronal multiplanar reconstructed images. For those patients who are unable to be examined by CT, a 3-view radiographic examination of the cervical vertebrae may be performed to provide a preliminary assessment of the likelihood of injury until a CT can be

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## CT VS. Radiography for Initial Evaluation of Cervical Spine Trauma (continued from page two)

be obtained....MRI should be the primary modality for evaluating possible ligamentous injuries in acute cervical spine trauma....MRI should be performed in patients who have possible spinal cord injury, in whom there is clinical concern for cord compression due to disk protrusion or hematoma, and in those suspected of ligamentous instability.”

It is well established that virtually all high-risk and moderate-risk patients ought to undergo some kind of imaging. However, there has been a shift in the guidelines relating to the type of imaging that should be obtained. The advent of helical MDCT (multidetector CT) has accelerated this shift.

### What type of radiologic examination should be obtained when patients sustain cervical spine trauma?

It cannot be categorically stated that the standard of radiologic care requires that all patients who sustain cervical spine trauma be examined by helical CT in lieu of or in addition to radiography. While there is at present no standard that calls for absolutely replacing radiographic imaging with helical CT, there is indication that such a standard may be evolving. Thus, radiologists should be familiar with the changing indications for and approaches to radiologic imaging of patients who have sustained cervical spine trauma.

### Does a radiologist have the responsibility of recommending that CT examination be obtained in all cervical spine injuries, whether or not a radiographic exam has been requested by the referring physician?

Neither a consensus of opinion in the radiologic community nor an appeals court decision focusing on this question has yet occurred.

### Risk Management Suggestions:

- Both outpatient and inpatient radiologic facilities should have written guidelines in place that specify whether radiologic examination performed for cervical spine trauma should be radiographic or CT.
- Relative to radiographic examinations, specific views should be listed.
- For CT examinations, protocols should be specific.
- In interpreting any radiographic examination of the cervical spine, radiologists should maintain a high degree of sensitivity to any finding that might be indicative of a fracture or other injury.
- Radiologists should not hesitate to recommend CT when any suspicion arises.
- Radiologists should attempt to have as much clinical information as possible available to them regarding the type of injury patients have sustained, and salient physical findings, at the time they interpret cervical spine radiological studies.
- Radiology communication with the referring physician is essential and should be documented.
- If cervical spine plain films prove limited, this strongly supports the need for a CT study.

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This text is abbreviated from Dr. Berlin's article originally published in the AJR (American Journal of Roentgenology) in April, 2003.

## Risk Management Scoop! *Tracking & Follow-up*

### Question:

How many times should I attempt to notify a patient of their lab or diagnostic results?

### Answer:

The medical office practice should follow a general policy regarding the timely communication of lab & diagnostic report results to its patients, as well as the documentation of these contacts.

We typically recommend three timely contacts; two phone calls, and if no response, a letter. The fact is “one size doesn't fit all.” The final gauge of whether the patient has been notified in a timely manner will depend upon the specific circumstances, the patient's condition, the nature of the lab/diagnostic test report, the urgency of the situation, and the timing between contacts.

# Being Consistent with Performance Reviews: The Process

By: Joe Deroko, Manager, Training and Development

At least once a year, most businesses, go through a process of reviewing the performance of their employees. This task is usually met with uncertainty and apprehension associated with the paperwork and possibility of confronting employees who have shown poor performance and/or behavior. However, if conducted properly, and following a sound process, this could be one of your most rewarding and beneficial business undertakings.

**Why do performance reviews exist?** The three main reasons to have a formalized process are for measuring and managing performance, development of the organization and the employee and compensation. First, measuring and managing performance is of course the obvious one. You need to be able to answer the question: "Is my employee doing their job effectively and efficiently?" Second, once you have determined the performance level, you can start focusing in on developmental plans such as training and exposure to different areas of your business. This will keep your employee engaged and should benefit you in the long run. And lastly, a performance review process should be what your compensation increases are based on.

## Unraveling The Process...

The process of conducting a performance review should be structured and well-defined. If your organization has an

employee policy and procedures manual, there should be a policy on your performance review process. Within this policy, you should identify time frames, a blank review form and a contact name of someone an employee can go to with questions. This policy should be clearly communicated with employees as well as the management team.

You will also want to make sure your managers are able to effectively write and communicate a review. Once, you have accomplished this you need to set and communicate timelines and due dates. Many organizations have the tools and the forms for a solid employee review process. However, staying on schedule and getting the reviews back by their due dates is where many fall short.

A review process that is adequately structured, effectively communicated, and efficiently conducted is essential to any organization. A process that fulfills these three key components will help add value to your organization and both management and staff will understand expectations. You will also create an atmosphere of accountability that will reduce your business and legal risk associated with poor performance and behavior, disciplinary procedures, and terminations.

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