

Exploring Simulation Utilization and Simulation Evaluation Practices and Approaches in Undergraduate Nursing Education

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Research Project Final Report

Abstract

Simulation is becoming one of the most significant teaching-learning strategy available in undergraduate nursing education (Aebersold & Tschannen, 2013; Akhtar-Danesh, Baxter, Valaitis, Stanyon, & Sproul, 2009). Through the development, application, and evaluation of high quality simulation experiences, learners are able to acquire and demonstrate the knowledge and skills necessary for safe, competent, and ethical nursing practice. While there is indication within the literature and anecdotally about the benefits of simulation, robust evidence that supports the effectiveness of simulation for learning and evaluation in nursing education has yet to be fully established and is slowly emerging (Alexander et al., 2015; Canadian Association of Schools of Nursing, 2015; Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014; Rickets, 2011). As the use of simulation increases in nursing education, the need to evaluate students appropriately, accurately, and in reliable ways intensifies (Todd, Manz, Hawkins, Parsons, & Hercinger, 2008). Furthermore, as nursing programs increasingly consider simulation as direct clinical replacement in the context of increased student enrolment and dwindling clinical placements, standardized evaluation must play a vital role (Canadian Association of Schools of Nursing, 2007; Norman, 2012; Todd et al., 2008). Our study investigated simulation utilization and simulation evaluation practices and approaches employed among undergraduate nursing educational programs in Ontario, Canada, using a mixed methods approach, including both quantitative and qualitative data collection through a confidential online survey. The goal of our study is to establish a “picture” of current trends, practices, and approaches related to simulation that is employed within this entire province. An overview of the study results and recommendations that have potential to make a substantial contribution to the growing evidence for best practices in the science of simulation will be discussed.

1. Summary of project aims

Background

Simulation is becoming one of the most significant teaching-learning strategy available in undergraduate nursing education (Aebersold & Tschannen, 2013; Akhtar-Danesh, Baxter, Valaitis, Stanyon, & Sproul, 2009). Through the development, application, and evaluation of high quality simulation experiences across a full range of modalities, (including high-fidelity, medium-fidelity, and low-fidelity) learners are able to acquire and demonstrate the knowledge and skills necessary for safe, competent, and ethical nursing practice. By approximating clinical practice within nursing education, simulation provides real-time opportunities for students to work through complex patient-care

situations, ideally receiving evaluative feedback that promotes increased confidence and competence (Cant & Cooper, 2010; Norman, 2012; Ricketts, 2011).

Increasingly, simulation is playing an essential role in supporting educators to facilitate nursing students' learning of complex concepts and skills (Canadian Association of Schools of Nursing, 2007, 2015; Ricketts, 2011). In clinical settings, the shift to higher acuity and increased complexity of patients demands higher levels of decision-making, further necessitating increased competency and confidence among nursing students and program graduates. A number of studies demonstrate the advantages of simulation in enhancing nursing students' knowledge, competence, confidence, and satisfaction, while readying students for clinical practice (Cant & Cooper, 2010; Norman, 2012; Ricketts, 2011). While there is indication within the literature and anecdotally about the benefits of simulation, abundant and strong evidence that supports the effectiveness of simulation for learning and evaluation in nursing education has yet to be fully established and is slowly emerging (Alexander et al., 2015; Canadian Association of Schools of Nursing, 2015; Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014; Ricketts, 2011).

As the use of simulation increases in nursing education, the need to evaluate students appropriately, accurately, and in reliable ways intensifies in all domains of learning (e.g., psychomotor, cognitive and affective domains) (Andreatta & Lori, 2014, Bensfield, Oleach, & Horsley, 2012; Ricketts, 2011; Todd, Manz, Hawkins, Parsons, & Hercinger, 2008). Furthermore, as nursing programs increasingly consider simulation as direct clinical replacement in the context of increased student enrolment and dwindling clinical placements, standardized evaluation must play a vital role (Canadian Association of Schools of Nursing, 2007; Norman, 2012; Smith, 2007; Todd et al., 2008). Diekelmann and Ironside (2002) note that evaluation is a critical, yet often overlooked component of simulation practice and research. Developing comprehensive insight into current nursing educational practices and approaches in relation to the utilization and evaluation of simulation for nursing education is a critically important undertaking, necessary to solidify the foundation for future development of the science of simulation for nursing education.

Study Purpose and Aims

The purpose of this study is to investigate simulation utilization and simulation evaluation practices used among undergraduate nursing educational programs in Ontario, Canada. In so doing, study findings will establish a "picture" of current trends, practices, and approaches related to simulation that are employed within this entire province. Specific areas for investigation include:

- 1) The simulation modalities (high, medium, low fidelity) that are employed in undergraduate nursing education in Ontario, including the degree to which they are utilized across the various nursing educational programs and models in this province;
- 2) The common simulation foci that are included in undergraduate nursing programs in Ontario; and
- 3) The current evaluation approaches and practices specifically related to simulation in nursing education, including evaluating students (formative, summative, high stakes,

and remedial evaluation), students' evaluation of the simulation for learning, evaluation practices as they are applied to examining the simulation itself, and evaluation of personnel involved in teaching-learning with simulation.

2. Theoretical/conceptual framework

This study is situated within a perspective that recognizes the significance of best practices in the science of simulation to transform nursing education. Simulation is an emerging field with great potential for supporting active learning and student engagement. As such, there is a recent movement to establish practices that ultimately will promote and ensure patient safety (Alexander et al., 2015; Canadian Association of Schools of Nursing, 2015; Hayden et al., 2014; Rickets, 2011).

As the use of simulation in nursing education increases, the need to investigate the use of simulation as a method to evaluate student performance in nursing education is essential. As a quality improvement initiative, there also is a need to assess simulation evaluation practices and approaches. To date, while literature exists on some of the common practices and approaches to simulation in education, standardization has not resulted (Leighton, 2013). As such, there is little available data broadly, and no available data in Ontario, describing simulation utilization and simulation evaluation in nursing education. Ultimately, developing an accurate understanding of the common range and patterns of utilization of simulation for nursing education and the practices and approaches to evaluation of simulation is a critical starting point in the comprehensive development of strategies geared toward effective integration of simulation into undergraduate nursing curricula.

3. Methods, procedures and sampling

Methods

In this study, a mixed methods approach was utilized, wherein both quantitative and qualitative data collection took place through a confidential online questionnaire to ascertain current practices in undergraduate nursing education in Ontario, Canada, specifically in relation to the utilization and evaluation of simulation. This study successfully underwent ethics reviews and approval processes at the authors' home academic institutions.

Sampling

To ascertain a comprehensive picture representing the state of the science of simulation in Ontario's undergraduate nursing educational programs, non-random and purposeful sampling was employed. The entry to practice requirement for registered nurses in Ontario is a baccalaureate degree. In this province, a total of 36 educational institutions (14 universities along with 22 college partners) are involved in either independently or collaboratively offering baccalaureate degrees in nursing. This research sought input from all of these 36 educational programs to gain insight into the practices and approaches focusing on inclusion and evaluation of simulation in nursing education across the entire province.

Procedures

A questionnaire comprised of quantitative and qualitative questions was developed to examine current practices and approaches in relation to inclusion and evaluation of simulation in Ontario undergraduate nursing education. The survey contained 52 questions, and was delivered to participants in a secure online format that was self-guiding and confidential. The closed-ended questions contained pre-coded responses and open-ended questions allowed participants to individualize their responses and elaborate on the practices around evaluation of all components of simulation for nursing education. Informed consent, as the first page of the questionnaire, was obtained through the online questionnaire.

In addition to some basic questions about the type of nursing program offered and enrolment date, the survey focused on three broad categories of inquiry:

1. Overview of simulation inclusion in undergraduate nursing programs in Ontario, including the simulation modality (high, medium, and low fidelity)
2. Specific simulation foci that are included in undergraduate nursing programs in Ontario
3. Comprehensive identification of evaluation approaches and practices in simulation, including:
 - i. Formative evaluation
 - ii. Summative evaluation
 - iii. High stakes evaluation
 - iv. Remedial evaluation
 - v. Student evaluations of the simulated learning
 - vi. Evaluation practices focusing on the simulation itself
 - vii. Evaluation of personnel involved in teaching-learning with simulation

For the recruitment process, academic leaders at all Ontario nursing programs were invited to either complete the questionnaire themselves or to pass the letter of invitation to key informants (e.g., simulationists, technologists or technicians, faculty, staff, leaders) with specific knowledge about simulation within that given nursing program to complete the questionnaire. Individual informants or a team of informants could choose to complete the survey. Participants were able to access the online questionnaire via a link included in the letter of invitation. Follow-up emailed letters of invitation were sent if a response had not been received to the first letter of invitation.

Analytic procedures involved a detailed examination of the data set pertaining to participant(s) representing an Ontario undergraduate nursing program, followed by a systematic and comparative analysis of the data sets generated from all sites. Quantitative data was analyzed using excel software. Basic descriptive statistics were employed to create a composite picture of simulation inclusion, simulation foci, and common practices and approaches to evaluation specifically focusing on simulation in nursing education in Ontario. Qualitative responses were analyzed as group/aggregate data to identify common themes to answer the research questions.

4. Summary of findings

The study's purpose is to develop a comprehensive picture of the utilization and evaluation of simulation in undergraduate baccalaureate nursing programs in Ontario, Canada. In this summary, findings from qualitative and quantitative data analysis processes have been integrated to draw overall conclusions and are presented in terms of overall trends and themes identified. Overall, there were 37 responses to the survey. In total, 27 participants fully completed a survey, and these participants represent 15 institutions, including eight colleges and seven universities. To date, the response rate is 41.7 % with data continuing to come in.

Overview of Simulation Inclusion

Simulation has become commonly used as a teaching-learning strategy in undergraduate nursing education among college and university programs in Ontario, Canada. Participants' responses to the questionnaire indicated that simulation is widely used in both clinical and non-clinical courses. However, simulation experiences are most often integrated into clinical courses. Regarding the types of courses in which simulation typically occurs, participants responded that clinical courses and lab courses most frequently include simulation, and simulation is occasionally included in nursing theory courses but rarely in non-nursing theory courses or interprofessional clinical or theory courses. All responding representatives of colleges and universities indicated that all types of fidelity (e.g., low fidelity, medium fidelity, high fidelity) are used in simulation throughout the years of their program, and particularly in clinical courses.

In response to whether new simulation hours have been added to their undergraduate nursing program during the 2013-2014 academic year, almost 60% (57.9%) of responding participants indicated that their programs increased hours of simulation. Increased faculty, educator expertise in simulation approaches, followed by faculty requests and curriculum changes, were reported as the most influential factors prompting increased simulation hours. An additional motivator included student requests. Limited placement availability, changes among agencies used for student placements, and limited preceptor availability were ranked as less important motivators in increasing simulation hours.

During the 2014-2015 academic year, 85% of responding participants indicated their undergraduate nursing programs planned to increase hours of simulation. Reasons for increasing hours of simulation were most strongly prompted by curriculum changes, followed by faculty requests and enhanced simulation expertise. Less influential factors were increased student enrollment and student requests. Limited placement availability, agency changes, and limited preceptor availability were reported as the least influential motivating factors.

Literature indicates that there is a strong trend to increase simulation experiences for students in order to prepare them with the competence and confidence required to practice in complex healthcare environments and to enhance patient safety (Cant & Cooper, 2010; Norman, 2012; Rickets, 2011). The study results demonstrate that this

trend has been taking place in Ontario nursing programs since at least 2013. In Canada, a heightened concern about decreasing clinical placement opportunities and competition for both placements and preceptors in conjunction with increased student enrolment and faculty shortages (Canadian Association of Schools of Nursing, 2007) has driven debates about increasing simulation hours to replace direct clinical practice in order to ready students for clinical practice. Interestingly, these concerns were reported by participants as less influential, with curriculum changes, faculty requests, and enhanced simulation expertise propelling increased simulation utilization in Ontario undergraduate nursing programs over the past two years.

Given concerns about dwindling clinical placements and available preceptors, an area of inquiry centred upon the use of simulation to replace hours that students typically spend in direct clinical practice. Under half (38%) of responding participants indicated that their nursing programs routinely utilized simulation for this reason. For a few programs, this purpose of simulation is an established practice in their nursing program curriculum. However, for most programs, the use of simulation utilization as clinical replacement was reported as an alternative learning experience when clinical placements are unable to accommodate students, for example due to an infectious outbreak on a unit. Also, amidst current concerns about access to clinical placements, almost no participant indicated their program was undertaking pilots to replace direct clinical hours with a portion of simulation hours. Significantly, the percentage of direct clinical hours in practicums that are consistently replaced with simulation among nursing programs was reported as between less than 5% to over 35%, and thus widely varies among programs. In addition, the hours of simulation to replace eight hours of clinical practice was reported as ranging between less than 2 hours to over 16 hours among nursing programs. Thus, there is a lack of standardization in regard to the use of simulation to replace direct clinical practice in Ontario undergraduate nursing education.

Simulation Foci

Among undergraduate nursing programs in Ontario, simulation foci was reported by participants to include a wide variety of fields within clinically-based or community-based nursing. However, clinical simulation foci was most frequently employed and include: medical simulations, maternal/child simulations, pediatric simulation, and surgical simulations. Among many nursing programs, community health and mental health simulations were reported as fairly frequently employed whereas interprofessional simulations and intraprofessional simulations were less often employed. Out-patient simulations, emergency preparedness simulations, disclosure of adverse events simulations, out-patient mental health/psychiatric simulations, and recovery room simulations were reported as infrequently used. Not surprisingly, participants also reported that simulations in their nursing programs most frequently focused on adult and pediatric populations, with older adult populations focused on substantially more often than young adults. Populations or groups less frequently focused on include women, adolescents, homeless persons, families, and aboriginal persons.

Simulation Evaluation Practices

Participants were asked to respond to a series of questions about evaluation practices for various components of simulation in their nursing programs. These included: i) the evaluative purpose; ii) the effectiveness of the evaluation; iii) the knowledge and skills of personnel; and iv) student reports of their experiences and perceptions. In regard to participants' overall perceptions of the significance of employing a range of evaluation practices, most responses revealed that both the evaluation of student learning and performance via simulation experiences and the evaluation of the simulation itself were highly valued to ensure high quality simulation experiences.

In regard to the purpose of the evaluation, simulations typically are used to evaluate students' performance and competence according to four purposes (formative, summative, high stakes and remedial evaluation). Collectively, their purpose is to assess if (and how well) the learner is able to meet the learning outcome, improve current practice, and identify gaps. They also may be used to assign a grade or to score learner performance (Bensfield et al., 2012; Barnes, Kardong-Edgren, & Rizzolo, 2014; Adamson, Jeffries, Rogers, 2012). All responding participants felt that formative evaluation approaches were important or very important, and most participants felt that remedial evaluation approaches were important or very important. In contrast, fewer participants reported that summative or high stakes evaluation approaches were very important or important to them, with a number of participants considering these two purposes of evaluation to be neither important or unimportant or unimportant. About student evaluation in simulation, some participants commented: "we are in an early stage of using simulation for summative evaluation", "simulation is the safe place for making mistakes, so should not be used as a high stakes testing environment" and "we mostly use simulation with formative assessment therefore this aspect is most important to us."

A variety of evaluation practices applied to examining the simulation itself (e.g., theoretical constructs, linkages to learning outcomes, evaluative tools such as rubrics and checklists, pre-briefing methods, and de-briefing methods; evaluation of personnel directly involved in teaching-learning activities) are critical quality improvement initiatives (Adamson et al., 2012; INACSL, 2013; Decker, Utterback, Thomas, Mitchell, & Sportsman, 2011; Willhaus, Burleson, & Palaganas, & Jeffries, 2014). Participants were asked to respond with their perceptions of the importance of these initiatives within their nursing programs. Virtually, all responding participants felt that the evaluation of simulation itself to be important or very important, yet only 40% reported that standardized approaches currently were employed in their nursing program. In regard to the use of standardized student evaluation tools in their nursing program, most participants (75%) reported the consistent employment of a standardized tool for summative evaluation, followed by high stakes evaluation (62.5%), formative evaluation (58.8%), and finally, remedial evaluation (45.5%). Comments suggested challenges are encountered in developing and utilizing consistent, formalized, and standardized processes. Some challenges reported included: a need for better simulation education and faculty development, lack of time, a need for faculty "buy-in", a lack of valid and reliable tools, and a need to develop specific simulation coordinator and education

positions. Some participants commented: “this is an area that requires development in our program”, “as our program develops, we will be implementing for valid and rigorous processes”, “the onus is on us to appropriately evaluate simulation teaching strategies to provide the best experience for students and ultimately contribute to safer patient care”, and “very important - however the curriculum is so jammed packed and there is never sufficient time”.

Most participants also considered the evaluation of personnel (e.g., faculty, staff, educators, facilitators) directly involved in simulation utilization to be important, and some participants considered this aspect of evaluation to be very important. Of responding participants, 50% noted that their nursing programs required a specific background for personnel. However, the specific background required widely varied among nursing programs, and collectively included simulation-specific credentials, a training certificate by external simulation specialists, a graduate degree with simulation focus, internal training with experts, or train the trainer approaches. In addition, less than half of responding participants (47%) indicated that their nursing programs employed standardized approaches to professional development (e.g., orientation, mentorship, structured professional development activities) and only 20% of participants indicated that their nursing programs employed standardized approaches to the evaluation of personnel (e.g., review of professional portfolios, direct observation, review of student feedback). Two participants commented on this “gap” at their institutions: “many programs are not aware of the educational opportunities for those working in simulation” and “there is not enough knowledge on what is involved in being a competent simulation facilitator/educator”. Other barriers reported included: cost of professional development activities, lack of infrastructure support and funding, lack of time, and too few personnel involved in simulation utilization in their program. Interestingly, enhanced faculty expertise was cited as an important impetus for the increased use of simulation among Ontario nursing programs since 2013, and in conjunction, among participants, a recognition of the need for well-qualified, well-developed personnel is apparent. Two participants commented: the “position has grown from lab role and has evolved as the science of simulation has evolved. As the pedagogy is advancing, the roles are also changing” and “the educator role needs to broaden to ensuring best practices are incorporated”.

Critical to the evaluation of simulation practices and approaches may be incorporation of students’ assessments of their learning and outcomes of learning in simulation experiences. In general, responding participants indicated that within their nursing programs, informal student evaluations rather than formal student evaluations were most frequently gathered, and informal evaluations typically occurred when the simulation was conducted. Feedback sought most often in informal evaluations focused on students’ perceptions of the overall quality of the simulation rather than the ability of the simulation to facilitate their meeting of learning outcomes or the details of the simulation, such as pre-brief activities, debriefing activities, or evaluative components. In the nursing programs where participants indicated that formal student evaluation occurs, student feedback sought most often focused on the overall quality of the simulation, and also the ability of the simulation to facilitate the meeting of learning

outcomes, with feedback regarding the details of the simulation less often invited from students. Participants also responded that formal student evaluation tended to be sought at various points in the term, such as when the simulation is conducted or as a part of the end of term formal course evaluation. Comments by participants indicated a general recognition of the value of, and efforts to, incorporate informal and formal student assessments in simulation curriculum development, yet they also suggested a need for further improvement. Some participants commented: it is “work in progress”, “another area we need to develop further”, and “great idea to add a simulation design/instructional evaluation”.

5. Recommendations

The study findings provide important insights into simulation utilization and simulation evaluation practices and approaches currently employed in undergraduate nursing education in Ontario, Canada. As such, they contribute to ongoing discussions about current trends and challenges experienced among institutions. A strong indication that simulation is viewed by the participants as an essential educational component because it can effectively prepare students with the required prerequisite knowledge, skills, and abilities to meet entry to practice competencies and ultimately promote job readiness of new registered nurses is apparent. Furthermore, Ontario nursing programs are increasingly using simulation to these ends, with overall trends of increased simulation use and development of simulation expertise. Yet, as a whole, the findings suggest a perception among many participants that simulation practices and approaches, although rapidly developing, still remain in early stages of growth and development.

Based on study results, recommendations for the ongoing evolution of the science of simulation in Ontario undergraduate nursing education can be established, and a few important one are highlighted.

1. The creation of shared forums and networking opportunities among Ontario undergraduate nursing programs and beyond for discussing challenges and solutions to simulation utilization and simulation evaluation practices and approaches.
2. The establishment of evidence that supports the appropriate and consistent use of simulation as a replacement for clinical hours (e.g. the number of hours of simulation used to replace hours of direct clinical practice). This is particularly importance given growing concerns regarding the scarcity of clinical placements and preceptors commonly experienced across Canada (Canadian Association of Schools of Nursing, 2007; Smith et al., 2007). Furthermore, it is important in the context of recent evidence (Alexander, et al. 2015; Hayden et al., 2014) that up to 50 percent of clinical hours can be safely substituted by high-quality simulation experiences to produce comparable end-of-program educational outcomes and ready-to-practice graduates.
3. Further development of the utilization of a variety of simulation modalities (summative, formative, high stakes, and remedial) for evaluative purposes of student

learning and performance, and in particular high stakes evaluation which remains underutilized and challenging to implement well. This is importance in the context of recent discussions have emerged that focus on the potential value of testing when working with upper level students. However, there is a gap in the literature regarding current practices around the use and evaluation of high stakes testing in undergraduate nursing education (Boulet, 2008; Gantt, 2013; Kardong-Edgren, Hanberg, Keenan, Ackerman, & Chambers, 2011; Sullivan, 2014).

4. The creation of a database that includes current practices and approaches related to simulation in Ontario undergraduate nursing education to be shared across the jurisdiction, and with the larger international nursing community.
5. Further development and implementation of rigorous evaluation practices pertaining to both student performance and simulation pedagogy itself, including investing in current efforts to develop and utilize best practice guidelines in simulation (INACSL, 2013; Society for Simulation in Healthcare (SSiH)).
6. Increased support and resources to support simulation utilization and simulation methodology in nursing education, especially in regard to professional credentialing and training and ongoing professional development of simulation educators.

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