

## References

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#### CURRENT USE OF LIVE TISSUE TRAINING IN TRAUMA: A DESCRIPTIVE SYSTEMATIC REVIEW

I was pleased to read the article by da Luz and colleagues (DOI: 10.1503/cjs.014114) addressing the increasingly important and controversial issue of live tissue training (LTT) versus simulation-based medical training. The authors rightly acknowledged that the anatomic differences between animals and humans is a disadvantage of LTT, that LTT does not confer a “clear benefit” in improving providers’ self-confidence when performing emergency procedures whereas manikin and patient experience does, and that simulators have been developed that “have already replaced some use of live animals in many areas of trauma training.” Yet, da Luz and colleagues concluded that LTT cannot be fully replaced until “more realistic simulators” are developed, a statement not supported by the evidence in the paper or elsewhere.

For instance, a recent Canadian Forces Health Services study found that a human patient simulator is as effective as LTT at teaching traumatic injury management to military medical technicians.<sup>1</sup> Also, researchers at the University of Toronto conducted a study that found simulator-based trauma training was superior to animal-based training and that students and instructors overwhelmingly preferred the simulator-based training. As a result, the researchers ended animal use in their trauma program, stating that they “could not justify identifying animals as the only suitable source for providing the necessary training in [their] ethics application for renewal.”<sup>2</sup>

Similarly, last year the United States military found that a human simulator teaches trauma skills as well as LTT and concluded that “if the goal for trainers is to produce individuals with high self-efficacy, artificial simulation is an adequate modality compared with the historical standard of live animal models.”<sup>3</sup> In a related commentary, one of the authors noted, “we have entered into an age where artificial simulator models are at least equivalent to, if not superior to, animal models. .... [T]he military should make the move away from all animal simulation when effective equivalent artificial simulators exist for a specific task. For emergency procedures, this day has arrived.”<sup>4</sup>

There are ethical, educational and economical advantages to ending LTT in favour of simulators for teaching trauma skills. It’s time to follow the evidence where it leads and replace the use of animals in medical training.

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DOI: 10.1503/cjs.010615

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#### CURRENT USE OF LIVE TISSUE TRAINING IN TRAUMA: A DESCRIPTIVE SYSTEMATIC REVIEW — AUTHOR RESPONSE

We thank Dr. Green for the insightful comments on our manuscript, which reviews the current evidence on the use of live tissue for trauma training.

We agree with Dr. Green that “there are ethical, educational and economic advantages to ending [live tissue training (LTT)] in favour of simulators for teaching trauma skills.” We also support the idea that “simulation should replace LTT where it leads the use of animals in medical training.” However, the conclusion that simulation is clearly superior to LTT across the spectrum of surgical trauma training based on the current literature may be disputed by some. While less complex surgical procedures conducted in the Advanced Trauma Life Support (ATLS) course<sup>1</sup> were replaced by simulation devices, in the Acute Trauma Operative Management (ATOM)<sup>2</sup> course LTT is still essential for teaching complex surgical procedures and manoeuvres. In the study mentioned in Dr. Green’s letter, a pilot randomized controlled trial of simulation and

LTT (which in our opinion is one of the best-designed studies addressing this subject currently), Dr. Savage<sup>3</sup> found no differences in uptake between the 2 training modalities. However, the author additionally stated that “inherent differences in both methods may require a third type of criterion standard model necessary to measure differences between the 2 training modalities.” The author further mentioned, “when a qualitative analysis of each modality is conducted, there are strengths and weaknesses in both.” Moreover, the author stated that “until more realistic simulators are developed, likely a combined training program using simulators and LTT will remain the preferred method of preparing medics for managing battlefield trauma,” which supports our statement. In another study<sup>4</sup> by Drs. Cherry and Ali, the authors commented that “a wide range of training modalities exist, but each (including high-fidelity simulators) has limitations, and these challenges need to be overcome.”

Our research targeted a polemic subject: the use of LTT in trauma compared with the use of other simulation methods. The extensive systematic literature review demonstrated that there is limited evidence to conclude that one method is better than the other. Important problems involving the existing literature in this subject include small sample sizes (no power to detect differences). In addition, structured evaluations used to measure outcome are not previously validated, there is no measurement of interrater reliability, and consideration should be given to having more than 1 independent evaluator during each assessment so that another potential source of bias is avoided and outcomes are interpreted properly. Furthermore, in our search, studies were heterogeneous with respect to participants, interventions, controls, measurements

and outcomes, limiting interpretation and generalizability. We agree that at present, simulation is a fundamental armamentarium for training in trauma, and we expect that this field is going to evolve and become more and more important in the future. However, we believe that studies with a better design/methodology still need to be conducted to definitively demonstrate whether simulation in trauma is more advantageous than LTT.

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DOI: 10.1503/cjs.015815

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#### PATIENT VIEWS ON FINANCIAL RELATIONSHIPS BETWEEN SURGEONS AND SURGICAL DEVICE MANUFACTURERS

The article “Patient views on financial relationships between surgeons and surgical device manufacturers”<sup>1</sup> has caught my attention as few articles have in a very long time! The subject is particularly relevant

today, not only because it has an important bearing on the cost of government-sponsored health care, but also because it delves into an aspect of health care delivery that is so seldom examined by the profession while at the same time having the most phenomenal import on the quality of care that we physicians and surgeons believe we are delivering to trusting patients.

Given the importance of the proposed study, I am disappointed that a convenience sampling was resorted to. I am not implying collusion, but convenience sampling, also known as “accidental,” “grab,” or “opportunity sampling,” is an inadequate instrument in the search for factual conclusion and truth. It is a nonprobability sampling from a population close at hand, readily available and within too close a network to be unbiased — a network difficult to distance from those involved, either geographically or on a professional level of doctor–patient interaction.

It would be naive on my part to think that the subject could be competently dealt with in a letter to the editor, but we must at least display the fact that these issues that question the integrity of the industry have been generously covered in American courts, with fines and reparation claims to the industry reaching billions of dollars. Class actions against Bard, Ethicon and Boston Scientific have peppered the news, revealing a justice system that is losing patience with the industry through multimillion dollar court-ordered decisions and settlements in favour of patients, including substantial punitive fines for “lying in court.”

The extent of the cooperation by the “collaborative faculty,” the term referring to surgeons who work closely with the industry, was highlighted in an editorial directed at the American Hernia Society when 60% of the speakers at their annual