

EDITORIAL

Charting a course for simulation innovation and research: preparing for success in the next decade

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Introduction

It was not so long ago that simulation was considered a 'niche' field. When medical education was brought up most minds turned, almost reflexively, to didactic or bedside training. In those days, it seemed anything reasonable was on the table. Little to no formal training existed, and simulation research largely focused on questions of viability and comparability to the tried and true. Those days, however, are no more. In the few short decades, our specialty has grown from childhood, through the pre-teen phase, and into its current late adolescence, a period marked by increasing formalization, the ubiquity of use and ever-deepening interactions with other technological developments such as 3D printing, gamification, virtual & mixed reality and generative artificial intelligence [1–3]. Rapid growth trajectories such as this can be exciting, but at such times it can be valuable to consider not just where we are going, but where we should be going. With this goal in mind, we suggest the following as high-yield paths.

Leveraging AI for the democratization of virtual reality

Much of the history of simulation has been one of increased accessibility. The technology has evolved from bulky, immobile mannequins that could only be housed in a brick-and-mortar simulation center to lighter, more mobile units that can be deployed *in situ* throughout a health system [4,5]. This trend towards accessibility has even enabled the effective deployment of simulation-based interventions in resource-poor settings [6]. Given the significant cost, however, this 'democratization' has yet to occur with virtual reality (VR).

Unlike standard mannequins, which typically have relatively accessible operating systems, it is simply not possible for the average simulationist to develop and implement their own VR cases due to a lack of expertise in the artistic and programming skills required, adding significant cost as cases must, therefore, be purchased from the corporation providing the VR system. However, the advent of large language models (such as ChatGPT) offers a means of altering this landscape, as they have already proven facile at creating game scripting programmes in common languages [7]. The development of such a system would place the ability to create, disseminate and implement VR cases essentially back into the hands of the simulationist.

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Expansion of simulation methodology as a research and testing environment

A second path involves a concerted effort to expand the use of simulation-based testing and research methodologies across the medical community. While our field may have begun primarily to provide immersive education, its potential applications far exceed this. Indeed, two of the most potent uses of simulation are for the real-time detection of latent safety threats within a health system (a use that leverages *in situ* approaches to simulation in order to assess care practices as they occur within the actual care environment) and as a controlled setting in which to test various non-simulation-related interventions [8–11]. In both of these use cases, the potential value of simulation lies in its ability to recreate almost any clinical scenario in a reproducible, standardized manner. This ability is well-known within our community of practice, but in my interactions with other fields of medicine, this is not well understood. Innovating in this area will require some degree of deliberate ‘infiltration’ of the simulation sections and special interest groups of national and international medical organizations, providing us with the needed leverage to suggest this use of simulation as a solution to problems as they arise. More widespread use of simulation in this way would also assist our own community of practice by providing a wider platform for ongoing programme evaluation and acquisition of the higher-level outcomes data (i.e. Kirkpatrick Level 4) needed to demonstrate return on investment and sustainability.

Solidifying scholarly foundations – the value of a continuous approach

A final path concerns how we maintain and synthesize the information present within the scholarly foundations of our field. Over the past 15 years, the Society for Simulation in Healthcare (SSH) has conducted three research summits, each charged with synthesizing what is currently known, gathering input from beyond the field and charting a path forward in terms of both research goals and practical guidelines [12–14]. As the amount of available literature expands in both volume and methodological diversity, it is becoming apparent that a less episodic, more comprehensive approach may be needed. Such an approach would involve a continuous review of new literature as it is published, generating syntheses and guidelines on an ongoing basis as consensus develops. An explicitly inclusive approach to both quantitative and qualitative methodologies is also required, as both approaches hold meaningful insights for practice. One potential model for a process such as this is the International Liaison Committee on Resuscitation (ILCOR), which conducts ongoing reviews of key aspects of the resuscitation literature with the goal of producing and revising guidelines in real time as new insights are obtained [15].

Conclusion

Our field is experiencing unprecedented growth in terms of technology and scope. As we move forward, we must consider each opportunity to direct this growth in ways that increase

our ability to make a difference in the lives of the patients we care for. We hope the above suggestions will spark interest among the readers in doing just that in new and creative ways.

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