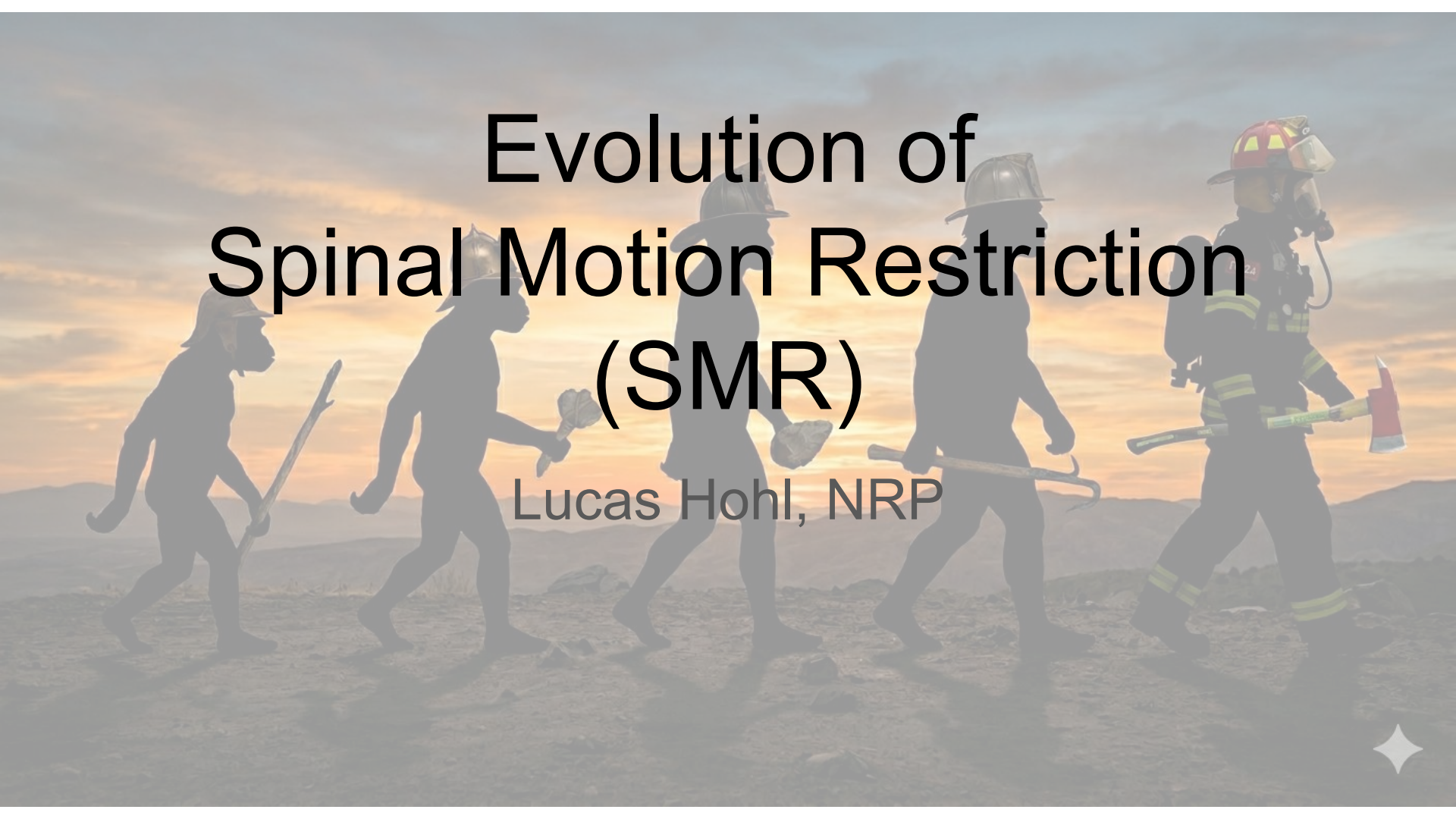


Evolution of Spinal Motion Restriction (SMR)

Lucas Hohl, NRP

Introduction

What are we talking about?

- SMR
- C-Collars
- Where we are
- Where we've been
- Where we're going
- Updates
- Techniques

Current Protocols

UC-Health Memorial/CSFD

- One Dose App
- Procedures→SMR
  - Recognize MOI or pre-existing medical condition implying potential need for SMR
    - MVCs, falls, assault, kypyhosis, osteoporosis, hx of spinal surgeries, etc.
  - Establish manual in-line C-spine stabilization
    - Go hands-on!

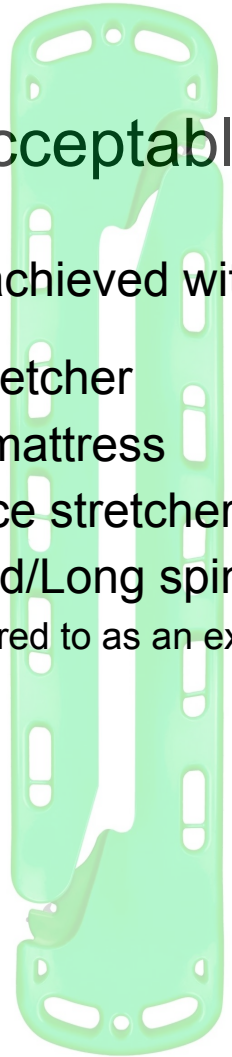
Current Protocols

- Assess patient for any of the following:
  - Psychological impairment, barriers to spinal assessment (language, development, distracting injuries), age >65 or <5, neurologic deficits/parasthesias, midline tenderness (especially pinpoint tenderness)
  - If NONE of the above are present…SMR not required
  - If any of the above are present…
    - Apply C-collar
    - Perform a Neuro exam
      - Motor/Sensory deficits or AMS or ↑ RASS = SMR
      - No deficits or alterations = No SMR, leave C-collar in-place

Current Acceptable Methods of SMR

SMR can be achieved with a combination of a C-Collar and any of the following:

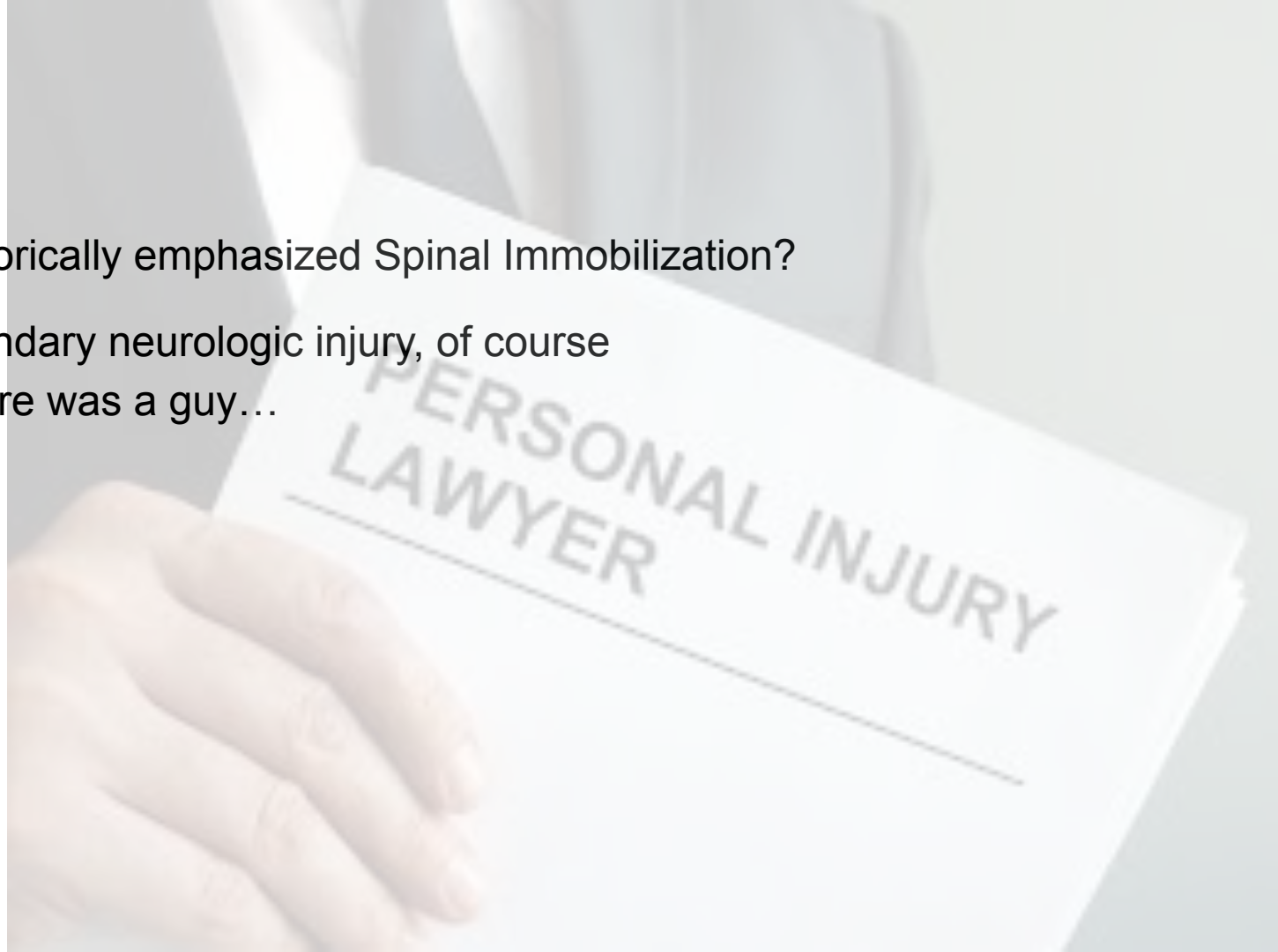
- Scoop stretcher
- Vacuum mattress
- Ambulance stretcher
- Backboard/Long spine board
    - (Referred to as an extrication board for remainder of presenation)



Why?

Why have we historically emphasized Spinal Immobilization?

- Prevent secondary neurologic injury, of course
- One time, there was a guy…
- CYA
- Others?



Show your age!

If you can remember, how were you trained?

Group 1: Pre-2010

C-collar, extrication board and high-flow oxygen for all?

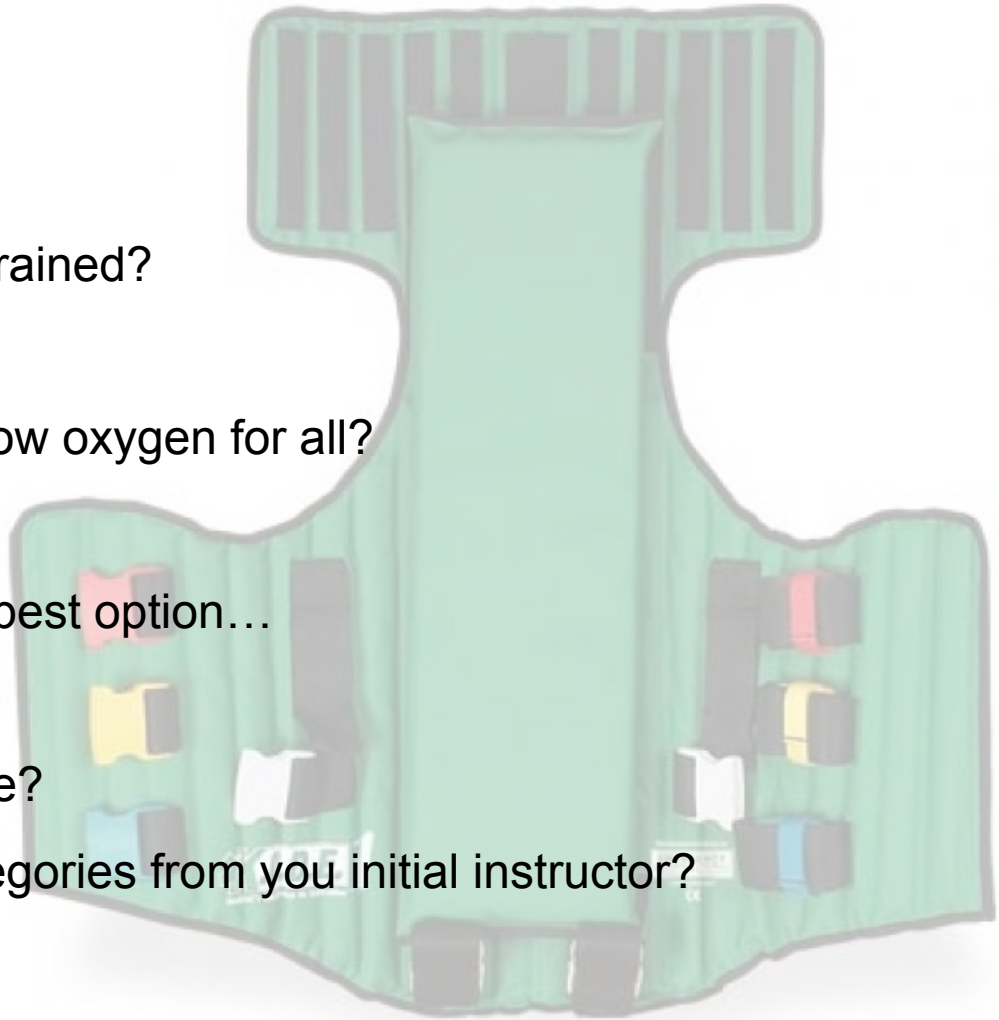
Group 2: 2010-2020

Backboards might not be always the best option…

Group 3: 2020-present

Why are you using that archaic device?

Can you remember any stories or allegories from you initial instructor?



Where did it begin?

- Remember the White Paper (from every single EMS textbook)
  - In the 1960s, increased traumatic injuries from MVCs lead to the rapid development of trauma protocols based on position statements–“expert opinions”
    - Essentially Trauma Surgeons’ “best guess”
    - These protocols were fairly universal as a c-collar and a rigid backboard
  - In 1993, Wilderness medicine expert Dr. Peter Goth realized that spinal immobilization would create logistical problems and instituted Selective Spinal Immobilzation
  - In 1998, Dr. Hauswald (UNM), began questioning the efficacy of spinal immobilization
    - HIs study actually showed increased risk of disability in the immobilized group
      - The study wasn’t perfect, but it started the conversation
  - By the early 2010s, further studies demonstrated Selective SMR was more appropriate

Where is it going?

Spinal Immobilization→Spinal Motion Restriction→Selective SMR

- Spinal Immobilization: Preventing movement of the spne
- SMR: Attempting to maintain anatomic alignment and minimize gross movement
- Selective SMR: Utilizing criteria/judgement to determine SMR need
- Updated guidelines to be published soon
    - Features:
        - Similar algorithm to current SMR selection criteria
        - No SMR in penetrating injuries
        - Add'l C-spine tools: towel rolls, soft collars, standalone head blocks, vacuum split without additional c-collar
            - Vacuum splints have demonstrated best motion restriction in one study
        - Extrication boards are for Extrication–remove as soon as able

Why the de-emphasis on Rigid Collars?

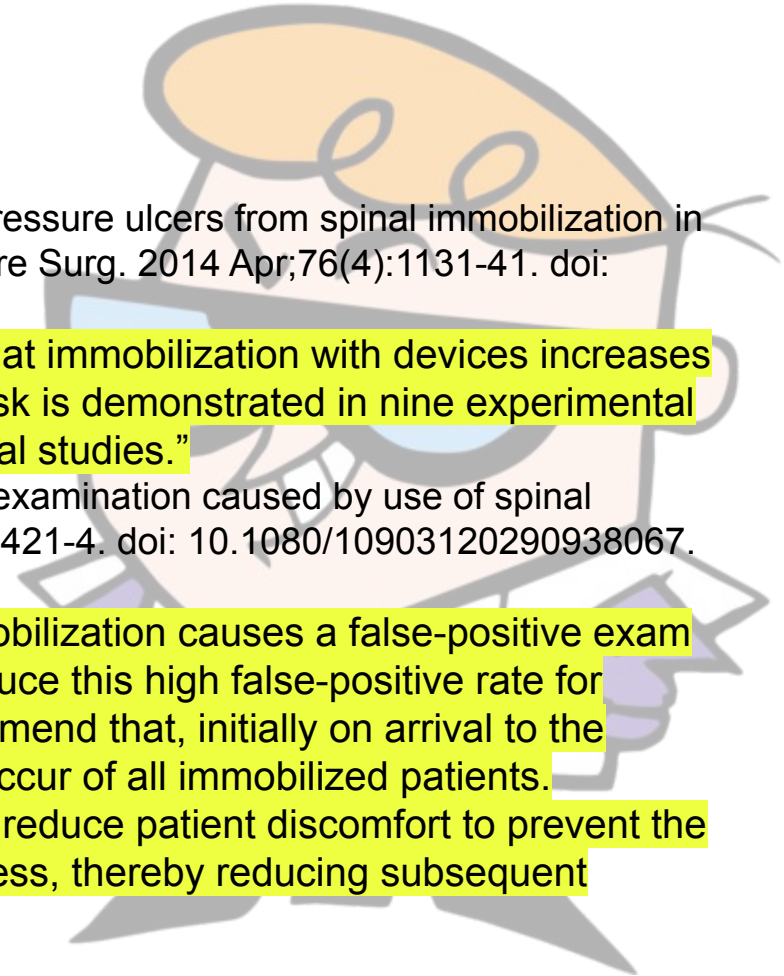
- Respiratory Complications
  - Difficult airway management
  - Impaired ability to clear secretions
    - ↑ aspiration risk
- Neurologic Compliations
  - Venous congestion / jugular restriction
  - ↑ ICP
- Others
  - Pain & pressure ulcers
  - Concealment of physical signs
    - JVD, subQ emphysema, tracheal deviation

We are NOT perfect!

The other tools…

- Vacuum mattress
  - Full body splint
  - More Comfortable
  - Conforms to individual
- Head blocks/Towel Rolls
  - Reduces lateral and rotational movement
  - Preserves anteriolateral neck access
  - Minimal restriction on airway management
  - Can remove one block quickly for vomiting
- Soft collars
  - Reduced pressure ulcers
  - Increased comfort

For the nerds…and the TL;DR



1. Ham W, Schoonhoven L, Schuurmans MJ, Leenen LP. Pressure ulcers from spinal immobilization in trauma patients: a systematic review. J Trauma Acute Care Surg. 2014 Apr;76(4):1131-41. doi: 10.1097/TA.0000000000000153. PMID: 24662882.
   - “The results from this systematic review show that immobilization with devices increases the risk for Pressure Ulcer Development. This risk is demonstrated in nine experimental studies with healthy volunteers and in four clinical studies.”
2. March JA, Ausband SC, Brown LH. Changes in physical examination caused by use of spinal immobilization. Prehosp Emerg Care. 2002 Oct-Dec;6(4):421-4. doi: 10.1080/10903120290938067. PMID: 12385610.
   - “This study shows that over time, standard immobilization causes a false-positive exam for midline vertebral tenderness. In order to reduce this high false-positive rate for midline vertebral tenderness, the authors recommend that, initially on arrival to the emergency department, immediate evaluation occur of all immobilized patients. Furthermore, backboards should be modified to reduce patient discomfort to prevent the iatrogenically induced midline vertebral tenderness, thereby reducing subsequent false-positive examinations.”

More Studies & Conclusions

3. Totten VY, Sugarman DB. Respiratory effects of spinal immobilization. Prehosp Emerg Care. 1999 Oct-Dec;3(4):347-52. doi: 10.1080/10903129908958967. PMID: 10534038.
    - “This study confirmed the previously reported respiratory restriction caused by spinal immobilization. Vacuum mattresses are more comfortable than wooden backboards.”
4. Mobbs RJ, Stoodley MA, Fuller J. Effect of cervical hard collar on intracranial pressure after head injury. ANZ J Surg. 2002 Jun;72(6):389-91. doi: 10.1046/j.1445-2197.2002.02462.x. PMID: 12121154.
    - “Early assessment of the cervical spine in head-injured patients is recommended to minimize the risk of intracranial hypertension related to prolonged cervical spine immobilization with a hard collar.”

Even more…

5. Hauswald M, Ong G, Tandberg D, Omar Z. Out-of-hospital spinal immobilization: its effect on neurologic injury. Acad Emerg Med. 1998 Mar;5(3):214-9. doi: 10.1111/j.1553-2712.1998.tb02615.x. PMID: 9523928.
    - “Out-of-hospital immobilization has little or no effect on neurologic outcome in patients with blunt spinal injuries.”
6. Durga P, Yendrapati C, Kaniti G, Padhy N, Anne KK, Ramachandran G. Effect of rigid cervical collar on tracheal intubation using Airtraq(®). Indian J Anaesth. 2014 Jul;58(4):416-22. doi: 10.4103/0019-5049.138976. PMID: 25197109; PMCID: PMC4155286.
    - Endotracheal intubation is more difficult, takes a longer time, and requires more maneuvers for success when cervical collar is applied.

Even more…

7. Milland K, Al-Dhahir MA. EMS Long Spine Board Immobilization. [Updated 2023 May 20]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK567763/

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TL;DR

https://rebelem.com/spinal-immobilization-in-trauma-patients/

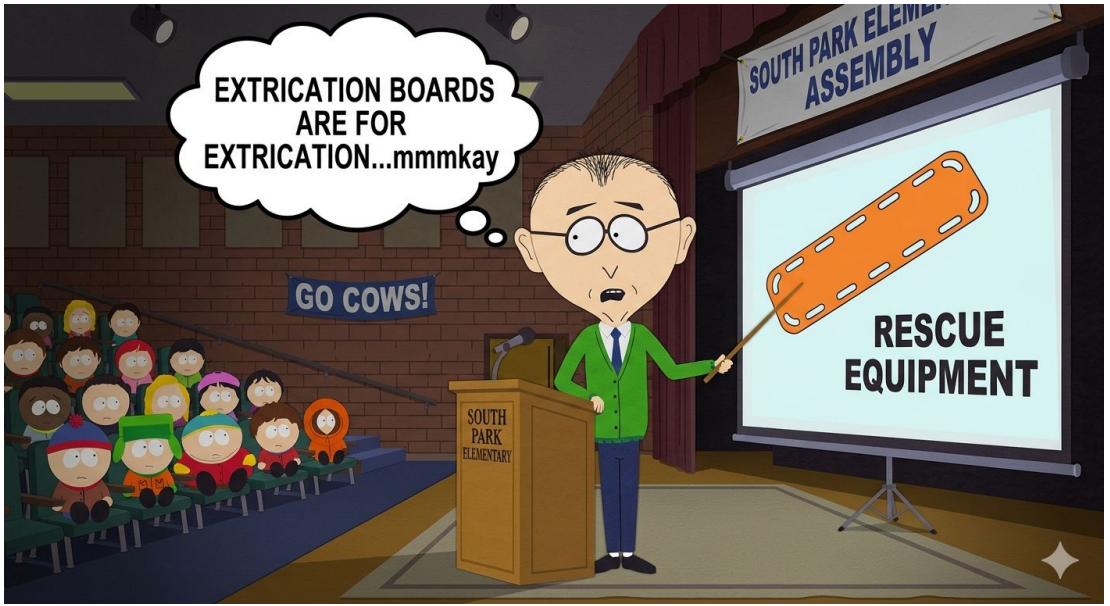
https://www.internationaljpp.com/content/features/no-place-for-the-rigid-cervical-collar-in-pre-hospital-care

ALWAYS follow your local protocols!

This is just a glimpse of where we are heading

Not advocating for anyone to be a protocol antagonist

Some agencies have long abandoned backboards, some are just getting used to the idea…



Questions? Discussions…

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Dr. Matthew Angelidis

Dr. Kashyap Kaul