

Is Routine Spinal Immobilization an Effective Intervention for Trauma Patients?

EBEM Commentator Contact

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SYSTEMATIC REVIEW SOURCE

This is a systematic review abstract, a regular feature of the *Annals'* Evidence-Based Emergency Medicine (EBEM) series. Each features an abstract of a systematic review from the *Cochrane Database of Systematic Reviews* and a commentary by an emergency physician knowledgeable in the subject area.

The source for this systematic review abstract is: Kwan I, Bunn F, Roberts I, on behalf of the WHO Pre-Hospital Trauma Care Steering Committee. Spinal immobilisation for trauma patients (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2005. Chichester, UK: John Wiley & Sons, Ltd.

OBJECTIVE

The objective of this systematic review is to quantify the effect of different methods of spinal immobilization (including immobilization versus no immobilization) on mortality, neurologic disability, spinal stability, and adverse effects in trauma patients.

DATA SOURCES

The authors searched the Cochrane Controlled Trial Register (CCTR), the specialized register of the Cochrane Injuries Group, MEDLINE, EMBASE, CINAHL, PubMed, and the National Research Register. They subsequently checked reference lists of all articles and contacted experts in the field to identify eligible trials. Eight manufacturers of spinal immobilization devices were also contacted for information. There was no language restriction in any of the searches.

STUDY SELECTION

The review was limited to randomized controlled trials comparing spinal immobilization strategies in trauma patients with suspected spinal cord injury. All trials performed in healthy volunteers were excluded.

DATA EXTRACTION

One reviewer performed screening of the electronic searches for possibly relevant trials (10% second reviewer assessment); the full text of all potentially relevant trials was retrieved, and

2 reviewers applied the selection criteria independently to the trial reports. Disagreements were resolved by a third reviewer. Two reviewers independently extracted data. The reviewers were not blinded to the authors or journal when performing these tasks.

MAIN RESULTS

The authors identified 4,438 potentially eligible reports; none of these met the inclusion criteria. The authors failed to find any randomized controlled trial performed on unhealthy volunteers that focused on spinal immobilization strategies and techniques in trauma patients. A number of randomized controlled trials were identified comparing different spinal immobilization strategies in healthy volunteers. The results of randomized controlled trials on healthy volunteers may provide some useful insights into their relative effectiveness in trauma patients. For this reason, although trials of healthy volunteers did not meet the inclusion criteria, the authors summarized them in the additional tables section of the review.

CONCLUSIONS

The authors of this Cochrane review failed to identify any randomized controlled trials that met their inclusion criteria. The effect of spinal immobilization on mortality, neurologic injury, spinal stability, and adverse effects in trauma patients remains uncertain. Because airway obstruction is a major cause of preventable death in trauma patients, and spinal immobilization, particularly of the cervical spine, can contribute to airway compromise, the possibility that immobilization may increase mortality and morbidity cannot be excluded. Large prospective studies are needed to validate the decision criteria for spinal immobilization in trauma patients with high risk of spinal injury. Randomized controlled trials in trauma patients are required to establish the relative effectiveness of alternative strategies for spinal immobilization.

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COMMENTARY: CLINICAL IMPLICATION

Spinal immobilization and spinal precautions are common practices in the out-of-hospital care of patients with trauma, especially those in whom spinal injury is suspected. Despite this practice, spinal cord injuries are rare, often obvious at the scene, and several validated decision rules exist that are designed to clinically clear the cervical spine and reduce the need for radiography.^{1,2} In the United States, out-of-hospital agency-specific protocols and national guidelines consider spinal immobilization as “the standard of care.” This systematic review concludes that there is no published or unpublished scientific evidence justifying the practice of spinal immobilization in the out-of-hospital setting, suggesting that a large randomized controlled trial is required to solve this problem. This lack of scientific evidence is potentially related to historical out-of-hospital practice factors or even perhaps fear of litigation by deviating from what is considered “standard of care.”

The authors of this Cochrane systematic review also describe several studies that show how spinal immobilization has little or no effect on outcomes.^{3,4} The authors suggest that because significant forces are needed to produce an unstable spinal injury, there is a high likelihood that the spinal cord damage occurs at impact and subsequent movement will not cause further damage. Moreover, other studies have found associated risks related to the practice of spinal immobilization, such as airway difficulties, increased intracranial pressure, increased risk of aspiration, and restricted ventilation.^{5,6} Finally, spinal immobilization could lead to increased pain and potentially delay discharge, lead to patient flow problems, and contribute to emergency department (ED) crowding.

Several cervical spine clearance and radiology clinical decision rules exist^{1,2} and are used in ED practice. Various recent publications have recommended the development of out-of-hospital-specific rules and proposed the possibility of using existing NEXUS or Canadian criteria in the out-of-hospital setting.⁷⁻¹⁰ A recent report demonstrated that emergency medical services (EMS) personnel could safely (sensitivity of 92% and specificity of 40%) decide on spinal immobilization using a simple decision scheme based on the NEXUS criteria of altered mental status, evidence of intoxication, neurologic deficit, suspected extremity fracture, and spine pain or tenderness.⁹

We agree that large randomized prospective studies assessing the effectiveness of different immobilization devices and techniques are required to effectively validate the practice of spinal immobilization.

TAKE HOME MESSAGE

There are no randomized controlled trials that support or refute the use of spinal immobilization in out-of-hospital trauma victims. Because of the potential complications associated with spinal immobilization, the validity of routine

out-of-hospital spinal immobilization in trauma patients should be questioned. In the absence of any evidence, EMS services should evaluate the value of translating current decision rules and evaluating nonrandomized controlled trial research in an effort to mitigate negative outcomes that could result from a routine and unnecessary immobilization practice.

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EBEM TEACHING POINT

Lack of evidence versus no difference. Many systematic reviews in emergency medicine consist of a small number of trials or small number of overall patients, often demonstrating no clear evidence of benefit (or harm). Lack of evidence of effectiveness does not prove ineffectiveness, nor does the absence of a statistical difference between 2 interventions represent equivalence. When no difference between 2 interventions is identified, many authors prematurely claim equivalence; however, in most cases the power of the systematic review is insufficient to draw such a conclusion. Under such circumstances, results should be described as demonstrating no evidence of a difference rather than being equivalent. Concluding that 2 interventions are equivalent should be limited to cases in which the 95% confidence intervals (CIs) are narrow and there is no possibility of a clinically meaningful difference.

Effectiveness is a measure of the benefit resulting from an intervention for a given health problem for a particular group. Using traditional effect measures such as relative risk or odds ratio, no effect is represented when the point estimate approximates 1.0. Even in large trials, the 95% CI of the point estimate may cross this vertical line of no effect. This CI may or may not include points corresponding to a clinically important difference between the interventions. Large samples will produce narrow CIs and therefore perhaps will provide adequate confidence that a minimally clinically important difference is absent. Small sample sizes generally provide wide CIs that may include values that, if true, would correspond to clinically important differences between the interventions.

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