Simulation: An Innovative Curricular Advancement to Instill Foundations of Lab Practice

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Introduction

Simulation is an educational modality used in both educational and clinical healthcare settings, where carefully planned situations or processes are mimicked in varying degrees of fidelity, or realism. As a form of experiential learning, simulation can help integrate theory and lessons into everyday practise. Simulation has existed as an important tool for decades. Its use has accelerated over the past 10-15 years with widespread implementation in many healthcare disciplines at the student and working professional level. Primary reasons for this rapid uptake are linked to an increased emphasis on the benefits of deliberate learning and immersive learning experiences, increased awareness of the need to improve patient safety, development of national simulation societies, and advances in technology that improves fidelity.[1] The field of simulation research has advanced accordingly, and many studies have concluded that there are positive outcomes from simulation for student learning and clinical competency.[2]

Simulation has a prescribed set of distinct phases: pre-brief, scenario, and debrief. During the pre-brief, participants are introduced to a scenario and are to act as they would in 'real life'. A primary goal of a pre-brief is to create a safe environment where participants are ensured they will not experience negative repercussions for making errors. Mistakes are framed as learning opportunities. In the scenario stage, participants work through the simulated activity and an observer makes note of their actions but does not intervene. Depending on the complexity of the simulation, there may be confederates who are instructed to give certain responses or act in certain ways. In the debrief stage, participants are guided through reflection activities. This may or may not be augmented by viewing a video of their simulation. Debriefing is an essential part of the learning process and should be performed in a structured and deliberate way.[3]

Authentic simulation modalities act on adult experiential learning pathways. Kolb's learning cycle has been used to understand simulation effectiveness.[4] Because simulation participants actively experiment with concepts in a realistic environment, and must reflect via the debriefing stage, learning is enhanced and better integrated with previous experiences.[3] Research also supports a desire for more simulation from students or practitioners who have been exposed to it in the past.[5,6] Essential transferable skills, such as communication and confidence, can be fostered through use of simulation.[5,7] Simulation can expose students to complex clinical scenarios, such as end of life care, where a recent student found increased student self-efficacy in care for the dying.[8] Particular to this project, we want to build on research that demonstrates positive impacts on the development of future clinical competency.[9]

Rationale and Project Description

Medical Laboratory Science (MLS) is a Canadian Medical Association accredited, fully integrated program, consisting of a pre-professional year followed by three years in the Division

of MLS in the Faculty of Medicine & Dentistry. Post pre-professional year, the first and third years of the program are regular didactic university years. The second year is a 38-week period of practical hospital training under the supervision of Alberta Health Services, Edmonton Zone. Students rotate through laboratories in clinical biochemistry, hematology, histotechnology, clinical microbiology, and transfusion science. All are required for Canadian Society for Medical Laboratory Science (CSMLS) general certification.

Historically, simulation has been used to a lesser extent in MLS than other health professions. There are broad contextual similarities but key differences that justify study into the effectiveness of simulation within MLS. For instance, the MLS profession is experiencing rapid change as it is becoming increasingly computerized and automated, requiring workers to interface extensively with instrumentation and information systems. This type of technical work is in all aspects of the clinical laboratory. Simulation will provide students a better understanding of laboratory workflow and operations. We have identified that simulations focused on laboratory information systems (LIS) are a relatively cost effective way to target this essential professional aspect earlier in the program. As an accreditation requirement, the program annually surveys employers of recent graduates to assess suitability of the training for an entry level laboratory technologist position. A recurring theme is that students' ability to troubleshoot quality control issues needs to be better developed and the program needs to offer further LIS training. This project will ensure that employers' needs are being better met.

This project will introduce formal simulation pedagogy to MLS. LIS simulation will be implemented in the first two years of the program. Currently, in the first didactic year, the students engage in several laboratory sessions each week in a low fidelity teaching laboratory. LIS exposure is extremely limited; there are no computers in the laboratory. During the second year of the program, students are in a simulated clinical teaching laboratory at the Edmonton General Hospital (EGH) for roughly one third of the time, and in clinical hospital laboratories for the remainder. The EGH lab has moderate fidelity, but is lacking in key components to increase realism; such as label printers and barcode scanners. These tools identify patient specimens in the working clinical laboratory; part of nearly every step of the testing pathway. In addition, there has been no formal implementation of a simulation pedagogy, in that instructors do not necessarily apply the simulation methodology of 'pre-brief, scenario, and debrief'. We have a prime opportunity with this proposed project to make small changes to capitalize on our existing basic infrastructure to enhance fidelity while increasing the capacity of our teaching staff to use a simulation based approach.

Our project involves two major aspects: broad early exposure to the LIS and simulated scenarios. In the first year, the LIS will be introduced during the orientation course, MLSCI 200. Students will learn how to interact with the LIS and understand it as an essential element of every patient test. Once they are familiarized with the LIS, they will participate in simulated LIS scenarios in any laboratory discipline (course). Simulated scenarios would begin in Winter term of the first year, as students need to work with the LIS under guidance and instruction in Fall

term. In the second year (clinical), simulated scenarios would continue and become increasingly complex in order to start to develop mastery. The intended LIS is identical to the one currently used in the Edmonton Zone of Alberta Health Services (AHS). The LIS will be used in 'test mode', whereby students will not be able to access real patient data. Any data used during the simulations will be simulated. AHS will provide the LIS software in support of the project. This project will expand access to educational experiences and increase student participation in a broad range of curricular experiential learning opportunities *(For the Public Good* Obj 7).

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