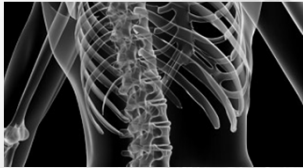


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### The Evidence Behind Prehospital Spinal Immobilization Changes



Brian Clemency, DO, MBA, FACEP  
EMS Fellowship Director  
Division of EMS  
Department of Emergency Medicine

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### Disclosures:

Dr. Clemency has no significant conflicts of interest. He is the first author on one of the studies reviewed.

We will discuss the proposed new NY State protocol, it has been approved by the SEMAC, and is still awaiting DOH approval/implementations.

Portions of this presentations were adapted with permission from:  
Jacobsen R. Mounting Evidence Against the Long Spine Board in EMS  
Bart J. Spinal Immobilization Practice Update

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*U.S. Consortium of Metropolitan Medical Directors Position Statement*  
**aka: *The Eagles***

"Current best practices reflect that there are no randomized controlled trials to evaluate the benefits of spinal immobilization in out-of-hospital trauma patients. As a result, current EMS protocols are based principally on historical precedent, dogma and medico-legal concerns, and not on scientific evidence. This situation is further complicated by the reality that such studies will not likely be performed in the future, primarily as a result of perceived legal and ethical concerns. There is, however, a growing body of literature that points to the potential deleterious effects of spinal immobilization, whether or not this modality is applied in an appropriate fashion."

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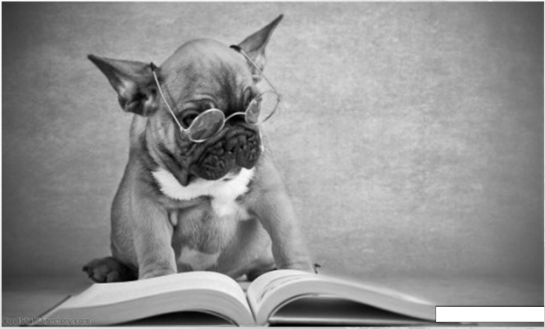
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In the beginning...



Spinal immobilization, like most EMS procedures, was adopted with little (if any) scientific basis.

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- Orthopedists recommended immobilizing “above and below” the fracture.
- This was extrapolated from long bones to the spine
- And then extended to the “whole spine”.

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### In the beginning... (1966, based on a case from 1955)

**EARLY MANAGEMENT OF THE PATIENT WITH TRAUMA TO THE SPINAL CORD**

W. O. GEISLER, M. WYNNE-JONES and A. T. JOUSSE  
Lyndhurst Lodge Hospital, Toronto, Canada

“This man would surely have been protected from the paraplegic condition had the spine instability been recognized and precautions taken.”

Geisler WO, Wynne-Jones M, Jousse AT. Early management of patients with trauma to the spinal cord. Med Serv J of Can. 1966;4:512-23.

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### In the beginning... (1968)

- C-collar and a backboard were promoted as necessary to keep the head and neck from sagging during extrication.
- The backboard was designed to assist in minimizing spinal movement during complex extrication maneuvers by freeing the hands of rescuers from actively holding spinal precautions.



Farrington DJ. Extrication of Victims. Journal of Trauma. 1968;8(493-512)

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And so it began.

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**Penetrating Trauma:  
The low hanging fruit**

- A retrospective review of 30,956 patients suffering penetrating trauma from the the ACS NTDB during 2001-2004
- 4.3% immobilized
- 8.1% overall mortality
- GSW pts more likely to be immobilized

Haut, Elliott R., et al. "Spine immobilization in penetrating trauma: more harm than good?." *Journal of Trauma and Acute Care Surgery* 68.1 (2010): 115-121.

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**Penetrating Trauma:  
The low hanging fruit**



- Number Needed to Treat
  - Patients with an incomplete spinal injury and required and operative procedure
  - 30 of 30,956 patient had a "potential benefit"
  - NNT = 1,032
- Number Needed to Harm
  - Number of patients who would need to be immobilized to be associated with 1 additional death
  - 14.7% vs 7.2% ( $p < 0.001$ )
  - NNH = 66

Haut, Elliott R., et al. "Spine immobilization in penetrating trauma: more harm than good?." *Journal of Trauma and Acute Care Surgery* 68.1 (2010): 115-121.

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### A final nail in the coffin

“This study suggests that thoracolumbar immobilization is almost never beneficial in patients with torso GSW, and that a higher mortality rate existed among those GSW patients without vertebral column injury vs those with such injuries.”



Cornwell, Edward E., et al. "Thoracolumbar immobilization for trauma patients with torso gunshot wounds: is it necessary?." *Archives of Surgery* 136.3 (2001): 324-327.

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### Meanwhile...

The spinal immobilization rates continued to increase.

Most immobilization was based on mechanism  
(any mechanism)

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## Cervical Spine Decision Rules are Great!

**Spinal Cord Injury without Radiographic Abnormality: Results of the National Emergency X-Radiography Utilization Study in Blunt Cervical Trauma**

Gregory W. Hendey, MD, Allan B. Wolfson, MD, William R. Mower, MD, PhD, and Jerome R. Hoffman, MA, MD for the National Emergency X-Radiography Utilization Study Group

**The Canadian C-Spine Rule for Radiography in Alert and Stable Trauma Patients** FREE

Ian G. Stiell, MD, MSc, FRCPC, George A. Wells, PhD, Katherine L. Vandemheen, BScN, Catherine M. Clement, RN, Howard Leslie, MD, Milena J. De Melo, MD, MSc, Andreas Laupacis, MD, MSc, Michael Schull, MD, MSc, R. Douglas McKinight, MD, Richard LeBeck, MD, Robert Brisson, MD, MPH, Daniel Cass, MD, Jonathan Drejer, MD, Mary A. Eisenhauer, MD, Gary H. Greenberg, MD, Ian MacRae, MD, MSc, Laura Morrison, MD, MSc, Mark Reardon, MD, James Worthington, MBS

Hendey, Gregory W., et al. "Spinal cord injury without radiographic abnormality: results of the National Emergency X-Radiography Utilization Study in blunt cervical trauma." *Journal of Trauma and Acute Care Surgery* 53.1 (2002): 1-4.  
 Stiell, Ian G., et al. "The Canadian C-spine rule for radiography in alert and stable trauma patients." *Jama* 286.15 (2001): 1841-1848.

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## Cervical Spine Decision Rules are Great!

For Alert Cervical Spine Status in US and Stable Cervical Spine Status in US  
 General Rule: C-Spine Rule in 4 Columns

1. Any High-Risk Factor That Warrants Radiography?  
 High GSI Score  
 Significant Mechanism of Injury  
 Presence of Extremity Fractures

2. Any Low-Risk Factor That Allows Safe Assessment of Range of Motion?  
 Alert (GCS 15)  
 No Significant Mechanism of Injury  
 No Significant Extremity Fractures  
 No Significant Cervical Tenderness

3. Alert to Answer, Responder Present?  
 Yes  
 No (No Radiography)

4. No Significant Cervical Tenderness

**Table 1 NEXUS Defined "Low-Risk" as Meeting None of the Listed Criteria**

1. Altered level of alertness
2. Intoxication
3. Posterior midline cervical spine tenderness
4. Distracting painful injury
5. Focal neurologic deficit

Hendey, Gregory W., et al. "Spinal cord injury without radiographic abnormality: results of the National Emergency X-Radiography Utilization Study in blunt cervical trauma." *Journal of Trauma and Acute Care Surgery* 53.1 (2002): 1-4.  
 Stiell, Ian G., et al. "The Canadian C-spine rule for radiography in alert and stable trauma patients." *Jama* 286.15 (2001): 1841-1848.

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## TLS Spine Decision Rules are Nonexistent!

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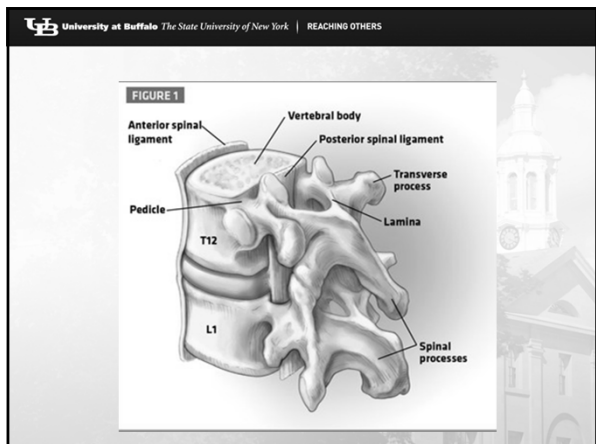
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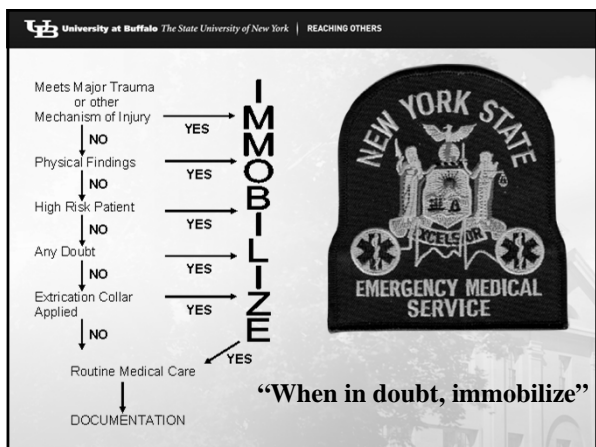
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**The Culture of “When in doubt immobilize”**

- 5,432 patients immobilized by EMS and transported to a trauma center (2010-2013)
- 233 (4.3%) had an acute thoracolumbar fracture, dislocation or subluxation
- 29 (0.5%) had an “unstable” injury

Clemency BM, Bart JA, et al. Patients Immobilized With a Longboard Rarely Have Highly Unstable Thoracolumbar Injuries [Abstract] Prehospital Emergency Care. 19(1). 2015.

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### What about the ground level falls?

No highly unstable injuries were found among the 951 subjects who were immobilized following ground level falls.

Clemency BM, Bart JA, et al. Patients Immobilized With a Longboard Rarely Have Highly Unstable Thoracolumbar Injuries [Abstract] Prehospital Emergency Care. 19(1). 2015.

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	Subjects	Any Spine Imaging	TL Imaging	Acute TL Fracture	TL Surgery
<b>Blunt Trauma</b>					
Assault	958	430 (85.0%)	343 (28.1%)	9 (1.0%)	0 (0.0%)
Fall/O	951	740 (79.0%)	205 (22.0%)	11 (1.2%)	0 (0.0%)
Fall13-4	163	149 (91.4%)	84 (57.7%)	6 (3.7%)	0 (0.0%)
Fall15-9	172	159 (92.4%)	117 (68.0%)	15 (8.7%)	2 (1.2%)
Fall10-14	86	60 (69.8%)	44 (51.2%)	9 (10.3%)	0 (0.0%)
Fall15-19	22	22 (100%)	20 (90.9%)	4 (18.2%)	1 (4.5%)
Fall>20	80	74 (92.5%)	69 (86.3%)	23 (28.8%)	8 (10.0%)
Falls - Unknown Height	46	43 (93.5%)	28 (60.9%)	6 (13.0%)	0 (0.0%)
Hanging	30	22 (73.3%)	9 (30.0%)	0 (0.0%)	0 (0.0%)
Motor vehicle collision	2935	2195 (83.3%)	1160 (46.1%)	97 (3.7%)	12 (0.5%)
Pedestrian/Bicyclist Struck	438	364 (83.1%)	264 (64.8%)	38 (8.7%)	1 (0.2%)
Other Bicyclist Accident	47	39 (76.6%)	12 (25.5%)	1 (2.1%)	1 (2.1%)
Sports Injury *	44	33 (75.0%)	10 (22.7%)	1 (2.3%)	1 (2.3%)
Other/Unknown	84	65 (77.4%)	42 (50.0%)	4 (4.8%)	0 (0.0%)
All Blunt	5286	4414 (83.5%)	2743 (51.9%)	234 (4.4%)	29 (0.5%)
<b>Penetrating Trauma</b>					
STAB	29	13 (44.8%)	9 (31.0%)	0 (0.0%)	0 (0.0%)
GSW	108	48 (44.4%)	30 (27.8%)	9 (8.3%)	3 (2.8%)
All Penetrating	137	61 (44.5%)	39 (28.5%)	9 (6.6%)	3 (2.2%)
<b>Total</b>	<b>5423</b>	<b>4475 (82.5%)</b>	<b>2782 (51.3%)</b>	<b>233 (4.3%)</b>	<b>29 (0.5%)</b>

Figure 2: Subjects and Findings by Mechanism  
 TL = Thoracic or lumbar spine. All percentages are based on total subject with same mechanism. Motor vehicle collisions include motorcycles and all terrain vehicles. Sports injuries excluded bicycle/motorized vehicles.

Clemency BM, Bart JA, et al. Patients Immobilized With a Longboard Rarely Have Highly Unstable Thoracolumbar Injuries [Abstract] Prehospital Emergency Care. 19(1). 2015.

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### While we were immobilizing everyone, what was everyone else doing?



- Patients with spine injuries in Albuquerque (where everyone was immobilized), were compared to Kuala Lumpur (where no one was immobilized)
- The 2 hospitals were comparable in physician training and clinical resources.

Hauswald, Mark, Dan Tandberg, and Zaliha Omar. "Out-of-hospital Spinal Immobilization: Its Effect on Neurologic Injury." *Academic Emergency Medicine* 5.3 (1998): 214-219.

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### A tail of 2 cities...



- There was less neurologic disability in the unimmobilized Malaysian patients (OR 2.03; 95% CI 1.03–3.99;  $p = 0.04$ ). This corresponds to a <2% chance that immobilization has any beneficial effect.
- Results were similar when the analysis was limited to patients with cervical injuries (OR 1.52; 95% CI 0.64–3.62;  $p = 0.34$ )

Hauswald, Mark, Dan Tandberg, and Zaliha Omar. "Out-of-hospital Spinal Immobilization: Its Effect on Neurologic Injury." *Academic Emergency Medicine* 5.3 (1998): 214-219.

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### Why should the backboard have a monopoly?

Scoop Stretchers and the "lift and slide" technique were able to restrict motion of the spine as well as the log-roll technique with long board.



Del Rossi et al. Are Scoop Stretchers Suitable for use on spine-injured patients? *American Journal of Emergency Medicine* 2010.

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## What's the best way to minimize spinal movement? Hint... its not a backboard

Original article

### Biomechanical analysis of spinal immobilisation during prehospital extrication: a proof of concept study

Mark Dixon,<sup>1,2</sup> Joseph O'Halloran,<sup>3</sup> Niamh M Cummins<sup>1</sup>

Dixon, Mark, Joseph O'Halloran, and Niamh M. Cummins. "Biomechanical analysis of spinal immobilisation during prehospital extrication: a proof of concept study." *Emergency Medicine Journal* (2013): emmed-2013.

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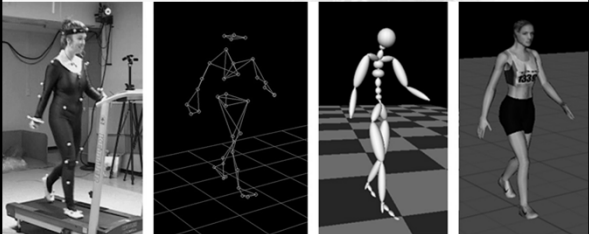
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THE OBJECTIVE OF THIS STUDY IS TO ESTABLISH WHICH TECHNIQUE PROVIDES THE MINIMAL DEVIATION OF THE CERVICAL SPINE FROM THE NEUTRAL INLINE POSITION DURING THE EXTRICATION OF THE RTC PATIENT USING BIOMECHANICAL ANALYSIS TECHNIQUES.



Dixon, Mark, Joseph O'Halloran, and Niamh M. Cummins. "Biomechanical analysis of spinal immobilisation during prehospital extrication: a proof of concept study." *Emergency Medicine Journal* (2013): emmed-2013.

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**Table 1 Self-extrication instructions**

Instruction sequence	Instruction
Step 1	'Do you understand what we are asking you to do?' Try and keep your head as still as possible. Stop at any time if you feel pain or strange sensations in your body
Step 2	Slowly move your right foot and place it on the ground outside the car
Step 3	Using the steering wheel for support pull yourself forward
Step 4	Keep your left hand on the steering wheel and place your right hand on the edge of the seat behind you
Step 5	Turn slowly on your seat to face the outside, your left leg should follow when ready but remain seated
Step 6	With both feet flat on the floor stand straight up using your arms for balance
Step 7	Take two steps away from the car

Dixon, Mark, Joseph O'Halloran, and Niamh M. Cummins. "Biomechanical analysis of spinal immobilisation during prehospital extrication: a proof of concept study." *Emergency Medicine Journal* (2013): emmed-2013.

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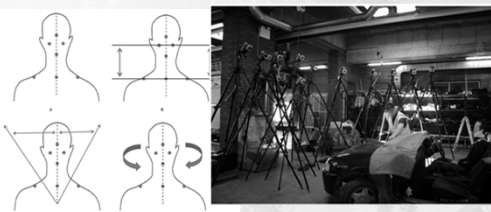
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page 1: 10 Location of reflective tape, 20 Capital plate movement, Frontal plate movement, Rotational plate movement.



Conventional extrication techniques record up to four times more cervical spine movement during extrication than controlled self extrication.

Dixon, Mark, Joseph O'Halloran, and Niamh M. Cummins. "Biomechanical analysis of spinal immobilisation during prehospital extrication: a proof of concept study." *Emergency Medicine Journal* (2013): emmed-2013.

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### On arrival at the hospital

- 50 "Immobilized" patients were prospectively evaluated upon arrival in the ED.
- 15 (30%) had at least one unattached strap or piece of tape that should have attached their head to the board
- 44 (88%) were found to have greater than 2 cm of slack between their body and at least one strap.

Peery CA, Brice J, White WD. Prehospital spinal immobilization and the backboard quality assessment study. *Prehosp Emerg Care*. 2007;11:293-7.

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### En route to the hospital

During transport, once on a backboard, patients still subject to significant head to toe and side to side forces.

Silbergleit R, Dedrick DK, Pape J, Burney RE. Forces acting during air and ground transport on patients stabilized by standard immobilization techniques. *Ann Emerg Med* 1991;20:875-877.

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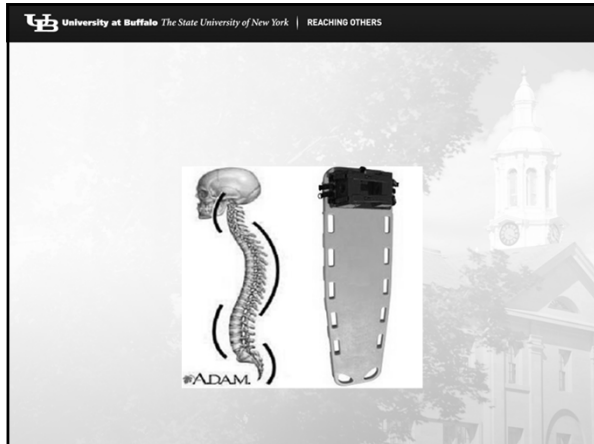
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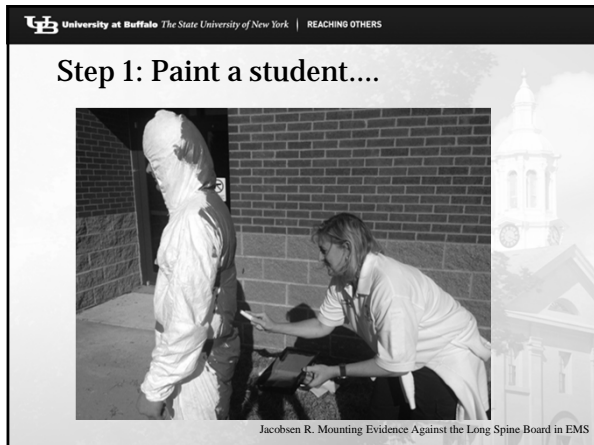
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**Step 3: Then lifted the student off.**



Jacobsen R. Mounting Evidence Against the Long Spine Board in EMS

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**We re-painted our student....and laid him on our cot mattress**



Jacobsen R. Mounting Evidence Against the Long Spine Board in EMS

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Comparison of points of contact showed increased points of contact and more comfortable than backboard



Jacobsen R. Mounting Evidence Against the Long Spine Board in EMS

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Rule #1  
Do No Harm

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**Evidence of HARM**

Respiratory compromise (reduces FVC, FEV1 in healthy patients strapped to a board)

Effect on injured patients? Ptx, pulm contusions, rib fx etc..

Bauer D, Kowalski R. Effect of spinal immobilization devices on pulmonary function in the healthy, nonsmoking man. Ann Emerg Med. 1988;17:915-8  
Walsh M, Grant T, Mickey S. Lung function compromised by spinal immobilization. Correspondence. Ann Emerg Med. 1990;19:615-6

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### Evidence for HARM

Pressure sores/tissue hypoxia

Good evidence that even short time periods on board cause tissue hypoxia on contact points as well as pressure wounds.....becomes worse with elderly and severely injured folks who can't readjust on board (aka spinal cord injured patient!)

Linares HA, Mawson AR, Suarez E, Biundo JJ. Association between pressure sores and immobilization in the immediate post-injury period. *Orthopedics*. 1987;10:571-3.  
Cordell WH, Hollingsworth JC, Olinger ML, Straman SJ, Nelson DR. Pain and tissue-interface pressures during spine-board immobilization. *Ann Emerg Med*. 1995;26:31-36.

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### Evidence for HARM

Increased pain

Healthy subjects placed on boards developed numerous complaints when on boards for short times (headaches, back, neck pain, dizziness, nausea)

Barney RN, Cordell WH, Miller E. Pain associated with immobilization on rigid spine boards. *Ann Emerg Med*. 1989;18:918.  
Chan D, Goldberg R, Tascone A, Harmon S, Chan L. The effect of spinal immobilization on healthy volunteers. *Ann Emerg Med*. 1994;23:48-51

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### Evidence for HARM

Increase in unnecessary radiologic imaging in ED



March J, Aushand S, Brown L. Changes in physical examination caused by use of spinal immobilization. *Prehosp Emerg Care*. 2002;6:421-4  
Berrington de Gonzalez A, Mahesh M, Kim K, Bhargavan M, Lewis R, Mettler F, Land C. Projected Cancer Risks From Computed Tomographic Scans Performed in the United States in 2007. *Arch Intern Med*. 2009;169:2071-77.  
Hall E, Brenner D. Cancer risks from diagnostic radiology. *Br J Radiol*. 2008 May;81:362-78.  
Fratley F, Pham J, Kirsch T. Use of advanced radiology during visits to US emergency departments for injury-related conditions, 1998-2007. *JAMA*. 2010;304:1465-71.

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Routine spinal immobilization for trauma patients has become established in developed countries throughout the world. Cervical spinal injury is, however, relatively rare in trauma patients, and immobilization practice was developed largely without firm supporting evidence. In recent years, published evidence has suggested that spinal immobilization may in some cases be harmful.

Our findings present a growing body of evidence documenting the risks and complications of routine spinal immobilization. There is a possibility that immobilization could be contributing to mortality and morbidity in some patients and this warrants further investigation

Abram, S., and C. Bulstrode. Routine spinal immobilization in trauma patients: What are the advantages and disadvantages? *The Surgeon* 8.4 (2010): 218-222.

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### Cochrane Review



“Unwarranted spinal immobilization can expose patients to the risks of iatrogenic pain, skin ulceration, aspiration and respiratory compromise, which in turn can lead to multiple radiographs, resulting in unnecessary radiation exposure, longer hospital stay and increased costs. The potential risks of aspiration and respiratory compromise are of concern because death from asphyxiation is one of the major causes of preventable death in trauma patients.”

Kwan I, Bunn F, Roberts I. Spinal immobilization for trauma patients. *Cochrane Database of Systematic Reviews*, 2009;1:1-15

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### But what about the children?

A prospective cohort of Pediatric trauma patients (prospective cohort)

Spinal immobilization was associated with:

- increased pain
- Increased radiographic usage
- increased admission to the hospital.



Leonard J, Mao J, Jaffe D. Potential adverse effects of spinal immobilization in children. *Prehosp Emerg Care* 2012;16:513-518.

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### But what if they just will not hold still?

- Alcohol Intoxication
- Drug Use
- Psychiatric
- Dementia
- Pediatrics
- Head Injury



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### But what if they just will not hold still?

- Tightening the straps may restrict movement but not the forces generated by the patient on the spine in resistance to restraining efforts.
- Attempting to enforce immobilization of the uncooperative patient may result in more force transmission to the spine than before the struggle commenced.



Hauswald M. A re-conceptualisation of acute spinal care. Emerg Med J. 2012;00:1-4.

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### But what if they just will not hold still?



- Forcing a patient into immobilization will probably not limit movement and definitely not reduce forces.

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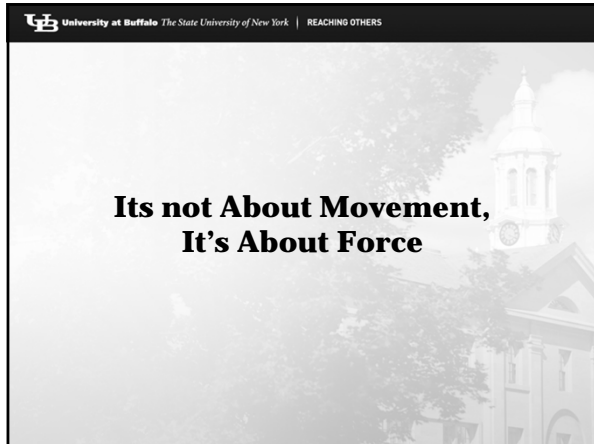
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**Its not About Movement,  
It's About Force**

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- Most patients who do have spinal injuries are mechanically 'stable' at least in the short term—stable in that significant force would need to be applied to the injured site to cause further damage.
- Reducing visible spinal movement does not necessarily reduce movement at the injured site both because movement at uninjured sites requires minimal force and because force applied at the injured site may not cause gross movement of the rest of the spine.
- Mechanical work at the injured site will by definition be minimised by minimising force and energy there.
- Mechanical work can increase injury but movement per se cannot

Hauswald, Mark. "A re-conceptualisation of acute spinal care." *Emergency Medicine Journal* (2012): emermed-2012.

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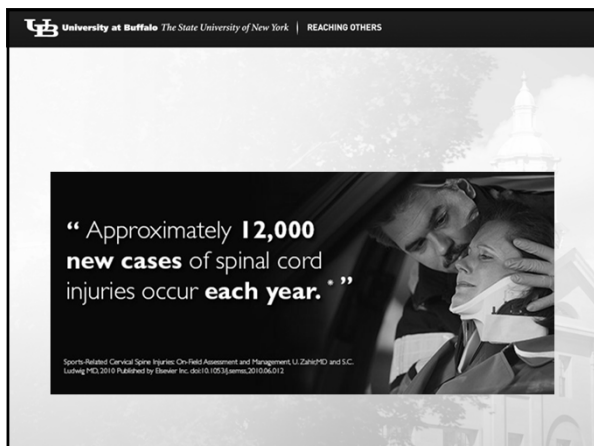
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**"Approximately 12,000  
new cases of spinal cord  
injuries occur each year."**

Sports-Related Cervical Spine Injuries: On-Field Assessment and Management, U. Zakharenko and S.C. Ludwig MD, 2010. Published by Elsevier Inc. doi:10.1053/j.ajem.2010.06.012

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### What questions do we ask?

- Did my patient have trauma?
- Could my patient have a spine injury?
- Could my patient have an unstable spine injury?
- Could my patient have an unstable spine injury that could get worse?
- Could my patient have an injury that could get worse due to not using a long board ... and how is that balanced against my patient's risk of getting worse because of a backboard.

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### What national associations are supportive of the current NY spinal immobilization paradigm?

- American College of Surgeons
- American College of Emergency Physicians
- National Association of EMS Physicians
- None of the Above

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### POSITION STATEMENT

#### EMS SPINAL PRECAUTIONS AND THE USE OF THE LONG BACKBOARD

National Association of EMS Physicians and American College of Surgeons Committee on Trauma

**• The long backboard can induce pain, patient agitation, and respiratory compromise. Further, the backboard can decrease tissue perfusion at pressure points, leading to the development of pressure ulcers.**

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### POSITION STATEMENT

EMS Section

- Appropriate patients to be immobilized with a backboard may include those with:
- Patients for whom immobilization on a backboard is not necessary include those with all of the following:
- Education of field EMS personnel should include evaluation of the risk of spinal injury in the context of options to provide spinal precautions.

Approved by the National Association of EMS Educators and the National Association of EMS Physicians in 2011. Approved by the National Association of EMS Educators and the National Association of EMS Physicians in 2011. Approved by the National Association of EMS Educators and the National Association of EMS Physicians in 2011.

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### And ACEP went even further.

American College of Emergency Physicians® POLICY STATEMENT  
ADVANCING EMERGENCY CARE

Approved January 2013 *EMS Management of Patients with Potential Spinal Injury*

Backboards should not be used as a therapeutic intervention or as a precautionary measure either inside or outside the hospital or for inter-facility transfers. Spinal immobilization should not be used for patients with penetrating trauma without evidence of spinal injury.

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### PROPOSED PROTOCOL CHANGE

The following is the proposed new protocol, it has been approved by the SEMAC, and is still awaiting DOH approval/implementations.




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**SEMAC - ENDORSEMENT**

**SEMAC Statement on Pre-hospital Spinal Immobilization**

The SEMAC recognizes that there has been a lot of discussion and education about the practice of spinal immobilization and that this has created some confusion for our providers and ED staff. We issue this position statement to update the position of the SEMAC on the practice of spinal immobilization or spinal motion restriction.

The SEMAC affirms the NASEMOP's recommendation for judicious use of the long spine board and recommends the liberal use of appropriately sized cervical collars for patients with traumatic mechanism where unstable spine injuries are suspected or cannot be excluded. As directed by the NY State Major Trauma criteria, a cervical collar should be placed when indicated. However, as is done in the hospital, spinal movement can be minimized "spinal motion restriction" without associated long spine board use.

In many patient circumstances, a long spine board may be the best method of extrication. A spine board is worth the time involved in all cases, and in many may be far more beneficial than useful. In most cases of ambulatory patients, the placement of an appropriately sized cervical collar followed by positioning the patient in a supine or semi-recumbent position on an ambulance stretcher, is sufficient to minimize spinal movement. A "standing-tilt-down" of patient onto a long spine board is an unnecessary practice and should not be performed.

The SEMAC recommends providers minimize spinal movement for patients with traumatic mechanism where unstable spine injuries are suspected or cannot be excluded. Methods for minimizing spinal movement may include:

1. Careful patient handling and transport on a padded stretcher
2. Extricating a patient using a scoop stretcher or other carrying device
3. Extricating a patient using a long spine board may be a useful method.

Avoiding transport on the long spine board is preferred, unless removal would delay transport of an unstable patient or removal cannot be safely performed.

The SEMAC recognizes the increasing evidence of harm associated with long spine board use without clear evidence of its benefit. A robust understanding of the adverse effects of long spine board use should be incorporated into curricula. Long spine boards do not have a role in transporting patients between facilities and in no case, shall failure to utilize a long spine board constitute a deviation from the standard of care.

The SEMAC also supports the practice of Emergency Department registered nurses (EN) removing patients from long spine boards. As set forth in a resolution that the spine board is not an immobilization device, and when supported by individual hospital policy and practice, we support an EN's removal from the long spine board to minimize patient discomfort prior to a practitioner medical evaluation.

**2015 SEMAC Suspected Spinal Injury Protocol & Rollout Documents**

*Final Report: Spinal Motion Restriction TAG*

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**PROPOSED PROTOCOL CHANGE**

**2015 Suspected Spinal Injuries**

**For patients meeting Adult or Pediatric Major Trauma Criteria (Protocol T-6 or T-7) with a BLUNT mechanism of injury:**

1. Spine injury should be suspected.
2. The patient should be placed in a properly fitted cervical collar and spinal movement minimized.

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### PROPOSED PROTOCOL CHANGE

For patients meeting Adult or Pediatric Major Trauma Criteria (Protocol T-6 or T-7) with a **PENETRATING** mechanism of injury, **OR** for patients **NOT** meeting Adult or Pediatric Major Trauma Criteria with a **BLUNT** mechanism of injury, **spine injury should be suspected if one or more of the following criteria are present:**

1. Altered mental status – Associated with trauma - for any reason including possible intoxication from alcohol or drugs (GCS<15)
2. Complaint of neck and/or spine pain or tenderness
3. Weakness, tingling or numbness of the trunk or extremities at any time **since** the injury
4. Deformity of the spine not present prior to the incident
5. Painful distracting injury or circumstances (i.e. anything producing an unreliable physical exam)
6. High Risk mechanism of injury associated with unstable spinal injuries that include, but are not limited to:
  - Axial Load (i.e. diving injury, spearing tackle)
  - High Speed motorized vehicle crashes or roll over
  - Pedestrian or bicyclist struck/collision
  - Falls >3feet/5steps or patient's height

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### PROPOSED PROTOCOL CHANGE

**If a spine injury is suspected, the patient should be placed in a properly fitting rigid cervical collar, and spinal movement minimized.**

**Patients without any of the above findings may be transported without the use of a cervical collar or any other means to restrict spinal motion.**

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### PROPOSED PROTOCOL CHANGE

**Notes:**

**A long spine board is one of multiple modalities that can be used to minimize spinal movement. Electing not to use a long spine board will not constitute a deviation from the standard of care.**

**Spinal movement can be minimized by application of a properly fitting rigid cervical collar and securing the patient to the EMS stretcher.**

**When spinal motion restriction has been initiated and a higher level of care arrives, patients should be reassessed for spinal injury (per this protocol).**

**When possible, the highest level of care on scene will determine if spinal motion restriction is to be used or discontinued (collar removed, etc.)**

**Long spine boards do not have a role in transporting patients between facilities.**

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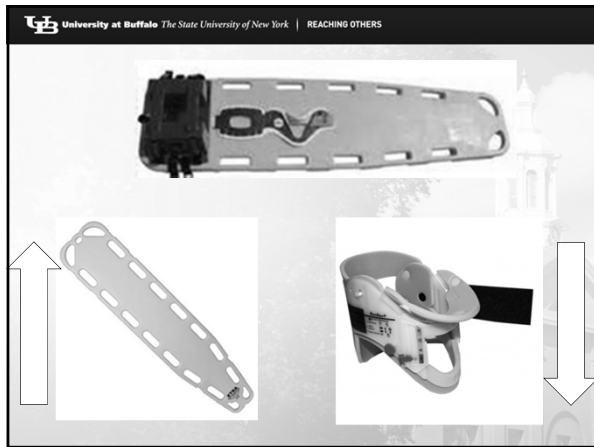
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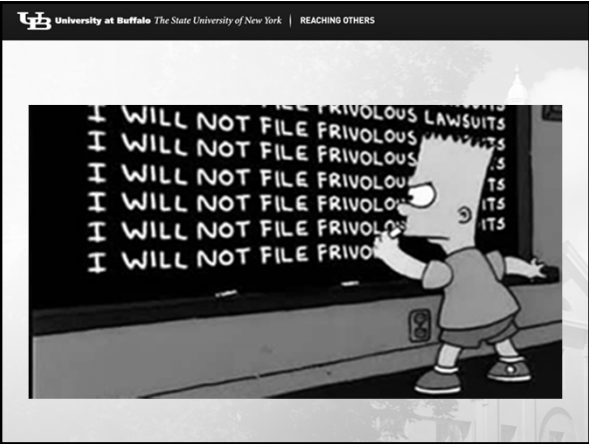
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**There's lots of ways to get worse.**

*Other features of the basic physics of spinal cord injury*

at C1/C2	ST and C7/T6	C8/T12/L1
<b>Spinal hyperextension and spinal flexion</b>		
<b>Vertebrae</b>	<b>Vertebrae</b>	
<b>C7/T6 head flexion/extension</b>	<b>C7/T6 head flexion/extension</b>	
<b>Ischemia</b>	<b>Ischemia</b>	
<b>Oligemia</b>	<b>Oligemia</b>	
<b>Disruption of axon transport</b>	<b>Disruption of axon transport</b>	
<b>Microvascular thromboses</b>	<b>Microvascular thromboses</b>	
<b>Platelet activation/aggregation</b>	<b>Platelet activation/aggregation</b>	
	<b>Free radical production</b>	
	<b>Apoptosis</b>	
	<b>Excitotoxicity</b>	
	<b>Ion channel dysregulation</b>	
	<b>Cellular membrane damage</b>	
	<b>Cellular dysfunction</b>	
	<b>Cellular death</b>	
	<b>Cellular repair</b>	

**ITS GOING TO GET WORSE**

Oyibo, Charles Aidemise. "Secondary injury mechanisms in traumatic spinal cord injury: a nugget of this multiply cascade." *Acta Neurobiol Exp (Wars)* 71.2 (2011): 281-299.

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**Challenges to Implementation**

A photograph of a signpost at an intersection. One sign reads "KNOWLEDGE ST" and the other, pointing in the opposite direction, reads "IGNORANCE BLVD".

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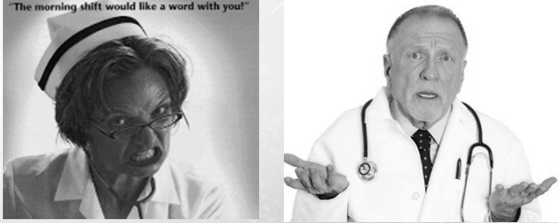
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### Challenges to Implementation

The morning shift would like a word with you!



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