EXPLORING THE LITERATURE OF A NURSE'S ROLE IN THE PLANNING, IMPLEMENTATION AND EVALUATION OF INTERPROFESSIONAL *IN SITU* SIMULATION: A SCOPING REVIEW

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Abstract

Background: *In situ* simulation is a growing trend in health care institutions. Considering that nurses are so engrained in bed side care of patients, they are usually involved in hospital simulation training. However, little is known about the nurses' role in the prior steps of these large institutional, interprofessional simulations such as the planning, implementation and evaluation of the simulation itself.

Objective: To conduct a scoping review of the literature to see what literature/research currently examines or discusses the inclusion of nursing in the planning, implementation and evaluation of a large interprofessional *in situ* simulation.

Methods: A scoping review was conducted using four main data bases as well as six articles were used from previous Google and Google Scholar searches. All data was collected in October, 2016. Inclusion criteria were articles that were published in English, any type of medical, in hospital simulation including pediatrics, surgical, emergency or trauma and lastly any review of actual case scenarios including *in situ* simulation, discussions around team work, planning simulation or papers providing guidance/advice on how to conduct *in situ* simulation. Overall, the goal was to look for anything that may discuss the importance of having nursing involvement in *in situ* simulation.

Results: Thirty-three articles met the criteria for this scoping review. Results determined that nurses were in fact involved in the implementation of actual simulations themselves (29/33), however were only involved in the planning phase of the simulations 12 out of 33 times. No concrete data was able to be collected on nurses in the evaluation phases of the *in situ* simulations. Nurses were also noted to be authors on 23 of the articles reviewed whereas physicians were authors in 29 out of 33.

Conclusion: Despite the fact that nurses are one of the most involved professions in interprofessional *in situ* simulation, they are not always included in the planning and evaluation of these types of simulations which could have negative outcomes / unspecific objectives for the nurses involved. Nurses are also not as well published on their own, without physician involvement. There is room for further research and improvement on the nurses' role in the planning phases specifically in these types of large interprofessional *in situ* hospital simulations to provide greater inclusion of the nursing profession.

Keywords: Interprofessional, *in situ* simulation, simulation, hospital, medical, nurses, planning, implementation, evaluation, authors.

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Lastly, I would like to thank my parents, my sisters, my vivacious grandma and the love of my life Phil for all of your encouragement and cheerleading throughout these past few years. I am so very grateful to have you all in my life. Your positive thoughts and words of affirmation are what helped get me through to the finish line.

Dedication

I would like to dedicate this SPAR to the late Dr. Sharon Simpson, PhD, RN.

Your enthusiastic commitment and passion for nursing education was one that is going to continue to inspire me for the rest of my life. I can only hope that one day I can look back on my own career with the reflection that I was able to connect with students and faculty as extraordinarily as you did. Your loving mentorship and encouragement towards your students will always be remembered. I wish so much that you could be here to see me finish this leg of my nursing journey. You are always in my thoughts…

Chapter 1: Introduction

Within large tertiary hospitals teamwork and communication are vital to the care and safety of the patient. When the care involves a badly injured trauma patient these factors may increase in significance specifically due to the intensity and sheer numbers of practitioners involved. Given this complex setting and potential for high stakes communication and multidisciplinary team work, simulation (SIM) has been identified as an innovative method for building relationships and communication between practitioners. *In situ* simulation specifically is increasing in popularity for teams within all specialities of the hospital as it can identify where issues or problems may occur in one's authentic health care setting. *In situ* simulation can be described as a team-based training technique conducted in patient care units using equipment and resources from that specific unit and involving actual members of the healthcare team (Patterson, Geis, Falcone, LeMaster & Wears, 2013). Within the emergency department, *in situ* simulation training has been shown to significantly improve team dynamics and communication between staff members as well as between patients and staff members (Sweeney, Warren, Gardner, Rojek & Lindquist, 2014). Communication and teamwork are the heart of emergency departments due to the vast intertwining of multiple disciplines working together side by side. Emergency medicine requires timely and efficient care by multiple personnel to treat those who may be gravely ill but could remain undiagnosed. Unfortunately, when non-technical skills such as clear and respectful communication between practitioners fail, patients are greatly impacted. Poor communication and poor teamwork accounts for over 55% of hospital failures and negative patient outcomes (Riley, Davis, Miller, Hansen, Sainfort & Sweet, 2011). When *in situ* simulation was used in trauma scenarios, study results demonstrated that teamwork and communication showed significant improvements that deteriorated once the simulation program ceased (Miller, Crandall, Washington & McLaughlin, 2012). *In situ* simulation offers the unique

opportunity to train the teams of people who strive to deliver safe and effective healthcare while enhancing policies, evaluating new technologies, and improving the systems (Guise & Mladenovic, 2013). For this reason the Institute of Medicine, the Joint Commission, and the Agency for Healthcare Research and Quality recommend medical simulation as one of the most important safe practice interventions to reduce errors and risks associated with the process of care (Guise & Mladenovic, 2013). Simulation therefore, remains a growing trend within educational institutions around the globe and increasing in health care centers all around BC (Qayumi et al, 2012). Local universities and hospitals are yearning for an increase in funding/philanthropy to develop high fidelity simulation labs to support this innovative teaching method. The healthcare industry globally is increasing their use of simulation to improve on systems issues and patient safety by focusing on interdisciplinary teamwork (Klipfel et al., 2014; Qayumi et al., 2012).

The need for this type of learning experience reinforces the priorities set out by the World Health Organization (WHO) in their report on a framework for action on interprofessional education and collaborative practice (Gilbert, Yan & Hoffman, 2010). This report defines key concepts such as interprofessional education, collaborative practice and health and education systems as priorities to transform the healthcare workforce with innovative solutions for education and institutional change (Gilbert, Yan & Hoffman, 2010). Within any functioning emergency department, the 'teams' consist mainly of nurses and physicians. In a larger center, such as a level 1 trauma center, there may be learners such as physician residents or nursing students as well as allied health care workers such as lab technicians, x-ray technicians, social workers and care attendants. When learning together, interprofessional education is generally well received by participants who want to further their abilities to critically reflect, enhance

communication and appreciate the benefits of working in teams (Gilbert, Yan & Hoffman, 2010). When teams do not work well together and experience communication breakdowns, it can negatively and gravely impact the patient resulting in a poor outcome (Klipfel et al., 2014). The importance of conducting these large interprofessional simulations is to highlight within emergency nursing education the importance of teamwork and collaboration with the end goal resulting in improved systems and communication dynamics in patient care. Watts et al. (2014) report that despite the challenges involved in designing and implementing a detailed multidisciplinary team simulation to work on non-technical skills, it is essential for institutions to prioritize teamwork and communication in the academic setting.

When planning these large interdisciplinary simulations it could be argued that having a committee with at least two disciplines adds to the richness of the planned objectives for the simulations. However, the exact benefits are unknown of an interprofessional team being involved in the development, implementation and evaluation of a team-based *in situ* trauma simulation. Maxson et al. (2011) revealed that health care professionals rarely train together as teams, yet evidence demonstrates that group training improves team performances and safety outcomes. The goal of acute care medicine within hospitals is to work as a high functioning team including various numbers of different professions such as nursing, physicians, lab technicians and radiology technicians. Using simulation as a venue for interdisciplinary learning has been shown to enhance nurse and physician collaboration which in turn has been proven to decrease morbidity and mortality rates, retain nursing staff, and increase overall patient safety (Maxson et al, 2011).

For the sake of consistency, the term interprofessional will be used throughout the paper. The term “interprofessional” was decided on as the main term for a collaboration of health care

teams as the term “interprofessional” and “interprofessional collaboration” is described by the CIHC (2010) as; when learners/practitioners develop and maintain working relationships that enable optimal health outcomes for patients in the health care setting. Furthermore, interprofessional education (IPE) is the process of preparing people of all academic disciplines to collaborate on practice initiatives such as health care simulation (CIHC, 2010).

Purpose Statement and Research Question

Purpose statement. This paper explores the literature regarding the issues, opportunities, strategies and best practices for having an interprofessional committee that includes nursing involved in the planning, implementation and evaluation of a large *in situ* hospital wide simulation. The literature discusses the importance of having interprofessional teams involved in simulation; however there is a paucity of literature in regards to the importance of having an interprofessional planning committee when it comes to team based simulation. In regards to nursing specifically, it has been difficult to find the literature discussing non-technical skills such as communication and team work in *in situ* simulation as most of the literature is around either physicians or interprofessional teams in general (Miller, Riley & Davis 2009). It has been noted that a large majority of the literature focuses on physicians, who write the majority of simulation cases for emergency simulation. For example, all the case scenarios on www.emsimcases.com a highly recognized Canadian simulation website, are authored by physicians and there is no representation of nursing or other disciplines mentioned in the peer review process or writing/editing of the cases. Therefore, this SPAR will review the literature for evidence that identifies nursing involvement in the planning, implementation and evaluation of large interprofessional *in situ* simulations. The purpose of the scoping review is to examine the literature surrounding *in situ* simulation to identify the potential need for an increased

involvement or consistent involvement of nurses in these types of large *in situ* hospital based simulations.

Research Question. What literature/research currently examines or discusses the inclusion of nursing in the planning, implementation and evaluation within large interprofessional *in situ* simulations?

Chapter 2: Methods

A scoping review was chosen as the best method for examining the literature on this topic of nursing involvement in hospital based *in situ* simulation. Reviewing the suggested format for scoping reviews by Arksey & O'Malley (2005) and The Joanna Briggs Institute (2015), the questions sought out in this scoping review were as follows; what was the nurses' role in the planning of large interprofessional *in situ* simulations? What was the nurses' involvement in the execution/implementation of these types of simulations? What was the nurses' involvement in the evaluation of these simulations?

Scoping reviews differ from systematic reviews in that systematic reviews are meant to summarise the results of carefully designed healthcare studies and provide high level evidence on the effectiveness of interventions (Cochrane Consumer Network, 2017). Scoping reviews are meant to examine broad areas of literature to identify gaps in the evidence, clarify key concepts and report on the types of evidence that address and inform practice in a topic area (The Joanna Briggs Institute, 2015). A scoping review can be descried as broadly exploring or examining the literature to accumulate as much evidence as possible and map the results (HLWIKI International, 2016). Scoping reviews are a type of literature review that aims to provide an overview of the type, extent and quantity of research available on a given topic in order to

identify potential research gaps and future research needs (HLWIKI International 2016). Therefore, this scoping review will examine the state of the literature on what is currently available on nursing involvement in the planning, implementation or evaluation of interprofessional *in situ* simulations with the hope to identify gaps and to provide potential recommendations for future research and practice.

Information Sources

Considering the nature of this search and its relation to acute care health facilities and health care professionals, a variety of medical information sources were examined. The four data bases used to identify relevant articles were: PubMed, Medline/Ovid, Web of Science, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). Six articles previously retrieved from Google and Google Scholar in the initial search were also included. Knowing that scoping reviews can include any existing literature, any online articles were open to being included in this scoping review (Arksey & O'Malley, 2005). These could include primary research studies, systematic reviews, simulation guidelines and case reviews.

Search Strategy

The search strategy involved in this scoping review was to capture the common terms for groups of medical professionals coming together to participate in simulation. The most common terms for groups of medical professionals from different professions working together included; interprofessional, interdisciplinary and multidisciplinary. The focus surrounding the type of nursing involvement in the simulation was the planning, evaluation or implementation of a simulation scenario. The types of simulation that were of importance for this review were *in situ* simulation. Four data bases and one search engine were used in this scoping review. Figure 1 reviews a table of search terms used. Figure 2 shows the number of hits each search strategy

received and Figure 3 is the flow chart of articles chosen for this scoping review. Appendix A summarizes the list off all articles used for the scoping review along with the author, year, journal name and title of the paper. All data searches were conducted in October of 2016 with the assistance of a professional librarian from the University of British Columbia.

Key discussions looked for within the literature were identifiers of nursing participation in the "planning" phase. These could be helping with writing the scenario, developing objectives for the learners, providing preparatory pre-briefing materials, securing equipment and personnel to be involved, creating the evaluation checklist or identifying the de-briefing questions/evaluation forms ahead of time.

The aspect of "implementation" for the scoping review literature looked mainly for nurses that were a part of the team involved in the actual simulation as the role of a nurse though any type of involvement in the actual simulation is accepted for the needs of this scoping review.

When looking at nursing being involved in the "evaluation" phase of the simulations this looked for nurses participating in the final evaluation and modification of the simulation after it was over to ensure any key points or learning requiring further exploration were addressed. These could include administrative involvement, equipment issues or educational gaps for staff. Nursing could then summarize their findings from the simulation to create changes for future practice within the institution.

Study Selection, Categorization and Data Extraction

A three step search strategy was applied when selecting the literature for this review as recommended by The Joanna Briggs Institute (2015). Published literatures both of primary research as well as reviews were used. The first step was to define the search terms using the

methods previously discussed and to put these into a figure (see figure 1). This involved figuring out the common terms and concepts that were used to find the title and abstract that were relevant to the specified topic. Next, the full texts of each article using the inclusion/exclusion criteria were screened and duplicates were removed. Once that step was completed the information that was relevant to the scoping review research question was extracted and placed in a table which can be found in the results section of this SPAR (Table 1). A narrative review of the data was then extracted from the identified articles and inserted into the table under the following headings: authors, journal name, findings, and "yes/no" or "not mentioned" to whether or not nursing was involved in the planning or implementation (as participants) of the described simulations. This is to ensure the outcomes of the findings in this SPAR are clear and contextualized so it is easier for the reader to understand (Arksey & O'Malley, 2005). No quantitative data was collected from these studies/reports. Unfortunately not enough data was found to add a column on the evaluation process for nursing involvement in the simulations, therefore the decision was made to leave it out of the table.

Considering that scoping reviews look more at the scope of the literature and not as much of the quality of the evidence, any online publications that met the stated inclusion criteria were involved in the scoping review.

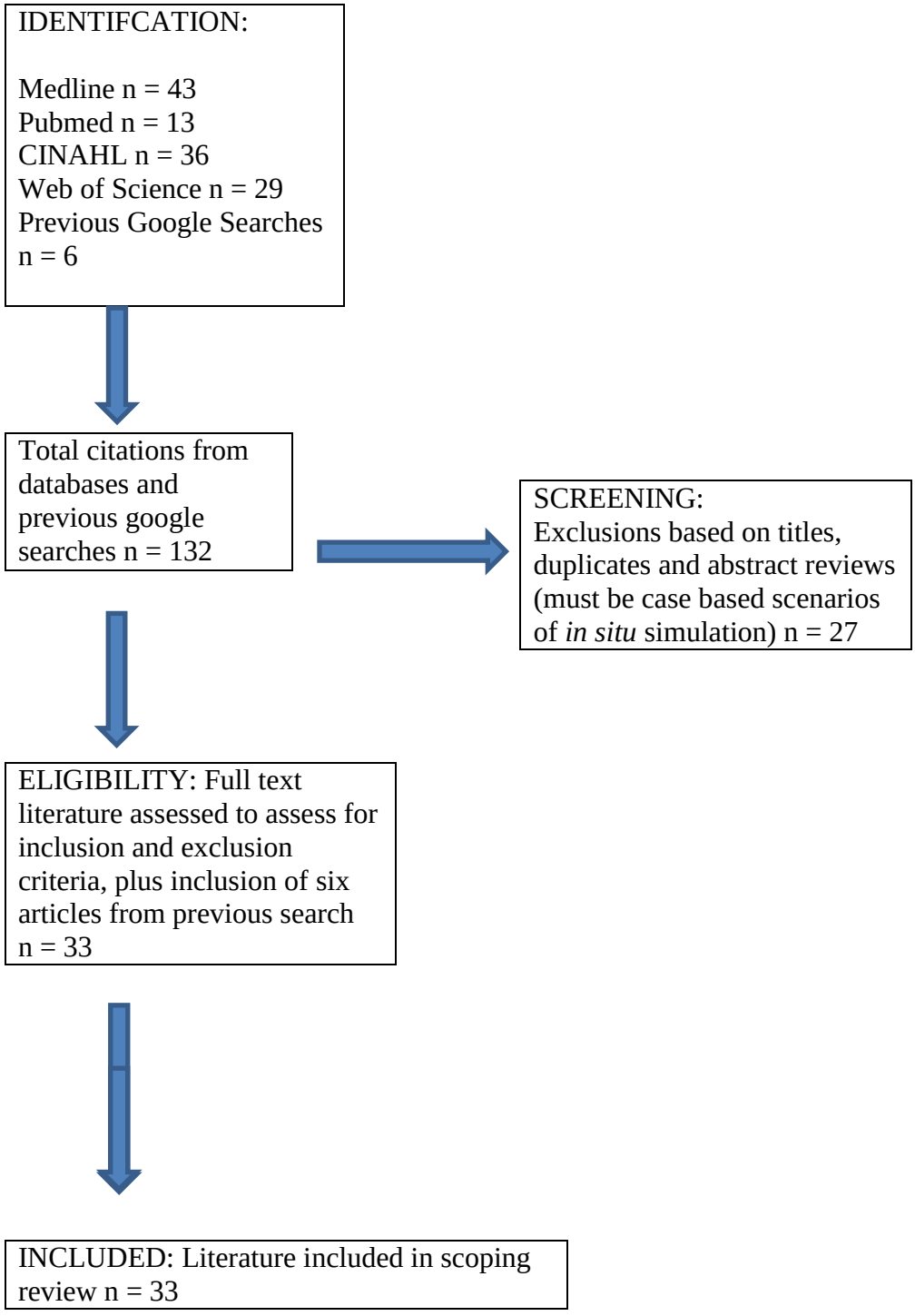
Figure 1. Search Terms

Concept (1)	Interprofessional	Interdisciplinary	Multidisciplinary	Nursing
Concept (2)	Planning	Evaluating	Implementation	
Concept (3)	In situ	Simulation	In situ Simulation	

Figure 2. Search Strategy and Number of Hits for each Database and Search Engine

Source	Number Found	Number Relevant	Strategy
CINAHL	N = 36	N = 12	(Multidisciplinary team) AND (in situ simulation) N = 22 Multidisciplinary team AND planning AND in situ simulation N = 1 Interdisciplinary AND planning AND in situ simulation N = 1 Interprofessional AND in situ simulation N = 7 Interprofessional AND planning AND in situ simulation N = 0 Planning AND in situ simulation N = 6 Multidisciplinary OR interprofessional OR interdisciplinary AND in situ simulation OR in situ training AND planning OR evaluating OR implement* N = 2
Medline (Ovid)	N = 43	N = 11	Nursing AND "in situ" simulation N = 17 Planning AND in situ simulation N = 3 Interdisciplinary AND in situ simulation N = 12 Interprofessional AND in situ simulation N = 11
PubMed	N = 13	N = 2	interprofessional AND planning OR evaluating "in situ simulation" N = 3 multidisciplinary AND planning OR evaluating "in situ simulation" N = 5 interdisciplinary AND planning OR evaluating "in situ simulation" N = 3 multidisciplinary planning AND in situ simulat* N = 2
Web of Science	N = 29	N = 8	(in situ simulat* AND interprofessional* OR multidisciplinary OR interdisciplinary NEAR/1 (team* OR committee* OR group)) N = 0 TOPIC:(nursing) *AND* TOPIC: (planning) *AND*TOPIC: (in situ simulation) N = 3 TOPIC: (interdisciplinary) AND TOPIC: (evaluating) AND TOPIC: ("in situ simulation") N = 4 (TOPIC: (interprofessional) AND TOPIC: (implementing)) AND TOPIC: ("in situ simulation")) N = 2 ((TOPIC: (multidisciplinary) AND TOPIC: (implementing)) AND TOPIC: ("in situ simulation")) N = 2 ((TOPIC: (interdisciplinary) *AND* TOPIC: (implementing)) *AND* T OPIC: ("in situ simulation")) N = 2 ((TOPIC: (nursing) AND TOPIC: (implementing)) AND TOPIC: ("in situ simulation")) N = 1 TOPIC: (nursing* in situ simulation) N = 15

Figure 3. Flow Chart of Article Selection:



Inclusion and Exclusion Criteria

Any literature involving multiple professions in health care related to conducting *in situ* simulations were included for this scoping review. With that criteria in mind inclusion criteria that were considered for this review were (1) articles that were published in English (2) any type of medical in hospital simulation including pediatrics, surgical, emergency or trauma (3) review of actual case scenarios including *in situ* simulation, discussions around team work, planning simulation or papers providing guidance/advice on how to conduct *in situ* simulation. Overall, the goal was to look for reports that identified nursing involvement in *in situ* simulation.

Literature that was excluded from this review included discussions on simulations that took place out of hospital such as schools, clinics or dental offices. Any article whose main topic was on debriefing or cost involvement was not included for this review. Journals that could not be accessed on line, books, textbooks or grey literature; and literature older than 2005 or not in English were also excluded.

Chapter 3: Results

The headings used for this graph were decided on by the authors, the journal, the findings and two tables to say if nurses were involved in the planning of the simulations and/or were participants. There was a lack of evidence to support the discussion and inclusion of the role nurses had in the evaluation of the simulations.

Table 1: Analysis of the Findings included in the Scoping Review

#	**Author**	***Journal***	**Findings**	**Nursing Involved in the Planning**	**Nurses as Participants**
1	Allan, et al.	*The Journal*	Goal was to improve	Yes	Yes

		of Thoracic and Cardiovascular Surgery	preparedness, comfort and decrease anxiety among multidisciplinary resuscitation teams in a pediatric ICU. Physicians and nurses involved in the writing and planning of the pediatric SIMs. Involvement in the SIMs included: nurses, fellows, attending physicians, RTs and NPs. Used video debriefing. Worked on teamwork principles and technical resuscitation skills. Significant increase in confidence within staff in a code after the SIM and nursing specifically reported feeling more comfortable raising concerns to other team members. Discusses the importance of all team members being active contributors to all aspects of the resuscitation. Used CRM principles. *Physician and nursing authors*		
2	Atamanyuk, et al.	*Interactive Cardiovascular and Thoracic Surgery*	Goal: Interprofessional CRM principles in the emergency management of a deteriorating child on ECMO. Involved: nurses, cardiologists, intensivists, anaesthetists, surgeons, and perfusionists. The hospital has a simulation pediatric resuscitation team training already impeded in the ICU there. Study was to review outcomes of this specific case in the pediatric ICU. Survey was to team. No specific mention of participants' specialties in the results. *Only physician*	Not mentioned	Yes

			authors on paper.		
3	Auerbach, et al.	*Journal of Pediatric Emergency Care*	Only the main physician/single investigator is the one who developed, conducted and debriefed the *in situ* simulation although all professions were involved in the sims such as RNs, surgeons, Physician assistants, EMS, students, diagnostic imaging, blood bank etc. All cases were significant trauma cases that required review by trauma program leadership (all physicians?). Cases were pre-programmed by simulation technicians. Cases had specific learning objectives around each case. *Physicians and nurses as authors on paper.*	No	Yes
4	Baker, et al.	*Journal of Advanced Nursing*	Physicians and nurses ran simulations on a cardiac resuscitation with medical and nursing students. Negotiated scenario together for both faculties learning goals. Stated that "interprofessional learning through simulation creates bridges across professional silos among learners and teachers". *Nurses and physicians as authors on paper.*	Yes	Yes
5	Braddok, et al.	*Journal of General Internal Medicine*	An MSN student coordinated all the program interventions but an internist developed the medical interventions. However, both physicians and nurses facilitated the training and debriefing. Collaboration for SIMs was between medical directors and	Yes	Yes

			nursing leadership. They developed *in situ* simulation training, charge nurse initiated debriefing of medical emergencies, monthly patient safety team meetings, a patient safety champion role, interdisciplinary patient safety conferences and a program to recognize exemplary teamwork. Their results after one year on scores of safety culture on study units were significant for nursing. However, not statistically significant for residents. Nurses and physicians participated in the program. *Nurses and physicians as authors on paper.*		
6	Clapper	*Clinical Simulation in Nursing*	No reference to simulation case scenario development, evaluation or implementation. Discussed more about equipment and set up of simulation centers than personnel involved. Author: *PhD in education and curriculum development. Non-health care background.*	Not Mentioned	No
7	Deering, et al.	*Seminars in Perinatology*	Article does specifically discuss the importance of teamwork training to have all personnel and providers who care for the patient involved SIM. Doesn't discuss a specific in *situ* SIM scenario in general, more so the benefits of multidisciplinary simulation in the perinatal environment. *Physician authors only*	Not Mentioned	Not Mentioned

8	Falcone, et al.	*Journal of Pediatric Surgery*	Discussed a lot about increasing nursing education and simulation around pediatric trauma. Nurses, physicians, paramedics and RTs involved. Nurses participated 3x more than all other professions. *Physician and nursing authors.*	Not Mentioned	Yes
9	Garden, et al.	*Anaesthesia and Intensive Care*	Pediatric *in situ* simulation. Involved multidisciplinary acute care staff. Nursing and physician or students involved. No mention of who specifically developed the SIM scenarios. Major latent safety threats identified. Combined development of the program. *Physician and nursing authors*.	Not Mentioned	Yes
10	Guise, et al.	*Seminars in Perinatology*	No specific case study or SIM discussed. Just review of the importance of *in situ* simulation for patient safety issues in the hospital. *Physician authors*	Not Mentioned	Not Mentioned
11	Hargestam, et al.	*BMJ Open*	Article on the importance of closed loop communication (CLC) specifically. Practiced this using *in situ* simulation for trauma patients in an ED using CLC. Used all professions in the SIM. No mention of who developed the trauma scenario/SIM. Not sure who the "instructors" were who collected the data. *Physician and nurse authors.*	Not Mentioned	Yes
12	Hinde, et al.	*Journal of Interprofessional Care*	Focused more on safety in the OR. Did a pre and post survey of *in situ* simulation in the OR with nursing, health care assistants, OR practitioners (?) and	Not Mentioned	Yes

			physicians. Unsure of specific SIM scenarios used. Just mentioned that 9 points of care simulation sessions were completed. *All physician authors*		
13	Kessler, et al.	*Journal of Emergency Medicine*	Simulation development group included a PI, nurse researcher, research assistant and staff members of the pediatric emergency department. Participants involved in the SIM were physicians and nurses. *Authors were physicians, 1 nurse and research assistants*.	Yes	Yes
14	Klipfel, et al.	*Urologic Nursing*	Nursing team developed the scenarios. The first iteration of the simulation design was limited to staff RNs. Following three PDSA (plan, do, study, act) cycles, the interdisciplinary team analyzed the suggestions of the RNs and physicians, *in situ* simulation evaluations, and literature review results. Participants were staff nurses and urology residents. *Authors were 5 RNs and 1 physician*.	Yes	Yes
15	Maxson, et al.	*Mayo Clinic Proceedings*	Scenarios were created by simulation training experts (profession unknown) and authors. Scenarios involved physicians and nurse on post-op surgical patients. *Authors: 5 RNs and 2 physicians*	Not Mentioned	Yes
16	Miller, D et al.	*Academic Emergency Medicine*	3 nurses were the observers of the *in situ* trauma simulations. Participants were all disciplines. Cases were either real traumas or simulations of real cases.	Not Mentioned	Yes

			Goal of the simulations were communication and teamwork between all trauma team members in trauma cases within an actual ED. Study showed improvements during having regular simulation. Improvements stopped once simulations stopped. No mention of the importance of nursing however, it was implied by their simulation goals. *Authors were 4 physicians.*		
17	Miller, K et al.	*Journal of Nursing Management*	Very focused on the importance of nurses in high performance teams. During critical events, *in situ* simulation was the method used to observe interdisciplinary interaction of nursing behaviours regarding communication. Participants included obstetricians, labour and delivery and special care nursery nurses, neonatal nurse practitioners, anaesthesiologists, certified nurse anaesthetists (CRNA), unit secretaries and operating room staff for every simulation. An obstetrician, a nurse researcher and a clinical nurse specialist created three scenarios based on actual sentinel events. Each scenario was designed to prompt non-technical team behaviours such as leadership, situational awareness, SBAR-R, closed loop communication and shared mental model.	Yes	Yes

			Authors were 1 RN, 1 PhD advisor and 1 Physician		
18	Miller, Kr et al.	*Journal of Perinatal & Neonatal Nursing*	Study purpose was to examine the nursing contributions to high reliability in interdisciplinary teams using *in situ* simulation. An obstetrician, a nurse researcher and a clinical nurse specialist created three scenarios based on actual sentinel events. Participants included: obstetricians, labour and delivery and special care nursery nurses, neonatal nurse practitioners, anaesthesiologists, certified nurse anaesthetists, unit secretaries and operating room staff for every simulation. *Authors were 2 nurses and a simulation physician.*	Yes	Yes
19	Nunnink, et al.	*Anesthesia and Intensive Care*	Open chest case post cardiac surgery. Unsure of who wrote the actual scenario for training. Compared video versus simulation training and found simulation training to have better outcomes on confidence scores within the staff. Nurses and physicians participated in the simulated case. *Authors: 2 Physicians and 2 nurses*	Not Mentioned	Yes
20	O'Leary, et al.	*Resuscitation*	Participants were doctors, nurses and medical students and nursing students in an *in situ* ED pediatric department. All scenarios were planned with medical AND nursing learning objectives. Both planned	Yes	Yes

			sims. Scenarios were based on real cases. Senior clinical instructors (medical and nursing) identified the suboptimal incidents and were trained in debriefing to elicit causation factors. Both Physician and nursing instructors have completed a simulation instructor course. In an attempt to reduce bias, all clinical instructors would meet after the scenario debrief and agree on the incidents of suboptimal care and causation factors. *Authors: Nurses and physicians.*		
21	Pak & Hardasmalani	*Advanced Emergency Nursing Journal*	The aim of this paper was to conduct a multidisciplinary *in situ* simulation drill to identify and remediate system-level breakdowns and organizational culture conflicts that can only be demonstrated in the actual patient care areas. "Simulation team" created scenario. Participants were all types of nurses, RTs, residents, surgeons and emergency physicians. A structured debriefing session was conducted by the individual specialties focusing on specific knowledge and skills. This was followed by a large-group debriefing that included all specialties and focused on teamwork and communication. With four patient care services involved, they observed the patient care process and	Not Mentioned	Yes

			identified latent errors in all disciplines, particularly those applicable to ED nursing. *Authors: 1 RN and 1 physician*.		
22	Patterson, et al.	*BMJ Quality & Safety*	SIM included a faculty physician, a resident physician, a nursing team leader, a bedside nurse, a medication nurse, an RT a paramedic (or patient care assistant) and a child life specialist (or chaplain), all of whom are ED personnel. The volume, acuity and complexity of the patient population, in addition to the many different disciplines involved in the care, represent huge risk factors for medical error. "These factors highlight the importance of teamwork training within the ED and the pursuit of a shared mental model during the care of critical patients in the resuscitation bay". Each group completed the intervention as a multidisciplinary team. Simulations included trauma and medical simulations and were based on high-risk clinical cases, either identified by one of the investigators or referred by ED staff. Authors were debriefers and organizers. Paper stated many times, the importance of *in situ* multidisciplinary simulation team training which speaks to the necessity of including frontline care providers in the evaluation of the	Yes	Yes

			systems in which they work. This committee, developed and chaired by one of this project's investigators, includes physicians, nurses and an equipment specialist who have been formally trained in simulation-based facilitation and debriefing. *Authors were physicians and nurses*		
23	Riley, et al.	*Joint Commission Journal on Quality and Patient Safety*	The team created obstetrical emergency scenarios based on real events. Unsure of who held the debriefing or ran the simulations. All disciplines participated in the SIMs. The primary finding indicates that the full intervention (in-situ simulation and didactic training) resulted in a 37% improvement in perinatal morbidity pre vs post intervention. *Authors: physicians, nurses and PhD researchers*	Yes	Yes
24	Rosen, et al.	*The Journal of Continuing Education in the Health Professions*	A systematic review. Findings reveal that cross-training is a strategy designed to allow team members to experience the roles and responsibilities of fellow team members and to gain new perspectives. Participants: all *in situ* programs that reported information on their learners (90%) included multidisciplinary teams, frequently from across multiple units or departments. Instructors: The majority of articles (55%) did not include details on the personnel	Not Mentioned	N/A

			running these simulations, their backgrounds, or any training they received to prepare them for the events. *Authors; physicians.*		
25	Sorensen, et al.	*Trials*	From their literature review, they concluded that simulation based medical education on labor wards is worthwhile and that multi-disciplinary team training is important approaches due to the complexities of the trained skills and the rarity of the high-risk obstetric emergencies. Study participants were of all disciplines. The development of the curriculum for the training day was developed and pilot tested by a local multi-professional working committee consisting of representatives from all the health-care professionals who will participate in the trial. *Authors; physicians and researchers*	Yes	Yes
26	Steinemann, et al.	*Journal of Surgical Education*	The intervention was a multidisciplinary, human patient simulator based, *in situ* trauma team training. Clinical process parameters were collected and teamwork was scored prospectively by trained critical care trauma nurses (CRN), who served as the scribes during trauma resuscitations. Thirteen CRN and 4 research assistants (3 medical students and 1 physician) received training in recording clinical data and	Not Mentioned	Yes

			use of T-NOTECHS before the start of pre-training data collection. Participants we of all disciplines, RNs, RTs and physicians. Discussed a lot of about the importance of surgical resident training. *Authors were physicians, nurses and research assistants*.		
27	Sweeney, et al.	*American Journal of Medical Quality*	Multidisciplinary teams of ED staff (ie, attending physicians, resident physicians, physician assistants, nurses, medical technicians and secretarial staff) participated in small groups of 8 to 14 people. Training was mandatory for all staff. Training was a medical simulation center to look like a normal ED. The training involved teams consisting of a combination of physicians, nurses, medical technicians, and secretaries. Debriefings were group discussions by all the trainees with a facilitator, relying on video review of the simulation scenario. Unclear who developed the scenarios. Surveys were just sent to nurses and physicians. *Authors were 3 physicians, 1 RN and 1 researcher.*	Not Mentioned	Yes
28	Van Schaik, et al.	*Clinical Pediatrics*	Interprofessional simulation-based team training program around pediatric resuscitations for physicians, nurses, pharmacists, and respiratory therapists. They described a low-cost *in situ* training program and a preliminary	Yes	Yes

			evaluation of the program's impact on self-efficacy in resuscitation skills among resident physicians and nurses. They identified stakeholders within nursing and physician leadership and ensured their buy-in. Scenarios and objectives were developed by the group (authors). One nurse and one physician instructor co-facilitated the debriefing. They experienced tension between learning priorities of residents and nursing staff, grounded in the different technical skills required for each profession. They recruited physician and nurse facilitators from each participating unit and by starting an "instruct-the-instructor" program. They currently have 23 RN instructors and 14 MD instructors that teach in the program. *Authors are 2 physicians, 2 nurses and 1 researcher.*		
29	Ventre, et al.	*Simulation Healthcare*	SIMs designed by simulation team and were validated by departmental specialist but not mentioned if they were physicians, nurses, or both. Nurse and physician content experts were available for both the simulations. Participants were all specialties in the obstetrics/L&D areas creating real life interdisciplinary teams. Debriefings were run by 2 Physicians, 1 nurse and 1 NP all experienced in	Not Mentioned	Yes

			simulation debriefing. *Authors: 2 physicians, 1 anesthesia assistant, 2 RNs, 1 RT and 2 researchers*		
30	Walker, et al.	*BMJ Quality and Safety*	In hospital spontaneous cardiac arrest *in situ* simulations program. Did talk about benefits of involving the entire multidisciplinary team. Stated a priority was to "Recruit one member of nursing staff from the clinical location" for the simulation itself but I think this is just to take part. States debriefing should be faculty members. Didn't stress the need for nursing debriefers for the nurses involved. Discussed the already imbedded program of an *in situ* cardiac arrest simulation program going on so didn't discuss the specific scenario in the article. *Authors; lead researchers and physicians.*	Not Mentioned	Yes
31	Watts, et al.	*Clinical Simulation in Nursing*	4 simulations – 2 were actual patient that were in the ICU. Involved; two second-year medical residents, eight nursing students, three respiratory therapy students, and three clinical laboratory science students. *Authors; nurses were the primary authors along with science and simulation faculty.*	Not Mentioned	Yes
32	Wheeler, et al.	*BMJ Quality and Safety*	Used standardized simulation scenarios for peds cardiac/respiratory arrest from actual cases. All professions involved in insitu SIMs. Debriefing	No	Yes

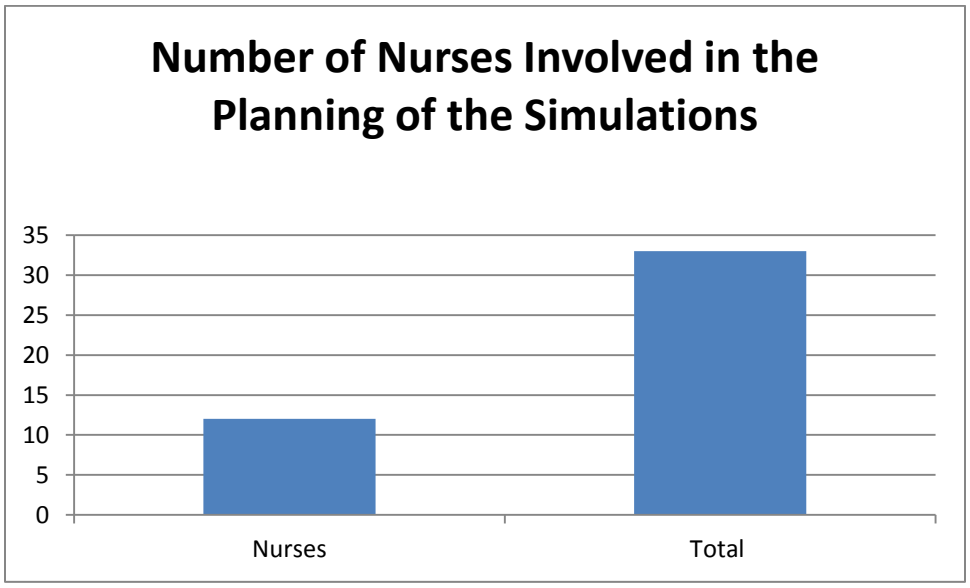
			done by authors. Appear to be all physicians. *Authors: all physicians*		
33	Zimmerman, et al.	*BMC Medical Education*	An inter-professional project group was launched to design and implement a Simulation-based team and resuscitation training program to improve patient safety during future critical events of rapid deteriorating patients in need of cardiopulmonary support. 3 of the group members were staff with previous simulation training. Unsure if physicians or nurses. Scenarios were based on real events. Unsure of who lead the debriefing. Results based on nurses and physicians. *Authors some physicians, unsure about nursing or others.*	Not Mentioned	Yes

Results Discussed

The goal of this scoping review was to explore the literature around the nursing role in the planning, implementation and evaluation of interprofessional *in situ* simulations. Very few articles reviewed mentioned the actual evaluation of the program or simulation exercise. It was difficult to gather data on exact numbers as this was rarely the focus of the discussion in the literature. Some mention the evaluation of the program but do not mention who was involved in the evaluation process such as health care leadership or management, clinical educators, simulation faculty etc. Therefore this section of the scoping review could not be discussed at further length due to lack of data. Below is a further breakdown of the numbers discovered to answer the questions asked of this scoping review of the literature.

Graph 1 shows that out of thirty three articles only twelve articles mentioned nursing involvement in the planning phases of developing interprofessional *in situ* simulation. The rest either mentioned that researchers, simulation teams or physicians planned the simulations or the article made no mention of who was involved in the planning of the group simulations. This could be proposed for future recommendations of a clearer outline by the authors regarding who specifically was involved in the development and planning of the simulation scenarios. Nurses are involved in the majority of bedside medical care in hospitals therefore it could be assumed that nursing is involved in most *in situ* hospital simulation scenarios. In the future, these studies could state more explicitly the level of nursing involvement in the planning and developing phases of *in situ* simulation.

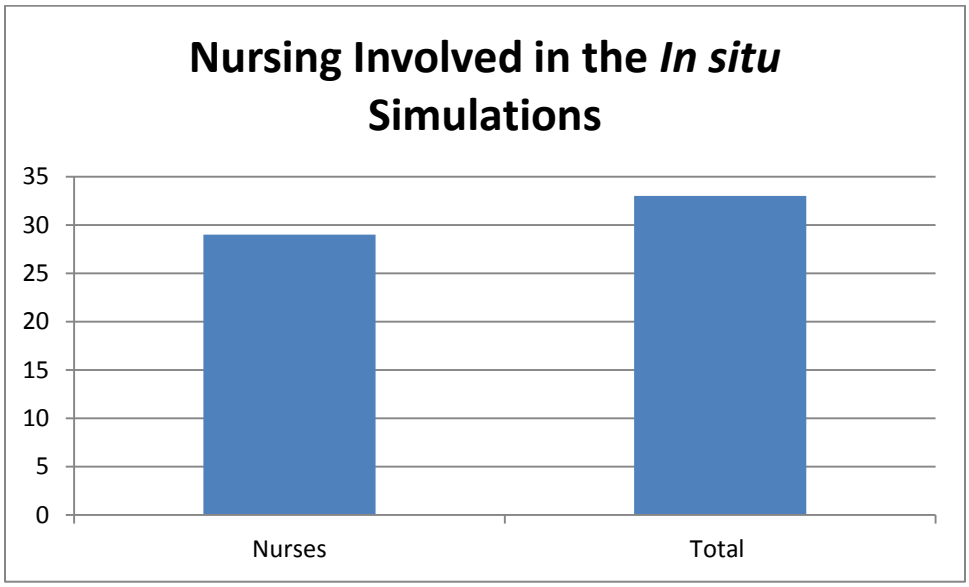
Graph 1: Nursing involved in planning of simulation



Graph 2 reveals that all articles except four (twenty nine in total) mentioned having nursing (or nursing students) involved in the actual implementation of medical simulations. Other professions also involved usually included physicians or medical residents, respiratory

therapists (RTs), midwives, emergency health services (EHS) or in hospital support staff (care attendants/auxiliary team members). The remaining four articles were either discussing a systematic review of simulation or did not have a real simulation as the basis of their discussion.

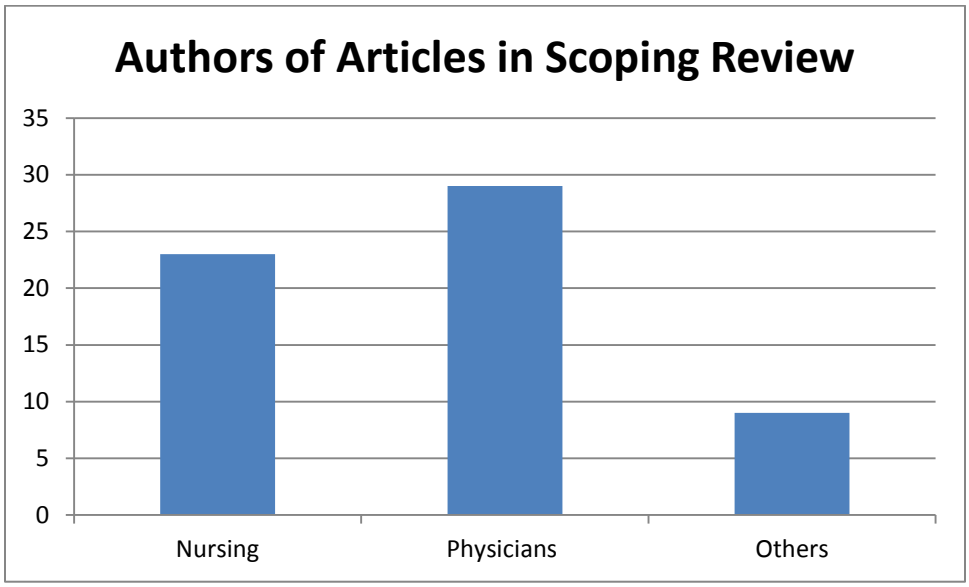
Graph 2: Nursing involved in the *in situ* simulations



Graph 3 was created out of interest but was not originally intended to be resulted in the scoping review. This graph however, shows that out of thirty three articles, physicians were the main authors in the literature (n=29). Nursing was second in authorship (n=23). Some articles were developed solely by researchers and some had researchers or simulation faculty involved in the authorship (n=9). Two papers might have had nurses on the committee, although there was no specific information to determine their profession; however, the lead researchers and authors were physicians. The graph below demonstrates that physicians are the main medical specialty to publish literature on *in situ* interdisciplinary simulation and nursing rarely takes the sole ownership of the publications. This is an area in need of future nursing research and publications. It may be that nurses were behind the scenes and actively involved in the simulations, however

they were not asked or were not interested (or did not have the compensated time) in being an author on the written literature component of the paper. It would be interesting to look at the connection between authorship and active involvement in a lot of the *in situ* simulations.

Graph 3: Authors of Articles in Scoping Review



Summary of Findings

To conclude the findings, 12/33 (36%) of the articles discussed the nurses role in planning of the simulations These actions included things such as writing the scenarios, securing a place, people and equipment or developing objectives for the learners. Of all articles reviewed, 29/33 (88%) had nursing involved in the actual simulations themselves such as taking part in being a participant in the actual SIMs or being a co-facilitator or researcher. Lastly it was inconclusive regarding the role of nursing in the evaluation of *in situ* simulations as there was little mentioned about this aspect of the simulations but it was interesting to note the authorship of the literature. It was revealed that in 23/33(70%) of the studies involved for this scoping review, nurses were the authors. Physicians however, were authors 29/33 (88%) of the time.

Chapter 4: Discussion

There were many lessons learned through this scoping review that warrant further discussion. One is that nursing and nursing faculty needs to take a more involved role in the publication of literature surrounding *in situ* simulation as it is a growing trend in hospitals worldwide. Second, nurses are usually involved as active participants in the actual simulations themselves, but only 36% of the simulations identified in this scoping review mentioned nursing involvement in the planning of the simulations. This could result in a disconnect between roles created for the simulation by non-nurses versus the actual nursing role on the unit. This disconnect, caused by a profession other than nursing (such as medicine) writing the nursing role in the simulations could result in assumptions being made that do not reflect current or best practice in nursing. In order for the simulations to be comprehensive and as real to life as possible, the practice of full interdisciplinary involvement in creating a simulation that does involve multiple professions should be the norm. One could argue that there should be a representative from each profession that is to be involved in the simulation in the actual planning and development in the simulation. This may not be feasible at every site however due to time constraints or lack of interprofessional relationships. However, when running the *in situ* simulations this could be a good time to get all parties together for discussions as they are usually all involved in the actual simulations themselves. Creative ways of involving other professions should also be explored, such as sharing documents, best practice standards and policies, getting feedback on objectives, scenario development, and proper assessment for both team-based and discipline specific evaluations.

Many articles did discuss the importance of having interprofessional *in situ* simulations regularly. One benefit was being on the actual unit and involving the actual working

professionals in the specific department intended for the learning objectives. *In situ* simulation was seen as a well-supported strategy to support system and culture changes as well as staff knowledge gaps. It was noted that many authors reported that a collaborative approach to the implementation of interprofessional *in situ* team training can lead to a sustainable program that serves both patient safety and training requirements set forth by professional organizations (van Schaik et al. 2011; O'Leary et al., 2014; Maxson et al., 2011; & Miller, K et al., 2009). This type of team training is essential to optimal patient care and mutual respect amongst team members (O'Leary et al., 2014; Maxson et al., 2011). In addition, interprofessional simulation in health care education prepares medical and nursing students to more readily enter the clinical setting armed with effective communication and collaboration skills as well as a mutual understanding of each other's profession and abilities (Watts et al., 2014; Van Schaik et al., 2011). This was also summarized by Barker, Pulling, McGraw, Dagnone, Hopkins-Rosseel & Medves (2008) that when bringing two professions to train together, such as medical and nursing students, that the interconnection of competencies form an interactive model that enhances interprofessional collaboration as outcome goals for patient care are the same.

Simulation-based training for healthcare providers is well established as a viable, efficacious training tool, particularly for enhancing non-technical team-working skills such as communication, decision making, leadership and task management (Walker et al., 2012). Team training in general has been shown to improve patient outcomes and is supported repeatedly in the literature by the Institute of Medicine and the Agency for Healthcare Research and Quality (Deering, Johnston & Colacchio, 2011). Group simulation and team based skills are essential for effective teamwork and important in the prevention of error and adverse events in hospitals.

Despite its clear benefits, here are some limitations of *in situ* simulation training that need to be mentioned. To effectively institute a new teamwork training curriculum, it is essential to train all staff in a clinical environment in a timely manner. This presents the difficulty of scheduling each simulation to include a complement of staff from every necessary discipline, including physicians, nurses, and respiratory therapists, all of whom work on different schedules and shifts. Perhaps even more difficult is incorporating consulting and ancillary staff, those who do not have a primary clinical unit but interact with clinicians in many different areas of the healthcare facility. There is an inherent difficulty scheduling people to participate in teamwork training while providing clinical care, as they may be required to leave to care for a patient. Conversely, people may be resistant to come in for training during their own time unless they are financially compensated, leading to further expense for the hospital. In a large unit or one that operates 24 hours a day, such as an emergency department, there is a challenge to identify and train enough facilitators to educate the entire staff, including those working "off-peak" hours (Riley et al., 2011; Walker et al., 2012). The majority of the literature reviews showed that simulations happened first thing in the morning around 0700, as this is the least busy time for patient care and can incorporate both night shift and day shift in the simulation. Facilitators also must be educated in the foundations of teamwork training, adult education, and the basics of operating the simulators (van Schaik, et al., 2011; Patterson etl a. 2013). Next, technical difficulties may occur more frequently when the simulators are being repeatedly moved to new locations, such as all over various hospital wards. Finally, setting up audio-visual equipment for recording simulations may be more difficult in several clinical environments, and participants may miss out on this valuable learning tool.

Gaps in the Literature and Potential for Future Research

There are a few gaps in the literature discussed by the authors. Pak & Hardasmalani (2015) revealed that "with the exception of cardiac arrest teams, there are very few reports of collaboration between more than two specialties using *in situ* simulation in the literature" (p.56). Authors van Schaik et al., (2011) reviewed a few studies that looked at a tool to specifically assess teamwork behaviors during neonatal resuscitation which demonstrated an improvement in these behaviors after simulation-based training. Interestingly enough, their findings revealed that the teams in these studies consisted of resident physicians only and did not reflect the multidisciplinary team in real-life resuscitations (van Schaik, et al., 2011). Their study reinforced the findings in this paper that despite the widespread call for *in situ* interprofessional team training, real documented data on the beneficial effects of such training is limited in the literature (van Schaik, et al., 2011). Their review goes on to say that "much has been published about high-fidelity simulation training programs, but little is available about *in situ* interprofessional team training, even though this may be the most feasible approach in terms of resources and cost and has the critical element of environmental fidelity" (van Schaik, et al., 2011 p. 808.).

The gaps that were found in this scoping review were around the specifics related to interprofessional *in situ* simulation and the evidence to support nursing and other disciplines in the evaluation process of the simulations. These two areas are open to the potential for future research and publications around the named topics.

Implications for Nursing Practice and Education

The overall implications this scoping review could have on the future of nursing practice and education are vast. It is well documented that teams make fewer mistakes than do

individuals; however most hospital clinical units continue to function as discrete collections of individuals in part because health care professionals are predominately educated as individuals and trained separately within their disciplines (Miller, Riley & Davis 2009). Therefore, nursing and medical students should be doing more interdisciplinary simulation training together rather than in silos. Considering that both physicians and nurses need to master the healthcare professional competencies such as knowledge (knowing), attitudes (being) and skills (doing) why not work on them collaboratively to enhance their mutual professional practice standards (Barker, et al., 2008)?

Miller, Riley & Davis (2009) go on to report that our health care professions are extremely adept in training individuals in the technical aspects of each discipline, yet have been slow to train for team skills for enhanced interdisciplinary team performance. Interdisciplinary team training is essential to both nursing and medicine to understand what each other's role is and how to mitigate a stressful situation such as a code or major trauma which will reinforce the importance of team work and communication amongst disciplines (O'Leary et al., 2014; Klipfel et al., 2014). This type of practice and education has been shown to foster respect for the contributions of each discipline (Maxon et al., 2011). A study out of Canada by Barker et al., (2008) discussed their framework for education simulations at the university level, to incorporate shared, complementary and some profession-specific competencies in the cohesive learning environment. In their study, this led to enthusiastically positive attitudinal scores and responses from both medical and nursing students (Barker, et al., 2008)

In situ simulation also is advantageous in supporting adult learning theory in mature learners, who could be involved in these types of high fidelity simulations. Guise & Mladenovic (2013) discuss that *in situ* simulation supports the learner by not only demonstrating the clinical

relevance of a new skill or communication technique, it also enables the learner to understand how to utilize all human and technological resources to support these new skills.

The intended benefit of this SPAR will hopefully result in encouraging nursing to get engaged in the simulation development process, and not just the simulation itself so that the cases will reflect more 'real life' nursing interventions, learning objectives, educational gaps, medical priorities, communication issues and team dynamics. This SPAR was able to provide a scoping review of the literature and critical analysis of issues around a lack of diversity in professions being involved in the planning of hospital simulations. This will hopefully inform decision making in interprofessional committees to involve the nursing profession in the planning, implementing and evaluation of future *in situ* simulations.

Limitations

Limitations to this scoping review are that only English journals newer than 2005 were accessed which could exclude some relevant literature from a non-English publisher. Debriefing literature was also excluded as the search would have been too vast considering that medical debriefing terminology is so highly published.

Conclusion

This scoping review provides a descriptive look into the role of nursing as reported in the literature in the increasingly popular educational method of conducting *in situ* hospital simulations. It has been revealed that although nursing is usually a main profession to be involved in the simulations, nurses are not always actively involved with the planning and evaluations of the simulations. This gap of not having nursing or any interprofessional involvement in the planning of hospital wide *in situ* simulations could consequently lead to some

unintended outcomes or absence of important learning objectives and no attention on common communication pitfalls. The learning objectives may be decided on by the SIM creators who turn out to be mainly physicians according to the literature found in this scoping review. The need for future nursing initiatives to become actively and consistently engaged in the planning, implementation and evaluation of large hospital wide *in situ* simulations is significant. This paper highlights the important role nursing plays in these types of ongoing simulations to improve our health systems and staff education within hospitals. By doing this we not only benefit the participants and organizations, we can ultimately improve on the never-ending goal of providing an increasing quality of patient care.

References

Allan, C. K., Thiagarajan, R. R., Beke, D., Imprescia, A., Kappus, L. J., Garden, A., Hayes, G., Laussen. P. C., Bacha., E., & Weinstock, P. H. (2010). Simulation-based training delivered directly to the pediatric cardiac intensive care unit engenders preparedness, comfort, and decreased anxiety among multidisciplinary resuscitation teams. *The Journal of Thoracic and Cardiovascular Surgery, 140*(3), 646-652. doi:http://dx.doi.org.ezproxy.library.ubc.ca/10.1016/j.jtcvs.2010.04.027

Arksey, H., & O'Malley, L. (2005) Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, 8, 19-32.

Atamanyuk, I., Atamanyuk, I., Ghez, O., Saeed, I., & Lane, M. (2014). Impact of an open-chest extracorporeal membrane oxygenation model for in situ simulated team training: a pilot study. *Interactive Cardiovascular and Thoracic Surgery, 18*(1), 17-20.

Auerbach, M., Roney, L., Aysseh, A., Gawel, M., Koziel, J., Barre, K., Caty. M.G., & Santucci, K. (2014). In situ pediatric trauma simulation: assessing the impact and feasibility of an interdisciplinary pediatric in situ trauma care quality improvement simulation program. *Pediatric Emergency Care, 30*(12), 884-891. doi:10.1097/PEC.0000000000000297 [doi]

Barker, C., Pulling, C., McGraw, R., Dagnone, J.D., Hopkins-Rosseel, D & Medves, J (2008). Simulation in interprofessional education for patient-centered collaborative care. *Journal of Advanced Nursing*, 64(4), 317-414. DOI: 10.1111/j.1365-2648.2008.04798.x

Braddock, C. H.,3rd, Szaflarski, N., Forsey, L., Abel, L., Hernandez-Boussard, T., & Morton, J. (2015). The TRANSFORM patient safety project: a microsystem approach to improving outcomes on inpatient units. *Journal of General Internal Medicine, 30*(4), 425-433. doi:10.1007/s11606-014-3067-7 [doi]

Calhoun, A. W., Boone, M. C., Peterson, E. B., Boland, K. A., & Montgomery, V. L. (2011). Integrated in-situ simulation using redirected faculty educational time to minimize costs: a feasibility study. *Simulation in Healthcare: Journal of the Society for Simulation in Healthcare, 6*(6), 337-344. doi:10.1097/SIH.0b013e318224bdde [doi]

Canadian Interprofessional Health Collaborative; a National Interprofessional Competency Framework. (2010). Retrieved from http://www.cihc.ca/files/CIHC_IPCompetencies_Feb1210.pdf

Clapper, T. C. (2013). In situ and mobile simulation: lessons learned … authentic and resource I ntensive. *Clinical Simulation in Nursing, 9*(11), 551-557. doi:http://dx.doi.org.ezproxy.library.ubc.ca/10.1016/j.ecns.2012.12.005

Cochrane Consumer Network, 2017. What is a systematic review? Retrieved from http://consumers.cochrane.org/what-systematic-review

Deering, S., Johnston, L. C., & Colacchio, K. (2011). Multidisciplinary teamwork and communication training. *Seminars in Perinatology, 35*(2), 89-96. doi:http://dx.doi.org.ezproxy.library.ubc.ca/10.1053/j.semperi.2011.01.009

EM SIM CASES (2017). Retrieved from https://emsimcases.com/

Garden, A. L., Mills, S. A., Wilson, R., Watts, P., & Griffin, J. M. (2010). *In situ* simulation training for paediatric cardiorespiratory arrest: initial observations and identification of latent errors. *Anaesthesia and Intensive Care, 38*(6), 1038-1042.

Gilbert, J. H., Yan, J., & Hoffman, S. J. (2010). A WHO report: framework for action on interprofessional education and collaborative practice. *Journal of Allied Health, 39*(3), 196.

Guise, J. M., & Mladenovic, J. (2013). *In situ* simulation: identification of systems issues. *Seminars in Perinatology, 37*(3), 161-165. doi:10.1053/j.semperi.2013.02.007 [doi]

Hinde, T., Gale, T., Anderson, I., Roberts, M., & Sice, P. (2016). A study to assess the influence of interprofessional point of care simulation training on safety culture in the operating theatre environment of a university teaching hospital. *Journal of Interprofessional Care, 30*(2), 251-253. doi:10.3109/13561820.2015.1084277 [doi]

HIWIKI International. (2015). Scoping reviews. Retrieved from http://hlwiki.slais.ubc.ca/index.php/Scoping_reviews

Kessler, D. O., Walsh, B., Whitfill, T., Gangadharan, S., Gawel, M., Brown, L., & Auerbach, M. (2016). Disparities in adherence to pediatric sepsis guidelines across a spectrum of emergency departments: a multicenter, cross-sectional observational in situ simulation study. *The Journal of Emergency Medicine, 50*(3), 403-415.e3. doi:http://dx.doi.org.ezproxy.library.ubc.ca/10.1016/j.jemermed.2015.08.004

Klipfel, J. M., Carolan, B. J., Brytowski, N., Mitchell, C. A., Gettman, M. T., & Jacobson, T. M. (2014). Patient safety improvement through *in situ* simulation interdisciplinary team training. *Urologic Nursing, 34*(1), 39. doi:10.7257/1053-816X.2014.34.1.39

Maxson, P. M., Dozois, E. J., Holubar, S. D., Wrobleski, D. M., Dube, J. A. O., Klipfel, J. M., & Arnold, J. J. (2011). Enhancing nurse and physician collaboration in clinical decision making through high-fidelity interdisciplinary simulation training. *Mayo Clinic Proceedings. Mayo Clinic, 86*(1), 31-36. doi:10.4065/mcp.2010.0282

Miller, D., Crandall, C., Washington, C., & McLaughlin, S. (2012). Improving teamwork and communication in trauma care through in situ simulations. *Academic Emergency Medicine, 19*(5), 608-612. doi:10.1111/j.1553-2712.2012.01354.x

Miller, K., Riley, W., & Davis, S. (2009). Identifying key nursing and team behaviours to achieve high reliability. *Journal of Nursing Management, 17*(2), 247-255. doi:10.1111/j.1365-2834.2009.00978.x [doi]

Miller, K. K., Riley, W., Davis, S., & Hansen, H. E. (2008). *In situ* simulation: A method of experiential learning to promote safety and team behavior. *The Journal of Perinatal & Neonatal Nursing, 22*(2), 105-113. doi:10.1097/01.JPN.0000319096.97790.f7

Nunnink, L., Welsh, A. M., Abbey, M., & Buschel, C. (2009). *In situ* simulation-based team training for post-cardiac surgical emergency chest reopen in the intensive care unit. *Anaesthesia and Intensive Care, 37*(1), 74-78. doi:20080284 [pii]

O'Leary, F., McGarvey, K., Christoff, A., Major, J., Lockie, F., Chayen, G., Vassiliadis. J., Wharton, S. (2014). Identifying incidents of suboptimal care during paediatric emergencies-an observational study utilising *in situ* and simulation centre scenarios. *Resuscitation, 85*(3), 431-436. doi:10.1016/j.resuscitation.2013.12.001 [doi]

Pak, K., & Hardasmalani, M. (2015). A multidisciplinary obstetric trauma resuscitation using *in situ* high-fidelity simulation. *Advanced Emergency Nursing Journal, 37*(1), 51-57.

Patterson, M. D., Geis, G. L., Falcone, R. A., LeMaster, T., & Wears, R. L. (2013). *In situ* simulation: detection of safety threats and teamwork training in a high risk emergency department. *BMJ Quality & Safety, 22*(6), 468-477. doi:10.1136/bmjqs-2012-000942

Qayumi, K., Donn, S., Zheng, B., Young, L., Dutton, J., Adamack, M., Bowles, R., & Cheng, A. (2012). British Columbia interprofessional model for simulation-based education in health care: A network of simulation sites. *Simulation in Healthcare: Journal of the Society for Simulation in Healthcare, 7*(5), 295

Riley, W., Davis, S., Miller, K., Hansen, H., Sainfort, F., & Sweet, R. (2011). Didactic and simulation nontechnical skills team training to improve perinatal patient outcomes in a community hospital. *Joint Commission Journal on Quality and Patient Safety, 37*(8), 357-364.

Rosen, M. A., Hunt, E. A., Pronovost, P. J., Federowicz, M. A., & Weaver, S. J. (2012). *In situ* simulation in continuing education for the health care professions: a systematic review. *Journal of Continuing Education in the Health Professions, 32*(4), 243-254. doi:10.1002/chp.21152

Sorensen, J. L., Vleuten, C. P. M. v. d., Lindschou, J., Gluud, C., Ostergaard, D., Leblanc, V., Johansen, M., Ekelund, K., Albrechtsen, C.K., Pedersen, B.W., Kjaergaard, H., Weikop, P., Ottesen, B. (2013). '*In situ* simulation' versus 'off site simulation' in obstetric emergencies and their effect on knowledge, safety attitudes, team performance, stress, and motivation: study protocol for a randomized controlled trial. *Trials*, *14*(1), 220-220. doi:10.1186/1745-6215-14-220

Steinemann, S., Berg, B., Skinner, A., DiTulio, A., Anzelon, K., Terada, K., Oliver, C., Ho, H.C., & Speck, C. (2011). *In situ*, multidisciplinary, simulation-based teamwork training improves early trauma care. *Journal of Surgical Education*, *68*(6), 472-477. doi:http://dx.doi.org.ezproxy.library.ubc.ca/10.1016/j.jsurg.2011.05.009

Sweeney, L. A., Warren, O., Gardner, L., Rojek, A., & Lindquist, D. G. (2014). A simulation-based training program improves emergency department staff communication. *American Journal of Medical Quality*, *29*(2), 115-123. doi:10.1177/1062860613491308

The Joanna Briggs Institute. (2015). Methodology for JBI scoping reviews. The Joanna Briggs Institute Reviewers' Manual 2015. Retrieved from http://joannabriggs.org/assets/docs/sumari/Reviewers-Manual_Methodology-for-JBI-Scoping-Reviews_2015_v2.pdf

van Schaik, S.M., Plant, J., Diane, S., Tsang, T., & O'Sullivan (2011). Interprofessional team training in pediatric resuscitation: a low-cost, *in situ* simulation program that enhances self-efficacy among participants. *Clinical Pediatrics*, *50*(9), 807 - 815.

Ventre, K. M., Barry, J. S., Davis, D., Baiamonte, V. L., Wentworth, A. C., Pietras, M., Coughlin, L., & Barley, G. (2014). Using *in situ* simulation to evaluate operational readiness of a children's hospital-based obstetrics unit. *Simulation in Healthcare : Journal of the Society for Simulation in Healthcare, 9*(2), 102-111. doi:10.1097/SIH.0000000000000005 [doi]

Walker, S. T., Sevdalis, N., McKay, A., Lambden, S., Gautama, S., Aggarwal, R., & Vincent, C. (2013). Unannounced *in situ* simulations: integrating training and clinical practice. *BMJ Quality & Safety, 22*(6), 453-458. doi:10.1136/bmjqs-2012-000986

Watts, P., Langston, S. B., Brown, M., Prince, C., Belle, A., Skipper, M. W., King, J.P., & Moss, J. (2014). Interprofessional education: a multi-patient, team-based intensive care unit simulation. *Clinical Simulation in Nursing,*doi:10.1016/j.ecns.2014.05.004

Wheeler, D. S., Geis, G., Mack, E. H., LeMaster, T., & Patterson, M. D. (2013). High-reliability emergency response teams in the hospital: improving quality and safety using *in situ* simulation training. *BMJ Quality & Safety, 22*(6), 507-514. doi:10.1136/bmjqs-2012-000931

Zimmermann, K., Holzinger, I. B., Ganassi, L., Esslinger, P., Pilgrim, S., Allen, M., Burmester, M., & Stocker, M. (2015). Inter-professional *in-situ* simulated team and resuscitation training for patient safety: description and impact of a programmatic approach. *BMC Medical Education, 15*, 189-015-0472-5. doi:10.1186/s12909-015-0472-5 [doi]

Appendix A

Articles included in Scoping Review:

#	Author	Year	Journal	Title of Paper
1	Allan, et al.	2010	*The Journal of Thoracic and Cardiovascular Surgery*	Simulation-based training delivered directly to the pediatric cardiac intensive care unit engenders preparedness, comfort and decreased anxiety among multidisciplinary resuscitation teams.
2	Atamanyuk, et al.	2013	*Interactive Cardiovascular and Thoracic Surgery*	Impact of an open-chest extracorporeal membrane oxygenation model for *in situ* simulated team training: a pilot study.
3	Auerbach, et al.	2014	*Journal of Pediatric Emergency Care*	*In situ* pediatric trauma simulation: assessing the impact and feasibility of an interdisciplinary pediatric *in situ* trauma care quality improvement simulation program.
4	Baker, et al.	2008	*Journal of Advanced Nursing*	Simulation in interprofessional education for patient-centered collaborative care.
5	Braddok, et al.	2015	*Journal of General Internal Medicine*	The TRANSFORM patient safety project: a microsystem approach to improving outcomes on inpatient units.
6	Clapper, T.C	2013	*Clinical Simulation in Nursing*	In situ and mobile simulation: lessons learned - authentic and resource intensive.
7	Deering, et al.	2011	*Seminars in Perinatology*	Multidisciplinary teamwork and communication training.
8	Falcone, et al.	2008	*Journal of Pediatric Surgery*	Multidisciplinary pediatric trauma team training using high-fidelity trauma

				simulation.
9	Garden, et al.	2010	*Anaesthesia and Intensive Care*	*In situ* simulation training for paediatric cardiorespiratory arrest: initial observations and identification of latent errors.
10	Guise, et al.	2013	*Seminars in Perinatology*	*In situ* simulation: identification of systems issues.
11	Hargestam, et al.	2013	*BMJ Open*	Communication in interdisciplinary teams: exploring closed-loop communication during *in situ* trauma team training.
12	Hinde, et al.	2016	*Journal of Interprofessional Care*	A study to assess the influence of interprofessional point of care simulation training on safety culture in the operating theatre environment of a university teaching hospital.
13	Kessler, et al.	2016	*Journal of Emergency Medicine*	Disparities in adherence to pediatric sepsis guidelines across a spectrum of emergency departments: a multicenter, cross-sectional observational *in situ* simulation study.
14	Klipfel, et al.	2014	*Urologic Nursing*	Patient safety improvement through *in situ* simulation interdisciplinary team training.
15	Maxson, et al.	2011	*Mayo Clinic Proceedings*	Enhancing nursing and physician collaboration in clinical decision making through high-fidelity interdisciplinary simulation training.
16	Miller, et al.	2012	*Academic Emergency Medicine*	Improving teamwork and communication in trauma care through *in situ* simulations.
17	Miller, et al.	2009	*Journal of Nursing Management*	Identifying key nursing and team behaviours to achieve

				high reliability.
18	Miller, et al.	2008	*Journal of Perinatal & Neonatal Nursing*	*In situ* simulation: a method of experiential learning to promote safety and team behavior.
19	Nunnink, et al.	2009	*Anesthesia and Intensive Care*	*In situ* simulation-based team training for post-cardiac surgical emergency chest reopen in the intensive care unit.
20	O'Leary, et al.	2014	*Resuscitation*	Identifying incidents of suboptimal care during paediatric emergencies-an observational study utilising *in situ* and simulation centre scenarios.
21	Pak, et al.	2015	*Advanced Emergency Nursing Journal*	A multidisciplinary obstetric trauma resuscitation using *in situ* high-fidelity simulation.
22	Patterson, et al.	2013	*BMJ Quality & Safety*	*In situ* simulation: detection of safety threats and teamwork training in a high risk emergency department.
23	Riley, et al.	2011	*Joint Commission Journal on Quality and Patient Safety*	Didactic and simulation nontechnical skills team training to improve perinatal patient outcomes in a community hospital.
24	Rosen, et al.	2012	*The Journal of Continuing Education in the Health Professions*	*In situ* simulation in continuing education for the health care professions: a systematic review.
25	Sorensen, et al.	2013	*Trials*	'*In situ* simulation' versus 'off site simulation' in obstetric emergencies and their effect on knowledge, safety attitudes, team performance, stress, and motivation: study protocol for a randomized controlled trial.
26	Steinemann, et al.	2011	*Journal of Surgical Education*	*In situ*, multidisciplinary, simulation-based teamwork training improves early trauma care.

27	Sweeney, et al.	2014	*American Journal of Medical Quality*	A simulation-based training program improves emergency department staff communication.
28	Van Schaik, et al.	2011	*Clinical Pediatrics*	Interprofessional team training in pediatric resuscitation: a low-cost, *in situ* simulation program that enhances self-Efficacy among participants.
29	Ventre, et al.	2014	*Simulation Healthcare*	Using *in situ* simulation to evaluate operational readiness of a children's hospital-based obstetrics unit.
30	Walker, et al.	2013	*BMJ Quality and Safety*	Unannounced *in situ* simulations: integrating training and clinical practice.
31	Watts, et al.	2014	*Clinical Simulation in Nursing*	Interprofessional education: a multi-patient, team-based intensive care unit simulation.
32	Wheeler, et al.	2013	*BMJ Quality and Safety*	High-reliability emergency response teams in the hospital: improving quality and safety using *in situ* simulation training.
33	Zimmerman, et al.	2015	*BMC Medical Education*	Inter-professional *in-situ* simulated team and resuscitation training for patient safety: description and impact of a programmatic approach.