EMS Spinal Immobilization: Overview and Sample Protocol

Jefferson G. Williams, MD MPH
Deputy Medical Director
Wake County EMS System, Raleigh, NC

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Objectives
• Briefly review the literature regardingprehospital spine evaluation, “clearance” andimmobilization
• Review the recently releasedNAEMSP/ACS-COT position statementregarding EMS Spinal Precautions and theuse of the long spine board
• Discuss our Protocol as an example
Overview: What do we know (and how do we teach it to our folks?)

1. Does the trauma patient need his cervical spine to be evaluated/cleared?
   - Is there potential for spinal injury?
2. If there is potential for spinal injury, how do we evaluate?
3. After evaluation, if there is concern for possible injury, how do we immobilize?
   - Taking “spinal precautions” in 2014

1. Is there potential for spinal injury?
   • Even if you are a “mechanism doesn’t matter” person, I would argue that mechanism of injury DOES play a role
     • (what gets the patient into the protocol?)
   • What constitutes a “mechanism having the potential for causing spinal injury”
     *NAEMSP position paper, 1999*

Does the ED literature help us?

The New England Journal of Medicine

*Validity of a set of clinical criteria to rule out injury to the cervical spine in patients with blunt trauma*

Jeremy H. Hopkins, M.D., William R. Womack, M.D., Ph.D., Alisa B. Wooten, M.D., Keith H. Too, M.D., M.P.H.,
and Michael L. Zuidema, M.D., for the National Emergency X-Radiography Utilization Study Group*

• NEXUS included: all patients with “blunt trauma” who received Xray
  • Somebody decided they needed an Xray, ordered based on “criteria usually used”
  • Specifcity 13% - would this increase imaging?
• CCR patients eligible for enrollment: “at some risk for C-spine injury either because they had neck pain from any mechanism of injury, or because they had no neck pain but had all of the following: some visible injury above the clavicles, had not been ambulatory, and had sustained a dangerous mechanism of injury.”

What is a “dangerous mechanism”? 

• CCR: Defined as:
  • a fall from an elevation 1 m or 5 stairs,
  • axial load to the head (eg, diving),
  • high-speed (100 km/h) motor vehicle collision,
  • rollover,
  • ejection,
  • bicycle collision,
  • motorized recreational vehicle collision

So where does that leave us? 

• Still a judgment call in terms of which patients have a mechanism that could potentially cause spinal injury (and are therefore “entered” into a spinal eval protocol)

• Some guidance: patients with neck pain (any? mechanism), non-ambulatory, visible injury above the clavicles, “dangerous” mechanism, extremes of age
So where does that leave us?

- Can’t we just be conservative and evaluate the spine of EVERY blunt trauma patient that EMS encounters?
- Sure, if we know that the risks of immobilization are vastly outweighed by the benefits…. Insert foreshadowing here…
- Lots of people will FAIL the evaluation for silly reasons: isolated “distracting” injuries
- Like NEXUS and imaging, does including “everyone” make specificity so low that we are needlessly INCREASING backboard use?

2. If there IS the potential for spinal injury, how should EMS evaluate?

- So we’ve made the decision that our patient has a “mechanism having the potential for causing spinal injury,” now what?
- Can we utilize “selective spinal immobilization,” or should everyone always get a LSB/C-Collar?

- Let’s assume for the rest of the talk that no studies demonstrate better patient outcomes due to backboard use, and that backboards can be bad for you, and that the title of the next talk is true…
- Clearly, EMS providers should utilize selective spinal immobilization (SSI) protocols
- Most evaluations of EMS SSI protocols utilize the NEXUS elements, or very similar
Spinal Immobilization is indicated in prehospital trauma patients... with a mechanism having potential for causing spinal injury, and at least one:
- Altered Mental Status
- Evidence of intoxication
- Distracting painful injury
- Neurologic deficit
- Spinal pain or tenderness

PEC. 1999;3:1-6

Multiple studies have shown that EMS providers can utilize SSI protocols with a high degree of sensitivity
- A handful of patients (< 0.5%, or ~57 of ~14,000) with spinal column injuries were "missed" – most due to protocol noncompliance – and not immobilized
- None of the non-immobilized patients were caused harm (i.e. cord injury) by failure to immobilize.
- Lower specificity suggests a good number of non-injured patients are immobilized
3. After eval via SSI protocol, if there is concern for possible injury, how do we enact spinal precautions?

• We have a patient with a “mechanism having the potential for causing spinal injury” who has failed our SSI protocol.

• We know that our SSI protocol is probably not very specific (Is the patient even injured?), spinal injuries are rare, and backboards have not shown benefit and are bad for you.

But we really don’t want to screw it up!

Those WERE the droids I was looking for...

POSITION STATEMENT

EMS spinal precautions and the use of the long backboard

- Acknowledges unproven benefit

- Delineates potential harms

- Recommends judicious use for spinal immobilization during transport, so that potential benefits outweigh risks.
Appropriate patients to be immobilized with a backboard may include:
• Blunt trauma and altered LOC
• Spinal pain or tenderness
• Neurologic complaint (numbness or weakness)
• High energy mechanism and any of:
  • Drug or EtOH intoxication
  • Inability to communicate
  • Distracting injury

Patients for whom immobilization on a backboard is not necessary include those with all of:
• Normal LOC (GCS 15)
• No spine tenderness or anatomic abnormality
• No neurologic findings or complaints
• No distracting injury
• No intoxication

Continued:
• Patients with penetrating trauma and no evidence of spinal injury should not be immobilized on a backboard.
• Spinal precautions can be maintained by application of a rigid cervical collar and securing the patient to the EMS stretcher, and may be most appropriate for:
  • Patients found to be ambulatory
  • Extended transports
  • Patients for whom a backboard is not otherwise indicated
My Interpretations
• Criteria for “spinal clearance” has not changed
• Penetrating trauma = no backboard
• No more “standing takedowns”
  • who else is appropriate for “collar and precautions?”
• The backboard is NOT the only option—don’t force it. Many options for “spinal

What we do in Wake County: Example Protocol
• NEXUS criteria
• Extra consideration for mechanism with extremes of age
• If immobilization is required:
  • we utilized the new position statement to provide guidance for “spinal precautions.”
1. Long spine boards (LSB) have both risks and benefits for patients and have not been shown to improve outcomes. The best use of the LSB may be for extricating the unconscious patient, or providing a firm surface for compressions. However, several devices may be appropriate for patient extrication and movement, including the scoop stretcher and soft body splints.

2. Utilization of the LSB should occur considering the individual patient’s benefit vs. risk.

3. Patients who should be immobilized with a LSB include: Patients with blunt trauma and distracting injury, intoxication, altered mental status, or neurologic complaint (e.g. numbness or weakness), and non-ambulatory blunt trauma patients with spinal pain, tenderness, or spinal deformity.
4. Patients with penetrating trauma and no evidence of spinal injury do not require spinal immobilization. Patients who are ambulatory at the scene of blunt trauma in general do not require immobilization via LSB, but may require cervical collar and spinal precautions.

5. Whether or not a LSB is utilized, spinal precautions are STILL VERY IMPORTANT in patients at risk for spinal injury. Adequate spinal precautions may be achieved by placement of a hard cervical collar and ensuring that the patient is secured tightly to the stretcher, ensuring minimal movement and patient transfers, and manual in-line stabilization during any transfers.

Initial experiences

- Ironing out conflicting statements in “the real world” – can we be more specific?
  - e.g. The ambulatory drunk who won’t lie flat after a high-risk MVC
- Sometimes a LSB is a good tool (for extrication or movement)
- Ambulatory does not mean the spine is cleared (Spinal Clearance has not changed, but options for Spinal Precautions have)
Case 1

- 50 yo M MCC
- Laid bike down at 35 mph
- Ambulatory, bilat wrist pain
- Vitals Ok, on scene no neck pain or tenderness
- Not collared or boarded, taken to WMR
- EMT-P assessment and spine clearance, EMT-I attending in the back en-route.

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Case 1

During assessment, while enroute to the hospital, the pt began to complain of anterior back pain. The pt also began to experience tingling in his arms. The pt then stated that the pain was felt all over, however, the worst pain was felt in his head, neck, and arms. The pt stated the pain was particularly bad at the point where the incision was for his C-spine surgery, on the anterior aspect of his neck, but continued to complain of pain to his vertebrae. The pt also explained, en route, that he had a brief dose of morphine where he did not remember the time between leaving from his bike and when the ambulance arrived.

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Case 1

- ED doc exam on arrival
  - Me: What's hurting you the most right now?
  - Him: the back of my neck
  - Me: Does it hurt worse when I press on it?
  - Him: yes
  - Me: What else is bothering you?
  - Him: I have this horrible burning pain and numbness down both of my arms
Case 1

• “No acute fracture, subluxation, bone destruction, or abnormal splaying of the spinous processes is seen. There are changes related to previous anterior fusion from the C5 level through the C7 level with vertebral body screws at C5, C6, C7. No definite evidence of hardware failure is seen. Prevertebral soft tissue appears more prominent anterior to the fusion site.”
Case 1 MRI

- At C4-5, there is disc desiccation and loss of height. Additionally, disc material not bound by the posterior longitudinal ligament extrudes into the central interspace and then extends cephalad behind the inferior C4 vertebral body. The disc fragment combines with congenitally short pedicles to narrow the AP canal diameter to less than 6 mm. There is prominent cord flattening.

**IMPRESSION:**

1. Subtle cord edema and/or myelomalacia at C4-5. Are the clinical symptoms suggestive of an acute cord syndrome?
2. Degenerative disc disease at C4-5. A large central disc extrusion combines with the congenitally small spinal canal to cause high-grade spinal stenosis with marked cord flattening.

Outcome

- Decompression, Diskectomy, fusion, HD 0
- “Consider immobilization in any patient with arthritis, cancer, dialysis or other underlying spinal or bone disease” ... this includes prior surgery, fusion, hardware, etc.

- Exams change - I totally understand.
  - From scene to hospital: + neck pain=tenderness, ? “Focal deficit” (extreme burning numbness bilat UEs)
  - When the exam changes, consider changing your plan, treatment. Collar before moving the patient?
  - Would a collar have helped this guy?
    - No but the retrospectoscope doesn’t work
What is a “Focal Neuro Deficit”

- “NEXUS: “A focal neurologic deficit is any focal neurologic finding on motor or sensory examination”
- “No precise definition of a painful distracting injury is possible” … “may include, but not limited to”

(did lawyers write this stuff?)

Case 2

- 43 yo M MCC
- Swerved, fell off at 50-55 mph
- Ambulatory walking around, No LOC
- No neck pain, no neck tenderness on our exam or in the ED
- No distracting injury
Case 2 CT

- “There is a linear lucency in the posterior inferior aspect of the left articular pillar of C7 seen only on sagittal reformatted images. This is likely a subtle nondisplaced fracture. No additional fractures are demonstrated. There is no prevertebral soft tissue swelling.”
- Normal alignment
- Home from ED in a hard collar.
- No issues here.

Take Home Points

- EMS Providers make decisions regarding Spinal Clearance and Immobilization all the time. How does a patient “enter” your protocol?
- Spinal Clearance is not the same as spinal immobilization
  - Consider your protocols and procedures for both
  - Step 1: How do we clear the spine (or not)?
  - Step 2: If the spine is not cleared, what are my options?
- Regarding Spinal Immobilization and Spinal Precautions, one size (the LSB) does not fit all.