

The Long Backboard vs the Vacuum Mattress

Neil McDonald, PCP, MPhil;¹ Mike Webster, PCP, BA, MADEM(can);² Aaron Orkin, MD, MSc, MPH, CCFP;³ David VanderBurgh, MD, CCFP(EM);⁴ David E. Johnson, MD⁵

1. Winnipeg Fire Paramedic Service, Winnipeg, Manitoba, Canada
2. Hamilton Paramedic Service, Hamilton, Ontario, Canada
3. Northern Ontario School of Medicine, Toronto, Ontario, Canada
4. Northern Ontario School of Medicine, Thunder Bay, Ontario, Canada
5. Wilderness Medical Associates International, Portland, Maine USA

Correspondence:

Neil McDonald, PCP, MPhil
Winnipeg Fire Paramedic Service
Winnipeg, Manitoba, Canada
E-mail: neil.mcdonald@utoronto.ca

Received: November 14, 2013

Accepted: December 7, 2013

Online publication: January 16, 2014

doi:10.1017/S1049023X13009229

Madshidfar et al are to be applauded for the initiative behind “Long Backboard versus Vacuum Mattress Splint to Immobilize Whole Spine in Trauma Victims in the Field: a Randomized Clinical Trial”.¹ We have three concerns related to this paper.

The first concern relates to the measurement of spine motion. In a systematic review of studies assessing cervical range-of-motion, Voss et al² detail the range of techniques used to measure head and neck motion in the scientific literature. That there is no standard technique to do so speaks to the difficulties in measuring vertebral movement in an objective and valid way. Nevertheless, technological advances have facilitated recent trends towards real-time measurement of motion in clinically relevant settings. Madshidfar and colleagues use none of these recent or earlier methods. They measure spine motion only by clinician or researcher observation. We disagree with the authors’ assertion that this method yields an objective result. Although a number is assigned, the measurement remains a subjective rating of accumulated motion, without any inter- or intra-rater reliability.

Second, the study lacks essential information and skips best practices in the reporting of interventional trials.³ The authors have failed to establish the baseline comparability of the study groups with respect to mechanism of injury, other traumatic injuries, pre-existing conditions, mental status, duration of immobilization, and timing of the outcome measurements. Most importantly, readers need to know whether any patients actually had a spinal column or spinal cord injury. Furthermore, the instructions given to patients may bias and/or confound results.² What were these instructions? How were they given? When were they given? How were they received? Were the same instructions given to both groups of patients?

Third, and perhaps most disturbingly, this experimental design raises serious ethical questions that remain unaddressed. The standard of care for trauma patients with possible spine injuries is clear: immobilization.⁴⁻⁶ Is it appropriate for an actual trauma patient, for whom immobilization is indicated and undertaken, to then be instructed to move? How were the risks of participation framed and communicated? What strategy was used to obtain informed consent within a study that departs so profoundly from the accepted standards of care?

The current paper shows a number of methodological gaps that, when taken together, caution against acceptance of its findings. We welcome and value further research on these questions.

References

1. Mahshidfar B, Mofidi M, Yari A, Mehrsorosh S. Long backboard versus vacuum mattress splint to immobilize whole spine in trauma victims in the field: a randomized clinical trial. *Prehosp Disaster Med.* 2013;28(5):1-4.
2. Voss S, Page M, Bengler J. Methods for evaluating cervical range of motion in trauma settings. *Scan J Trauma, Resus, Emerg Med.* doi: 10.1186/1757-7241-20-50.
3. Schulz KF, Altman DG, Moher D, for the CONSORT Group. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. *Ann Int Med.* 2010;152(11):726-732.
4. American College of Surgeons Committee on Trauma. *Advanced Trauma Life Support for Doctors*, 8th ed. Chicago: American College of Surgeons; 2008.
5. McSwain N, Salomone J, Pons P. *PHTLS: Prehospital Trauma Life Support*, 7th ed. St Louis, MO: Mosby JEMS; 2011.
6. Theodore N, Hadley M, Aarabi B, et al. Prehospital cervical spinal immobilization after trauma. *Neurosurgery.* 2013;Suppl 2:22-34.

Author Reply:

Babak Mahshidfar, MD;¹ Mani Mofidi, MD;¹ Ali-Reza Yari, MD;¹ Saied Mehrsorosh, BSc²

-
1. Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran
 2. Tehran Emergency Medical Service System, Tehran, Islamic Republic of Iran

Correspondence:

Mani Mofidi, MD
Tehran University of Medical Sciences
Rasoul Akram Hospital,
Emergency Department
Sattarkhan Ave, Nyaiesh St.
Tehran, Islamic Republic of Iran
E-mail: m-mofidi@sina.tums.ac.ir

We thank Mr. McDonald and colleagues for his precision in considering our article. First of all, we must point to the fact that our study is the first conducted in the field on real patients. All health care providers working in prehospital settings know the difficulty and hostility of this working in the field. So, some limitations and shortages were predictable when we started the study.

In response to Mr. McDonald's specific comments:

1. A digital inclinometer and a standard handheld goniometer or fluoroscopy (X-ray) are necessary to measure spinal movements accurately.¹ Both of these methods are unlikely to be available in the prehospital setting. We considered dedicating an individual investigator to assess and fill in forms to increase inter-rater reliability; the rates were compared with each other. Instead, we simply included conscious and cooperative trauma victims and excluded everyone who seemed not to answer the questions reliably.
2. In prehospital settings, whole spinal immobilization is done immediately after "ABC" evaluation and stabilization, if there is a significant mechanism of injury.²⁻⁴ Evaluation of patients to find or rule out spinal injuries is neither precise nor practical in prehospital settings. On the other hand, Anglo-American systems (including our EMS system) call for "scoop and run" and there is no time to be wasted. The observer (who filled in the forms) did not interfere with the standard of care according to our system (according to reminders/instructions at the beginning of the study).
3. We never neglected ethics during this study, as both methods have been accepted as effective ways to immobilize the whole spine.⁵ We used rigid cervical collars with lateral head immobilizers for all patients, and EMTs immobilized the whole spine as appropriate. In addition, no health care provider tried moving any patient's spine; rather, the patients moved their spines themselves in full consciousness and cooperation, making it very unlikely to cause harm, considering the restriction applied by the devices.

We are aware of all the limitations of our study, so we appreciate all the criticisms and we are all ready to clear up any ambiguity about the paper. We hope our study encourages others to complete additional clinical studies in prehospital settings.

References

1. Hamilton RS, Pons PT. The efficacy and comfort of full-body vacuum splints for cervical-spine immobilization. *J Emerg Med.* 1996;14(5):553-559.
2. American College of Surgeons Committee on Trauma. *Advanced Trauma Life Support for Doctors*, 8th ed. Chicago, IL: American College of Surgeons; 2008.
3. Mackenzie R. Spinal injuries. *J R Army Med Corps.* 2002;148(2):163-171.
4. Eismont FJ, Currier BL, McGuire RA Jr. Cervical spine and spinal cord injuries: recognition and treatment. *Instr Course Lect.* 2004;53:341-358.
5. Luscombe MD, Williams JL. Comparison of a long spinal board and vacuum mattress for spinal immobilisation. *Emerg Med J.* 2003;20(5):476-478.