Invited Commentary

A Call to Action: The Future of Simulation-based Research in Emergency Medicine in Canada

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Simulation is rapidly becoming an integral component of emergency medicine (EM) training and practice. Healthcare simulation using manikins, computer or screen-based simulators, task trainers and virtual and augmented reality have been effectively used to support the acquisition of key EM competencies[1]. Key attributes of instructional design shown to enhance learning outcomes have been defined through systematic review[2]. Simulation can also be used as investigative methodology, where it serves as a proxy for the real clinical environment to study factors affecting human and systems performance in healthcare[3]. A better understanding of how simulation-based research can advance clinical care in EM is essential to building the value proposition.

In this issue of the journal, Chaplin et al propose a research agenda for Canadian EM simulation community, and in doing so, help guide the direction of the field for the foreseeable future[4]. In their study, they apply a comprehensive, robust and iterative approach to consensus generation with representation from all adult Royal College of Physicians and Surgeons of Canada academic EM programs. Simulation leads were surveyed to capture the breadth of ongoing research activities along with perceived facilitators and barriers of simulation-based research (SBR). A subsequent meeting of these leaders defined a consensus research agenda for EM simulation in Canada. They describe a spectrum of ongoing SBR projects involving education, evaluation, and assessment that demonstrate the growth of simulation-based education as a core educational modality for EM training. The barriers to SBR – lack of mentors, lack of protected time, lack of dedicated funding, and lack of collaboration – highlight key opportunities for the EM community to explore in order to maximize the impact of SBR on EM practice. The top 8 priorities for SBR reflect thematic areas that are tightly aligned with the current state of medical education in Canada, with a heavy emphasis on competency-based medical education, summative assessment, interprofessional learning, and continuing professional development.

The work by Chaplin et al highlights the importance of collaborative research efforts in SBR, stating that "collaboration at the departmental, institutional, and national level is needed to engage in simulation-based research"[4]. We view this paper as a call to action. Departmental and institutional leaders should recognize the growing importance of simulation in healthcare by protecting time for simulation leaders to conduct scholarly work and providing dedicated funding opportunities for SBR. A logical next step for EM simulation leaders in Canada might be to formalize the community of practice by forming a national EM simulation research network. Research networks foster collaborative, multicenter studies which are sorely lacking in EM simulation research, provide structure for coordinated feedback and peer review, and connect novice and senior investigators in mentorship relationships that nurture future leaders in the field[5]. Periodic meetings serve to match principal investigators with content experts, connect researchers with shared interests, and most importantly, plan a coordinated effort to collectively address priorities for SBR in

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Canada. Inclusive membership, engaging colleagues from academic programs affiliated with the College of Family Physicians of Canada and Pediatric Emergency Medicine, along with interprofessional colleagues and patient partners may serve the research agenda, and our patients, more comprehensively. Recognizing limited protected time and formal research training of many EM colleagues, partnerships with PhD colleagues focused on educational research, may improve research productivity and promote alignment of research with scientific theory.

In an era of competency-based medical education (CBME), "simulation will play an increasingly important role in both the delivery of high-quality training experience and the assessment of entrustable professional activities"[4]. The EM simulation community can help define how simulation may be implemented as part of CBME for various medical specialities, and how the benefits of simulation-based assessment (i.e. controlled environment, on-demand clinical cases) can be optimized to supplement workplace-based assessments. As simulation is increasingly used for higher-stakes assessment, a coordinated national effort will be beneficial to identify and/or develop tools with validity evidence, to standardize scenarios and calibrate raters. Anesthesiology programs in Canada serve as an exemplar of this having successfully implemented a national approach to simulation-based assessment of clinical competence[6].

We share Chaplin et al's view that "determining a return on investment of simulation in EM training will be important…"[4], especially in an economic climate where resources are increasingly scarce. Exploring the cost-effectiveness of simulation-based education will appropriately justify when to integrate simulation into more areas of training[7]. To strengthen the value proposition of simulation, we encourage investigators to incorporate outcome measures that assess both short and long term learning outcomes, and if possible, to also report patient outcomes. As making strong causal inferences between learning outcomes and patient outcomes can be difficult, an alternate approach is establishing links from an educational intervention to certain provider behaviors, and then from these provider behaviors to patient outcomes[8]. Additionally, researchers should consider relevant systems level outcomes, such as employee job strain, absenteeism and turnover, that may be important to senior hospital leadership controlling operating and educational budgets[9].

Simulation has benefits extending beyond its use to support education. Canadian EM simulation leaders identified simulation as an investigative methodology as a priority for SBR. Studies of this type have far-reaching clinical applications, which can be categorized by examining factors that influence clinical performance and patient safety[10]: individuals (eg. sleep deprivation); teams (eg. CPR coaching in cardiac arrest teams); work environment (eg. resuscitation room design); technology (eg. new equipment); systems (eg. clinical schedule); and patient factors (eg. clinical complexity). Conducting studies of this type in the in situ environment allows for identification of latent safety threats, followed by the development and testing of new protocols designed to mitigate these threats. We encourage researchers to consider the value of simulation as investigative methodology, particularly in situations where it would be difficult (or impossible) to conduct the study with real patients.

In summary, Chaplain and colleagues propose a clear roadmap for the work that needs to be done to advance EM simulation in Canada … and we anticipate that the EM simulation community will rise to accept this challenge!

Keywords: Simulation, emergency medicine, research, agenda, Canada

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