Evaluation of Commercially Available Traction Splints for Battlefield Use

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Reel Research and Development, Inc. wishes to respond to statements made in "Evaluation of Commercially Available Traction Splints for Battlefield Use" (Nicholas M. Studer, Seth M. Grubb, Gregory T. Horn, and Paul D. Danielson; *J Spec Oper Med*. 2014;46–55). As the manufacturer of one of the traction products included in this classroom study, the REEL Splint (RS; Reel Research and Development, Inc, Ben Lomond, CA; http://splints.webs.com/; NSN 6515-01-250-8936), we feel compelled to respond to the study findings, especially in regard to the RS:

(1) In practicality, we agree that the RS was not designed specifically for use in "dismounted carry" operations as defined by the authors;

(2) The universally applicable RS should not have been included in a narrowly focused dismounted traction study that used a "traction manikin" in a classroom setting to postulate field results;

(3) Studies and standardization of RS—those directly related to military medicine—have taken place contrary to the authors' assertions.

(4) The authors make unsupported findings regarding the use and efficacy of the RS for difficult "angulated bone and joint immobilization," calling for replacement using aluminum malleable splints (SAM Splint);

(5) The authors make a broad and "outside the scope of study" recommendation that the RS should be entirely removed from military service, because the RS has "persisted too long";

(6) The RS has been clinically proved to be effective for designated areas of inclusion—the authors should retract any unsupported hypothesis of RS efficacy outside the study's confines of evaluation.

Initially, the authors describe the US Army's traction splint posture as having "little training or standardization" and state that "no previous studies have evaluated these devices and their suitability to the military environment." This statement is not accurate. The Defense Medical Standardization Board (DMSB) at Ft. Detrick "standardized" the RS for DEPMEDS (Deployable Medical Systems) and the US Army commissioned an examination authorized by AMEDD. Field Training Exercises (FTX) testing was overseen by the Combat Developer's office and included the Combat Medical Specialists Division Alpha and Bravo medics at Ft. Sam Houston, TX. (Disposition/after-action reports are available for view at www.splints.com.) It was concluded in field trials that the RS was well suited for many military care scenarios. Additionally, the RS would replace many other, less-effective splints, systemwide, reducing the overall size, weight, and cube. However, conclusions regarding "line medic" (dismount operations) stated the RS may NOT be particularly useful for "line medics to carry" as being "heavy and bulky for the medic who has limited space."[1] This was and continues to be our company's position. Given the subject matter of the study being "dismounted operations," we logically wonder why the RS was included in a narrowly focused battlefield traction product evaluation. If the authors had contacted us for background information or reviewed our website, it would have been clear that the RS was not suited for the study. The other three tested products were single pole–style traction devices and, as such, are not comparable in design to the more universal traction and angulated immobilization product (RS).

The authors offer a set of completely unsupported assertions comprising vastly different care areas, clearly outside the scope of their study. One such conclusion is that the RS could be overall "replicated" by the aluminum malleable SAM Splint now carried in various trauma sets. The authors offer no pertinent or actionable clinical evidence to support such an assertion. Those possessing experience in field medicine, specifically lower extremity angulated bone and joint trauma, appreciate that these injuries compromise a separately distinct, comprehensive, and challenging area of patient care. Military medicine involves a plethora of traumatic injuries occurring in war and peacetime settings. Often, lower extremity injuries must be completely stabilized as encountered, preserving limb patency while addressing

the prevention of costly and debilitating limb morbidity. We believe the SAM is a great splint for many reasons, but concluding, out of hand, absent any clinical support/evidence, that the SAM is equivalent to the RS is absurd. The RS has been extensively evaluated and clinically proved to be the most reliable and robust articulation device for these critical and important areas of lower extremity care.

The authors fail to appreciate the findings of a significant patient study in the *Annals of Emergency Medicine*.[2] This 2-year referenced field study was conducted at the University of California, San Francisco School of Medicine. The study presented 53 "real" patient cases, only 11 of which involved traction. Of significance is that 42 other cases involved many other types of injuries, including difficult joint dislocations and angulated fractures. The first prototype RS splint performed exceedingly well in this patient field study. (Subsequent commercial models have proved to be even better performers.) We know of no credible information or studies regarding angulated lower extremity care, using malleable aluminum sheet–padded splints, *specifically as they would compare with RS performance*. A.J. Heightman, editor of the *Journal of Emergency Medical Services,* authored an article in which he discussed his views on the RS specific to severe joint and fracture immobilization.[3] He concluded the RS is the "perfect splint for the task," stating "I have discovered an articulating splint that's perfect for the immobilization of severely dislocated and fractured bone and joints" [RS], "the [RS] can be adjusted or molded to almost any fracture or dislocation angle," and "The [RS] provides ease of movement and support straps allow for wound treatment and visualization." He further states that the SAM and adjustable Air and Vacuum splints may not be useful because "conventional splints may not adequately immobilize or support the injury, *above and below the joint* [emphasis added], being even more difficult, "when the knee is rotated." Shouldn't the question arise as to when and where is it appropriate to use proven care modalities for military care situations; especially when these injuries represent not just the 2% of traction applications but, importantly, the other 98% of lower extremity traumatic injuries? We believe the RS has demonstrated that it positively addresses an entire distinct and separate area of clinical evaluation.

The authors take a broad leap of faith by suggesting the RS should be removed from "military service" entirely; the authors state, the RS has "persisted too long, due to its length of service." **Basing such comments on a study in which there is such a high rate of failure when attempting to apply the splint and "generalized poor performance and overall low confidence (of the participants) with traction splinting" is not sound.** We believe products such as the RS "persist" (sustainable) "too long" (or over time) because they perform as advertised; until or unless they are supplanted by a superior device. We see no evidence supporting a broad postulation pertaining to military care in its totality. The authors cite no clinical and/or scientific evidence in doing so. The fact is, the RS has, and continues, documenting scores of clinical cases, while garnering hundreds of testimonials of efficacy in a variety of operational care situations. Patients continue to benefit significantly from the RS in military and civilian emergency medical services (EMS) scenarios. Original US Army studies underscore the broad scope of use that the authors seem to ignore or dismiss — that the RS is well suited (and remains so) in most described BAS, DTS, and MEDIVAC type of operations and was, therefore, recommended for purchase. We believe, as US Military and other studies[4] demonstrate, the UNIVERSAL RS continues to have many important roles in military and civilian lower extremity care scenarios.

Other statements from the article by Studer et al. caught our attention. As the presented chart of advantages and disadvantages reveals, KTD accurately depicts their product as a traction "device" while underscoring that other "splinting materials may be required." We surmise the same for other similar "pole devices" as the CT-6 and STS. Obvious and pertinent questions arise: What other splinting materials would be needed to be brought forward to completely stabilize the limb? How much do they weigh? How bulky are they, and what would they cost? Would any such scenarios even be practical within the narrow scope of "dismounted operations"? Additionally, we have seen no evidence of pelvic problems cited for traction with the RS.

Three unique design features of the RS were not noticed or discussed as improvements over the more antiquated HARE style traction "splint": (1) the highly contoured ISCHIAL pad, (2) the pivoting ischial fit, and (3) the minimal 5-degree position of function knee flexion. The flexion feature completely addresses peroneal nerve issues (a superficial nerve located at the area of the proximal fibula), as well as improving popliteal artery function. In regard to the peroneal nerve, it is telling that the majority of EMS providers cannot identify the nerve or its location. Because it is important in traction applications, the nerve is even more consequential in the management of all angulated type fractures and dislocations, which can greatly affect morbidity and return to duty issues. In terms of training and ease of use, the DMSB results underscore that the RS requires "little instruction time" and "ease of application as the patient lays."[1]

Military medicine is certainly complex in many areas and involves many unique care challenges. It stands to reason that specific products are more suitable for

different care situations. We should learn to appreciate that grossly angulated injuries represent unique and important facets of lower extremity care, those pertaining greatly to costly and debilitating patient morbidity. Additionally, discussion regarding traction applications should include where and when it is appropriate or necessary to use more supportive traction "splints" (RS) that "provide a high degree of immobilization" versus lesser supportive "devices" that may require ancillary splinting equipment. We believe uniquely postured products such as the UNIVERSAL RS are clinically proven to be better suited for a variety of lower extremity joint and bone angulations and femur traction cases as well.

Adherence to study parameters is vitally important to any practical well-defined product review and comparison. Wandering from stated parameters and then drawing conclusions not grounded in "defined" study parameters and goals can be dangerous, negatively affecting demonstrated patient care in a variety of military settings outside the realm of "dismounted" field medicine alone.

We thank the authors and appreciate their efforts in exploring this important discussion. We also respectfully ask that any unsupported, unfounded, or broad-based non–evidence-based conclusions regarding long-standing patient care be reconsidered or retracted, even if only "opinion" as stated.

References

1. MAJ J. Sandoval, US Army Disposition documents March 1987.
2. Auerbach PS, Geehr EC, Ryu RK, The Reel Splint: experience with a new traction splint apparatus in the prehospital setting. *Ann Emerg Med*. 1984;13:419–422.
3. Heightman AJ. Articulated knee injuries placing proper emphasis on the recognition & stabilization of severely dislocated knees. *JEMS*. 2004;29:46–55.
4. Reel Research and Development, Inc. www.splints.com (contact author for details on studies).

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