



**THE STEINBERG CENTRE  
FOR SIMULATION AND INTERACTIVE LEARNING  
A FORWARD VIEW**



**McGill**

Faculty of  
Medicine



**STEINBERG  
CENTRE FOR SIMULATION AND  
INTERACTIVE LEARNING**



Photo: Owen Egan

## MESSAGE FROM THE DEAN

**The Steinberg Centre for Simulation and Interactive Learning is an outstanding example of what makes good ideas great. In one decade, it has earned a reputation both here and abroad, and it's about to get even better.**

The McGill Faculty of Medicine is very proud of the vital role the Centre plays in the education of our doctors, nurses and therapists. It is a jewel in our crown, and as we learn more about the power of experiential training and we modernize our curricula for future generations, so are we taking simulated training into a bold, new direction.

Under the strong leadership of Rajesh Aggarwal, together with the truly inspirational engagement of Arnold and Blema Steinberg, the Centre will become a platform not only for skills training, but also for innovation in training and clinical care, as well as for life-long learning. We know the benefits of a simulated clinical environment where learners can safely make mistakes. Equally important is ensuring they are exposed to the most advanced

methodologies. Expertise at the Centre will be combined across professional disciplines to further enrich the training experience, and doors will be opened to the community through a range of public outreach and educational programs.

It is an exciting time for innovation in health education, and the Steinberg Centre for Simulation and Interactive Learning is seizing the opportunity. I congratulate everyone involved in the launch of this new mandate, the ultimate goal of which is to bring the highest quality of care to the individuals and families we serve.

Sincerely,

**David Eidelman, MDCM**  
Vice-Principal (Health Affairs)  
Dean of the Faculty of Medicine



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Photo: Owen Egan

## MESSAGE FROM THE DIRECTOR

**Simulation has been a part of medical care for decades, from learning how to tie knots on a bench-top model, to practising how to share bad news with a patient, to utilizing high-fidelity virtual reality simulation to practise procedures, and involve the whole health care team.**

Simulation works. We know that it is a good idea to train in a risk-free and educationally orientated environment. It is now paramount to take simulation to the stage where, through better innovation, research and implementation, we can truly realize its potential to impact patient care. Simulation-based training can be used to learn new skills, but also to advance our existing skills, from competent to expert. It can also help us to regularly assess and maintain our ongoing performance.

The Steinberg Centre for Simulation and Interactive Learning is a technologically advanced and immersive facility, with space, equipment and expertise to rival any centre across the globe.

Our passion and drive is to deliver high-quality educational activities to health care professionals, and to provide a venue to engage in cutting-edge research and innovation. This must be guided by our mission to deliver better care for our patients, and to work with our community to become a locus for better health overall.

It is my great honour to lead the Steinberg Centre for Simulation and Interactive Learning through this exciting and ground-breaking phase of its evolution, for McGill and beyond.

**Rajesh Aggarwal,**  
**MBBS, MA, PhD, FRCS, FRCSC, FACS**

Director, Steinberg Centre for Simulation and Interactive Learning  
Associate Professor of Surgery



**McGill**

Faculty of  
Medicine

## EXECUTIVE SUMMARY

**The Steinberg Centre for Simulation and Interactive Learning is a phenomenal facility, with dedicated faculty, committed learners and passionate staff, all of whom care deeply about the delivery of authentic learning experiences. Our reach is broad, covering almost all aspects of health care, from medical and nursing students, through to practising physicians keen to acquire new skills in a safe and technologically advanced learning environment.**

Our vision for the Centre is about bringing together the tripartite missions of world-class education, pioneering research and leading-edge innovation, in the realm of simulation and interactive learning, to build a safer and better health care system. Underpinning this approach is an enabling operational framework, together with the engagement of community.

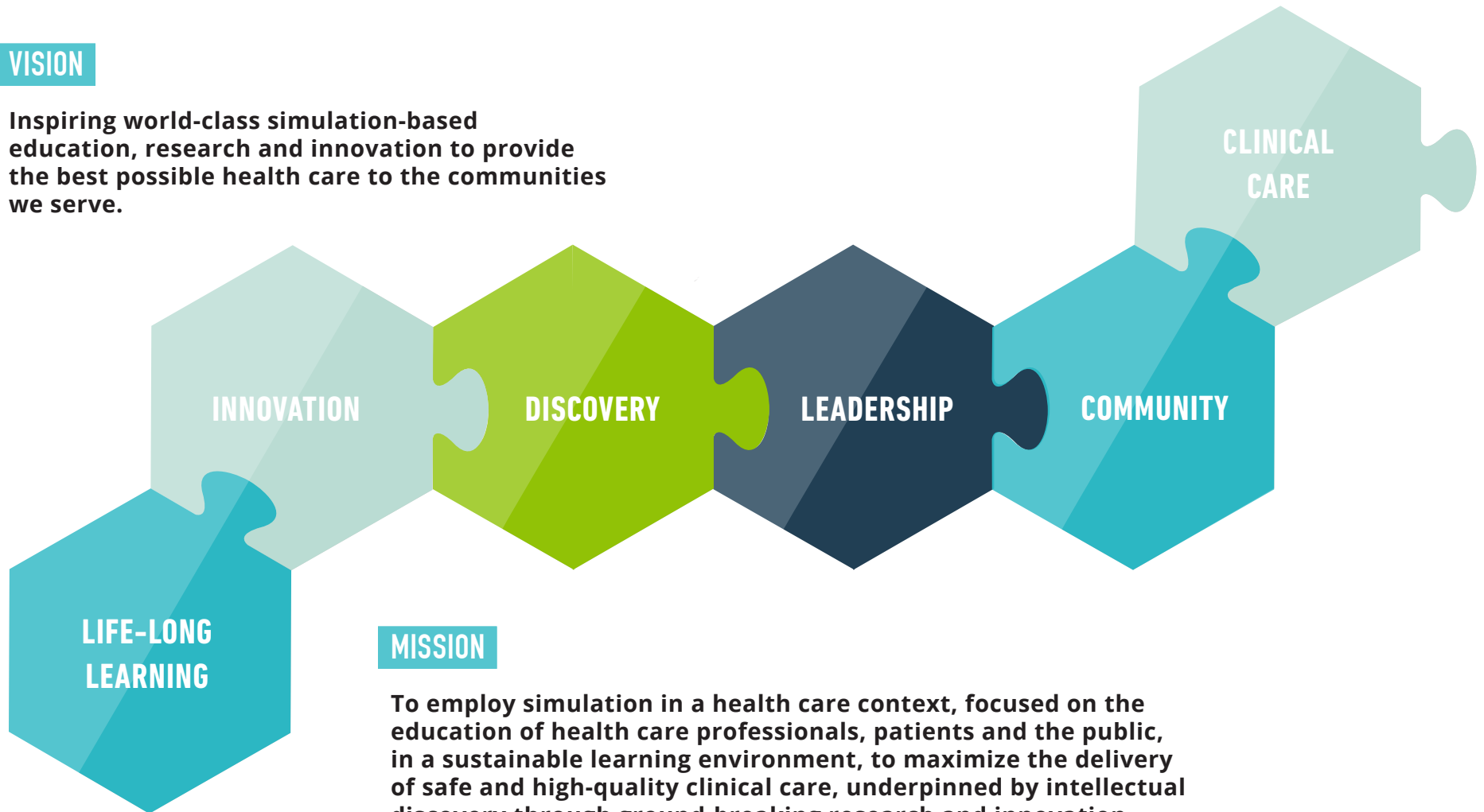
The involvement of traditional partners, such as clinicians and educators, is paramount, but our aim is to go further – to employ colleagues with expertise in engineering, design, health economics, operations management, psychology, visual arts and others, to realize our mission to deliver safe and effective clinical care.

Patients and public engagement are a critical part of our approach with the potential to profoundly impact the health of our community. Initiatives such as outreach events for local school children, summer simulation camps for those interested in health care careers, and programs for patients who want to learn how to manage their own care can all contribute to better health care outcomes.



## VISION

Inspiring world-class simulation-based education, research and innovation to provide the best possible health care to the communities we serve.



## MISSION

To employ simulation in a health care context, focused on the education of health care professionals, patients and the public, in a sustainable learning environment, to maximize the delivery of safe and high-quality clinical care, underpinned by intellectual discovery through ground-breaking research and innovation.

## OUR PRIORITIES

1. To deliver high-quality simulation-based **educational** activities
2. To build a robust and internationally acclaimed **research** program
3. To create a platform for medical **innovation**

These priorities are supported by two key factors:

1. Fostering an enabling **operational framework**
2. Engaging the **community** in the vision



## THE STEINBERG CENTRE FOR SIMULATION AND INTERACTIVE LEARNING

The McGill Medical Simulation Centre was officially opened on September 14, 2006 as a result of a collaboration between McGill and its Faculty of Medicine and its affiliated hospitals.

The Centre set out to provide simulation-based medical education in an inter-professional manner, encompassing the Schools of Medicine, Nursing, Physiotherapy and Occupational Therapy, Dietetics, and Communication Sciences and Disorders.

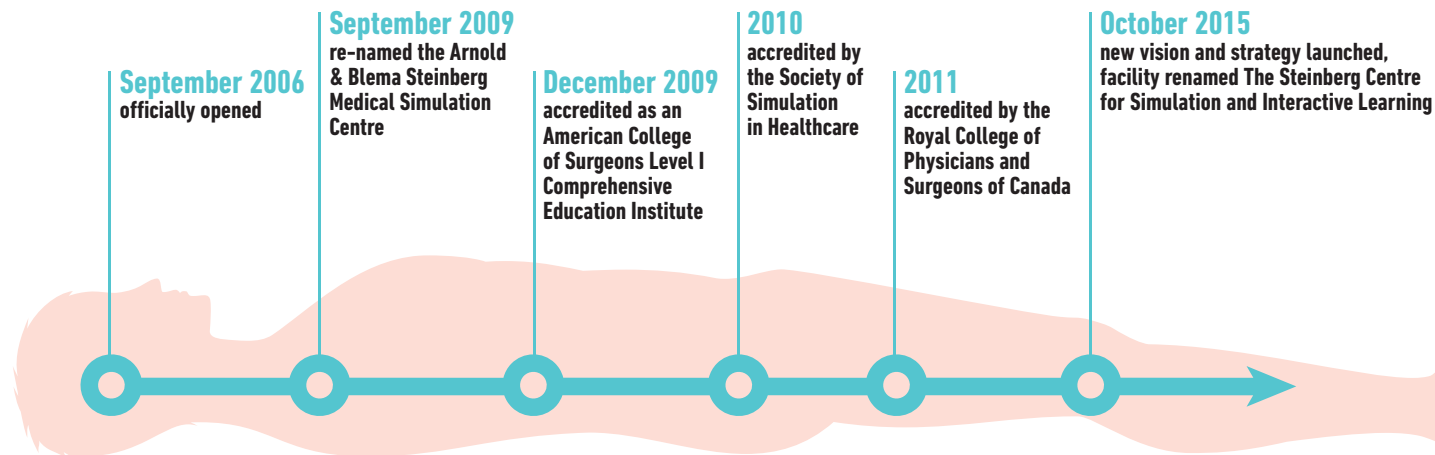
In September 2009, the Centre was re-named the Arnold & Blema Steinberg Medical Simulation Centre. Three months later, it was accredited as an American College of Surgeons Level I Comprehensive Education Institute. The Centre has also been successfully accredited by the Society of Simulation in Healthcare (2010) and The Royal College of Physicians and Surgeons of Canada (2011).

In October 2015, a new vision and strategy were launched, and the facility was renamed The Steinberg Centre for Simulation and Interactive Learning.



Photo: Owen Egan

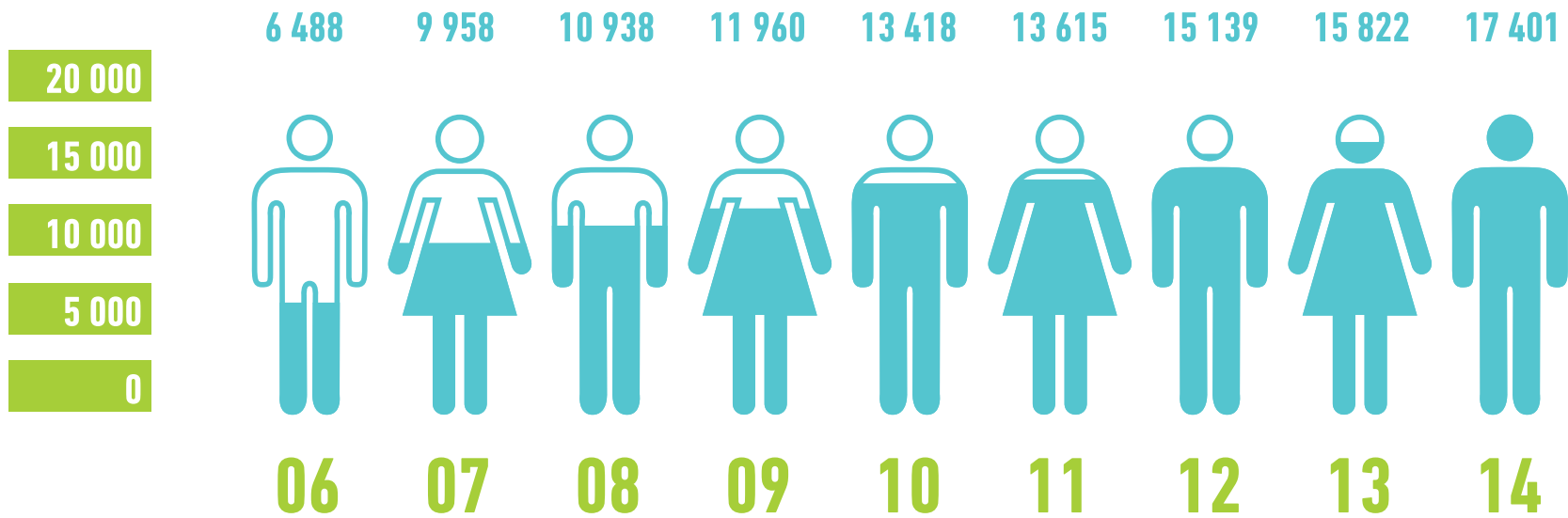
### Simulation Centre Timeline



Since its inception, the Centre has hosted over 110,000 learner visits of which over 60,000 have occurred in the past 4 years.

## SIMULATION CENTRE LEARNER VISITS

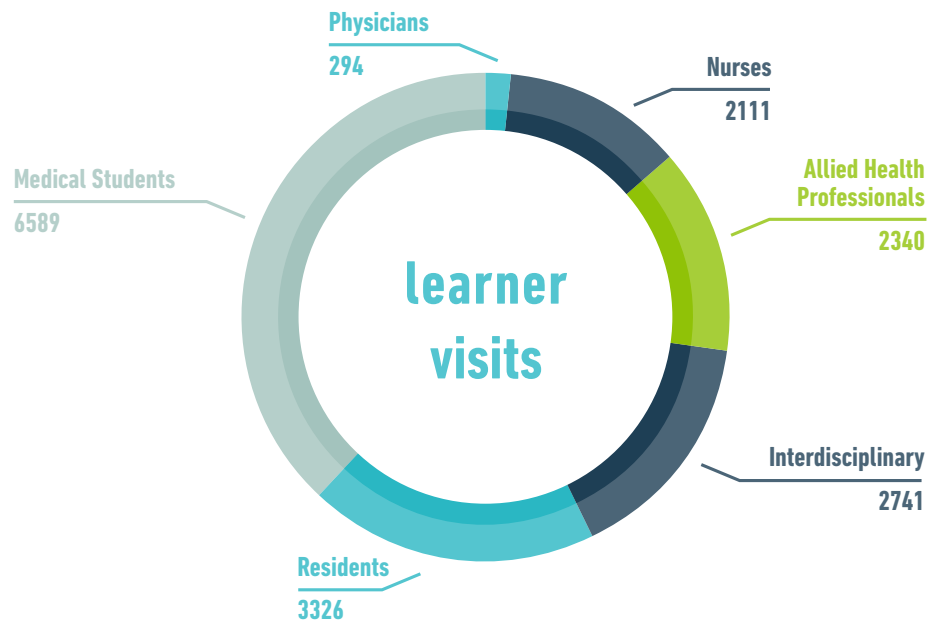
The majority of learners comprise medical students, nursing students, physical and occupational therapy students and residents. The Centre also provides training to non-McGill health care professionals, industry and the Canadian military.





## LEARNER VISITS PER GROUP (2014)

Educational activities range from teaching procedural skills on synthetic and real-tissue models to communication skills using actors for patients and inter-professional team-based skills in a high-fidelity simulated suite with computer-operated mannequins.



## LEARNER VISITS PER ACTIVITY TYPE (2014)



“

The Centre has been successful in attracting grants and generating research results through its collaborations with McGill's Centre for Medical Education, the Faculty's clinical departments and universities across North America and beyond. Visiting Professorships, such as the Flanders Family Visiting Professor in Medical Simulation, have enabled us to learn from others, as do McGill's internal research rounds.

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Photo: Owen Egan



**Now in our 10th year, we are in an exciting and envious position to capitalize on past successes and continue to inspire the next generation of simulation-based education, research and innovation. Key within our strategic plan is to maximize the delivery of safe and high-quality clinical care.**

Health care is now an expansive domain, incorporating multiple types of health care practitioners, using a host of advanced care technologies and operating at multiple sites of care delivery to manage clinical conditions with ever-increasing complexity and variability.

In order to deliver unparalleled learning experiences, the Centre needs to engage and create beyond the traditional boundaries of medical expertise and knowledge.

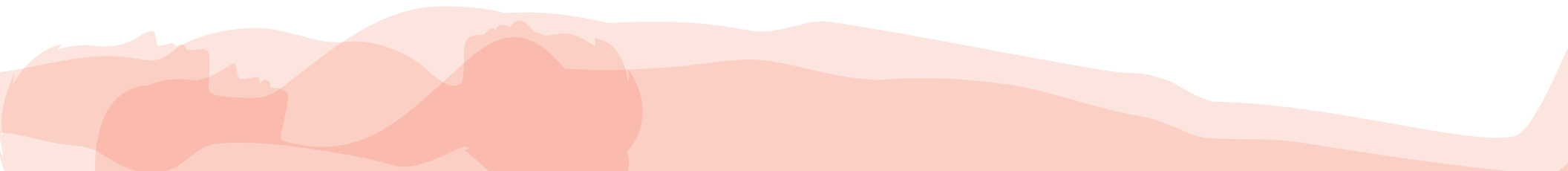
To capitalize on the future of simulation and catalyze the delivery of safe and high-quality health care, we need to work with groups and individuals with expertise in a wide range of disciplines. These include outcomes research, big data, human factors, ergonomics, online and pervasive educational technologies, serious gaming, immersive environments, process design and redesign, industrial design engineering and device development, to name a few.

It is with this imperative that we have taken the bold step to rename the Centre and renew our core purpose.



We need to work with groups and individuals with expertise in a wide range of disciplines.

# STRATEGIC PLAN – AN OVERVIEW



## THE EDUCATION MISSION

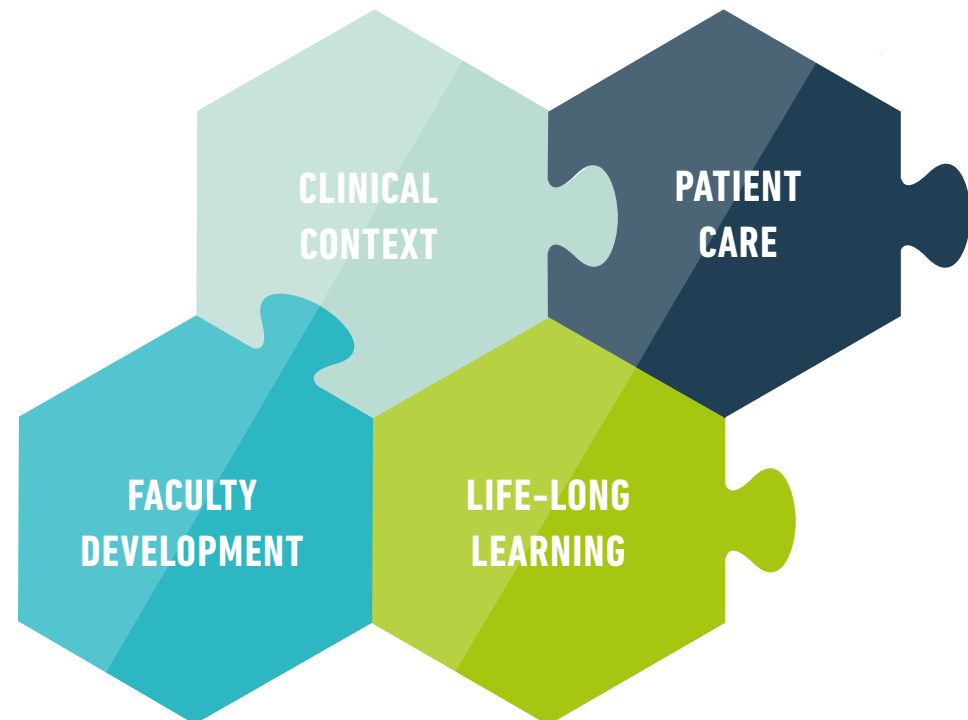
While simulation-based medical education has been prevalent in clinical arenas for almost 40 years, there has been a lag in the efforts to translate simulation training into discernible improvements in clinical care.

The focus has been on delivery of simulation training modalities, with measurement at the level of learner performance, though not addressing the impact on patient care.

Key Concepts:

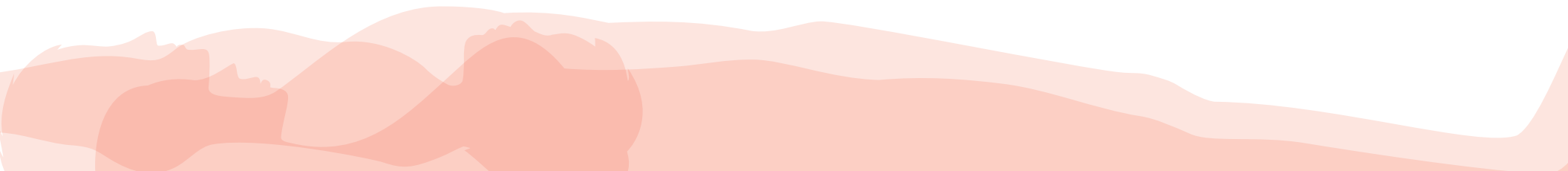
1. To consider learning objectives of simulation activities in a clinical context
2. To derive clinical measures of performance from the care setting
3. To be underpinned by a robust program of faculty development

**The educational mission of the Steinberg Centre for Simulation and Interactive Learning will be firmly embedded within processes to improve clinical care.**



## ENABLERS OF THE EDUCATION MISSION

1. Director of Education
2. Identification and recruitment of clinical personnel with respect to their roles within the simulation centre, i.e., specialty directors of education, faculty educators and simulation instructors
3. Faculty development program, specific to simulation training and assessment
4. Learner's Quality Circle
5. Engagement with patient safety experts



**AN EDUCATIONAL FRAMEWORK FOR SIMULATION**

**Anesthetics  
Family Medicine  
Medicine  
Nursing  
Obstetrics & Gynecology  
Pediatrics  
Physical & Occupational Therapy  
Psychiatry  
Radiology  
Surgery**

**Medical Expert  
Communicator  
Scholar  
Collaborator  
Professional  
Manager  
Health Advocate**

**CLINICAL  
COMPETENCE**

**CANMEDS ROLES**

## EDUCATION CASE STUDY

### Clinical Care Pathways or Simcare

- Current simulation-based training is focused on achieving competence in discrete activities, usually in a uni-professional setting, e.g., central-line insertion for medicine residents, sharing bad news for medical students, etc.
- This is not the mode of clinical practice, where health care is dispensed in a multi-professional setting with care delivery concerning the whole patient.
- Patient care pathways are an attractive concept for simulation-based medical education.
- Mapping of a care pathway for a disease process, e.g., acute stroke, colon cancer, spinal stenosis, supported by the knowledge, skills and attitudes to care for the patient, provides a clear scaffold to develop simulation-based encounters.
- The training activity is solidified in a clinical sphere, which can be directly translated to the clinical setting.
- Process and technological innovations can be tested, using simulation as a primer to prototype the process and to educate health care professionals, prior to clinical implementation.





## EDUCATION CASE STUDY

### Post-Operative Nursing Care

- Nursing care in the post-operative setting is complex with a multitude of patient types, from elective to emergent, and simple to complex.
- Competence is traditionally acquired through development of a knowledge base, followed by learning through observation and doing.
- A blended simulation program, including online modules, simulated patient encounters, mannequin-based scenarios and team-training activities, is necessary.
- The impact of such a program can be assessed through learner confidence, process measures, such as time to discharge from the recovery room, and clinical outcomes.
- The simulation program can be used to re-create real adverse events, which have occurred in the clinical space. All personnel can be educated in an in-situ setting to prevent, identify and ameliorate the effect of such adverse events.



## THE RESEARCH MISSION

In order to improve the impact of simulation-based training and assessment, a research agenda needs to be defined. This can also lead to the development and growth of simulation scientists in this emerging area of intellectual discovery.

Key Concepts:

1. To develop world-class research in medical simulation
2. Engage and promote a cadre of faculty scholars in simulation science
3. Provide resources in terms of research methodology, grant accrual and scholarly dissemination
4. Value research outputs and outcomes
5. Develop novel collaborations between contrasting and complementary research groups

**The Steinberg Centre for Simulation and Interactive Learning will be a venue for simulation-based research activities.**




## ENABLERS OF THE RESEARCH MISSION

1. Director of Research
2. Research fellows, affiliates and assistants
3. Simulation consensus conferences
4. Invited speaker series




director of  
research



fellows, affiliates  
& assistants



simulation  
consensus  
conferences



invited speaker  
series

## RESEARCH CASE STUDY

### Simulation: The Return on Investment

- Simulation-based medical education has enjoyed heavy investment in the past decade, especially in North America and Europe.
- While it is assumed that this type of medical education is of value, with regard to outcomes achieved per unit of resource allocation, there is minimal evidence for this approach.
- A critical area of discovery, working together with researchers in outcomes analysis, implementation science, health economics and clinical epidemiology, is crucial for McGill and the global health care community.
- This approach can enable simulation to be allocated in an evidence-based manner, focused on those areas which have a high impact on the delivery of safer and more effective clinical care.



Photo: Owen Egan

## RESEARCH CASE STUDY

### Simulation as a Process to Embed Evidence into Practice

- Evidence-based medicine translates poorly into practice.
- Successful implementation of new technologies, processes, pathways and education strategies are challenging at best.
- Optimal realization of a clinical intervention is undertaken in a multi-disciplinary manner, with members of the clinical team working together to deliver high-quality care.
- A hands-on simulation-based approach to multi-disciplinary care is completely novel, with the potential to lead to better clinical care, in addition to enhanced teamwork.
- This model can also be used to assist patients in managing their own clinical conditions, especially for chronic disease states.



## THE INNOVATION MISSION

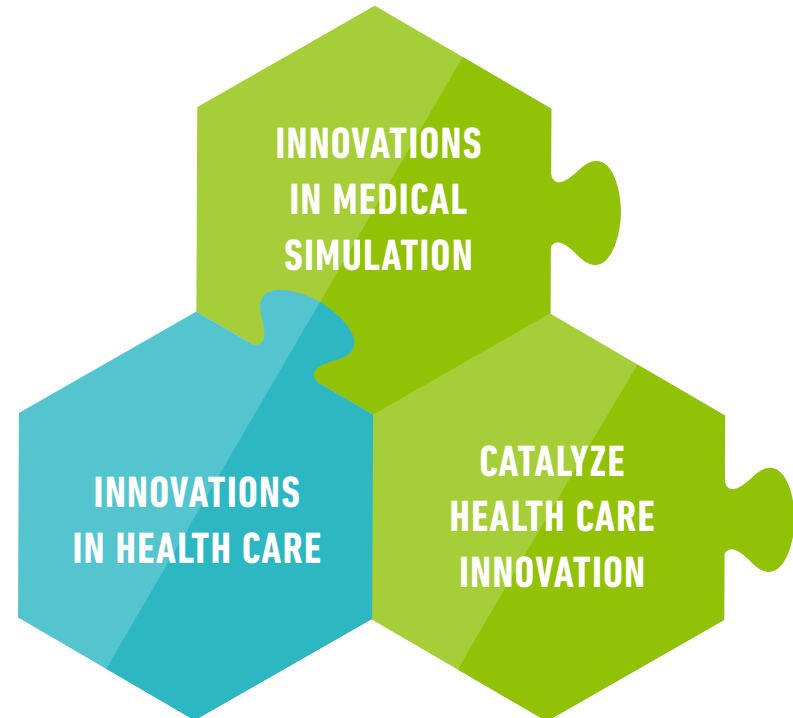
The present degree of innovation in simulation programs is based on educational tools and processes. There needs to be much greater interaction outside of clinical medicine, for example, with engineers, designers, artists and industrial psychologists, to use simulation as a tool to assist in the progress of medical innovations.

The focus on innovation will be based on the broad nature of health care, through two complementary routes:

Key Concepts:

1. Innovations in medical simulation – to produce materials and processes that enable more authentic and accessible learning environments, improved tools for evaluation, and pervasive learning opportunities
2. Innovations in health care – to use the simulation environment for the design, development and implementation of novel products and processes, prior to their introduction into the clinical setting

**The Steinberg Centre for Simulation and Interactive Learning will develop expertise and authority in the use of simulation to catalyze health care innovation.**



## ENABLERS OF THE INNOVATION MISSION

1. Director of Innovation
2. Innovation fellows and affiliates
3. Creation of a critical mass of collaborators in this arena

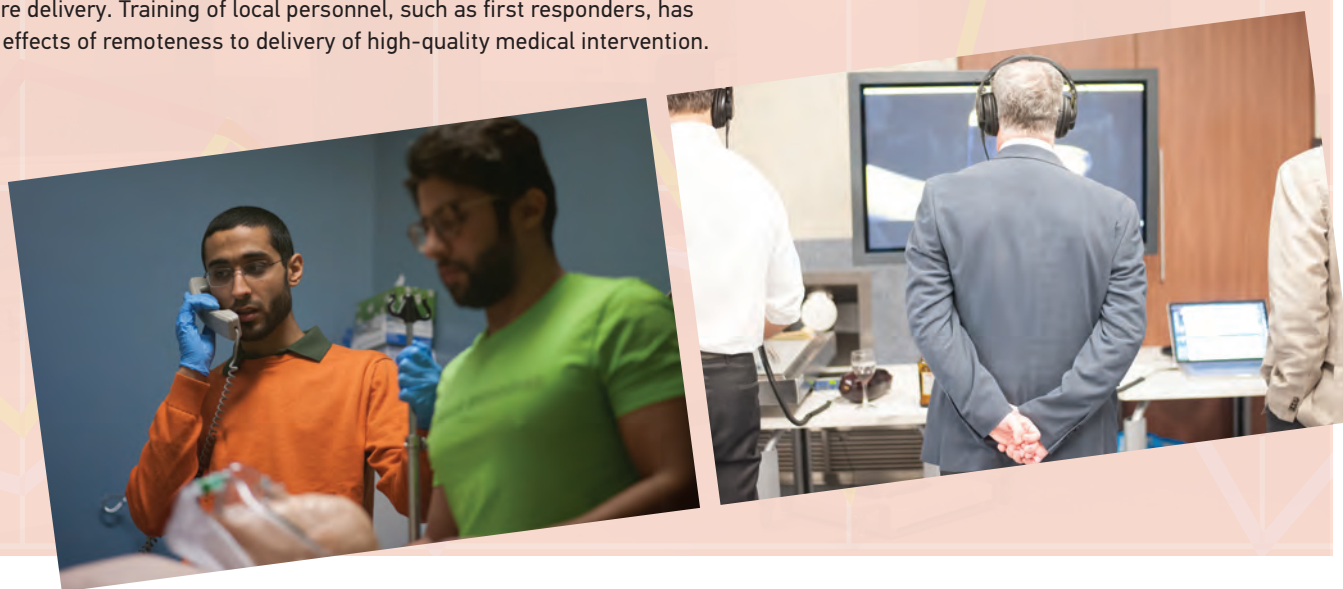


Photo: Owen Egan

## INNOVATION CASE STUDY

### Innovations in Medical Simulation

- Low-cost simulation – The impact of low-cost, high-impact medical simulation has yet to be realized. Widespread adoption, especially in rural and low-income settings, has the potential to significantly enhance clinical outcomes of care.
- Pervasive simulation – The potential of web-based simulation platforms is phenomenal and is sorely under-utilized. Working with instructional designers, serious game developers and educational technologists can enable a far wider reach of simulation-based training and assessment in all types of health care settings.
- Tele-simulation – The remoteness and inaccessibility of rural areas, especially during inclement weather, is a challenge to care delivery. Training of local personnel, such as first responders, has the potential to mitigate the effects of remoteness to delivery of high-quality medical intervention.





## INNOVATION CASE STUDY

### Innovations in Health Care

- Current processes of medical innovation are based firmly within industry.
- Design, development and testing of innovative health care products and processes occurs outside of the clinical setting, and often in workshops or laboratories.
- Simulation technologies can be used as a tool to catalyze health care innovation:
  - Discover areas of need with regard to medical innovation (needs analysis)
  - Define the focus of a medical innovation solution to a clinical problem
  - Develop design solutions that can benefit from iterative testing in an authentic clinical environment, with real end-product users
  - Deliver working prototypes that have been tested in realistic clinical settings
- This process can enable a 'fail early, fail often' approach to health care innovation.



## INNOVATION CASE STUDY

### Simnovate

- A strategic approach to encompass simulation, education and innovation in the health care domain.
- A focus on four domain areas, i.e., patient safety, pervasive learning, medical technologies and global health.
- A broad review of current strengths and areas of focus, determination of future directions and zones of importance, and prescription of approaches to achieve such goals.
- Bringing together a community of like-minded individuals, groups and organizations, of international repute, enthusiasm, passion and drive.
- Developing a cadre of clinicians, researchers and innovators to think differently about the future of health care design and delivery.



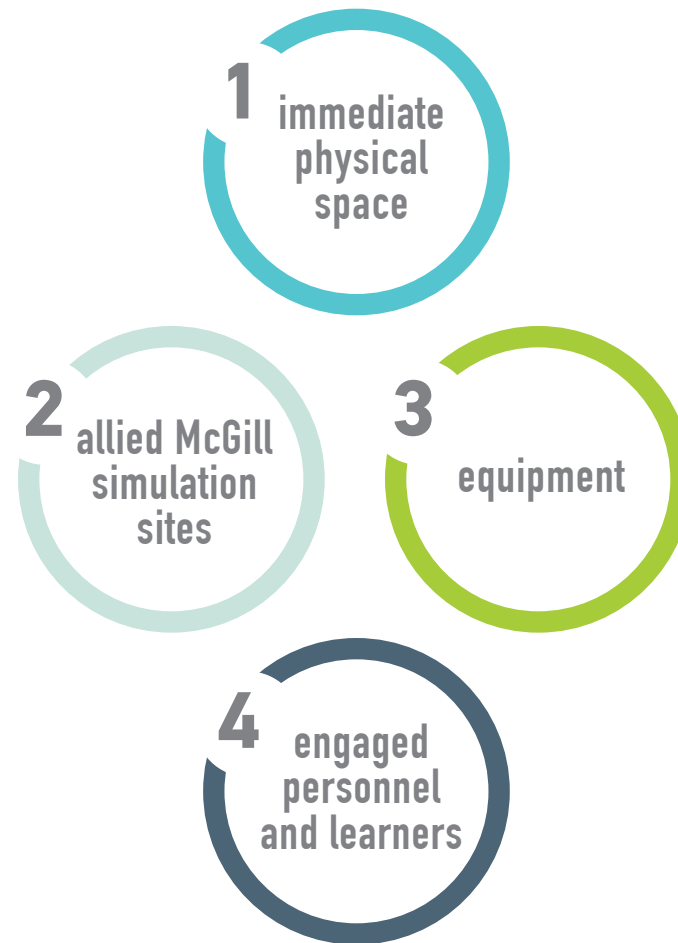
## THE OPERATIONAL FRAMEWORK

The structure of the Centre comprises the immediate physical space, and extends beyond this to include allied McGill simulation sites, the equipment, personnel and learners who are engaged in medical simulation.

There is a drive toward in-situ simulation activities, which not only brings the clinical and educational paradigms of simulation closer together, but also:

1. Enables replay of clinical adverse events, which, when coupled with root-cause analyses, can be used to further understand cause and effect, as well as to train health care practitioners in best practices
2. Allows 'stress-testing' of clinical systems to identify unknown harms and define strategies to manage such harm

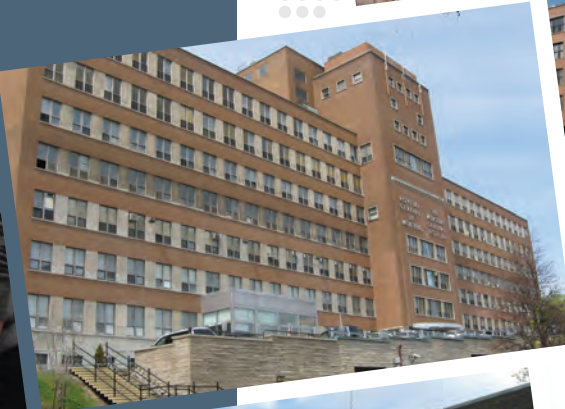
**The Steinberg Centre for Simulation and Interactive Learning will work with simulation expertise across all McGill sites, to exchange and learn best practices from each other.**



## A DISTRIBUTED MODEL OF SHARED EXPERTISE

Enablers of the Operational Framework:

1. An asset map, or audit, of McGill health care sites with respect to simulation activities
2. A responsive, transparent and simple booking system
3. Online review of simulation activities, with ability to assess performance remotely
4. A robust online presence, including social media platforms
5. Engagement with local, national and international simulation programs, to develop and implement best practices
6. Discovery of simulation practices in other high-performance industries, e.g., aviation, sports and the arts



## COMMUNITY ENGAGEMENT

The Centre is a focal site for the McGill community, and beyond. There is a need for improved visibility of the centre, its activities and its achievements.

There is a critical need to engage the local community at a number of levels:

1. Outreach events for local school children who are interested in pursuing a career in the health care arena
2. Open house events for the public, which can provide access to educational tools and processes for health care practitioners, while also delivering public health messages
3. A week-long summer simulation camp for high-school students
4. Specific outreach activities for patients to learn how to manage chronic conditions, such as asthma, diabetes and heart failure

**The Steinberg Centre for Simulation and Interactive Learning will engage the local community to help achieve better health care outcomes.**



## AN IMPLEMENTATION STRATEGY

The Centre, its allied clinical facilities and in-situ activities, together with pervasive simulation, encompass the structure of a simulation program. These structures are supported through the relevant equipment, personnel and learners who are engaged in medical simulation.

The processes of simulation are defined as the interactions and transactions between learners, educators, researchers, innovators and staff, with simulation equipment, environments and experiences, through the McGill network, and beyond.

The outputs are based on the simulation setting, the type of simulation facility and the types of learners present.

The outcomes are derived from clinically relevant and appropriate measures for the clinician, clinical patient pathway, institution, region and beyond. The outcome measure of greatest importance is that related to each individual patient.



Photo: Owen Egan



## CARE SETTING

Patient  
Clinician  
Clinical Setting  
Clinical Team  
Clinical Pathway  
Medical Facility  
Institution  
Region  
Collaborators  
Society & Global

## STRUCTURE

Simulation Centre  
Allied Facilities  
In-Situ Activities  
Pervasive Simulation

OUTCOMES

OUTPUTS

## TRACKING OUR PROGRESS

It is critical to have measures of our performance with respect to this strategic plan, based on our missions:



## EDUCATION

1. Develop a tool to determine the value of simulation-based activities undertaken at the simulation centre, allied sites, in-situ locations
2. Establish tools and processes to evaluate level 3 and 4 outcomes, i.e., impact of individual behaviour on clinical performance, and impact on the health care system
3. Work with clinical informatics and patient safety units to determine performance measures of importance
4. Design and implement simulation care pathways
5. Roll out a faculty development program
6. Ensure that all simulation faculty have undertaken a development exercise, prior to being credentialed to teach in the simulation centre
7. Develop a learner's quality circle
8. Implement an education committee
9. Recruit a Director of Education
10. Increase inter-professional activities
11. Increase the in-situ simulation activities



## RESEARCH

1. Bring together a critical mass of simulation scholars within the McGill nexus
2. Recruit simulation researchers to the simulation centre
3. Accrue grant funding
4. Recruit a Director of Research
5. Undertake a series of simulation consensus conferences, focused on critical areas of simulation-based research, e.g., transfer of training, use of simulation for clinical competence assessment, value of simulation
6. Develop a network of simulation partners across the globe
7. Research abstracts, publications and presentations
8. Establish a diploma in Medical Simulation

## INNOVATION

1. Build a program of pervasive learning in health care
2. Work with global health partners to consider opportunities in low-cost simulation
3. Develop a tele-simulation program within Quebec
4. Create a network of clinicians, engineers, designers and educational technologists who can use simulation to catalyze innovation in health care
5. Develop collaborations with industry partners
6. Attract grant funding



## OPERATIONS

1. A fully automated and transparent booking system
2. Online and pervasive educational tools, e.g., for pre- and post-testing
3. Online Audio-Visual system
4. An asset map of McGill simulation sites
5. An online presence, including social media

## COMMUNITY ENGAGEMENT

1. Outreach events
2. Open house events
3. Summer camp
4. Patient and public awareness simulation programs



## CLOSING STATEMENT

The Steinberg Centre for Simulation and Interactive Learning will be a venue for inspiration, evolution and engagement with regard to the role of simulation, in all its forms, to deliver better education to our clinicians, better care for our patients and better health for the communities we serve.



**Steinberg Centre for Simulation and Interactive Learning  
McGill University  
3575 avenue du Parc, Suite 5640  
Montreal, QC H2X 3P9  
Tel: 514.398.8978 Fax: 514.398.5497  
Email: [medsimcentre@mcgill.ca](mailto:medsimcentre@mcgill.ca)**

**[www.mcgill.ca/medsimcentre](http://www.mcgill.ca/medsimcentre)**