## 46 yo M high speed MVA

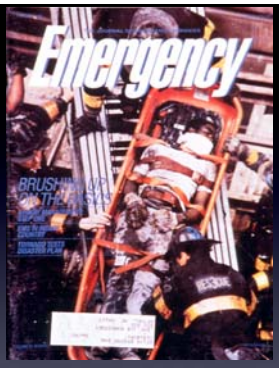
- Pt with facial trauma from airbag, cannot move legs
- Immobilized on LSB, c-collar to Level III trauma center, then transferred to Level I
- At Level I CT and long workup. Pt on LSB 4hrs 15 min
- T8 Fx with cord compression, pt admitted for surgery and eventual rehab
- Developed sacral decubiti leading to eventual sepsis and death

## *Imagine a World without Backboards!*

**Marvin A Wayne, MD, FAAEM, FACEP, FAHA**
Associate Clinical Professor University of Washington, EMS Medical Director Bellingham/Whatcom County WA
Emergency Dept. PeaceHealth St. Joseph Medical Center

## Disclosures

None related to this presentation




## It's Time for a Change...

A Progressive approach to Pre-Hospital Spinal Care

## OBJECTIVES

- Discuss the inaccuracy of mechanism of injury as the primary indicator for spinal immobilization.
- Describe the harmful effect of rigid spinal immobilization.
- Describe "Biophysics" as it applies to spinal precautions.
- Review the literature regarding the danger/inadequacy of rigid spine immobilization
- Describe alternatives to ridged spine boards.

One of the most common "treatments" in EMS, whether the patient needs it or not. "There might have been a mechanism of injury".

## So Why Do We Immobilize?

In theory:

- To prevent secondary cord injury
- Further manipulation makes any potential lesions larger and more severe
- Manipulation of unstable fractures may cause a cord lesion.

In reality its:

- "Tradition"
- "Dogma"
- Fear of litigation
- ED/EMS doctrine

## Is it really a big deal?

- Up to 5 million patients are back boarded in the U.S. annually*
- Only 2-3% actually have spine injuries

But it's okay, cause were just being conservative, right?

**YES, It is a big deal...**

*Kwan I BF, Roberts I. On behalf of the WHO Pre-Hospital Trauma Care Steering Committee. Spinal Immobilization for Trauma Patients. Cochrane Database Syst Rev. 2003(3)

## Harmful Effects of Spinal Immobilization With a rigid spine board:

- Pain / Anxiety- pain on spine leading to X-ray
- Increased intracranial pressure
- Cervical collar- distraction, masking injuries
- Risk of aspiration- Potential for airway compromise, head injured patients often vomit
- Respiratory Decompensation- 15-20% reduction in respiratory capacity
- Decubitus ulcers:
  - Occiput
  - Sacrum
  - Heels

## Interface Pressures

4 x pressure necessary for permanent damage

Elderly male patient with closed head injury transported on a rigid spine board. He died 73 days after admission from pressure sores. *He had no spine injury.*

Morrisc, McCoy, Lavery. Spinal immobilization for unconscious patients with multiple injuries. *BMJ 329 28 Aug 2004*

"First responders would have to immobilize the spines of 1,032 patients before potentially benefiting one person," the study's authors wrote. "But it only took 66 patients to potentially contribute to one death."

Spine immobilization in penetrating trauma: more harm than good?
J Trauma. 2010 Jan;68(1):115-20; discussion 120-1.

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

Jerome R. Hoffman, M.D., William R. Mower, M.D., Ph.D., Allan B. Wolfson, M.D., Kwok H. Todd, M.D., M.P.H., and Michael I. Zucker, M.D., for the National Emergency X-Radiography Utilization Study Group*

Abstract

*Background.* Because clinicians fear missing occult cervical-spine injuries, they obtain cervical radiographs for nearly all patients who present with blunt trauma. Previous research suggests that a set of clinical criteria (decision instrument) can identify patients who have a negligible risk of cervical-spine injury and who consequently have no need for imaging studies.

*Methods.* We conducted a prospective, observational study of such a decision instrument at 21 centers across the United States. The decision instrument required patients to meet five criteria in order to be classified as having a low probability of injury: no midline cervical tenderness, no focal neurologic deficit, normal alertness, no intoxication, and no painful, distracting injury. We examined the performance of the decision instrument in 34,069 patients who underwent radiography of the cervical spine after blunt trauma.

*Results.* The decision instrument identified all but 8 of the 818 patients who had cervical-spine injury (sensitivity, 99.0 percent [95 percent confidence interval, 98.0 to 99.6 percent]). The negative predictive value was 99.8 percent (95 percent confidence interval, 99.6 to 100 percent); the specificity was 12.9 percent; and the positive predictive value, 2.4 percent. Only one of the patients classified as unlikely to have an injury according to the decision instrument met the preset definition of a clinically significant injury (sensitivity, 99.6 percent [95 percent confidence interval, 98.6 to 100 percent]; negative predictive value, 99.9 percent [95 percent confidence interval, 99.8 to 100 percent]; specificity, 12.9 percent; positive predictive value, 1.9 percent), and only one of these injury patients received surgical intervention. According to the cases of 4309 patients who met the decision instrument, radiographic imaging could have been avoided in the cases of 4309 (12.6 percent) of the 34,069 evaluated patients.

*Conclusions.* A simple decision instrument based on clinical criteria can help physicians to identify reliably the patients who need radiography of the cervical spine after blunt trauma. Application of this instrument could reduce the use of imaging in such patients. (N Engl J Med 2000;343:94-9.)

©2000, Massachusetts Medical Society.

Because unrecognized injury to the cervical spine can produce catastrophic neurologic disability, clinicians liberally order radiographs of the cervical spine, and as a result the majority of the radiographs are normal.[1-8] Eliminating even a small proportion of the approximately 800,000 cervical-spine radiographs ordered annually in the United States for patients with blunt trauma could lead to substantial savings and decrease patients' exposure to ionizing radiation.[9-11]

Several small studies[12-17] have suggested that patients with blunt trauma have a low probability of injury to the cervical spine if they meet all five of the following criteria: they do not have tenderness at the posterior midline of the cervical spine, they have no focal neurologic deficit, they have a normal level of alertness, they have no evidence of intoxication, and they do not have a clinically apparent, painful injury that might distract them from the pain of a cervical-spine injury.

Although the combination of these five criteria was reported to have a sensitivity of 100 percent for ruling out cervical-spine injury, the lower confidence limit for the sensitivity of the instrument was only 89 percent, which is too low to justify its widespread use.[4] We organized the National Emergency X-Radiography Utilization Study (NEXUS) to validate this set of criteria and to test the hypothesis that patients with blunt trauma who meet all five of the above criteria have a very low probability of clinically significant injury to the cervical spine.[4]

METHODS

Participating Centers

Twenty-one centers across the United States participated in this prospective, observational study. Among them were university and community hospitals, hospitals with and without residency programs, and public and private hospitals; they varied in size, in the level of activity in the emergency department, and in the level of activity in trauma care. Each center was designated to assess the validity of the following five criteria (the decision instrument):

From the Emergency Medicine Center and the Departments of Medicine, Surgery, and Pediatrics, University of New Mexico, Albuquerque (J.R.H.); the Department of Medicine, Los Angeles School of Medicine, Los Angeles, the Department of Emergency Medicine, University of Pittsburgh School of Medicine, Pittsburgh (W.R.M.), the Department of Medicine, Cleveland Metrohealth Hospital, Cleveland (A.B.W.), the Department of Medicine, Atlanta (K.H.T.). Address reprint requests to Dr. Hoffman at the UNM Emergency Medicine Center, 924 Westwood Blvd., Suite 100, Los Angeles, CA 90024, or at nexus@ucla.edu.

*The centers and investigators participating in the National Emergency X-Radiography Utilization Study (NEXUS) are listed in the Appendix.

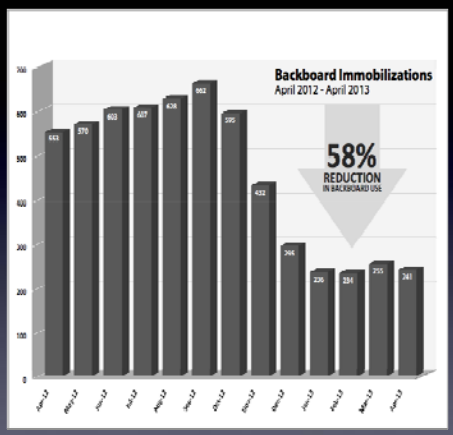
94 · July 13, 2000

## NEXUS:

**Multi year study**
- **21 Emergency Depts.**
- **34,069 patients with MOI**

- **818 spine injured**
- **810 found (8 missed)**

The New England Journal of Medicine 7/13/2000




## Spine Injury

### Field Assessment and Treatment

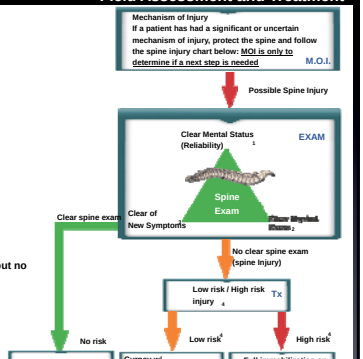
1) **Clear Mental Status:**
**Patient should be reliable= Calm, cooperative, sober and alert. Patient should not display SSx of ASR, decreased AVPU, or severely distracting injury.**

2) **Clear Physical Exam:**
**Patient should have a normal spinal column exam= No tenderness on palpation of all spinal vertebrae, normal neuro motor exam= equal strength flexion and extension in all four limbs. Equal differentiation of sharp/soft sensation in all four limbs. No radicular sensations.**

3) **Clear of New Symptoms:**
**No complaint of new neck or back pain**
**No complaint of new numbness or weakness**

4) **Low Risk= reliable + spine pain and/or tenderness but no neuromotor deficits**
**No language barriers.**

**High Risk= Unreliable and /or neuromotor deficits (spine pain and/or tenderness may also be present)**
**Elderly and /or Frail.**



**Immobilization is "a tradition that started decades ago," says Dr. Demetriades, who directs the Division of Acute Care Surgery at USC. "There was never any scientific evidence that it works."**

Spine immobilization in penetrating trauma: more harm than good?J Trauma. 2010 Jan;68(1):115-20; discussion 120-1.

## The Malayan/ New Mexico comparative spine study

- Five year retrospective chart review at two
- University teaching hospitals.
- University of Malaya and the University of New Mexico
- 354 patients seen with SCI
- None of the 120 Malayan patients were immobilized
- All of the 334 New Mexico patients were immobilized
- Neurological disability was less for the Malayan subjects! (11% vs. 21%)

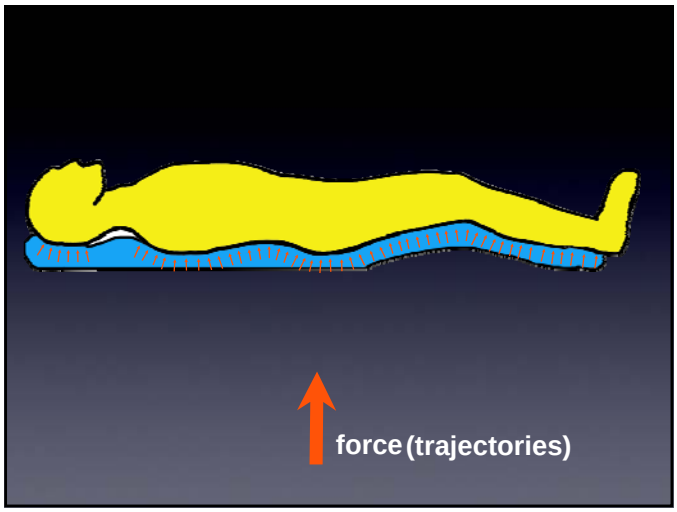
•Conclusion: immobilization has little or no effect on neurologic outcome!

Hauswald M, Ong G, Tandberg D, Omar Z. Out-of-hospital spinal immobilization: its effect on neurologic injury. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine.* Mar 1998;5(3):214-219.

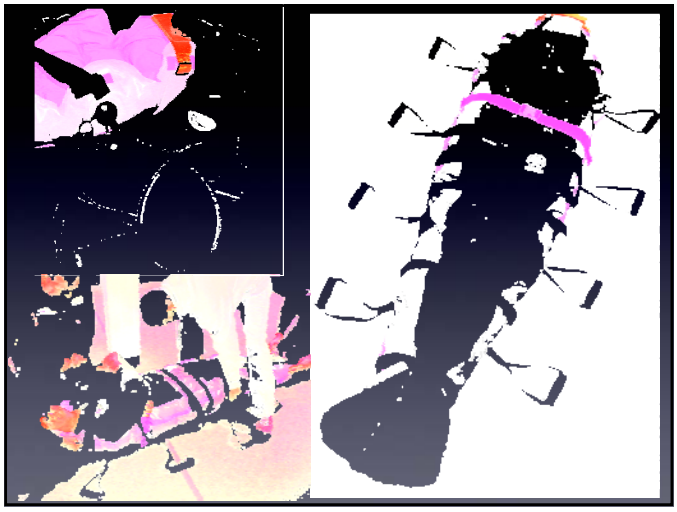
Let's look to Physics!

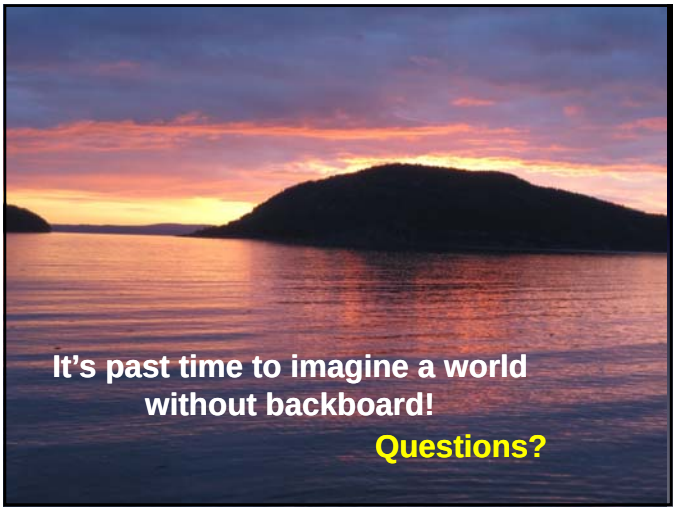
force (trajectories)

force is concentrated


force (trajectories)

the VSB is particularly good at this kind of support




It's past time to imagine a world without backboard!
Questions?