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Teaching sustainable interprofessional collaborative competencies through interprofessional simulation

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by

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Abstract

Problem & Purpose: Researchers have investigated the level and type of learning gained after attending interprofessional simulation; however, limited research exists regarding the retention of the concepts learned during interprofessional simulation over time. The goal of this research was to understand if undergraduate nursing students retained and incorporated interprofessional collaborative competencies they learned from interprofessional simulation into their clinical practicum.

Methods: A quasi-experimental, longitudinal, one group pretest and posttest design to understand the dependent variable of nursing students' self-reported level of competence with interprofessional collaborative competencies. The independent variable studied was the student experience with trauma interprofessional simulation.

Results: Undergraduate nursing students were able to retain the self-reported interprofessional collaborative competence they gained from interprofessional simulation during their 8 week practicum, however there was no significant increase in their competence from after simulation to the completion of practicum. The results from this study were not able to confirm a large change in self-reported interprofessional competency between the time of simulation (time point 2/posttest 1) and practicum completion (time point 3/posttest 2).

Recommendations: Recommendations to future educators promoting the learning of interprofessional collaborative competencies include: more frequent and consistent exposure to interprofessional education and interprofessional simulation; engagement of curriculum leaders to create learning goals and objectives for students related to interprofessional collaboration; optimize engagement and buy-in from the person,

environment, and occupation; and finally to use International Nursing Association Clinical Simulation and Learning simulation standards to have a standardized practice for creating and conceptualizing interprofessional simulation.

Keywords: interprofessional collaboration, interprofessional simulation, interprofessional collaborative competency framework, Canadian Interprofessional Health Collaborative, International Nursing Association of Clinical Simulation and Learning standards, undergraduate nursing students

Definition of terms

Canadian Interprofessional Health Collaborative (CIHC) – national hub for interprofessional education, collaboration in healthcare practice and patient centered care. CIHC is made up of health organizations, health educators, researchers, health professionals, and students from across Canada. CIHC identifies and shares best practices and its extensive and growing knowledge in interprofessional education and collaborative practice

(CIHC, 2010)

Canadian Interprofessional Competency Framework – Framework created by CIHC based on a review of the literature related to competencies and competency-based education as well as existing competency frameworks. The framework relied on the ability to integrate knowledge, skills, attitudes and values in arriving at judgements

(CIHC, 2010)

Interprofessional communication – learners or practitioners from different professions communication with each other in a collaborative, responsive and responsible manner

(CIHC, 2010)

Interprofessional education (IPE) – when students (of different health care professionals) from two or more profession learn about, from and with each other to enable effective collaboration and improve health outcomes

(INACSL Standards Committee, 2016a)

International Nursing Association of Clinical Simulation and Learning (INACSL) – Organization with the mission to advance the science of healthcare simulation. INACSL

are global leaders in transforming practice to improve patient safety through excellence in healthcare simulation

(INACSL Standards Committee, 2016a)

Interprofessional collaboration – process of developing and maintain effective interprofessional working relationships with learners, practitioners, patients, clients, families and communities to enable optimal health outcomes

Interprofessional collaborative competency attainment survey (ICCAS) – 20 item self-assessment tool that covers aspects of trainee roles on a team and use of interprofessional practice team approaches to patient care. It's intended to measure the self-reported competencies of interprofessional care in interprofessional education programs

(Archibald, Trumpower, & MacDonald, 2014)

Interprofessional Simulation/ Simulation Enhanced interprofessional experiences – simulation based activities in which participants and facilitators from two or more professions are placed into a simulated health care experience in which shared or linked educational goals are pursued, which the individual involved learn from, about and with each other to enable effective collaboration and improve health outcomes

(INACSL Standards Committee, 2016a)

Normalacy testing – A check of the distribution of results to identify if the data set is well modelled by normal distribution and how likely it is for a random variable underlying the data set to be normally distributed

(Polit & Beck, 2017)

Simulation – an educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life. Simulation can incorporate one or more modalities to promote, improve, or validate a participant's performance

(INACSL Standards Committee, 2016a)

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Chapter 1: Introduction

In healthcare today there is demand for specialized client centred care amongst decreasing resources (World Health Organization, 2010). To achieve and maintain optimal client centred care, collaboration among healthcare professionals is critical for positive patient care and efficiency while delivering care (Lancaster, Kolakowsky-Hayner, Kovacich, & Greer-Williams, 2015; McInnes, Peters, Bonney, & Halcomb, 2015; Xyrichis & Lowton, 2008). The World Health Organization (2010) acknowledged interprofessional collaboration as an essential element to "accomplishing safe and sustainable health care to enhance patient care and safety" (p.6). Interprofessional collaboration is crucial in the process of meeting increasingly complex and diverse patient care needs (Lancaster et al., 2015). Kyrkjebo, Brattebo, and Smith-Strom (2006) report it is inappropriate to train health professionals separately and later expect them to establish collaborative relationships.

According to the Canadian Interprofessional Health Collaborative (CIHC) (2010), interprofessional collaboration is the "process of developing and maintaining effective interprofessional working relationships with learners, practitioners, patients, clients, families, and communities to enable optimal health outcomes". Interprofessional education (IPE) is an approach to prepare healthcare students, in nursing, social work, and medicine for collaborative practice and interprofessional collaboration (Bridges, Davidson, Odegard, Maki, & Tomkowiak, 2011; CIHC, 2010). IPE sessions and workshops provide health care students an opportunity to engage in learning with, from, and about each other while sharing and developing their skills (Bridges et al., 2011; Craddock, O'Halloran, Borthwick, & McPherson, 2006). The creation of collaborative

learning and working relationships can assist in "[implementing] continuous and evolving interactions between professionals" (Legare et al., 2011, p. 23). These relationships are necessary when dealing with the increasingly demanding and complex health issues evolving in today's health care system (Walsh & van Soeren, 2012).

The movement towards patient safety is a significant factor in why IPE and simulation are widely recognized as an essential approach to learning within health care education (Kyrkjebo et al., 2006; Robertson & Bandali, 2009; Walsh & van Soeren, 2012). Simulation has been cited as a method of interprofessional education which promotes patient safety while recreating real patient interactions (Reime et al., 2017). Effective communication is one of the most commonly cited pillars and outcomes of interprofessional collaboration (Brock et al., 2013; Failla & Macauley, 2014; A. E. King, Conrad, & Ahmed, 2013; J. King et al., 2016; Legare et al., 2011) and is known to directly contribute to increasing patient safety (Brock et al., 2013; Kyrkjebo et al., 2006; Salam, Saylor, & Cowperthwait, 2015).

Statement of the Problem

Researchers have investigated the level and type of learning gained after attending interprofessional simulation; however, limited research exists regarding the retention of the concepts learned during interprofessional simulation. Labrague, McEnroe-Petitte, Fronda, and Obeidat (2018) investigated frequency and duration of interprofessional simulation during a student's undergraduate career, however studies have yet to address the questions related to the effectiveness, transfer, or retention of interprofessional collaborative competencies learned through interprofessional simulation over time (Labrague et al., 2018). Cant and Cooper's (2010) systematic review of interprofessional

simulation literature also concluded that more details on the size and length of simulation and its effects on learning needs to be examined, alongside the development of a universal method of measuring outcomes of interprofessional simulation. The CIHC (2010) framework does outline six interprofessional competencies; however, the evaluation of simulation based on the CIHC competencies is limited (J. King et al., 2016; Riesen, Morley, Clendinneng, Ogilvie, & Murray, 2012). The CIHC framework for interprofessional collaboration was created in 2010, and the International Nursing Association of Clinical Simulation and Learning (INACSL) standards were published in 2016, therefore they were not available for earlier studies (CIHC, 2010; Horsley, O'Rourke, Mariani, Doolen, & Pariseault, 2018; INACSL Standards Committee, 2016c). One of the key competencies cited by many researchers throughout their work in interprofessional collaboration is interprofessional communication (Brock et al., 2013; A. E. King et al., 2013; J. King et al., 2016; Legare et al., 2011). Applying these competencies to Canadian IPE programs will provide beneficial knowledge around how undergraduate curriculums are adapting to integrating IPE.

Brashers et al. (2016) identified a need to longitudinally assess teamwork competencies to better link IPE to changes in clinical behavior. Brashers et al. (2016) study explored the effects of different interprofessional education modalities over two years in the area of pain management. Their research did identify increases in learning from interprofessional education however were unable to find similar results from previous research to support their findings. However, currently most analyses are of the changes immediately post program. Brashers et al. (2016) concluded student's collaborative competencies had increased after two years of IPE. The increase in

collaborative competence may be attributable to having had multiple opportunities for IPE including interprofessional simulation. Students who were exposed to multiple interprofessional simulation felt repetition allowed them to improve (Kyrkjebo et al., 2006; Reime et al., 2017). In addition, Cant and Cooper (2010) systematic review of interprofessional simulation concluded that exposure to simulation experiences themselves was the most influential in having an effect on learning outcomes.

In 2012 Meffe, Claire Moravac, and Espin collected data at multiple post program points to measure retention and transfer of interprofessional concepts. They suggested that participants transferred their interprofessional learning into the practice setting. However, they came to this conclusion from participant comments. The participant's comments made it appear to the researchers as though the strategies used in this program, which were focused on collaboration, had a sustained effect in practice more than one-year post program. The interprofessional learning was described as an improvement in their process of relationship building and communication skills. Meffe, Claire Moravac, and Espin (2012) methods of collecting data at multiple post program points was a good starting point to learn more about the retention of interprofessional simulation. However, more research involving multiple post simulation assessments will give educators a better idea of how effective interprofessional simulation is in teaching and supporting student retention of interprofessional competencies.

Purpose of the Study

The purpose of this study was to uncover how effective interprofessional simulation is in teaching and practicing the CIHC (2010) interprofessional collaborative competencies, and whether or not it creates sustainable learning for nursing students

within their practice. This study will allow the researching team to uncover if the interprofessional collaborative competencies learned from interprofessional simulation are sustainable over time and are supported throughout the student's practicum to grow.

The aim of my research was to examine the relationship between interprofessional simulation and the learning of interprofessional collaborative competencies, specifically at the communication competency involving undergraduate nursing students. The scant amount of researchers examining retention of interprofessional collaboration competencies through simulation brings forward the following research question: What is the effectiveness of interprofessional simulation on interprofessional collaborative competencies, specifically effective communication over time?

Organization of Thesis

The next chapter of this thesis is a review of the literature on interprofessional collaboration and interprofessional simulation. In chapter three I outline the three theoretical frameworks I used to inform this study and were used to analyze the data. Chapter four includes a description of the design and methods I used to conduct this study and chapter five I will describe and discuss the results from the data analyses. In chapter six I will discuss and interpret the results. Finally, in chapter seven I will offer conclusions with recommendations for future practice enhancement and research.

Chapter 2: Literature Review

The purpose of this literature review is to explore and discuss interprofessional collaboration and its relation to interprofessional simulation as a teaching method. First, a discussion of interprofessional collaboration and interprofessional collaborative competencies will be completed. Second, an in-depth analysis of interprofessional simulation and its benefits as an academic teaching tool will be outlined. I will then identify the common outcomes of interprofessional collaboration through simulation as well as the current literature on how it has been evaluated. Finally, I will present an examination of the interprofessional competency related to communication.

For this review, I used a combination of peer-reviewed studies from nursing, medicine, pharmacy, social work, occupational therapy, and physiotherapy to complete a comprehensive review of the literature related to interprofessional collaboration and interprofessional simulation in undergraduate studies. Search terms I used in CINAHL, MedLine, Ebsco, and PubMed databases included “interprofessional collaboration”, “interprofessional simulation”, “nursing students”, interprofessional education”, “interprofessional collaborative competencies”, and “undergraduate education”. After I reviewed the abstracts, I retrieved all articles with a declared focus on interprofessional collaboration and interprofessional simulation.

Interprofessional Collaboration

The positive outcomes of interprofessional collaboration in healthcare can be organized into three categories: patient outcomes, healthcare professional outcomes, and organizational outcomes. Multiple researchers have investigated patient outcomes of

interprofessional collaboration and the most commonly noted patient outcome of interprofessional collaboration is improved quality of care they receive (Baggs, 1994; Baggs & Schmitt, 1988; Bronstein, 2003; Dechario-Marino, Jordan-Marsh, Traiger, & Saulo, 2001; Disch, 2001; Fewster-Thuente, 2015; Henneman, Lee, & Cohen, 1995; Lancaster et al., 2015; Lernetti, Stolt, Rickard, & Suhonen, 2015; Petri, 2010; Robinson, Gorman, Slimmer, & Yudkowsky, 2010; Yeager, 2005). The improved quality of care can be defined by shorter length of stay (Fewster-Thuente, 2015), increased patient satisfaction (Baggs & Schmitt, 1988; Bronstein, 2003; Dechario-Marino et al., 2001; McInnes et al., 2015; Yeager, 2005), increased family satisfaction (Bronstein, 2003), and improved safety (Lancaster et al., 2015; Robinson et al., 2010; Yeager, 2005). Patients benefit greatly from interprofessional collaboration, making it integral to creating positive change in healthcare outcomes for patients. Additionally, all members of the collaborating team, patient and health care provider, benefit from interprofessional collaboration in a positive manner.

Healthcare professionals also benefit from participating in interprofessional collaboration. Satisfaction in their jobs and better decision making are two commonly cited outcomes in healthcare professionals (Baggs & Schmitt, 1988; Dechario-Marino et al., 2001; Henneman et al., 1995; McInnes et al., 2015; Petri, 2010; Yeager, 2005). Dechario-Marino et al. (2001) created a pretest and posttest action research study to examine the correlation between interprofessional collaboration and satisfaction in shared decision making in nurses (n=87). The researchers distributed measures for participants to self-report their satisfaction of their care decision before and after attending the collaborative initiative intervention. A significant positive correlation between nurses

self-report of collaboration and satisfaction with decision making was found (Dechario-Marino et al., 2001). Healthcare professionals are also viewed as more productive and effective when collaborating with other disciplines (Henneman et al., 1995; Lancaster et al., 2015; McInnes et al., 2015; Petri, 2010; Yeager, 2005). The concept of a collaborative teams can also aid in creating environments that foster less burn out and less turn over due to increased job satisfaction (Failla & Macauley, 2014). It is also cited to improve healthcare professionals delivery and quality of care (Baggs & Schmitt, 1988; Disch, 2001; Fewster-Thuente, 2015; Lernetti et al., 2015; Petri, 2010; Robinson et al., 2010; Yeager, 2005). Lastly, Bronstein (2003) emphasized interprofessional collaboration allows team members to address complex problems in a creative way. These creative solutions can facilitate the learning of new interventions to problems that were possibly difficult to approach from a single discipline's perspective.

Reduction of health care costs are the most widely cited organizational benefits of interprofessional collaboration (Baggs & Schmitt, 1988; Dechario-Marino et al., 2001; Fewster-Thuente, 2015; McInnes et al., 2015; Petri, 2010). Petri (2010) and Henneman et al. (1995) conducted an analysis of the concept of interprofessional collaboration wherein both concluded that the increased efficiency of healthcare professionals as well as decreased patient length of stay are most likely reasons for reduction of costs. There is a growing interest in the amount of money spent on educating interprofessionally and the value of this educational investment (Walsh, Reeves, Maloney, 2014). However there are few original studies looking at the cost value of interprofessional education in healthcare (Walsh & van Soeren, 2012). Mizrahi and Abramson (2000) investigated the views of two healthcare professionals, social workers (n=50) and physicians (n=50), during an

interprofessional education opportunity on an acute care case. Fifty pairs of professionals (n=100) and their views of the collaborative process and outcomes were examined. From these professionals views, Mizrahi and Abramson (2000) concluded that the reduction of cost is integral as it can motivate organizations to enhance the environmental and organizational factors that facilitate interprofessional collaboration. Barsuk, McGaghie, Cohen, O'Leary, and Wayne (2009) created a simulation program consisting of a lecture, step-by-step demonstration, and a simulation based practice with focused feedback for central venous catheter insertion for residents (n=76). The researchers found that after completing this simulation education program there was a significant reduction in infections related to catheter insertion. The researching team projected that the reduction in this incidence would create savings for the organization of over $700,000 annually (Barsuk et al., 2009). Though this research was not directly related to interprofessional simulation, the cost benefits of simulation itself may be linked to a proportionate cost benefit of interprofessional simulation.

Health educators, researchers, health care professionals, health care organizations, and students from across Canada have collaboratively created the National Interprofessional Competency Framework which provides an integrative approach to describing the competencies required for effective interprofessional collaboration (CIHC, 2010). The six competencies in this framework include: 1) interprofessional communication, 2) patient/client/family/community-centered care, 3) role clarification, 4) team functioning, 5) collaborative leadership, and 6) interprofessional conflict resolution. Many of these competencies are in line with the objectives of interprofessional education (IPE) and have been used to evaluate IPE outcomes (J. King et al., 2016; Riesen et al.,

2012). However, this framework only became available to nursing educators in 2010, therefore all prior research was evaluated differently. The framework was created to offer the global community a clear understanding of the characteristics of an ideal collaborative practitioner (CIHC, 2010). By creating this clarity, the CIHC (2010) intended to assist health care professionals to be better able to inform curriculum and professional practice with a lens of interprofessional collaboration.

Multiple researchers believe IPE in undergraduate education can lead to many positive outcomes for nursing professionals (Brashers et al., 2016; Coster et al., 2008; J. King et al., 2016; Morison, Boohan, Jenkins, & Moutray, 2003; Riesen et al., 2012). Outcomes include, improvement in morale for healthcare professionals, reduction in the incidence of communication breakdowns, promotion of mutual understanding between professions, enhancement of professional confidence, facilitation of interprofessional communication (J. King et al., 2016), increased patient safety, greater patient satisfaction, professional efficiency and increased job satisfaction (Delunas & Rouse, 2014). Patient safety is an overarching goal for all health care professionals, and this movement involves embracing an interprofessional model of teamwork and advocating for the use of simulation as a teaching method (Gallo & Smith, 2014). Simulation based training reduces medical errors and enhances clinical outcomes for patients, increasing patient safety (Aggarwal & Darzi, 2011). Reeves et al. (2010) argue that these benefits simply reinforce the idea that IPE should be a prerequisite for students to understand the complexity of professional practice in patient care. Despite the various positive outcomes of IPE, Delunas and Rouse (2014) question the effectiveness of IPE activities and believe there should be more research on the consistency of these outcomes, as no significant

statements have been made throughout the literature. Many researchers also question which delivery method of IPE, for example simulation or learning modules, is the most effective in learning interprofessional collaboration for undergraduate students (Cooper, Spencer-Dawe, & McLean, 2005; Erickson, Brashers, Owen, Marks, & Thomas, 2016; J. King et al., 2016; Morison et al., 2003; Riesen et al., 2012).

Simulation

Interprofessional education can take many different forms in undergraduate education such as lectures (Morison et al., 2003), group workshops (Erickson et al., 2016; Meffe et al., 2012), learning modules (Cooper et al., 2005; Meffe et al., 2012), case studies (Mellor, Cottrell, & Moran, 2013), simulation and interprofessional clinical (Delunas & Rouse, 2014; Khalil, Leversha, & Walker, 2015; Lachmann, Ponzer, Johansson, Benson, & Karlgren, 2013; Meffe et al., 2012; Saunders, Singer, Dugmore, Seaman, & Lake, 2016). Simulation has been widely noted in the literature as one of the most common and effective methods of implementing interprofessional education compared to those listed above (Aggarwal & Darzi, 2011; Bolesta & Chmil, 2014; Brashers et al., 2016; Bridges et al., 2011; Cant & Cooper, 2010; Gibbs, Dietrich, & Dagnan, 2017; Gunnell, Madsen, & Foley, 2016; A. E. King et al., 2013; J. King et al., 2016; Komasawa & Berg, 2016; Lefebvre, Wellman, & Ferry, 2015; Mellor et al., 2013; Murphy & Nimmagadda, 2015; Riesen et al., 2012; Robinson et al., 2010). Simulation has also proven to be effective in altering student's attitudes towards interprofessional collaboration (Bolesta & Chmil, 2014; Coster et al., 2008; Hood et al., 2014; Lefebvre et al., 2015; Morison et al., 2003; Salam et al., 2015).

International Nursing Association for Clinical Simulation and Learning Standards

The International Nursing Association for Clinical Simulation and Learning (INACSL) define simulation as

> "an educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life. Simulation can incorporate one or more modalities to promote, improve, or validate a participants performance" (INACSL Standards Committee, 2016a, p. 44).

Simulation provides students with learning opportunities to develop skills in "assessment, critical thinking, problem-solving, collaboration, and decision making while maintaining patient safety" (Reime et al., 2017, p. 51). Evidence suggests there is a "relationship between simulation, learning effectiveness and changes in student attitudes, beliefs, and confidence" (Lefebvre et al., 2015, p. 9).

The International Nursing Association for Clinical Simulation and Learning (INACSL) have focused on creating and sharing standards and criteria for best practice of simulation (INACSL Standards Committee, 2016c). The committee highlights that purposeful simulation design can facilitate consistent outcomes and strengthen the overall experience of simulation. INACSL Standards Committee (2016c) has created an eleven step criteria necessary to meet the standards of Simulation^{SM}:

1. Perform a needs assessment to gather foundational evidence for the need for a well-designed simulation.
2. Construct measurable objectives.

3. Structure the simulation based on the purpose and theory for the simulation.
4. Design a scenario or case to provide context for the simulation.
5. Uses various fidelity levels to adjust realism.
6. Maintain facilitative approach that is centered around the participant and driven by the objectives, level of knowledge and experience, and the expected outcomes.
7. Begin simulation with pre-briefing.
8. Follow simulation with debriefing.
9. Evaluate participant, facilitators, the simulation, facility and team.
10. Provide participants with preparation materials for simulation.
11. Pilot test simulation prior to full implementation.

The committee strongly argues that ineffective or suboptimal results from a simulation experience is because these standards were not followed correctly. Using purposeful, systematic, and flexible designs to create simulation-based experiences will allow participants to meet the expected learning objectives and outcomes.

As the goal for patient safety continues to be brought to the forefront and evolve, the movement towards interprofessional model and teamwork is embraced (Gallo & Smith, 2014). In the past, most simulation education was profession specific (Failla & Macauley, 2014; Robertson & Bandali, 2009). However, after frameworks such as the CIHC interprofessional collaboration framework, and the INACSL simulation standards were developed in 2010 and 2016 respectively, more simulation activities are interprofessional. Traditionally, nursing students attended simulation that involved only undergraduate nursing students and their educators. However, with the emphasized importance of interprofessional collaboration in education (World Health Organization,

2010), differing professionals have been invited to interprofessional simulations (Failla & Macauley, 2014; Saunders et al., 2016). Research involving the benefits of simulation as a method of learning has primarily focused on the benefits of profession specific simulation (Gunnell et al., 2016). Interprofessional simulation has allowed health professionals to learn the concepts of teamwork and collaboration and develop positive attitudes towards one another before actual patient-care experiences (Gunnell et al., 2016). Using simulation exposes students to a safe environment to mirror the interactions between professionals, without any risk to patient care (Brock et al., 2013; Gunnell et al., 2016). More specifically, interprofessional simulation, or simulation enhanced interprofessional experiences are defined as:

> "simulation based activities in which participants and facilitators from two or more professions are placed into a simulated health care experience in which shared or linked educational goals are pursued, which the individuals involved learn from, about, and with each other to enable effective collaboration and improve health outcomes" (INACSL Standards Committee, 2016a, p. 45).

INACSL Standards Committee (2016b) recognizes that interprofessional education and simulation should overlap to provide a collaborative approach to learning the interprofessional practice competencies. The standards committee has also created criteria to meet the standard for simulation-enhanced interprofessional education (Sim-IPE) to build on those standards and criteria discussed above. The first of their four criteria necessary to meeting the SIM-IPE standards, is to conduct the SIM-IPE based on a theoretical or conceptual framework. Secondly, they suggest using best practice in the design and development of the SIM-IPE. Third, the committee believes the barriers

should be recognized and addressed. Lastly, there must be an appropriate evaluation plan for simulation. INACSL Standards Committee (2016b) describe the potential consequences of not applying these criteria when thinking about SIM-IPE can create ineffective learning opportunities, professional mistrust, ineffective working relationships, unsafe learning environments and a lack of role clarity. Failla and Macauley (2014) provide a detailed concept analysis of interprofessional simulation highlighting positive outcomes of participation in interprofessional simulation. These include: shared learning and decision making skills, cohesive and collaborative team functioning, trust and relationship building and finally improved patient safety.

In a mixed methods study conducted by Reime et al. (2017), undergraduate nursing students (n=123), postgraduate nursing students (n=61) and medical students (n=78), participated in a focus group to discuss topics such as interprofessional simulation, non-technical skills, different roles, and improvements for the future. Students reported that regardless of their role in an interprofessional simulation they learned the importance of interprofessional team collaboration. Students also pointed out that interprofessional simulation provided them with a more realistic simulation experience than profession specific simulation (Reime et al., 2017). Lefebvre et al. (2015) explain that IPE opportunities that involve simulation are highly effective in altering attitudes and beliefs towards working in teams. Interprofessional simulation has been used in a variety of clinical contexts to simulate interprofessional interactions within resuscitation emergency, crisis resource management (Dagnone, McGraw, Pulling, & Patteson, 2008; Jankouskas, Haidet, Hupcey, Kolanowski, & Murray, 2011), disaster management (Atack, Parker, Rocchi, Maher, & Dryden, 2009; Lefebvre et al., 2015),

family conferences (Schmitz, Chipman, Luxenberg, & Beilman, 2008), intensive care delivery (Mah et al., 2009; Meffe et al., 2012), and daily assessments (Salam et al., 2015). The diversity of clinical situations that can be recreated in simulation confirms how flexible and useful simulation can be as a tool for education of students.

Manning, Skiff, Santiago, and Irish (2016) research used simulation as a strategy to bring together nursing (n=43) and social work students (n=21) to increase their interprofessional competence. Nursing and social work students completed the simulation activity together and after were asked to complete a survey to explore how effective the integration of simulation was to the curriculum. Students were also given the opportunity to answer four open ended questions surrounding their experience with interprofessional simulation. Students used this opportunity to describe interprofessional simulation as a way to enhance their interprofessional communication and professional role clarity (Manning et al., 2016). Students describe simulation as a method of understanding their personal practice as it fits within an interprofessional team, as well as a method of increasing their knowledge of interprofessional practice (Hesjedal, Hetland, & Iversen, 2015; Komasawa & Berg, 2016; Saunders et al., 2016). A study conducted by Bolesta and Chmil (2014) had nursing (n=7) and pharmacy students (n=48) participate in a high-fidelity patient simulation. The students were then given the Readiness for Interprofessional Learning Scale (RIPLS), which is used to measure student's self-reported attitude towards interprofessional learning. Students involved in this interprofessional simulation found interprofessional communication was the most important benefit from IPE (Bolesta & Chmil, 2014). Interestingly, the CIHC (2010)

have set up the framework to support the notion that interprofessional communication is an overarching concept for all domains of interprofessional collaboration.

Effective communication

One key factor involved in interprofessional collaboration is effective collaborative communication (CIHC, 2010; Failla & Macauley, 2014; Petri, 2010). Manning et al. (2016) suggest that "all interprofessional team members should acquire knowledge [and] skills in open communication" (p. 556). Interprofessional communication is key in the interprofessional interprofessional collaborative competency framework (CIHC, 2010), making this an important factor to evaluate in interprofessional simulation. CIHC (2010) has defined interprofessional communication as one of the six competency domains of interprofessional collaboration and explain that it is overarching of all other domains.

Legare et al. (2011) emphasizes the importance of communication between professionals throughout the decision making process in order to achieve two things: 1) a common understanding of the problem, and 2) a creative solution to the problem. Dechario-Marino et al. (2001) pretest and posttests study focused on nursing students (n = 87) self-reported satisfaction with shared decision making found that unlike as hypothesized, participating students were not significantly more satisfied with their shared decision making after the IPE activities. However, their findings did not reach statistical significance, limiting the information we know about shared decision making as a result of IPE.

Manning et al. (2016) narrative analysis of nursing students (n=43) and social work students (n=21) experiences through trauma simulation concluded that poor

teamwork and poor communication can result in significant harm to patients when students are in practice settings. Brock et al. (2013) characterize these adverse events with medical errors and negative health outcomes. Failure for effective team communication can also cause a significant negative economic impact on the organization and can compromise patient safety and care (Brock et al., 2013). These include reducing the quality and safety of care, longer patient lengths of stay, and a decrease in efficiency. Interestingly, the work of Brock et al. (2013) and Manning et al. (2016) is amongst the only literature describing the impact a lack of effective interprofessional communication can have on multiple levels of the health care system. Because the lack of communication can cause negative outcome on health care professionals, patients, and employers, there should be an emphasizes the importance effective communication has on interprofessional collaboration and our health care system. Due of the almost synergistic nature of these two factors (Bridges et al., 2011), assessing student retention after learning interprofessional communication can provide valuable knowledge to the conceptualization of interprofessional simulation.

Many different theoretical frameworks can help to explain how to achieve optimal outcomes from interprofessional simulation. The following chapter I will discuss the CIHC (2010) national interprofessional competency framework, Kolb's Experiential Learning Theory (KELT) (Kolb, 1984), and the Person-Environment-Occupation Model (Law et al., 1996) and their relationship with interprofessional simulation.

Chapter 3: Theoretical Framework

The theoretical frameworks guiding my investigation are the Canadian Interprofessional Health Collaborative national interprofessional competency framework (CIHC, 2010), Kolb's Experiential Learning Theory (KELT) (Kolb, 1984), and the Person-Environment-Occupation Model (Law et al., 1996). I chose these three frameworks because they each offer multiple paradigms to apply to the various professions to fit the collaborative nature of interprofessional collaboration and interprofessional simulation. In this chapter I will describe these theories and their concepts will be explained as they pertain to interprofessional simulation-based learning in health care education.

Canadian Interprofessional Competency Framework

The CIHC created a competency framework for interprofessional collaboration to guide interprofessional education and collaborative practice for all professions in a variety of different contexts. The framework is based on an extensive review of literature related to the competencies as well as education. This framework is unique in that it relies on the "ability to integrate knowledge, skills, attitudes, and values to arrive at judgements" (CIHC, 2010, p. 8). As outlined in chapter 2 there are six competency domains that are comprised to create this framework: interprofessional communication, patient/client/family/community-centered care, role clarification, team functioning, collaborative leadership, and interprofessional conflict resolution. The application of these domains are interdependent of each other which provides a "dynamic and flexible foundation for interprofessional learning and practice" (CIHC, 2010, p. 10). The domains of interprofessional communication and patient/client/family/community-centered care

support all the other domains. The four remaining domains are role clarification, team functioning, interprofessional conflict resolution and collaborative leadership. Interprofessional communication and patient/client/family/community-centered care support are relevant in all situations and should be applied with any or all of the other four domains, this can be seen in Figure 1 below.

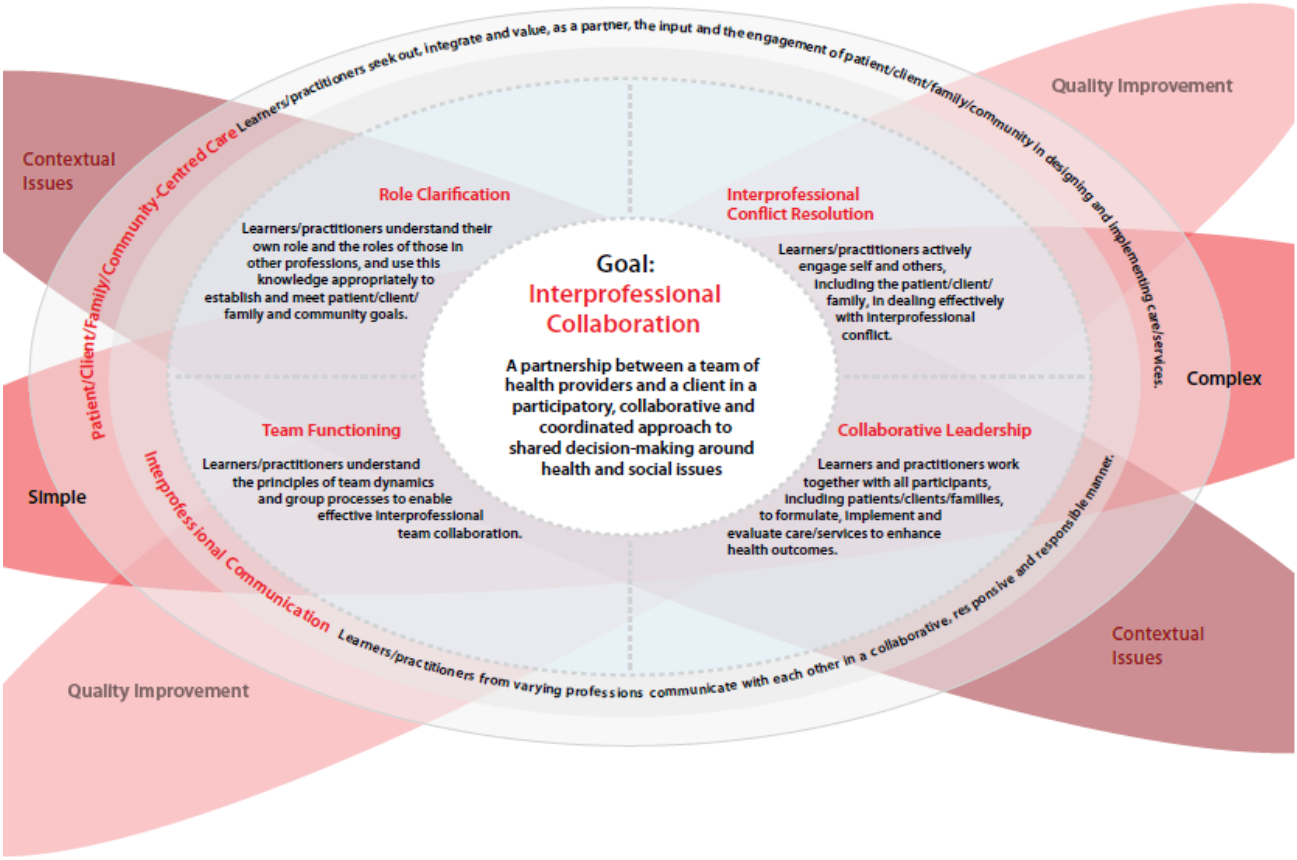


Figure 1. Interprofessional Competency Framework (CIHC, 2010)

Role clarification focuses on when the learner or health care professional understands their own role as well as the roles of others. They can then use this knowledge to establish goals for their patient/client, family and community. Role clarification also involves the ability to clearly articulate their own goals, knowledge, and

skills within their clinical context, as well as understand how other professional identities are unique and have their own goals, knowledge, and skill set.

Patient/Client/Family/Community-Centered care focuses on the interprofessional team integrating the input of the team members as well as the patient/family/client or community in the design and implementation of care. It involves a dyadic partnership between a team of health care providers and the patient, where patients retain control over their care. Patients should have access to the knowledge and skills of their team to make comprehensive care plan decisions together. In this domain, all members of care, health professional or patient, are experts that are critical in creating plans of care.

Team functioning involves “trust, mutual respect, availability, open communication and attentive listening” all to build cooperative relationships (CIHC, 2010, p. 14). Individuals must work as part of teams to determine the outcome of complex situations which require multiple expertise to arrive at the best possible outcome for patient/family/community care.

Collaborative leadership is the domain focusing on the shared leadership in several different complex situations. All health care practitioners and learners should assume shared responsibility and accountability in making complex care decisions. Collaborative leadership divides into two forms of the leadership role: task-orientation and relationship-orientation. Task-oriented leaders help members of the team to achieve a common goal or task, whereas relationship-oriented leaders focus on optimizing the effectiveness of how members work together. Collaborative leadership within this framework also highlights the role of the patient/client as a leader if they wish to observe this role.

Interprofessional communication is one of the over-arching domains expected to be observed within every situation and with all other domains. Interprofessional communication is characteristic of "listening, non-verbal means of communication, negotiating, consulting, interacting, discussing and debating" (CIHC, 2010, p. 16). Respectful authentic interactions, full disclosure, consistency and transparency must be involved in all interactions order to support the other domains of interprofessional collaboration.

The final domain, interprofessional conflict resolution is essential to achieving interprofessional collaboration; it's important all members involved, patient/family, practitioner all are able to handle disagreements and find a solution to optimize care. Conflicts within these interprofessional teams are categorized in this framework as conflicts of goals and conflicts of roles. Interpreting differences of opinion in a healthy and constructive manner is part of being "conflict positive" that is encouraged in interprofessional conflict resolution.

Kolb's Experiential Learning Theory

Kolb's Experiential Learning Theory (KELT) describes three main components of learning: hands-on experience, interaction with the environment, and reflection on the experience. Kolb (1984) proposed six shared characteristics between the three traditions of experiential learning of Dewey, Lewin, and Piaget.

The six characteristics of experiential learning are as follows:

1. Learning as a process.
2. Continuous process learning that is grounded in experience.
3. Conflict resolution between the different modes of learning adaptation.

4. Learning as a holistic adaptation process.
5. Person and environment transactions.
6. Learning as a process of knowledge creation

(Kolb, 1984)

Interprofessional simulation should mimic KELT's framework by using these six characteristics to help support the experiential learning intended to occur during interprofessional simulation.

Kolb (1984) proposed that ideas and concepts are not fixed but rather are constantly changing. These ideas and concepts change through differing experiences, forming and reforming of ideas in the process of learning; the first characteristic of experiential learning is that learning is a process. Kolb (1984) explains that failure to learn from any experience results when individual do not modify their ideas and concepts during the experience.

Kolb (1984) also proposes that experiential learning is a continuous process grounded in experience. Kolb explains that the learner is always learning, growing and adding to their existing knowledge. The role of the educator is then to modify student's existing ideas and introduce new ideas. Learning is meant to occur through this modification of the learner's understanding and be treated as an experience also.

Thirdly, Kolb (1984) explains that conflicts between different adaptive learning modes is required for learning to occur. Learning is a process and Kolb suggests this process requires an ability to move through differing roles through the learning experience. Learners should be able to move from an active role to a more reflective

observing role fluidly and move from analytic objectivity to abstract conceptualization during their learning experience.

Kolb (1984) fourth proposition of experiential learning is a holistic adaptation process, and different ways of learning should be implemented. Learning involves integration of individual's thoughts, beliefs, feelings and perceptions, and should not be limited or constricted to one way of thinking. Learning should be a process that is collective and encompasses all learning and activities across one's life span.

The fifth characteristic of experiential learning, involves the transaction between person and learning environment. Learners can meet their learning objectives by altering the conditions of their environment and adapting to these changing environments. The environment, including who and where, can influence the experience greatly. There are elements of the environment that educators and learners alike can manipulate to optimize learning. Educators need to be aware of how influential the environment can be on learning and ensure the environment of interprofessional simulation is conducive of learning.

The final proposition of experiential learning by Kolb (1984) is knowledge creation through the learning process. An emerging definition is that learning is a process by which experience transformation and transaction creates new knowledge (Kolb, 1984). It can also be existing knowledge that is modified to create operational new knowledge.

When analyzing interprofessional simulation, it has been conceptualized with Kolb's model of experiential learning framework, in hopes that the six propositions are considered, and enhance and support student learning. Initial briefing or preconference, simulation, and debriefing collectively make the common structure for simulation based

teaching. Simulation allows students to respond to and manipulate authentic, real-world situations to enhance their knowledge and critical thinking for future encounters. Simulation is mainly used to create a safe and controlled environment for learning of complex situations without compromising patient safety. Simulation is a special opportunity for learners, it allows students to actively participate in the learning process. Students are encouraged to participate in all three segments of simulation to achieve the highest level of learning from their experience.

Person-Environment-Occupation Model

Person-Environment-Occupation (PEO) frame of reference is an occupational therapy specific model, which examines the dynamic interactions that occur between the individual, the environment, and the occupation of the individual(Metzler & Metz, 2010). The manner in which these three factors interact with one and other determines the occupational performance of an individual. If the component interactions are out of balance, the individual's performance in their occupation will not be optimal. Therefore, PEO facilitates alternative interventions in any of the three given areas to increase performance within the occupation (Law et al., 1996). Occupational therapists and nurses often work with one another in acute care settings, therefore this framework is ideal in it's application to interprofessional simulation and interprofessional collaboration, with varying health professionals working in acute care settings.

The definition of a person in the PEO model, is not limited to only the individual but also encompasses all the roles and experiences that person brings to the situation. Within the health care environment all professionals bring their individual skill sets, professional expertise, attitudes and interests that impact the interactions with clients,

staff, and their environment alike (Metzler & Metz, 2010). The framework defines the environment as the situations and contexts external to the person, which they must respond and react to. The term occupation within the framework describes the tasks, activities, and occupations. Occupation also involves the actions and activities which are meaningful to individuals throughout their lifespan, which can be competed alone or with others, and are influenced by culture, roles and time (Law et al., 1996)

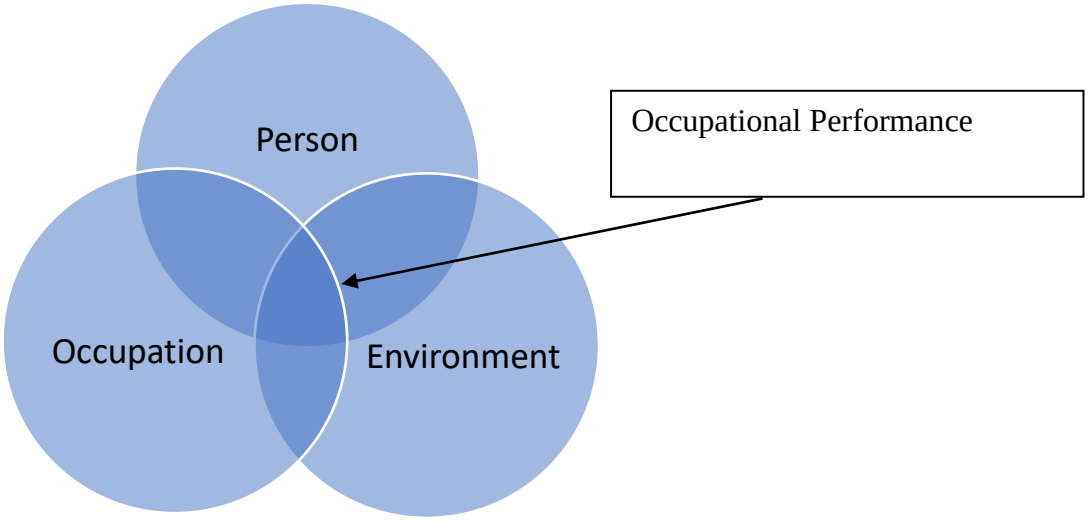


Figure 2.1 The Person Environment Occupation Model

In the PEO model, these three components interact and transact with one another to create optimal occupational performance, as seen in the diagram above in figure 2.1.

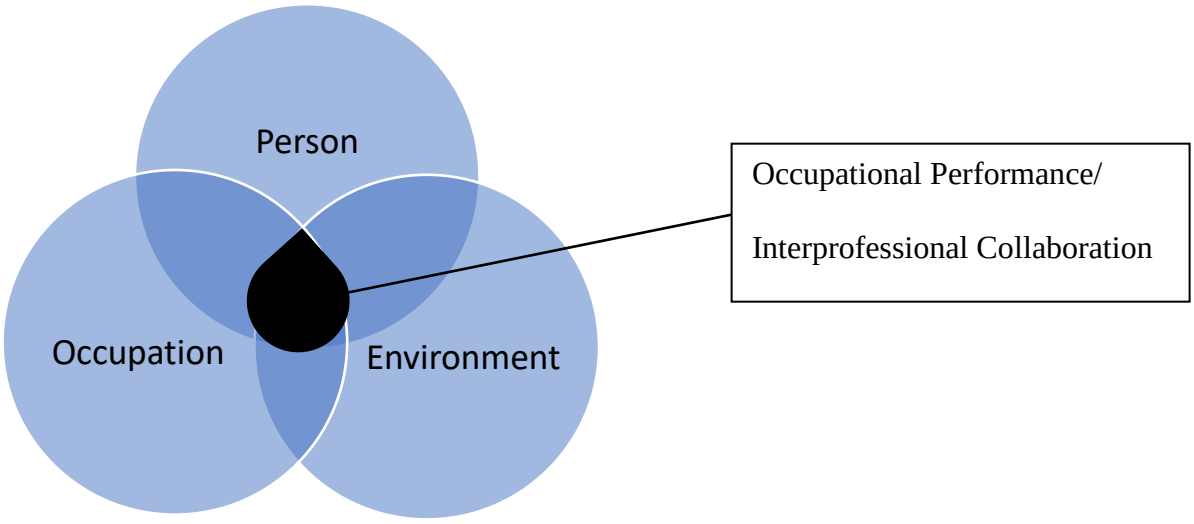


Figure 3.2 An interpretation of the Person Environment Occupation Model.

** The PEO Model has not been modified, this is my interpretation of how it supports and applies to interprofessional simulation.*

In the context of interprofessional simulation, this overlap of occupation performance can be interpreted as interprofessional collaboration. Figure 2.2. is a how I have used the PEO model to guide my thinking to reflect and apply the PEO model in relation to interprofessional collaboration. In order to maximize the occupational performance and interprofessional collaboration there must be a balance and positive interaction between the three components. The PEO Model is a useful framework to understand interprofessional collaboration between health professionals. If the occupational performance of interprofessional collaboration between the professionals is minimal, the overlap is small, a change in one or more of the components must be made. Likely, the personal and environmental factors are dynamic and flexible and can influence the occupational performance. Currently, nursing students are not given optimal opportunity to interact with other health care professionals within their nursing education, interprofessional simulation provides the environment for interprofessional

collaboration to be practiced and observed (Law et al., 1996). The PEO Model can be conceptualized and used to understand the dynamic transactions made within interprofessional simulation between health care professionals to facilitate the goal of interprofessional collaboration.

In the next chapter I will identify how I used these theoretical frameworks to analyze the interprofessional simulation and make sense of the quantitative results gathered from this study. INACSL standards, Kolb's theory of experiential learning and the person-environment-occupation model will be used to understand how to inform interprofessional simulation to generate optimal outcomes, how interprofessional simulation is an effective teaching modality, and to enhance the interactions between all elements to achieve the best learning outcomes.

Chapter 4: Methodology

In this chapter, I will outline in detail the methodological approach I chose to collect and analyze the study findings. Specifically, I will describe the study design, sample, setting, variables, measurements, data analysis methods, and ethical considerations.

Design

For this study I used a quasi-experimental, longitudinal, one group pretest and posttest design to understand the dependent variable of nursing students' self-reported level of competence with interprofessional collaborative competencies. The independent variable studied was the student experience with trauma interprofessional simulation.

In keeping with a pretest and posttest design, I collected data at three different data collection points: (1) prior to attending the trauma interprofessional simulation, (2) immediately after attending the trauma interprofessional simulation, and (3) eight weeks post intervention (after the 12 week practicum was complete). Data collection occurred in the spring and summer 2017 semester from second-year students regarding their experience at the trauma interprofessional simulation.

Simulation Learning Experience

The trauma simulation at the University of Calgary took place at the Undergraduate Medical Education Center at the Cumming School of Medicine simulation labs. The organizers at the University of Calgary created the interprofessional simulation learning activity using the criteria outlined by INACSL. It was used for the purpose of using an global simulation framework to the conceptualization the learning activity alongside a method to addressing potential barriers to designing and implementing

interprofessional simulation. Prior to the learning experience, the nursing 389 course coordinator sent a "student primer" (Appendix A) to all students prior to the simulation. The student primer included an outline of the interprofessional collaboration objectives in relation to the theoretical framework used to create the simulation, and each of the profession specific objectives, such as nursing learning objectives. Its purpose was to provide students with a primary and secondary survey outline to ensure they understand the steps they need to take to complete a comprehensive assessment within this simulation as well as understand their team goals and expectations.

The simulation is composed of three phases; pre-briefing, simulation and debriefing, along with a large trauma simulation demonstration by an interprofessional team and takes place over four hours. During the pre-briefing phase of the simulation, the nursing students met their interprofessional student group and familiarized themselves with their team. They also reviewed the accompanying trauma case with their team to ask questions to one and other as well as their simulation preceptors. The following case study information was given to students regarding the simulation: We have just been informed that a bus has just rolled over on the ramp between 16th and University Ave. The passengers with life-threatening injuries have been transported to an Alberta Health Services emergency department. We will need your help in assessing and treating the passengers with serious injuries with EMS does not have the resources to assess at this time. 5 EMS crews will be arriving to our location in the next 15 minutes. They will need to know whether your patient needs to be transported to the hospital at that time or if they are able to wait an additional 30 minutes prior to being transported. During the simulation, students were to engage in active learning by participating in the simulation

with the standardized patient. Students were to engage with the standardized patient reporting injuries and to do an assessment and practice team collaboration. Interprofessional co-debriefers conducted debriefings after the simulation for students in their interprofessional groups. Debriefing included questions pertaining to each domain of the Canadian Health Interprofessional Practice framework. It consisted of constructive reflection and feedback of the learner's personal actions and feelings, identifying what went well and what did not, and listening to other team members feedback. The students then all attended a trauma simulation demonstration lead by the organizers of the simulation and include various professionals as well as standardized patients. The simulation demonstration provided students with the opportunity to analyze ideal interprofessional collaboration in the given scenario. Students were then asked to complete another simulation with a similar scenario but with a different standardized patient and a second standardized patient acting as a family member. By doing this, students were able to witness ideal interprofessional collaboration through the demonstration and then the opportunity to practice ideal interprofessional collaboration during this second simulation activity. They were also given the opportunity to de-brief this second simulation activity with their co-facilitators.

Sample

The sample and data collection occurred at the University of Calgary in Calgary, Alberta, Canada. I collected data in the learning and simulation laboratories at the University of Calgary's Foothills Medical Campus during the Trauma Day interprofessional trauma simulation. I used a convenience sample to recruit all second year, term six undergraduate nursing students (N=110). Inclusion criteria required that

nursing students were in enrolled in Nursing 389, Integrated Nursing Roles and Practice II: Learning, Practice and Scholarship in the Practicum Setting. Nursing 389 includes a practicum over 12-weeks focusing on optimizing family health and function while mitigating health risks to family members. This course was offered in the second year of their program and consisted of 12-weeks in a long term care community setting. Students are taught basic clinical nursing skills and learning interprofessional principles throughout the course. A combination of theory and practice is used throughout the class to develop the skills and competencies in nursing families in transitional periods across the lifespan.

The nursing students attend Trauma Day as part of their curriculum requirements at week four, which involves a trauma interprofessional simulation and an interprofessional learning opportunity. In order to complete the course, nursing students were to complete a twelve-week practicum in a health care setting focusing on adult health and fundamentals of nursing with a preceptor for a designated 346 hours. Exclusion criteria included any student in nursing 389 who did not participate in the trauma interprofessional simulation offered. All eligible students were invited to participate and complete the questionnaire electronically and in person.

Using G*Power, I conducted a statistical power calculation with the biostatistician in the nursing graduate research office. With power set at .80 and probability (alpha) set at .05, the statistical program determined a repeated measures ANOVA test will detect a small to medium effect size (0.15) between before and after simulation for a minimum sample size of 73 participants. With the power set at .80 and probability (alpha) set at 0.05, a repeated measures ANOVA test will detect a small size

effect (0.10) between the results before and after simulation for a minimum of 163 participants. I anticipated that were would be some difficulty obtaining participants considering the longitudinal nature of the study.

Procedures

Ethical Considerations

The study was approved by the Associate Dean of Undergraduate Nursing at the University of Calgary (Appendix B) and subsequently approved by the University of Calgary Conjoint Health Research Ethics Board (Appendix C). Permission to use the ICCAS tool was obtained from the creators of the tool (Appendix D). Following the completion of the research study, the data will be kept for five years and then destroyed as required by the Conjoint Health Research Ethics Board.

To ensure anonymity and privacy was maintained I provided a consent form and information sheet to all participants regardless of electronic and paper submissions (Appendix E). A statement on this form clearly indicated that by completing the survey, participants were giving their implied consent for myself, the primary researcher, to use all obtained information for my thesis project, presentations, and publications.

I received the survey data for analysis without any identifying information. The data was shared in aggregated form with the supervisory committee members. To maintain continued confidentiality, all data is password protected on a universal serial bus drive (USB) and can only be accessed by the primary research using a password.

Recruitment

I recruited students at the beginning of the interprofessional simulation, directly after, and after their practicum was completed. I offered students a brief presentation with

a synopsis of the research at all three data collection points for recruitment. The presentation involved clarification of the parameters of the study and participation, as well as answers to any questions. In collaboration with the nursing practice course coordinator, I emailed all students in nursing 389 prior to the simulation with details about the research as well as an electronic pretest survey for completion. The researching team also handed out paper surveys alongside the same information letter with details about the study and participation (Appendix E). A consent form was also included with a statement clearly indicating that by completing the survey, participants have given implied consent to use all information obtained for this research project, presentations, and publications. Participation in the research was voluntary and had no impact on students' completion of the trauma simulation or nursing 389.

Participants created anonymized codes for themselves throughout the surveys, therefore no identifying information will be revealed during publication. This allowed pairing of individual's responses throughout multiple data collection points, while maintaining their anonymity. I inputted all paper surveys manually into Lime Survey© and paper surveys were then kept in a locked area for the principle investigators to access the data. Responses were taken from the Lime Survey© software and subsequently inputted into Statistical Package for the Social Science (SPSS©) 24.0 for analysis.

Data Collection

The researchers collected data at three different time points: (1) prior to students participating in the simulation, (2) immediately after completion of simulation activity, and (3) after a 12-week practicum (8 weeks post intervention) (Table 1). Data was

collected using one tool, the interprofessional collaborative competency attainment survey (ICCAS; Appendix F**)**.

Table 1. Data collection timetable

First data collection point *Pretest* June 27th 2017 NUR389 Week 4	**Trauma day – interprofessional simulation** *Intervention* June 27th 2017 NUR389 Week 4	**Second data collection point** *Posttest 1* June 27th 2017 NUR389 Week 4	**Practicum** ***Intervention*** June 2017 – August 2017 NUR389 Weeks 5-12	**Third data collection point** *Posttest 2* August 2017 NUR389 Week 12

Instruments

The questionnaire/survey is composed of two different components:

Demographic tool. To create a randomized anonymous code for the researcher to pair pretest and posttest to one and other, participants were asked to generate a code using a combination of a family member's name and a significant date. **The coding instructions were provided in the Interprofessional Collaborative Competency Attainment Surveys (ICCAS).**

Interprofessional collaborative competency attainment survey. The ICCAS is based on a set of interprofessional care competencies created by the Canadian Interprofessional Health Collaborative in 2010 (Archibald, Trumpower, & MacDonald, 2014). ICCAS is a 20-item self-assessment tool that covers aspects of trainee roles on a team and the use of interprofessional practice team approaches to patient care. The tool has a pretest and posttest design, and in total included 40 items. The tool is meant to

measure participant's self-reported skills in communication, collaboration, roles and responsibilities, collaborative patient-family-centered approach, conflict management and team functioning. The ICCAS seemed most appropriate to evaluate the CIHC interprofessional collaborative competencies as it was created based on the CIHC interprofessional collaborative competencies. The ICCAS has also been used to evaluate interprofessional simulation activities in undergraduate education (J. King et al., 2016; Lauckner, Nickerson Rak, Hickey, Isenor, & Godden-Webser, 2018; O'Rourke & Brown, 2017; Schwindt et al., 2017). Horsley et al. (2018) integrative review of interprofessional simulation reported many of the studies related to interprofessional simulation outcomes collected data related to student's attitudes and confidence towards interprofessional collaboration after interprofessional education. Horsley et al. (2018) mention the lack of evaluation of learning of interprofessional collaborative competencies warranting future research to focus more on the students learning outcomes rather than their attitudes and readiness to collaborate. Barsuk et al. (2009) believe that though a change in attitude and self-confidence of interprofessional collaboration is a positive outcome, this improvement does not predict an improvement in clinical outcomes or performance ability, therefore is not the best indicator of a clinical improvement in interprofessional collaborative competency skills. The ICCAS evaluates student learning of the CIHC interprofessional collaborative competencies directly, allowing researchers a better understanding of the outcomes and value of interprofessional education. It can be used to demonstrate the effectiveness of interprofessional education intervention programs and allow individuals to reflect on how their training influences their interprofessional collaborative competencies. It is based on a set of interprofessional care competencies developed in

English and has gone through Pan-Canadian Delphi process (Archibald et al., 2014). These interprofessional care competencies come from the Canadian Interprofessional Health Collaborative Competency Framework (Archibald et al., 2014; CIHC, 2010). Essentially, the ICCAS learners are required to reflect and self-assess their change in level of competency following completion of an interprofessional education (IPE) intervention (Archibald et al., 2014). The scale is multi-dimensional and has six sub scales: (1) communication, (2) collaboration, (3) roles and responsibilities, (4) collaborative patient/family-centered approach, (5) conflict management/resolution, and (6) team functioning. The survey uses a 7-point Likert scale with response categories ranging from 1 (strongly disagree) to 7 (strongly agree). The authors used item level scored for some analysis and averaged item scored by factor for other analyses, however no specific scoring procedures were described. The theoretical range of scores is from 0-140, with higher scores indicating more use and applicability of that interprofessional competency. In this research it will also be interpreted to determine the effectiveness of interprofessional simulation as an interprofessional education intervention. The internal consistency of the ICCAS was assessed using Cronbach's alpha coefficients and item-total correlations. Cronbach's alpha co-efficient in the pre-program were calculated for two subsets, comprising the items loading on factor 1 and factor 2 respectively. Cronbach's alpha coefficients were 0.961 for items loading on factor 1 and 0.94 for items loading on factor 2. For the post program assessment, the Cronbach's alpha is 0.98 for all items on the scale. These high values indicated a very good internal consistency, deleting any pre-program or post program items would not increase the Cronbach's alpha therefore all items were retained (Archibald et al., 2014). Recently, Schmitz et al. (2017)

completed a study to investigate the validation of the ICCAS tool. The tool was administered in a pre- and post-test design. This study provided further content validity of the tool, it confirmed that there is a relationship between ICCAS items and the measure of change in interprofessional collaborative ability. Schmitz et al. (2017) conclude the ICCAS is an appropriate tool to assess interprofessional collaborative behaviours however, more research needs to be done to further examine the validity of the tool in terms of the relationship between self-assessed scores and external measures of interprofessional collaborative behaviours.

Data Analysis

I transferred all completed paper surveys into Lime Survey© to receive an electronic receipt of each survey exportable to SPSS©. I used SPSS© version 24.0 released in 2016 by IBM™ for data analysis. To analyze the pretest and posttests, I used descriptive statistics, mean, standard deviation, range and frequency. I used a repeated measures ANOVA to describe the differences between the pretest and posttest (1 and 2) results. Normalacy testing was completed for each of the variables to determine the appropriateness of using a repeated measures ANOVA test for analysis. The results from the repeated measures ANOVA will help answer the question of whether there are differences within self-reported competency levels over the course of time. A p value of 0.05 was used for data analysis to determine statistical significance (Polit & Beck, 2017). The following chapter will highlight the results from the repeated measures ANOVA test used to determine the difference from pretest to posttest 1, and then to posttest 2.

Chapter 5: Results

In this chapter, I discuss the results of the study, including a description of the participant characteristics, and student self-report of their competence of interprofessional collaborative competencies. I used repeated measures ANOVA tests to calculate and detect the differences in student's experiences prior to interprofessional simulation, after interprofessional simulation, and after completion of their practicum.

Characteristics of the Participants

The number of second year students at the University of Calgary in the undergraduate nursing program at the time of data collection was 110 students. The University of Calgary sent the questionnaire via the student learning management system. After the first email questionnaire was sent out, no responses were received. Prior to the commencement of the simulation students were given a paper copy of the questionnaire by the researcher as well as a verbal explanation of the study and parameters of participation. At this time 75 students responded. Upon completion of the simulation exercise students were provided the first posttest, at this time 79 students responded. Eight weeks after the simulation, after students had completed their entire twelve week nursing 389 practicum, students were again provided with a paper copy of the questionnaire, at this time 80 students responded. Of the completed surveys, those students who did not complete the survey in its entirety were excluded, alongside those surveys identifications that did not complete all three points of data collection. The final number of completed questionnaires across all three data collection points was 63 student responses (Figure 3).

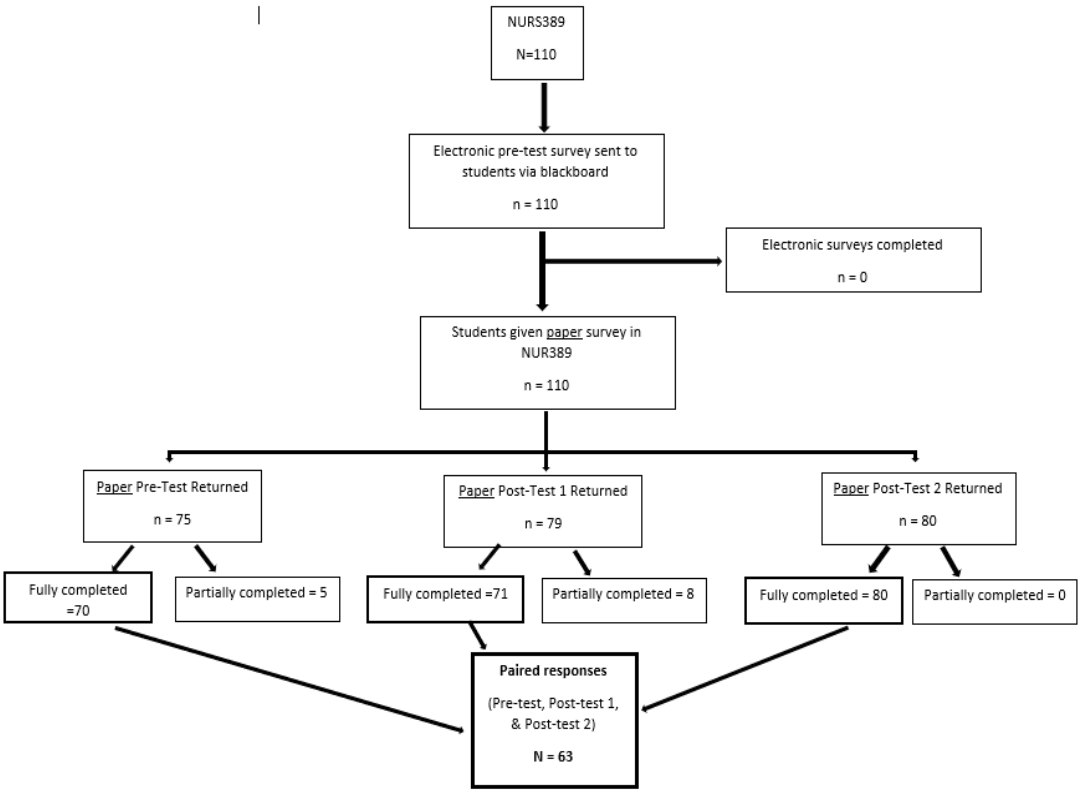


Figure 4. Responses to ICCAS

The response rate prior to removing incomplete surveys for pretest was 68% (n=75), for posttest 1 was 72% (n=79) and for pretest 2 was 73% (n=80). After removing all surveys that were not completed in their entirety across all three time points the response rates are as follows: pretest 64% (n=70), posttest 1 65% (n=71), and posttest 2 73% (n=80). Finally, surveys that did not have survey identifications to match across all three data points were removed, the final number of paired responses was n=63 (57%).

Normality testing was completed to understand the distribution of the scores, as well as decide on whether or not a repeated measures ANOVA parametric test was appropriate to run on the data. Table 1 describes the skewness ratio and kurtosis ratio calculated to describe the distribution of the variables. The parameters to be considered

normally distributed is within +/- 1.96. The pretest was normally distributed, with a skewness ratio of -.51 and a kurtosis ratio of -.24. Posttest 1 was not normally distributed, with a skewness ratio of -2.82 and a kurtosis ratio of .48. Posttest 2 was not normally distributed, with a skewness ratio of -2.99 and a kurtosis ratio of -.63. Each of the subsections of the survey were also tested for normal distribution, six of these were normally distributed, while the remaining 12 were not normally distributed as seen in Table 1.

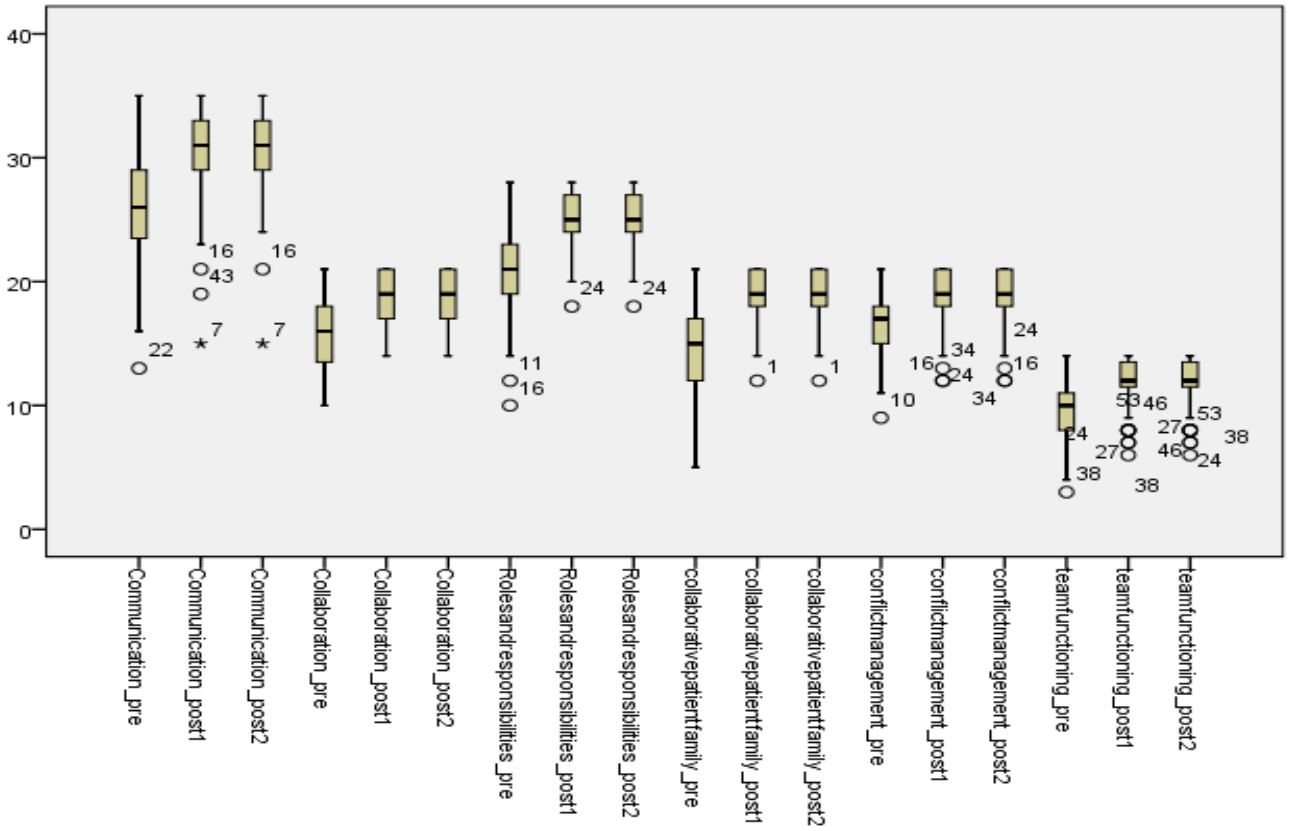
Table 1. Distribution (n= 63)

Variable	Skewness Ratio	Kurtosis Ratio	Distribution
Pretest	-.51	-.24	Normal
Posttest 1	-2.85	.45	Negative skew
Posttest 2	-2.99	-.63	Negative skew
Communication Pre	-1.07	1.47	Normal
Communication PT1	-4.79	4.81	Negative skew
Communication PT2	-4.94	6.32	Negative skew
Collaboration Pre	-.35	-1.61	Normal
Collaboration PT1	-1.33	-1.71	Normal
Collaboration PT2	-1.33	-1.71	Normal
Roles & responsibilities Pre	-2.14	.86	Negative skew
Roles & responsibilities PT1	-2.75	.87	Negative skew
Roles & responsibilities PT2	-2.75	.87	Negative skew
Collaborative family/pt. centered care Pre	-2.28	.59	Negative skew
Collaborative family/pt. centered care PT1	-2.69	.48	Negative skew
Collaborative family/pt. centered care PT2	-2.73	.52	Negative skew

Conflict Management Pre	-1.24	-1.30	Normal
Conflict Management PT1	-4.87	3.84	Negative skew
Conflict Management PT2	-4.87	3.84	Negative skew
Team Functioning Pre	-.92	.18	Normal
Team Functioning PT1	-4.12	1.53	Negative skew
Team Functioning PT2	-4.12	1.53	Negative skew

** Skewness and Kurtosis limits +/- 1.96 to be normally distributed
Pre=pretest, PT1=posttest 1, PT2=posttest 2

Graph 1. Box Plot for Outliers (n=63)



Although not all the variables were normally distributed, we conducted an analysis to determine if outliers were present within our data and eliminated them to then recheck the normalcy. The box plot in Graph 1 describes the outliers present within the

data set, values that are starred on the box plot represent outliers. There was only one case in which the outlier was recommended to be removed by SPSS. We removed this case and ran descriptive statistics again to determine if there were any changes to the distribution of the variables. Please see Table 2. After omitting the outlier, the final number of paired responses used in the analyses was n=62 (56%).

Table 2. Distribution after outliers have been removed from data set(n=62)

Variable	Skewness Ratio	Kurtosis Ratio	Distribution
Pretest	-.47	-.13	Normal
Posttest 1	-2.95	.85	Negative skew
Posttest 2	-3.15	1.06	Negative skew
Communication Pre	-0.42	1.63	Normal
Communication PT1	-3.39	1.93	Negative skew
Communication PT2	-2.51	.67	Negative skew
Collaboration Pre	-.25	-1.61	Normal
Collaboration PT1	-1.45	-1.58	Normal
Collaboration PT2	-1.45	-1.58	Normal
Roles & responsibilities Pre	-2.04	.83	Negative skew
Roles & responsibilities PT1	-2.81	.87	Negative skew
Roles & responsibilities PT2	-2.81	.87	Negative skew
Collaborative family/pt. centered care Pre	-2.19	.57	Negative skew
Collaborative family/pt. centered care PT1	-2.85	.65	Negative skew
Collaborative family/pt. centered care PT2	-2.89	.77	Negative skew
Conflict Management Pre	-1.25	.035	Normal
Conflict Management PT1	-4.79	3.67	Negative skew

Conflict Management PT2	-4.79	3.67	Negative skew
Team Functioning Pre	-.82	.23	Normal
Team Functioning PT1	-4.14	1.53	Negative skew
Team Functioning PT2	-4.14	1.53	Negative skew

** Skewness and Kurtosis limits +/- 1.96 to be normally distributed
Pre=pretest, PT1=posttest 1, PT2=posttest 2

After removing the outlier from the data set, the pretest is the sole time points that is normally distributed. We then checked the mean and median to determine the difference between the values. The difference between the values of the mean and median was fairly small, which can be seen in Table 4. Because the difference between parametric and nonparametric tests is that parametric tests look at the differences between means and nonparametric tests look at the differences between medians and these two values are similar, the researching team has decided to continue this analysis with the parametric test of a repeated measures ANOVA for better interpretability of the results. Table 4. describes the average scores for each of the three survey time points, the possible total score for the overall survey is 140. Pretest average was $M_{Pretest1}$=103.23, there was an increase of 14% in the average score from pretest to posttest 1, $M_{Posttest1}$=123.94. From posttest 1 to posttest 2, there was an increase of 0.2% in the mean scores, $M_{Posttest2}$=124.18.It also describes the average score in each subsection of the survey, which is separated by interprofessional collaborative competencies.

Table 4. Average overall scores (n=62)

Variable	mean (SD)	median (min-max)
Pretest	103.23 (14.54)	103 (69-140)
Posttest 1	123.94 (11.71)	125 (92-140)

Posttest 2	124.18 (11.65)	125.5 (92-140)
Communication Pre	26.03 (4.13)	25.5 (13-35)
Communication PT1	30.54 (3.57)	31 (19-35)
Communication PT2	30.76 (3.22)	31 (21-35)
Collaboration Pre	15.74 (3.09)	16 (10-21)
Collaboration PT1	18.61 (2.09)	19 (14-21)
Collaboration PT2	18.61 (2.09)	19 (14-21)
Roles & responsibilities Pre	20.85 (3.65)	21 (10-28)
Roles & responsibilities PT1	25.23 (2.38)	25 (18-28)
Roles & responsibilities PT2	25.23 (2.38)	25 (18-28)
Collaborative family/pt. centered care Pre	14.63 (3.44)	15 (5-21)
Collaborative family/pt. centered care PT1	18.66 (2.17)	19 (12-21)
Collaborative family/pt. centered care PT2	18.69 (2.15)	19 (12-21)
Conflict Management Pre	16.65 (2.75)	17 (9-21)
Conflict Management PT1	18.90 (2.22)	19 (12-21)
Conflict Management PT2	18.90 (2.20)	19 (12-21)
Team Functioning Pre	9.32 (2.47)	9.5 (3-14)
Team Functioning PT1	11.98 (2.05)	12 (6-14)
Team Functioning PT2	11.98 (2.05)	12 (6-14)

Pre=pretest, PT1=posttest 1, PT2=posttest 2

A repeated measures ANOVA test was used to compare the means of the nursing students interprofessional collaborative competencies prior to the simulation to after the simulation and after the practicum for nursing 389 was complete (Table 4). $M_{Pretest1}$= 103.23 (SD=14.54) and $M_{Posttest1}$ =123.94 (SD =11.71). The pairwise comparison charts

shows that there is a significant difference (p=.000) between the pretest and posttest 1, the mean difference is -20.71. There is a 14% increase in students self reported competency of interprofessional collaborative competencies from pretest to posttest 1.

Table 4. Repeated Measures ANOVA (n=62)

Variable	mean (SD)	mean difference	p-value
Pretest	103.23 (14.54)	-20.71*	.00
Posttest 1	123.94 (11.71)	-.24**	.20
Posttest 2	124.18 (11.65)		
Communication Pre	26.03 (4.13)	-4.51*	.00
Communication PT1	30.54 (3.57)	-.21**	.32
Communication PT2	30.76 (3.22)		
Collaboration Pre	15.74 (3.09)	-2.87*	.00
Collaboration PT1	18.61 (2.09)	.00**	.
Collaboration PT2	18.61 (2.09)		
Roles & responsibilities Pre	20.85 (3.65)	-4.37*	.00
Roles & responsibilities PT1	25.23 (2.38)	.00**	.
Roles & responsibilities PT2	25.23 (2.38)		
Collaborative family/pt. centered care Pre	14.63 (3.44)	-4.03*	.00
Collaborative family/pt. centered care PT1	18.66 (2.17)	-.03**	.48
Collaborative family/pt. centered care PT2	18.69 (2.15)		
Conflict Management Pre	16.65 (2.75)	-2.26*	.00
Conflict Management PT1	18.90 (2.22)	.00**	.
Conflict Management PT2	18.90 (2.20)		
Team Functioning Pre	9.32 (2.47)	-2.66*	.00

Team Functioning PT1	11.98 (2.05)	.00**	.
Team Functioning PT2	11.98 (2.05)		

* Mean difference values are from time point 1 (pretest) to time point 2 (posttest 1)
** Mean difference values are from time point 2 (posttest 1) to time point 3 (posttest 2)
Pre=pretest, PT1=posttest 1, PT2=posttest 2

The mean difference between pretest and posttest 1 for overall scores was -20.71, p=.00; the mean difference between posttest 1 and posttest 2 for overall scores was -.24, p=.20. The mean difference between the pretest and posttest 1 for the communication competency was -4.51, p=.00. The mean difference between posttest 1 and posttest 2 for the communication competency was -.21, p=.32. The mean difference between pretest and posttest 1 for collaboration competency was -2.87, p=.00. The mean difference between posttest 1 and posttest 2 for the collaboration competency was .00, there was no p-value, indicating no significant changes. The mean difference between pretest and posttest 1 for the roles and responsibilities competency was -4.37, p=.00. The mean difference between posttest 1 and posttest 2 for the roles and responsibilities competency was .00, there was no p-value, indicating no significant change. The mean difference between pretest and posttest 1 for the collaborative family and patient centered care competency was -4.03, p=.00. The mean difference between posttest 1 and posttest 2 for the collaborative family and patient centered care competency was -.03, p=.48. The mean difference between the pretest and posttest 1 for the conflict management competency is -2.26, p=.00. The mean difference between posttest 1 and posttest 2 for the conflict management competency is .00, there was no p-value, indicating there was no significant change. The mean difference between pretest and posttest 1 for the team functioning competency was -2.66, p=.00. The mean difference between posttest 1 and posttest 2 for

the team functioning competency was .00, there was no p-value, indicating no significant changes.

Though the results from this study were not able to confirm a large increase in self-reported interprofessional collaborative competency after the simulation (time point 2) and practicum were complete (time point 3), the slight increase is in all areas of interprofessional collaborative competence confirms the knowledge learned from simulation was retained. There is a growth of knowledge in interprofessional collaboration competencies over time that I believe comes from participating in an interprofessional simulation.

In the next chapter, I will highlight these significant findings, alongside an analysis of these findings in relation to the theoretical framework. I will also discuss the recommendations for future practice and research.

Chapter 6: Discussion

The small increase in self reported interprofessional collaborative competence in nursing students after simulation was complete can be attributed to exposure to interprofessional collaboration, which for many nursing students may have been the first time. Even though students may have had limited exposure to interprofessional education prior to this experience, students still benefited from the simulation. Kyrkjebo et al. (2006) mentioned that exposure itself to interprofessional simulation allowed students to self-report improvement in their interprofessional collaborative competencies. Further supporting the consideration that IPE should be exposed to health care students earlier in their undergraduate career. Currently, this interprofessional simulation is offered to undergraduate students in term four of eight terms and do not get the opportunity to attend another interprofessional simulation. They do attend another simulation experience in term eight, however not in an interprofessional learning environment. My recommendation is to introduce interprofessional simulation activities in terms one, two, and three during nursing student undergraduate careers to help increase the interprofessional collaborative competence. More frequent simulation activities should also be done for students, it is a great way to enhance learning and provide students with a safe environment to practice and make mistakes to learn from (Kyrkjebo et al., 2006). Studies have recommended repeated use of simulation itself is beneficial to healthcare professionals, patients, and healthcare organizations, (Dagnone et al., 2008; Gallo & Smith, 2014; Gunnell et al., 2016; Komasawa & Berg, 2016) therefore there should be similar outcomes of repeated interprofessional simulation. Exposure to interprofessional simulation increases interprofessional collaborative competence, therefore repeated

exposure will only help to increase these outcomes of learning. More simulation activities, possibly on a smaller scale, such as with role-play rather than standardized patients, should be done throughout the practicum to support students to practice and learn interprofessional collaborative competencies. More simulation experience will also allow students to repeatedly evaluate their learning of interprofessional collaborative competencies over time. Continual check-in of their learning will allow health care students to also identify the gaps in their knowledge thereby fostering accountability and professionalism in their practice. Interprofessional simulation is an effective method of delivery of interprofessional education and we should advocate for more interprofessional simulation opportunities for nursing students throughout their undergraduate education.

It was interesting that there was a small increase in self-reported competence in interprofessional collaboration competencies from students after their 12 – week clinical practicum. In other words, the practicum was effective in students retaining the knowledge they gained from attending interprofessional simulation. However, there was no relevant increase to the knowledge students had already gained, this can be due to multiple reasons. First, students self-reported competence of interprofessional collaborative competencies at posttest 1 was relatively high, 103.57. The largest value that could be reported was 140, therefore the room for student to identify their growth was not as large. The scale only allowed students to rate their competence from 1-7, at posttest 2, students may not have remembered their previous entry and reported similar levels of competence, even though they may have felt their practicum experiences increased their knowledge and understanding of interprofessional collaboration. There may not have been enough options within this tool for students to appropriately gauge

their learning, and because they were reporting high levels of competence already, they could not report any higher. Second, students may not have had enough resources to support the learning of interprofessional collaborative competencies throughout their practicum. For example, the student primer (Appendix A) was given to students prior to the interprofessional simulation to guide students learning goals specific to the interprofessional collaborative framework and the simulation. However, simulation resources were not available during the practicum portion of nursing 389. The absence of predetermined goals for learning during practicum related to interprofessional collaboration may be a reason for the lack of increase in self-reported interprofessional collaborative competencies. Atack et al. (2009) report that students often overestimate their interprofessional skills at the start of an interprofessional education activity or course and only become aware and recognize how much they had to learn after the IPE is complete.

To increase student learning during clinical practicum and enhance retention of interprofessional collaborative competencies over time, there needs to be more resources to (INACSL Standards Committee, 2016c) engage interprofessional learning. For example, outlining interprofessional goals that relate to student's practicum will allow them to identify and evaluate their learning throughout their practicum. INACSL outlines standards for simulation activities in order for them to be optimal for student learning, some of these recommendations should adapted for the practicum setting and implemented to enhance learning. INACSL recommends that interprofessional simulation and interprofessional education should overlap to enhance a collaborative approach to learning interprofessional collaboration competencies and optimize learning (INACSL

Standards Committee, 2016c). This further supports my recommendation to outline learning goals related to interprofessional collaboration throughout student practicums to provide them with interprofessional education simultaneously. Brashers et al. (2016) also recommends multiple interprofessional educational opportunities should be given to students during their academic career to increase their competencies. Stakeholders at the various health care settings also need to be engaged by the educational institutions to determine these goals and expectations of interprofessional learning for all health care professionals involved. By having all stakeholders buy-in we can foster strong participant engagement in interprofessional collaboration. Recommendations to add interprofessional goals to the nursing 389 course outline, as well as weekly learning goals during practicum will provide students with a means to learn and evaluate their learning of interprofessional collaborative competencies. The nature of nursing student's practicum was in silos, hindering nursing student's opportunity to exhibit interprofessional collaborative competencies in their placements. There has been growing literature regarding interprofessional clinical placement, in which students of differing disciplines complete their placements together (Anderson, Cant, & Hood, 2014). Students indicated that interprofessional clinical was valuable for their learning, as it provided a more authentic and high quality learning environment (Anderson et al., 2014). There should be more opportunity for students of different professions to complete their clinical placements together to provide students with the opportunity of growth in interprofessional collaborative competencies.

Theoretical Frameworks

International Nursing Association of Clinical Simulation and Learning (INACSL)

As mentioned before, the organizers of the simulation involved in Trauma Day's interprofessional education activity used the INACSL standards to create the simulation. This study assists in confirming the use of purposeful design to create simulation learning activities, such as applying the INACSL criteria to interprofessional simulation does in fact help to optimize the learning of interprofessional collaborative competencies. Using the INACSL criteria to create interprofessional simulation will create a standardized process to conceptualizing and implementing interprofessional simulation. By streamlining the expectations and evaluation of interprofessional simulation we can assist in ensuring that the outcomes of interprofessional simulation are similar to what has been found in previous research and this study, an increase in self-reported interprofessional collaboration. It will also allow educators to being to streamline and replicate the process of teaching and delivering interprofessional simulation to ensure all health care professionals are receiving similar training and knowledge.

For example, the "student primer" (Appendix A) was given to participants a week prior to the simulation activity. The primer encompassed the elements required for criterion two, "constructing measurable objectives", criterion three, " structure the format of a simulation based on the purpose, theory, and the modality for the simulation", criterion four, "Design a scenario or case to provide the context for the simulation-based experience" and criterion ten, "provide preparation materials and resources to promote participants' ability to meeting objectives and outcomes of simulation". In addition to this, all other INACSL recommendations were implemented in the simulation. Though

interprofessional simulation is a great interprofessional education opportunity for students, there must be follow up support to ensure student continue to build their interprofessional collaborative skills.

The first of the four INACSL criteria necessary to meeting the SIM-IPE standards is to conduct the SIM-IPE based on a theoretical or conceptual framework. The second, INACSL recommend using best practice in the design and development of the SIM-IPE. The University of Calgary used various interprofessional frameworks such as the Canadian Interprofessional Health Collaborative interprofessional competency framework as well as the Team SCHEMEs, a interprofessional collaboration framework created by the Faculty of Medicine at the University of Calgary using the CIHI competencies (Appendix A) to guide the implementation and learning of the interprofessional simulation offered. These were the best practice standards set out by Canada in relation to interprofessional collaboration. Third, INACSL believes the barriers should be recognized and addressed. Lastly, there must be an appropriate evaluation plan for simulation. Continual evaluation of student and facilitator experience during and after interprofessional simulation by the University of Calgary support this recommendation by INACSL. By continually evaluating, the stakeholders engaged in planning and implementing this simulation can build on the program each year it is delivered.

Kolb's Experiential Learning Theory

The interprofessional simulation involved all three components of experiential learning; students were invited to participate during the simulation (hands-on experience), engage with all other participants and the standardized patient (interaction with the environment), and debrief on the simulation experience (reflection on the

experience). The interprofessional simulation was an opportunity for learners to actively participate in the learning process in all three components. Kolb's experiential learning theory framework should continue to support and guide all interprofessional education opportunities for undergraduate nursing students, not limited to interprofessional simulation. The application of this model is relative to nursing 389 in the sense that students are required to go to practicum and complete nursing care (hand-on experience), engage with patients and staff alike within their care facility (interaction with the environment), and check in with students after practicum is complete (reflection on the experience). This may be why students still reported high levels of interprofessional competence at posttest 2, after practicum. There may not have been a large increase in self-reported competence from posttest 1 to posttest 2, it should be highlighted that practicum did support the learning that had occurred after the interprofessional simulation was complete. Using frameworks such as Kolb's Experiential Learning Theory to analyze not only the simulation but the practicum also can help support the idea that though the practicum portion was not as optimal in students increasing their learning, the framework did work in supporting the learning that existed.

Person-Environment-Occupation Model

The increase from pretest 1 to posttest 1 was significant, therefore I conclude that the interactions between the individual, the environment, and the occupation was optimal creating interprofessional collaboration. The interactions between these three components was just as optimal from posttest 1 to posttest 2, as seen by the similarity in self-reported interprofessional collaborative competence by nursing students from posttest 1 to posttest 2, after simulation and after practicum. However, we expected to see a larger increase

between posttest 1 and posttest 2. The interaction between all three components was different during the interprofessional simulation and the practicum components of nursing 389. I believe the largest differences between the two is the direct relationship to interprofessional collaboration and the environment component of the person-environment-occupation model. Firstly, interprofessional simulation is guided by multiple interprofessional frameworks, and has predetermined goals of interprofessional collaboration. Whereas, practicum is multidimensional, students are required not only to fulfill goals of interprofessional collaboration but also have clinical skills goals. Secondly, the environment of interprofessional simulation is much different than that of practicum. All participants are learners and students alike, whereas in practicum students are often working with interprofessional teams with registered professionals, possibly heightening their anxiety. Simulation is an environment where students can maintain patient safety and develop their skills (Reime et al., 2017), whereas this is not the same case during practicum where students are working with patients and families. Also, all stakeholders are engaged in achieving the same interprofessional competency learning goals during interprofessional simulation. The facilitator is the students guide to learning the interprofessional collaborative competencies during interprofessional simulation. During practicum, the preceptor is responsible for supporting student learning in many different avenues, not only their interprofessional collaborative competency goals. Furthermore, all team members involved in the interprofessional team during practicum have the same goals, in terms of student learning. The environment may need more engagement to optimize practicums ability for students to build on their learning from interprofessional simulation. The clinical placement environments also may have been

limited in their ability to foster interprofessional collaborative competencies. Each student went to a different placement that may or may not have had an interprofessional team to allow students to engage in interprofessional collaboration. The applicability of the trauma simulation may not have translated well into their clinical placement affecting student's ability to relate the two and build on their learning, as their placement may not have been trauma focused.

Interprofessional Collaborative Competencies Attainment Survey (ICCAS)

The subsections of the ICCAS survey have only been examined individually by some researching teams, J. King et al. (2016) found that the smallest improvement was found in the communication competency throughout their research. Our researching team was similarly interested in looking at the communication competency as it supports all other interprofessional collaborative competencies. In contrast to the research completed by J. King et al. (2016), the largest improvement in learning from posttest 1 to posttest 2 was communication. There was a 13% increase in the communication competency from pretest to posttest 1, and only a slight increase from posttest 1 to posttest 2, 0.63%, however both values were statistically significant. I had hoped there would be a more significant increase in learning in this area, even from pretest 1 to posttest 1, however the results show student's improved in the team functioning competency, collaborative family and patient centered care competency, and roles and responsibilities competency. Students reported high levels of self-reported competency in communication from pretest one, students may not have recognized the challenges that lie within their communication prior to learning, showing a smaller change in their learning.

In relation to all other interprofessional collaborative competencies, communication did exhibit the largest change from posttest 1 to posttest 2. The role of communication as an overarching competency for interprofessional collaboration needs to be emphasized during interprofessional learning opportunities to continue to support the learning of this competency. Roles and responsibilities, as well as team functioning were the two interprofessional collaborative competencies that saw no change from posttest 1 to posttest 2. Student did however exhibit these competencies to the same level of competence after practicum was completed, yet there was no growth to the learning they had gained from interprofessional simulation. Competencies where little to no growth was seen from posttest 1 to posttest 2 need to be analyzed throughout practicum to identify the gaps in knowledge and allow educators to deliver more targeted education.

Limitations

Student's self perception of interprofessional competence statistically did improve for all survey items. Yet, this study demonstrated that students already had a relatively high level of self-perceived interprofessional competence (based on pretest 1 results, 103.57), therefore a large increase in scores was unlikely. This may also be why the results from posttest 1 (123.57) and posttest 2 (123.81) did not show a significant difference, but rather a very minimal change (0.24). Like any research study, there were confounding factors that are limitations to this study.

The use of indirect outcome measures such as self-perceived interprofessional collaborative competence may not be as reliable as clinical observations or other validated instruments in assessing the learning and retention of learning, thus restricting the statistical outcomes. It should also be noted that the ICCAS does not measure the

quality of learning of the interprofessional collaborative competencies. A level of assessment involving higher levels of Kirkpatrick's model for levels of training evaluation should be considered in the future to uncover the quality of learning (Kirkpatrick & Kirkpatrick, 2006). The student responses to the ICCAS survey may have also been influenced by outside work experience or professional maturation that may have occurred throughout the semester outside of nursing 389. The population was also homogeneous, as we only collected data from nursing students involved in the interprofessional simulation. The results are reported for a single institution in a single academic year, with no performance to create a baseline or benchmark to compare too. It would be beneficial to continue this research but involve all health care professional students who have participated in the simulation to understand their learning in comparison to nursing students. It would also help diversify the population from which we collected data, making our results more generalizable to other health care provider students. This will also increase the number of participants eligible to participate and involved. This study only included 110 students, of these only 63 participants had complete data sets that could be used for data analysis. The power calculation completed prior to data collection revealed the need for 73 participants to detect a small to medium effect. Also, additional demographic information from the participants would provide more details about if the learning differed depending on age, previous education or even gender.

There has been a variety of tools used to measure the value of interprofessional simulation on students; however, due to the variety used it is difficult to compare results from study to study. The ICCAS is a useful tool to use in the evaluation of

interprofessional simulation to measure interprofessional collaborative competencies, as it is guided by the CIHC Interprofessional Collaborative Competencies. Simulations activities that utilize the CIHC framework will benefit from using the ICCAS as it follows the same framework. Therefore, the goals for the simulation and how we evaluate those goals will be consistent, providing us with rich information about the simulation outcomes. Also, analyzing each subsection of the ICCAS individually is not the intended use of the tool, therefore drawing conclusions from the statistical data in each section may not be an appropriate analysis of the data collected. A study conducted by J. King et al. (2016) did however analyze the ICCAS by the CIHC interprofessional collaborative competencies. Like J. King et al. (2016) study and this research, the ICCAS should continue to be used in this manner to compare results between research studies.

Additional limitations in this research related to participant responses. Due to the longitudinal nature of the study, I collected data over three months at three different time points, I expected a certain level of attrition. The attrition could be a result of student attendance; if students did not attend the simulation on time or maybe missed the in-person recruitment process. Electronic surveys were given to all nursing 389 students one week in advance to the interprofessional simulation via the Desire2Learn blackboard for students. Interestingly, we did not receive any electronic submissions of the survey. Students may not have seen the notification on their blackboard or within their email to complete the electronic survey. Many other notifications are sent to students on a regular basis and in relation to interprofessional simulation, so it simply could have been missed. It was also identified in the posting that submitting the electronic survey was not mandatory but rather extra work in preparation for their interprofessional simulation.

Student may have harboured anxious feelings towards their first interprofessional simulation and focused more on the mandatory pre-simulation activities and surveys. Students were given an in-person explanation of the research study by the primary investigator right before the pretest, posttest 1 and posttest 2. This was prior to distribution of the paper surveys, students were then also given the opportunity to ask questions about the research study. Students may have felt more inclined to complete the survey as the researcher was present and explained the parameters of participation clearly. Also, students may not have fully completed the survey, and incomplete surveys were removed from the data. This was because data could not be matched to one participant over the three data collection points. Students may have felt rushed to complete the survey and oversighted this area. During both pretest and posttest 1 there was also subsequent research occurring to evaluate the simulation; giving students multiple different surveys to complete in addition to the ICCAS survey used for this study. The ICCAS was one of three different surveys for nursing students in attendance to complete. Students may also have had some anxiety around completing the survey at data collection point 1 prior to the simulation, as this was nursing students first simulation experience.

Interestingly, we also gained respondents as we collected data over time rather than lose respondents. I believe environment made a large impact on the response rate. During the pretest participant recruitment, if students were late for the simulation or did not make it to the registration desk on time, they missed the primary researcher's presentation on the research, therefore some of the students from nursing 389 (n=110) were not recruited. The second data collection point for pre-test 1 occurred at the end of

the interprofessional simulation. Nursing students were asked to stay after all other health care professional students left to complete the survey involved in this study. Students may have left in this time without researchers knowing as it was the end of the day and they may have been fatigued from attending the simulation as well as completing the two other research surveys distributed just prior to the ICCAS for this study. The third data collection point occurred in the final nursing 389 lecture. The final lecture of nursing 389 is a mandatory class for nursing students therefore the researching team was able to recruit all 110 possible participants. The professor of nursing 389 also provided students with a brief introduction to the study and researching team prior to the recruitment. This may have encouraged students to participate also as they felt their professor or mentor supported their participation in the study.

Recommendations for future practice

As the movement towards interprofessional collaboration and interprofessional education continues to grow, strategies are being set in place to help support undergraduate nursing students achieve competency in interprofessional practice (Labrague et al., 2018). Labrague et al. (2018) systematic review of interprofessional literature found that strategies such as policy formulation, curricular reengineering, and accreditation changes are being used to implement interprofessional collaboration competencies into undergraduate learning.

Through my analysis I uncovered that earlier, more frequent and consistent exposure to interprofessional education and interprofessional simulation should be recommended for future nursing practice. I suggest that nursing undergraduate educators can improve student exposure to IPE and simulation in three ways. First, curriculum

leaders need to be engaged to create interprofessional collaborative competency goals for students to learn in nursing 389. Interprofessional learning needs to be guided throughout practicum, just as it is during simulation to optimize learning outcomes for nursing students. By creating specific goals for interprofessional collaborative competency learning, students will be aware of their expectations and be able to better evaluate their learning. Secondly, all elements of the Person-Environment-Occupation model need to be engaged to optimize interprofessional collaboration (Metzler & Metz, 2010). The environment, or key stakeholders within the environment need to be engaged in learning and teaching interprofessional collaborative practice. Open conversations between health care facilities and the role of students within the interprofessional team should be highlighted and brought to the forefront so all team members can support undergraduate nurses learning. Lastly, INACSL standards should be used to create all interprofessional simulation activities to standardize delivery and outcomes of interprofessional simulation. Cant and Cooper (2010) believe that the only way for knowledge to grow related to participating in simulation is when best practice guidelines are utilized. After completing a focused review on the literature surrounding high-fidelity simulation, Doolen et al., (2016) suggest a standardized process be used to implement simulation. These standards should also be used as a benchmark to evaluate interprofessional simulation to increase the rigor in research (Doolen et al., 2016).

Future Research

It is important that research within this area of interprofessional collaboration and education continues to grow. Future research should support and continue to build on these findings in four ways. First, a larger population should be recruited to collect data

from, with more diverse characteristics, for example, from different health care programs. Different undergraduate health care professionals should be invited to evaluate their learning in comparison to undergraduate nursing students. Their different perspectives will add to the body of knowledge of how interprofessional teams learn, and the different worldviews that come from different healthcare professionals in relation to interprofessional practice.

Second, all interprofessional simulation activities should be evaluated in a uniform manner. Using the same evaluation tool for all interprofessional simulations will create a standardized process for collecting outcome data from interprofessional simulation. The benefits of having standardized outcome data is that the data can then be compared to research in other studies using the same evaluation process also. Identifying similarities and differences between different simulation activities will help to identify some of the demographic or confounding factors associated with learning. INACSL does a great job of identifying and recommending best practice for simulation; one of them being an evaluation of outcomes. INACSL should become leaders in creating a tool to effectively assess the intentions of interprofessional simulation. By engaging INACSL to do this, both the conceptualization and analysis of interprofessional simulation will be parallel.

Third, future research should also include mixed methods studies that allow students to describe their learning of interprofessional collaborative competencies. By collecting qualitative data students will be able to dialogue and provide rich information about the resources students feel they require in order to learn best. Students also perceive their learning changes differently; it is important to allow students to identify

these changes in greater detail. A mixed methods study in the future will help bridge the gap between understanding confounding factors to the results by using different tools and scales to evaluate student learning. Though the CIHC interprofessional collaborative competency framework should guide the evaluation of interprofessional simulation and interprofessional learning, the ICCAS may not have provided participants with enough room to describe the increase in their learning. Exploration into different tools that are guided by the CIHC interprofessional collaborative framework should be considered.

Finally, we need to understand how to maximize interprofessional education, and interprofessional simulation specifically for nursing students. These issues involve many factors, such as cost, lack of administrative support, lack of resources, time, and funding (Brashers et al., 2016; Cooper et al., 2005; Delunas & Rouse, 2014; Erickson et al., 2016; Horsley et al., 2018; J. King et al., 2016; Labrague et al., 2018). Stakeholders will be more engaged to provide administrative support, resources, and funding if the outcomes of interprofessional collaboration are strongly supported. More research needs to be done on the impact students have on the care progression and organization when working in interprofessional collaborative teams effectively. As Mizrahi and Abramson (2000) mention, reduction in costs is one of the organizational benefits of interprofessional collaboration, more randomized control trials that signify monetary savings from interprofessional education can create an incentive and illicit buy in from key stakeholders. By using mixed methods studies, or randomized control trails that allow for less confounding factors, justification for interprofessional simulation becomes stronger.

Conclusion

The purpose of this study was to determine how effective interprofessional simulation is in teaching and practicing the CIHC (2010) interprofessional collaborative competencies, and whether it creates sustainable learning for nursing students within their practice. By creating a pre and posttest study, the researching team was able to evaluate the change in learning before and after interprofessional simulation. By creating one more time point for data collection, after students completed their practicum, the researching team was able to measure if student learning was retained. Students showed small increases in their learning from simulation (posttest 1) to after practicum (posttest 2) in all interprofessional collaborative competencies. I can conclude that interprofessional simulation does support interprofessional collaborative competence retention throughout nursing student's careers. However, a large growth in student knowledge after their practicum was complete was not identified. Recommendations for future practice on how to continue to build and enhance undergraduate nursing students learning will help optimize the learning achieved after interprofessional simulation.

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Appendix A: Trauma Simulation Primer

Student

Primer/Informatio

n Trauma Day

SIM

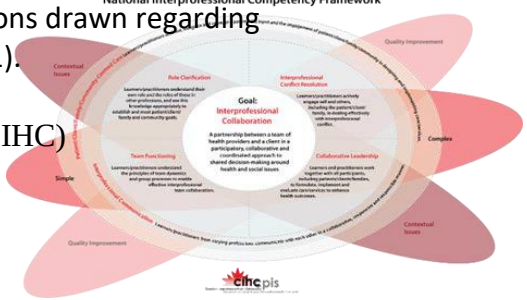
Interprofessional

Education Event

June 27, 2017

What is Interprofessional Practice?

Interprofessional teams collaborate to develop a plan of care by *jointly* assessing and treating patients and by pooling their knowledge. In an interprofessional collaborative atmosphere all disciplines cross professional boundaries and share information in and out of team meetings (Sorrells-Jones, 1997; McCallin, 2001). In contrast, in **multidisciplinary teams** members work separately to assess and treat patients, then come together to share information. Each discipline works independently and then informs other disciplines during team meetings of conclusions drawn regarding patient status (Sorrells-Jones, 1997; McCallin, 2001).



- Canadian Interprofessional Health Collaborative (CIHC)
  - Developed national interprofessional

competency framework Fosters
related interprofessional practice and
education research

- http://www.cihc.ca/files/CIHC_IPCompetencies_Feb1210.pdf

- CIHC definition of interprofessional collaboration:
  - Interprofessional collaboration is the process of developing and maintaining effective interprofessional working relationships with learners, practitioners, patients/clients/families and communities to enable optimal health outcomes
  - Key elements of collaboration include respect, trust, shared decision making, and partnerships

- CIHC six competency domains
  - Interprofessional communication
  - Patient/client/family/community-centered care
  - Role clarification
  - Team functioning
  - Collaborative leadership
  - Interprofessional conflict resolution

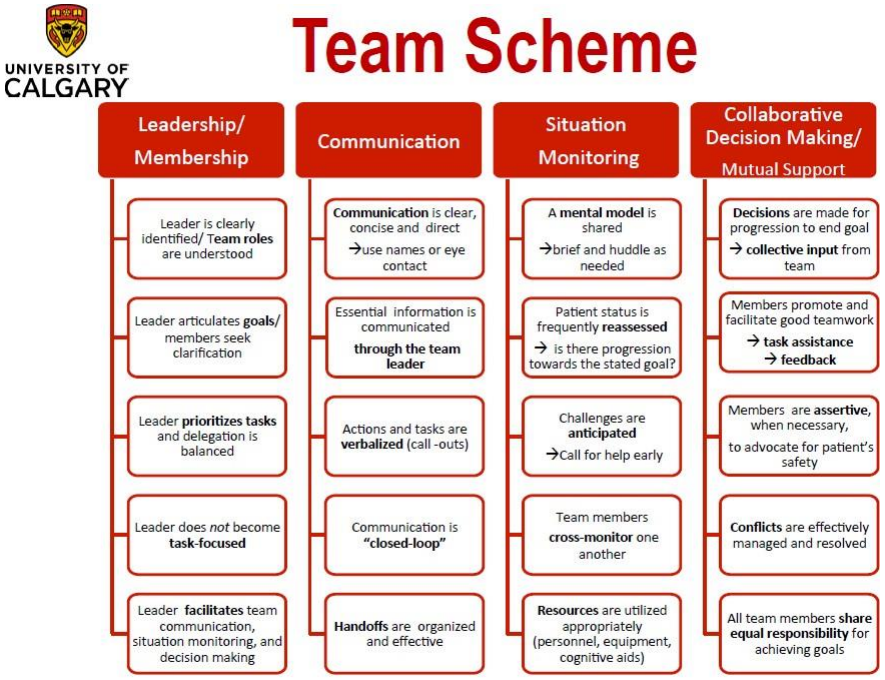
Trauma Simulation Session Objectives:

***Please wear comfortable clothing and shoes, as you will be moving around.**

- You are <u>not required</u> to wear a uniform for this simulation (i.e. Scrubs, lab coat, etc.)

*** Please bring your stethoscope, a pen and an electronic device (smartphone, tablet or laptop).**

Please limit personal belongings you bring with you , essential items only



Adapted from: CIHC National Interprofessional Competency Framework *and* TeamSTEPPS

Interprofessional Collaboration (Teamwork) Objectives – these are apply to all students:

1. During the scenarios a leader is clearly identified and recognized by all team members.
2. The individual in the leader role assures an appropriate balance between command authority and team member participation.
3. Each team member demonstrates a clear understanding of his or her role.
4. Learners can describe the roles of those in other professions and use this knowledge appropriately to meet shared patient care goals.
5. Team members prompt each other to attend to all significant clinical indicators throughout the scenario.
6. When team members are actively involved with the patient, they verbalize their activities aloud.
7. Team members repeat back or paraphrase instructions and clarifications in indicate they heard them correctly.
8. Learners communicate with each other is a collaborative, responsive and responsible manner.
9. All members of the team are appropriately involved and participate in the activity.

Medical Student Objectives:

1. Recognize Trauma: Mechanism; Potential Injuries
2. Conduct a Primary Survey Trauma Assessment and Management
   a. A (Airway; Voice; LOC; Chin-lift/jaw thrust; Oxygen administration; Suction)
   b. B (Breathing; Air Entry; Oxygenation)
   c. C (Circulation; Blood Pressure; Perfusion; Stop Bleeding; Volume replacement)
   d. C-spine Control (Management of potential injury; Towels; Collar)
3. Obtain a history in trauma
   a. AMPLE history (Allergies; Medications; Past history; Last meal; Events re: incident)
4. Conduct Secondary Survey
   a. Head to toe exam

Nursing Student Objectives:

1. Accurately assess the patient's vital signs and level of consciousness.
2. Conduct a focused assessment based on the presenting clinical situation.
3. Demonstrate ability to perform a comprehensive assessment.
4. Recognize deterioration in the patient's clinical status and intervene appropriately within scope of practice.
5. Demonstrate ability to respond appropriately to a life-threatening situation (i.e. CAB, CPR, hemorrhage, C-spine precautions)
6. Communicate effectively with other healthcare team members, the patient and the family using advanced communication strategies.
7. Demonstrate SBAR reporting procedure when calling for assistance or transferring care.
8. Demonstrate standard precautions in all patient care interventions.
9. Provide psychosocial support to the patient and family members.

Respiratory Therapy Student Objectives:

1. Demonstrate effective communication skills.
2. Use professional and respectful language, behaviour and attire
3. Demonstrate support and caring toward patients, co-workers and others.
4. Perform a patient assessment.
5. Manage oxygen therapy.
6. Manage the patient's airway
7. Apply critical thinking in practice
8. Participate within the interdisciplinary team to achieve a high standard of patient-centered care

Trauma Assessment and Management Overview

1. Primary Survey (personal protection precautions)

- **A** Airway maintenance with cervical spine protection
- **B** Breathing and Ventilation
- **C** Circulation with Hemorrhage control
- **D** Neurologic Status
- **E** Exposure / Environmental control

Immediately address life threatening injuries as they are identified.

A. Assess airway patency level of consciousness (LOC), stridor, vomitus, blood Consider:

- Chin lift/Jaw Thrust/suction
- Oxygen administration
- Bag valve mask
- Definitive airway endotracheal tube or surgical airway
- Maintain/immobilization of cervical spine

B. Breathing: Assess adequacy of ventilation, trachea midline, chest wall excursion, subcutaneous air, jugular venous distension

Consider:

- Supplemental oxygen
- Needle thoracotomy
- Chest Tube insertion

C. Circulation with Hemorrhage Control: assess LOC, skin color, pulse, blood pressure, capillary refill

Consider:

- Definitive bleeding control (pressure, surgery, embolization)
- Appropriate vascular access
    - Two large bore intravenous with crystalloid and potential blood products.

D. Disabilit y Neurologic Status Consider:

- Level of Consciousness, pupil size and reaction, lateralizing signs and spinal cord level
- AVPU (alert, verbal, pain, unresponsive)
- Glasgow Coma Scale GCS

E. Exposure and Environmental Control Consider:

- Patient completely undressed but prevention of both hypothermia and exposure to ongoing burn or chemical insults for both patient and caregiver.

- <u>Adjuncts to primary survey and resuscitation:</u>
    - EKG monitoring, pulse oximetry blood pressure
    - Gastric and urinary catheters

- Chest x ray/ pelvic x ray / FAST (trauma ultrasound)
- Reassessment and consideration of need for transfer

Secondary Survey - (Only if primary survey complete, resuscitative efforts are initiated and patient's vital signs are improving)

- Head to toe evaluation and careful methodical exam of entire patient including log roll.
  - ✓ Head, maxillofacial structures, cervical spine and neck, chest, abdomen, perineum/rectum/vagina, musculoskeletal system, and neurological system.

- AMPLE history:
  - ✓ allergies, medications, past illnesses/pregnancy, last meal, events /environment related to injury

➢ <u>Adjuncts to secondary survey:</u>
- Further imaging spine, limbs, CT, ultrasound, endoscopy
- Reassessment/Re-evaluation post intervention
- Definitive Care or Transfer to higher level of care

**This information is based on principles taught in Advanced Trauma Life Support (ATLS)

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Appendix B: ICCAS Permissions

[redacted]

From: [redacted]
Sent: October 17, 2018 12:51 PM
To:
Cc: [redacted]
Subject: RE: ICCAS permissions

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Hello [redacted]
Thanks for writing. Yes, you may use the ICCAS for your thesis research. Good Luck!

Sincerely,
[redacted]

[redacted]

[redacted]

LA RECHERCHE QUI CHANGE DES VIES, C'EST ICI.

LIFE CHANGING RESEARCH HAPPENS HERE

Appendix C: Consent Form and Information Sheet

IMPLIED CONSENT

TITLE: **Interprofessional simulation: An effective means of creating sustainable interprofessional collaborative competencies?**

INVESTIGATORS: -------- ----------, ---------- ----------, ---------- ----------, ---- ---------.

SPONSOR: ***Self-funded, Master's Thesis, University of Calgary.***

This information sheet is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, please ask. Take the time to read this carefully and to understand any accompanying information.

BACKGROUND

Simulation has allowed health professionals to learn the concepts of teamwork and collaboration and develop positive attitudes towards interprofessional collaboration before actual patient-care experiences (Gunnell et al., 2016). It has been effective in fostering effective communication and nurse-physician decision making. Evidence suggests there is a "relationship between simulation, learning effectiveness and changes in student attitudes, beliefs, and confidence" (Lefebvre et al., 2015, p. 9).

Many studies have looked at the changes in attitudes of students after interprofessional education, however, limited studies look at the retention of the concepts learned over time. This study will allow students to share their self-evaluation of their learning and use of interprofessional collaborative competencies before and after an interprofessional

simulation experience. By comparing these results, this study hopes to solidify that interprofessional simulation is beneficial in creating sustainable learning of interprofessional competencies in nursing students.

WHAT IS THE PURPOSE OF THE STUDY

This study will utilize the research question to recognize student perceptions of interprofessional simulation and its applicability, if any, to their actual practice. By doing so, it will enable educators to challenge the existing framework for developing interprofessional simulation and create innovative strategies to foster retention of interprofessional collaboration concepts in students.

WHAT WOULD I HAVE TO DO?

Complete three surveys: 1) Interprofessional collaborative competency attainment survey (ICCAS, MacDonald et al., 2009) prior to beginning Trauma Day activities (simulation), after the completion of these activities, as well as after completion of placement. Each survey will take approximately **10 minutes** to complete.

WHAT ARE THE RISKS?

There are no perceived risks of this study on participants than those encountered daily.

WILL I BENEFIT IF I TAKE PART?

There are no directly anticipated benefits for you as a result of participation in this study.

DO I HAVE TO PARTICIPATE?

No, participation is voluntary. You can withdraw from this study at any time, without penalty or disadvantage to you. You may contact ------ ------ at ---------- or --- ---- ---- to withdraw yourself from the study. New information from this study or other

studies may affect whether you want to continue to take part in the study. If this happens, we will tell you about this new information. Data may be withdrawn up until the commencement of data analysis. Prior to that, student surveys will still have the anonymized codes which can be used to eliminate all linking data. After all data is collected, these codes will be removed therefore researchers will not be able to remove specific data sets.

WILL I BE PAID FOR PARTICIPATING, OR DO I HAVE TO PAY FOR ANYTHING?

You will not be paid for participating in the study.

WILL MY RECORDS BE KEPT PRIVATE?

We will respect your privacy. No information about who you are will be given to anyone or be published without your permission, unless the law requires us to do this. The University of Calgary Conjoint Health Research Ethics Board will also have access to these records.

The data produced from this study will be stored in a secure, locked location in the Faculty of Nursing at the University of Calgary. Only members of the research team (and maybe those individuals described above) will have access to the data. This could include external research team members. Following completion of the research study, the data will be kept for five years and then destroyed as required by the Conjoint Health Research Ethics Board. You will be assigned a participant number instead of your real name, and the published study results will not reveal your identity. A master list that ties your name to your participant number will be stored in a sealed enveloped inside a locked filing cabinet at the university of Calgary. Only the lead researcher who developed the

list will be aware of its contents.

Your data is only accessed by the research team, and data is not transferred to third parties or for any other purposes.

LimeSurvey is an online survey platform used for survey administration. If you choose to participate in the survey, you understand that your responses to the survey questions will be stored and accessed in Canada. Your data is only accessed by the research team, and data is not transferred to third parties or for any other purposes. The security and privacy policy for this web-survey company can be found at the following link: https://www.limeservice.com/en/news/21-english/general-content/39-data-protection-statement."

AGREEMENT TO PARTICIPATE

Your decision to complete and return this survey will be interpreted as an indication of your agreement to participate. In no way does this waive your legal rights nor release the investigators, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time.

have further questions concerning matters related to this research, please contact:

----- ----- --- --- ----

or

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If you have any questions concerning your rights as a possible participant in this research, please contact the Chair of the Conjoint Health Research Ethics Board, Research Services, University of Calgary, 403-220-7990.

The University of Calgary Conjoint Health Research Ethics Board has approved this research study, REB -- - ---

Appendix D: ICCAS

ICCAS – Interprofessional Collaborative Competencies Attainment Survey

For your unique anonymous participant code, please provide your mother's first name initial, the day and month of her birthday: __ - __ __ __ __
Please indicate your profession: _____
Please indicate if you are: a student _____ year of program _____ or practitioner _____

Please answer the following questions by filling in the circle that most accurately reflects your opinion about the following interprofessional collaboration statements:
1= strongly disagree; 2= moderately disagree; 3=slightly disagree; 4= neutral; 5=slightly agree; 6=moderately agree; 7= strongly agree; na= not applicable

Please rate your ability for each of the following statements:

	before participating in the interprofessional simulation I was able to:								**after** participating in the interprofessional simulation I was able to:								**after** completing my 8 week placement I was able to:							
Communication	1	2	3	4	5	6	7	na	1	2	3	4	5	6	7	na	1	2	3	4	5	6	7	na
1. Promote effective communication among members of an interprofessional (IP) team*	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2. Actively listen to IP team members' ideas and concerns	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3. Express my ideas and concerns without being judgmental	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
4. Provide constructive feedback to IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5. Express my ideas and concerns in a clear, concise manner	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Collaboration																								
6. Seek out IP team members to address issues	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7. Work effectively with IP team members to enhance care	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8. Learn with, from and about IP team members to enhance care	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Roles and Responsibilities																								
9. Identify and describe my abilities and contributions to the IP team	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10. Be accountable for my contributions to the IP team	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11. Understand the abilities and contributions of IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12. Recognize how others' skills and knowledge complement and overlap with my own	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Collaborative Patient/Family-Centred Approach																								
13. Use an IP team approach with the patient** to assess the health situation	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
14. Use an IP team approach with the patient to provide whole person care	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
15. Include the patient/family in decision-making	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Conflict Management/Resolution																								
16. Actively listen to the perspectives of IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
17. Take into account the ideas of IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
18. Address team conflict in a respectful manner	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Team Functioning																								
19. Develop an effective care*** plan with IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
20. Negotiate responsibilities within overlapping scopes of practice	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

*The patient's family or significant other, when appropriate, are part of the IP team.
**The word "patient" has been employed to represent client, resident, and service users.
***The term "care" includes intervention, treatment, therapy, evaluation, etc.