

Simnovate: simulation, innovation and education for better healthcare

Rajesh Aggarwal^{1,2}

¹Department of Surgery, Faculty of Medicine, McGill University, Montreal, Quebec, Canada

²Steinberg Centre for Simulation and Interactive Learning, Faculty of Medicine, McGill University, Montreal, Quebec, Canada

Correspondence to

Dr Rajesh Aggarwal, Steinberg Centre for Simulation and Interactive Learning, Faculty of Medicine, McGill University, Suite 5640, 3575 Parc Avenue, Montreal, Quebec, Canada H2X 3P9; rajesh.aggarwal@mcgill.ca

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ABSTRACT

Simulation has already transformed medical education, and holds the power to shape modern healthcare systems, communities and populations. Simnovate is a mission, a community and a partnership of passionate, driven and game-changing individuals, who wish to see the change we can make together, in the world, right now. Four domains were defined: patient safety, medical technologies, global health and pervasive learning, with domain group experts that span healthcare simulation, outcomes research, aviation, serious gaming, patient safety, economics, machine learning, biorobotics, implementation science, global health and the visual arts. Bringing together simulation, innovation and education, for better health and care.

Healthcare is complex. It took 50 years, from 1900 to 1950, for medical knowledge to double. In 1980, it took 7 years and in 2010 it took 3½ years. In 2020, it is projected that knowledge will double every 73 days. In 2016, there were over 70 000 different diagnostic codes for medical diseases and almost as many different procedure codes for their treatment. Just last year, the Food and Drug Administration approved almost one new drug per week.

There is a growing elderly population and therefore a greater number of age-related ailments requiring care. The health impacts of more people living with chronic disease and obesity have already begun to overwhelm health systems around the world. We are also living with huge disparities in health outcomes.¹ For example, the life expectancy of a girl born in Sierra Leone is half as long—42 years, as a girl born in Japan—86 years. Also, the chance of a child dying before age 5 years in Angola is 90 times higher than in Finland.

Healthcare delivery is also evolving from being focused on management of acute episodes, to coordinated care for chronic and relapsing conditions. It is now team-based, patient-focused and available in multiple settings—beyond traditional hospitals and clinics, to delivery of medical care in the home, a shopping mall or even in mobile trucks.

With this immense complexity, with multiple practitioners, with many healthcare settings, there is a risk of harm. The figures vary, though about 1 in 10 patients admitted to a hospital experience a medical error.² A recent report from the National Academy of Medicine says that most of us will most likely experience a diagnostic error in our lifetimes.³ Improving diagnosis requires teamwork, and good communication among the entire healthcare team, with patients as central members of this team.

Concurrent to this transformation of healthcare is an equivalent, if not greater, emergence of interactive and technology-enhanced learning platforms. The technological education revolution can also bring together learners from all over the globe, sharing best practices and engaging across cultural and social contexts. The Internet, smartphones, mobile applications, virtual and augmented reality, serious gaming and immersive simulation environments are all advances in our striving to do better for our patients.

Three-dimensional printers, artificial intelligence and machine learning, wearable technologies, the internet of things and smart machines bring further opportunities for healthcare innovation and disruption. The convergence of multiple sectors of technology and industry is evidence of the era of limitless possibility—recently discussed by Klaus Schwab at the World Economic Forum in Davos as the fourth industrial revolution.⁴

Despite these technological advances, our healthcare practices, processes and procedures still need to be learnt. Simulation enables us to acquire skills, in a safe environment, to be measured and to practise, practise and practise, until we get it right every time. This is for every aspect of care, not just technical or surgical procedures. Susan Block, from the Dana Farber Cancer Institute in Boston, informs us that ‘a family meeting is a procedure, and it requires no less skill than performing an operation’.⁵

Simulation has already transformed medical education, and holds the power to shape modern healthcare systems, communities and populations. Simnovate is a mission, a community and a partnership of passionate, driven and game-changing individuals, who wish to see the change we can make together, in the world, right now. Bringing together simulation, innovation and education, for better health and care.

The process began to take shape in May 2015, with a launch event at the Steinberg Centre for Simulation and Interactive Learning. Four domains were defined: patient safety, medical technologies, global health and pervasive learning. The four domain groups comprise 48 world-class experts, hailing from 35 institutions across 9 different countries and 4 continents. Breaking traditional silos and boundaries, the domain group experts span healthcare simulation, outcomes research, aviation, serious gaming, patient safety, economics, machine learning, biorobotics, implementation science, global health and the visual arts.

Since May 2015, the four groups of international experts have engaged in regular discussions to create a strategic agenda for simulation around the four domains, focused on improving patient safety,



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creating and evaluating medical technologies, responding to global threats and advancing pervasive learning. The culmination of this work was the Simnovate International Summit, held in Montreal in May 2016, attracting over 150 attendees from across the globe. During this summit, each of the four work groups presented their white papers, each of which charted the baseline of work in their respective domains and determining what is missing to propel change in their specific areas.

The series of manuscripts in this special supplement are a summary of the work of the four domain groups, together with ongoing and iterative discussions during and after the Simnovate International Summit.

The improvement of ‘patient safety’ continues to be at the forefront of the drive to improve patient outcomes. Simulation is a high-impact training tool that has been shown to improve clinical skills, but has not been comprehensively integrated into patient safety solutions until now. Current barriers to greater implementation were a perceived gap between those identifying safety lapses and education providers to remedy them. Integration of simulation into a healthcare learning system must be pursued, with in situ simulation having the greatest potential for enhancing clinical outcomes.

Innovation in healthcare is the practical application of new concepts, ideas, processes or technologies into clinical practice. The medical technologies domain group sought to explore the role of simulation as a tool to diminish risks and resources associated with healthcare innovation. Simulation was purported to have the strongest potential role for early prototyping, testing for safety and product quality, and testing for product effectiveness and ergonomics. The overall charge is to help guide innovators and channel resources appropriately, which will result in the development of an outcome that has the least potential to fail.

The current uses and outcomes of simulation in low income and middle income countries (LMICs) was the focus of the ‘global health’ domain group, undertaken through a scoping review, survey and expert consensus. While broad implementation of simulation is lacking in LMICs, there was predominant use of low-technology manikins, with a number of studies based on the role of simulation to measure quality of care delivery, through the use of standardised patients. There was a definite appreciation that the full potential of simulation-based interventions to drive higher quality of care has yet to be realised.

With regard to ‘pervasive learning’, the self-defined mandate for the group was to consider the role of simulation for engaged learning, to directly impact health professions education, with specific regard to online and serious gaming. A conceptual framework was derived to consider how the characteristics of simulation (scope, modality and environment) interplay with fidelity (physical, conceptual and emotional), realism and engagement (behavioural, cognitive and emotional) to translate deliberately taught knowledge, skills and attitudes into clinical competence and overall performance.

Over and above the domain groups, the simnovate international summit engaged three keynote speakers, eight workshops, a debate and many panel sessions. The debate considered the cost of innovation in healthcare, asking the simple question—is it too costly? With increasing demands, disease burden and an ageing population, rising costs may be unavoidable. However, while ideas are inexpensive, it may be the process that is too long and costly; is there too much premature scaling? Or is it more about how costs and the return on investment are measured?

Related to the debate, and considering healthcare innovation in general, the summit also included a panel on youth innovation. Interest in youth innovation, and the millennial generation, has been catapulted forward with advances in handheld technologies, social media and young, successful innovators. The panel brought together five such innovators working on start-up projects such as a reusable female condom, an essential surgical instrument tray, cancer diagnosis, low-cost renal dialysis and waterless toilets. The young innovators demonstrated a diversity of topics, approaches and solutions to healthcare challenges which, if curated, could lead to immense advances in healthcare.

Simnovate sought to bring simulation, innovation and education together to the forefront of initiatives for healthcare systems. The mission is to propel an agenda for the strategic use of simulation in improving patient safety, creating and evaluating medical technologies, responding to global health threats, and advancing pervasive learning. The simnovate journey is where simulation, innovation and education collide for the first time, to create a mission for delivery of safe and high-quality care to all our patients.

Finally, and most importantly, I would like to pay a special thank you to the Steinberg Foundation for its immense support of the Steinberg Centre for Simulation and Interactive Learning and, more specifically, the simnovate international summit. Their generosity, vision and encouragement have been phenomenal.



Figure 1 Arnold and Blema Steinberg at the launch event for the newly renamed Steinberg Centre for Simulation and Interactive Learning, October 21 2015.

I would like to dedicate this special issue of *BMJ Simulation and Technology Enhanced Learning*, comprising the academic output of the Simnovate International Summit, to the late Arnold and Blema Steinberg (figure 1)—a couple who exhibited grace, poise, intellect, thoughtfulness, and above all, curiosity and engagement in everything they did to drive forward health care and education to impact on society today, and for future generations.

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