



Simulation Program Development Guide

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Executive summary

This document provides useful information for the development and operationalization of simulation centres, programs and courses for the purpose of health care education. It is based on notes gathered during the 12th Annual International Meeting on Simulation in Healthcare in 2012, and does not include a literature review or industry analysis.

Takeaways for the Faculty of Medicine at UBC

- Recruit a faculty champion (such as an Assistant Dean, Simulation, or Simulation Program Director) to be responsible for developing and implementing a simulation program.
- Conduct an inventory of simulation technologies (from standardized patients, virtual patients, to task trainers or simulation mannequins).
- Conduct a program goal assessment and develop an educational strategy that:
 - Aligns simulation activities with new curriculum for MDUG
 - Works with existing interprofessional education leaders to determine common learning objectives and corresponding simulation activities for students from multiple health professions
- Draft service level agreements with simulation centres for program use.
- Determine course or departmental leaders who can develop and implement simulation courses based on program goals
 - Provide eLearning and instructional design services to develop simulation courses.
- Design operational plan and budget for implementing simulation activities.
- Ensure staff training and faculty development is developed and supported.

What is simulation?

Simulation is about anticipation, preparation and practice. It involves activities that reproduce an activity, a manual skill, a scenario or an interaction.

The goals of simulation are not to teach new knowledge, although often simulation can help to identify areas where knowledge or understanding is lacking.

The goals of simulation are therefore to:

1. Attain and practice proficiency in a communication or manual skill (such as suturing, resuscitation, airway management, inserting IVs)
2. Identify process and communication related issues in team based care
3. Identify what manual skills, communication, incident/patient management or systemic skills need to be improved.
4. Practice understanding of roles and team based care.

The top 10 considerations for planning a simulation program

1. Have a purpose for introducing simulation activities.
2. Simulation is a set of activities that may or may not require technology. Some of the most effective simulation uses actors, standardized patients.
3. Managing a simulation centre is different from running a simulation program.
4. Effective interprofessional healthcare needs interprofessional simulation.
5. The most effective simulation centres and programs are those that have a committed faculty champion.
6. Do not underestimate the need to create a governance model for financial and program goals decisions.
7. Determine the learning needs of your program(s) before you purchase any equipment.
8. Make sure simulation centres have both a start-up and operational budget.
9. Simulation output (the value it provides) is not easy to measure in the short term. Do not let the lack of short-term evidence discourage the launch of a simulation program.
10. Have a clearly defined purpose for using simulation!

Simulation and MD UG Education

This section outlines ideas for simulation activities related to medical undergraduate education and includes sections on assessment, examples of MD UG simulation courses and key ideas for simulation and interprofessional education.

Simulation and Assessment

Simulation activities in the education setting are used for formative assessment (feedback) and summative assessment (grading). In both instances, the assessment activity should aim to provide feedback reinforcing correct behaviours and skills in a safe and encouraging manner.

- Simulation, such as virtual patients can be used for formative or summative assessment. Value points can be assigned for completion, or for the completion of the virtual patient according to a 'preferred' pathway.
- Objective Standardized Clinical Exams (OSCEs), are a popular type of summative assessment that uses patient-actors in clinical skills rooms for summative assessment.
- Simulation activities involving mannequins or task trainers are most used for formative learning, however it is often compulsory for students to attend simulation sessions to complete requirements.

Best practices for using SP or mannequin-based simulation for formative assessment:

Simulation activities are usually used for feedback (formative assessment). Formative feedback is often provided in conjunction with review of:

- 1.) The video recording of the simulation activity, and sometimes with,
- 2.) The analytics data generated through the simulator.

When debriefing on simulation activities using video and data:

- Allow students to self-reflect before conducting a group reflection exercise
- Allow students as a group to make suggestions about what went right, and what could be improved.
- Provide constructive feedback about behaviours that can be improved on and things that students did well (do not target the individual, but rather skills or behaviours that can be improved).
- For IP based simulation, ensure that there is a faculty member from each of the relevant professions to co-facilitate debrief.
- Provide the video recording of the simulation to the students via a learning management system for future review

Best practices for using SP or mannequin-based simulation for summative assessment:

If simulation is used for grading students (summative assessment):

- Develop scenarios that clearly have a preferred (most correct) process and outcome.
- Develop scenarios that are appropriate to the learner level and match the learning objectives of their program.
- Develop appropriate checklists that are used by the observer to mark the students behaviours during the simulation. These checklists should be easy to follow for the observers/markers.
- Dedicate enough observers to assess the students fairly using checklists.
- For IP based simulation, use teamwork skills scales for evaluating teams
- Store the video recording of the simulation in a learning management system for future review and potential student promotion/remediation.

Examples of schools using simulation for undergrad students:

Yale

At Yale, the goal of simulation is to allow for quick immersion of incoming students into the medical professional identity, and to prepare students for residency.

Students use simulation in years 1 and 3.

Year 1:

Students take part in an immersion (orientation) program in their first week of medical school, which includes time spent in hospitals. In their first week of medical school, students get one hour of simulation time (30 minutes hands on, and 30 minutes observing a different group) and a one-hour debrief. The purpose is early professional identification. The topic of the simulation activity varies, but focuses on consultation and developing a patient care plan. The simulation activity takes place in two groups of four, where one group is simulating and the other is observing. All eight students participate in the debrief, which is conducted by a basic scientist and clinician.

Year 3:

Students take part in simulation in a simulation lab once a week for 12 weeks at some point in their third year. The lab consists of two simulation sessions of 15 minutes each working on two cases (total of 30 minutes simulation time) and 30 minutes debriefing. Over 12 weeks, each student will have participated in 24 different simulation cases. This requires the simultaneous availability of multiple simulators and faculty. The focus of the

program is on teamwork, crisis management and communication with experts, allowing the students to practice their ability to succinctly summarize the patient's state.

Queens University

Queens developed ninety interprofessional simulation sessions that comprise a single simulation course. This course is intended for senior nursing students (Year 3) and MD undergrad students (years 1-4). Over the course of two years, the curriculum planners for nursing and MD undergrad developed ninety simulation session plans that met the objectives of both curricula in the obstetrical and pediatric skills and infection control.

The modules were evaluated using quizzes, performance checklists and observations. And included four modules comprising ninety separate simulation activities:

- 10 airway management sessions
- 10 IV catheter sessions
- 2-4 cardiac arrest skills sessions
- 24 cardiac arrest team practice sessions
- 10 Obstetrics sessions
- 10 Paediatrics sessions
- 10 Suctioning
- 3 Infection control

Interprofessional Education (IPE) and Simulation

Goals

“Those who play together need to practice together.” - ... Queens University

Education needs to be responsive to interprofessional needs in health care practice. American health education programs tend to identify components of their curricula, which can lend themselves well to interprofessional simulation activities. The focus of their simulation activities which are interprofessional focus on understanding roles, responsibilities, situational awareness and family/patient interaction.

American guideline for Interprofessional Collaborative Practice Competency Domains
<http://www.aacn.nche.edu/education-resources/IPECReport.pdf>:

1. Values and ethics for interprofessional practice
2. Roles and responsibilities
3. Interprofessional Communication
4. Teams and teamwork

Health care education programs that collaborate on IPE simulation tend to use the Team STEPPS model to plan and evaluate activities using standardized team based evaluation methods.

Evaluation of teamwork for IPE simulation is done using one of the many teamwork scales models. For an overview of teamwork scales see this literature review:
<http://www.hbs.edu/research/pdf/11-116.pdf>

Faculty Development

Faculty development is a key component of simulation. Faculty development needs to begin with the faculty champion/assistant dean of simulation. Exposure through learning the successes and implementation models of different program and courses is very helpful. The faculty champion for simulation in a program can begin to recognize the training needs of other course leaders and work with the faculty development office to meet the following training objectives:

Faculty Development Objectives:

- Describe concepts of simulation-based education
- Describe differing types of simulation
- Describe elements for well-designed simulation-based education to achieve good outcomes (for instance, DM Gaba's 11 Dimensions of Simulation (2004)).
- Identify ways to use simulation for an existing curriculum or a new simulation course/experience
- Understand when simulation is useful and when objectives can be met by other activities
- Identify the elements of simulation course/scenario design
- Develop simulation scenarios
- Describe ways to prepare the learner prior to simulation activities
- Describe simulation debriefing strategies
- Demonstrate ability to lead a debriefing session
- Demonstrate effective debriefing strategies

Simulation Centres, Programs and Courses – What is the difference?

The difference between simulation centres, program and courses, is one of physical location, purpose and governance. The following section will describe what simulation centres, programs and courses are, as well as steps to launching them.

- Simulation centre

A simulation centre is a physical location that includes simulation equipment and services. There are two models of simulation centres. 1). Simulation centres designed for the purpose of a particular program or stakeholder, and 2). Simulation centres designed for supporting multiple programs and stakeholders.

- Simulation program

A simulation program is a grouping of courses and simulation activities that is designed to meet the needs of a particular stakeholder group, for example the Nursing Program, MD Undergrad Program or the PG family practice residency program. A simulation program may have multiple objectives and courses. A simulation program can also be conducted in many different simulation centres.

- Simulation course

A simulation course is a specific group of simulation activities that meets part of the objectives of a simulation program. A simulation course is usually a part of a larger simulation program, and can be conducted across multiple simulation centres, as long as the centres provide the same simulation technologies.

Simulation Centres

The following section includes information on the steps to launching a simulation centre, the ingredients in managing a simulation centre, the services a centre can provide as well as staffing.

Steps to launching a simulation centre

1. Hire an Simulation Centre Director/Clinical Educator
2. Hire a Project <manager
3. Establish a governance model that includes
 - a. Financial governance
 - b. Centre mandate governance (Program types and model)
4. Determine the centre's mission and goals
5. Conduct an environmental analysis
 - a. Financial analysis (sources of funding, costs)
 - b. Stakeholders and their Program needs
6. Determine the risks of building a centre/not building a centre
7. Determine a centre model
 - a. Centre built for a specific purpose/ stakeholder group
 - b. Centre built to support multiple programs/ stakeholder
 - i. Drop-in for interdisciplinary use
 - ii. Multiple programs use centre simultaneously
 - iii. Centre organizes interdisciplinary programs
8. Determine a startup and operational budget
9. Conduct a technology needs analysis based on program goals

10. Develop building and technology designs
11. Build centre
12. Hire and train staff
 - a. Simulation Centre Manager
 - b. Simulation Coordinator/Assistant
 - c. IT specialist
13. Develop operational plans for
 - a. Staff – job descriptions, backfill, etc.
 - b. Training – for staff and faculty
 - c. Equipment management – determine times for upgrades/maintenance
14. Develop and promote services
 - a. Create a program matrix for interested programs – outline what types of programs/services a centre can offer based on what technologies it has.
15. Develop an evaluation plan for the centre

Ingredients in managing a simulation centre

A simulation centre needs to be managed according to its purpose, which could be either to 1). Provide simulation services in support a of a particular simulation program (build-to-fit), or provide simulation services in support of multiple simulation programs/stakeholders.

1. Direction and governance
 - a. A centre requires ongoing direction for growth of services, innovation and
 - b. A centre requires clearly defined governance to decide on centre use, program growth and finances.
2. Scheduling and monitoring use
 - a. Organize and schedule drop-in sessions
 - b. Schedule program sessions
 - c. Organize and find opportunities for interdisciplinary sessions
3. Equipment/technology management and procurement
 - a. Simulator
 - b. Task trainers
 - c. Other equipment: IV bags and fluids, needles, defibrators
 - d. Learning management system
4. Equipment/technology set up (start up and ongoing) and technical troubleshooting
5. Provide Simulation Services

Simulation Centre Services

Simulation Centres will wish to provide educational, technical and eLearning services to Programs or Courses who wish to use the centre. Alternatively, the program or course faculty and staff can do some of these activities.

1. Educational Services
 - a. Course/Program Consultation (best done by a 'Clinician Educator')
 - i. Provide an intake form
 - ii. Identifying goals and objectives
 - iii. Identifying specific learning objectives and corresponding simulation activities
 - b. Program/Course Development
The centre can provide a "package of staff" that includes (instructional designers, the Clinical Educator, IT Staff) for:
 - i. Developing cases
 - ii. Evaluating, assisting with debriefing
 - iii. Developing elearning materials (quizzes, videos, modules, virtual patients)
 - iv. Programing cases into the simulator
 - c. Faculty Development and training
 - i. Training for course facilitators
 - ii. Training for program staff (on the possibilities of simulation technology)
2. Programming Coordination and IT services
 - d. Running and managing IT and audiovisual equipment
 - e. Setting up of the simulator, simulator equipment management
 - f. Managing a learning management system for
 - i. Review of recorded session
 - ii. Simulator analytics
 - iii. Quizzes
 - iv. Articles
 - v. Modules

Simulation Centre Staff

A simulation centre needs to be properly staffed in order to begin and continue successful operations. The following positions should be adjusted based on the size of the centre and the number of users/programs it offers.

1. Simulation Director/Clinical Educator
 - a. Provides direction to the centre by:
 - i. setting program goals
 - ii. selecting programs
 - iii. ensuring financial accountability
 - iv. ensuring clarity of governance
 - v. advocating for the centre's activities
 - vi. aligning centre activities with health education goals

- b. Leads the 'intake process' for new programs. Conducts an educational needs assessment by ensuring that clinical and learning objectives can be met with simulation.
- 2. Simulation Manager
 - a. Manages the acquisition of simulation equipment
 - b. Ensures centre services are running adequately
 - i. Ability to record simulation
 - ii. Rooms for debriefing
 - c. Ensures programs adhere to centre policies
 - d. Organizes training for staff and faculty development activities
- 3. Simulation Centre Assistant/Coordinator
 - a. Schedules simulation activities
 - b. Manages student and employee flow through the centre
 - c. Coordinates supplies (ensures supplies are ordered, sets up the mannequin with the assistance of the Simulation Centre Technician)
- 4. Simulation Instructional Designer (this position can exist as part of the centre, or as part of the Medical School)
 - a. Designs the storyboard for the simulation program
 - b. Designs microsimulation activities, such as modules or virtual patients
 - c. Ensures the right pre-and post activities are available, such as quizzes
- 5. Simulation Centre Technician
 - a. Images computers in the computer lab
 - b. Wires, sets up mannequins
 - c. Sets up audio and visual equipment
 - d. Manages server and LMS

Simulation Programs

This section provides an overview of the steps needed to launching a simulation program for a particular stakeholder group. A simulation program will usually include more than one simulation course, which addresses the program objectives. A program can be for a specific group (i.e., simulation program for MD UG), or can span multiple educational/clinical stakeholders (such as interprofessional simulation programs that include students from nursing, MD undergrad students, residents and paramedic professionals).

Steps to launching a simulation program

1. Find and hire a Director/Assistant Dean for Simulation
2. Conduct a a strategic, educational and business assessment
 - a. Determine the program strategic goals
 - i. Determine what health disciplines have simulation needs and whether they are willing to collaborate on IPE simulation.
 1. What are the expert and administrative leads in various departments who are willing to collaborate on IPE simulation

- activities? Identify who the learners are. What locations are they in?
- ii. Identify curriculum leaders who have a stake in the development of the program's goals.
 - iii. Determine a governance structure for making program approval decisions.
 - iv. Determine and document the Faculty of Medicine's commitment to simulation activities and devise a simulation vision and strategic plan.
 - v. Determine the start-up and operating budget to commit to developing a simulation program.
 1. Will budget be contributed from multiple health professions?
- b. Determine the high-level program educational goals
 - i. Based on the stakeholders, determine the expected outcomes that the simulation program would achieve.
 - ii. Determine high-level learning objectives.
 - iii. Determine simulation goals that can be developed into courses and lead by different course directors (SMEs)
 - c. Conduct an inventory and develop service level agreements
 - i. What centres are available (geographically, service-level agreements) to the identified stakeholder groups?
 - ii. What simulation technology do each of these centres they have?
 - iii. Determine gap between the educational needs and simulation objectives and the technology that is available (I.e. Is there a child simulator available for pediatrics?)
3. Establish curriculum/program needs and objectives
 - a. Determine a program strategy (what courses will be developed in what order)
 4. Find Course Directors (across different health professions)
 - a. Find program directors who can develop simulation courses (see below for course development) that can meet the program objectives.
 5. Provide training for course directors based on their specific needs

Simulation Courses

Simulation courses are time intensive to develop and facilitate. Simulation courses should:

- Relate to a simulation program's goals
- Have access to simulation resources (technology, e-learning and education professionals), based on service level agreements
- Usually require two faculty members per course:

- Course Director:
 - works with the Program-level Simulation Champion/Assistant Dean for Simulation to develop course objectives that meet the curriculum and IPE needs as identified in the program strategy
 - Works with designers to plan the simulation activities
 - Leads the simulation activity
- 2nd Course instructor:
 - Can be a subject matter expert
 - Assists in designing the simulation activity
 - Leads the observation and debriefing during the simulation activity

Steps to developing a simulation course

1. Identify the goals and objectives that simulation is intended to address.

The process of determining simulation activity objectives is to assessing the true learning need. For example, one objective might be for a hospital to implement a simulation program to improve cardiac resuscitation skills. Upon further questioning, it can be discovered that the true need for simulation is interprofessional team crisis communication, not skill-based practice.

- a. What 'issue' or 'problem' is simulation intended to address?
- b. What is the course objective? I.e. what is the goal of the simulation activity?
- c. What healthcare/clinical challenge will this simulation activity address?
- d. What is the healthcare domain? (Nursing, PT, family practice, surgery...)
- e. Who are the learners? What are the learners' experiences with simulation?
- f. Is there a need for interprofessional simulation?

2. Identify the type of simulation that is needed

- a. What type of simulation the most effective way to meet this objective?
- b. What type of simulation is the most cost efficient way to meet this objective?
- c. How many learners will use the space at any given time?

3. Plan the specific learning objectives and assessment goals

- a. What are the specific learning objectives (the objectives of the simulation activities, not the entire program/course)?
- b. What are the skills, knowledge and behaviours that need to be assessed?

4. Plan the simulation and evaluation activities

- a. What are the specific activities that comprise this simulation?
 - i. What is the sequence of learning activities in this simulation?
 - ii. Are these activities formative or summative?

- iii. Is there value in asking learners to prepare for the simulation by:
 1. Pre-reading articles or case studies
 2. Pre-viewing videos
 3. Doing interactive modules
 - iv. What type of debriefing is appropriate?
 1. Independent
 2. Group based
 3. Video based
5. Determine technology and resources
- a. What type of equipment/technology is needed for the simulation?
 - b. What type of equipment/technology is available to my program through local/regional simulation centres?
 - c. Where will the simulation take place – what are the space/venue/travel considerations.
 - d. Who can assist from within the Simulation Centre, and what staff are on my team to help implement these courses?

Other Resources Available

- Checklist for US Accreditation Standards for Developing Simulation Programs
- Children's Hospital of Philadelphia
 - Curriculum Development Policy for Simulation
 - "Building a better scenario" PowerPoint presentation
 - Simulation program 'intake form' – to facilitate consultation for developing a simulation course
 - Simulation instructional design process and steps for writing objectives
 - Case Template
- Dr. DM Gaba's article on the eleven dimensions of healthcare simulation
- Queens university: PowerPoint presentation on interprofessional simulation in MD UG
- McGill: Simulation Centre Policy and Procedure Manual
- Yale Medical School
 - Simulation schedule for Year 3, twelve week simulation program
 - Student introduction to Year 3 simulation program