Strengthening Clinical Knowledge:

Repeating High Fidelity Patient Simulations

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ELAINE ABROOK

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Dean
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University of Saskatchewan
4th Floor, Health Sciences E-Wing
104 Clinic Place
Saskatoon, Saskatchewan
S7N 2Z4

Abstract

The clinical environment provides important learning opportunities for health care professions, especially nursing students. The clinical environment offers students a social learning experience not available in the classroom. Providing safe and competent patient care is a critical component of nursing education; however, approaches to preparing nursing students for practice remains relatively unchanged for the past 50 years (Gonzalez & Kardong-Edgren, 2017). Technological advances, increased imperatives for patient safety, and emphasis on evidence informed interventions means that traditional teaching strategies for preparing nursing students for clinical practice need to evolve to improve care outcomes while ensuring patient safety. High fidelity patient simulation (HFPS) is a teaching strategy increasingly used by nurse educators to provide students with opportunities to practice nursing care without risking patient injury. As in clinical education, debriefing and feedback are key elements in the development of clinical competence and mastery learning in HPFS (Taras & Everett, 2017). Many nursing programs have integrated HFPS into their curricula as a replacement or compliment to clinical practice with little research on the philosophical and pedagogical underpinnings (Harder, 2010; Schiavenato, 2009). This study used qualitative methodologies to explore the value of repeating the HFPS scenario after debriefing as a pedagogical strategy for maximizing students' learning. Two focus groups consisting of second and fourth year undergraduate nursing students' shared their perceptions on repeated the HFPS scenario after debriefing as a pedagogical strategy for learning. Drawing on Vygotsky's (1978) *Sociocultural Theory*, Kolb's (1984) *Experiential Learning Cycle,* and the *National League for Nursing/Jeffries Simulation Model* (2012) the findings revealed six (6) themes: developing competence, teamwork, cueing, anxiety, making mistakes, and feedback.

Participants reported repeating the scenario reduced their anxiety and stress, while allowing them to focus on using critical thinking skills more effectively when providing patient care.

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Dedication

To my parents whose praise and encouragement helped me fulfill my goal.

To my children, persistence has great rewards.

To siblings and families –Thank you.

To educators who teach with passion, love, and understanding.

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Chapter 1

Introduction

Clinical learning experiences are a highly valued and critical components of undergraduate nursing programs because they provide students opportunities to apply theoretical knowledge, develop clinical judgement, practice psychomotor skills, and become socialized into the profession (Ion, Smith, & Dickens, 2017). In this age of rapidly changing health systems and evolving technologies, finding appropriate clinical placements has become increasingly challenging for nurse educators (Registered Nurses Association of Ontario [RNAO], 2016). Some of these challenges include increased patient acuity, shortened length of hospital stays, accelerated advances in patient care-related technologies, decreased availability of clinical placement sites, increased restrictions on nursing students' practice in clinical settings, and enhanced patient safety initiatives (Badir et al., 2015; Foronda & Alhusen, 2016; Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014; Ironside, McNelis, & Ebright, 2014). In addition, many clinical experiences may be too complex for beginning students (Hill, 2017) and the random nature of patient conditions may not offer appropriate opportunities to practice particular skills and achieve competency. Students need multiple, diverse, and repeated practice in assessments, interpreting data, as well as planning and performing patient care (Hill, 2017); however, the current clinical climate may not provide the appropriate kinds of clinical experiences to enable development of foundational competencies (Gonzalez & Kardong-Edgren, 2017; Hendricks, Taylor, Walker, & Welch, 2016).

To ensure graduates can practice safely and competently, undergraduate nursing curricula must continuously update content to keep pace with changes in health care and the knowledge explosion; use evidence-based teaching methodologies to bridge the gap between theoretical and

clinical courses; and facilitate students' professional and interprofessional competence (Hendricks et al., 2016; Institute of Medicine [IOM], 2010). Despite this dynamic context, pedagogical strategies for teaching clinical nursing skills have remained relatively unchanged over the past 50 years despite known problems with inconsistent teaching approaches, evaluation practices, and retention of critical foundational skills (Gonzalez & Kardong-Edgren, 2017). "Strategies are needed that allow faculty to anticipate evolving nursing practice needs, respond in a timely manner, and thrive while engaging in change" to ensure that nursing students are prepared to meet the challenges of health care in the future (Hendricks et al., 2016, p. 33).

Simulation-Based Learning

Simulation refers to techniques that "…replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion" (Gaba, 2004, p. i2). The fidelity of a simulated experience reflects how closely it mimics real life (Hall & Tori, 2016). Fidelity exists on a continuum from low-to-high fidelity and, as the degree of realism increases, so does the fidelity (International Nursing Association of Clinical Simulation and Learning (INACSL); 2016). The use of low fidelity simulation (e.g., anatomical models, task trainers, and role-playing) in nursing education dates back to the late 1800s (Nehring & Lashley, 2009). For example, in 1874, Lees advocated for the use of jointed human skeletons and other models in all nursing schools. In 1910, Mrs. Chase, a full-body static mannequin, enabled nursing students to practice injections and procedures involving the rectum, urethra, and vagina (Nehring & Lashley, 2009).

Simulation technologies leapt forward in the 1960s, when Asmund Laerdal (a toy manufacturer) developed *Resusci-Anne*, a life-sized cardiopulmonary resuscitation mannequin (Grenvik & Schaefer, 2004). A few years later, *Sim One* became the first computer-controlled

simulator that could reproduce elements of human physiology and behaviour (Bradley, 2006). In the next decade, Harvey, a full-sized mannequin developed at the University of Miami could simulate 27 cardiac conditions (Gordon, 1974). Recent advances in computer technology, virtual reality platforms, and haptic (tactile) technologies have increased the uptake of computer-based simulation technologies in health sciences education. In 2007, 70% of Canadian schools of nursing employed simulation technologies (Canadian Association of Schools of Nursing [CASN], 2015). A few years later, a United States survey reported that 87% of undergraduate nursing programs provided their students with medium- and high-fidelity experiences (Hayden, 2010).

The uptake of simulation-based learning is driven by the imperative for patient safety (Henneman, Cunningham, Roche, & Cumin, 2007; Paparella, Mariani, Layton, & Carpenter; 2004); increased competition for clinical practice sites (Rhodes & Curran, 2005; Schoening, Sittner, & Todd, 2006); higher acuity of hospitalized patients and the complexity of their care (Bremner, Aduddell, Bennett & VanGeest, 2006; Fiengold, Calaluce, & Kallen, 2004); the need for learning experiences that facilitate critical thinking (Norman, 2012); and a growing interest in competency-based learning and assessment (Damassa & Sitko, 2010).

High fidelity patient simulation (HFPS). HFPS is an interactive strategy that provides students with a safe environment to develop and apply knowledge and practice psychomotor skills. Today's high fidelity patient simulators are interactive computer-controlled mannequins capable of realistic physiological responses including respiration and lung sounds, cardiac rhythms and pulses, abdominal sounds, pupillary constriction, and voice responses (CASN, 2015; Gaba, 2004). HFPS experiences are ideal learning environments for students because they provide opportunities to practice in a safe environment where the acuity and complexity of the

patient's condition can be matched to students' learning needs and their level of knowledge and skills (Hill, 2017).

HFPSs allow nurse educators to develop learning experiences that duplicate patient care scenarios that nursing students may encounter in clinical practice. These experiences can range from relatively low-risk, high-frequency occurrences (e.g., congestive heart failure, post-operative procedures, diabetes, childbirth, and palliative care) to high-risk, low-frequency occurrence crises events (e.g., hemorrhage, cardiac arrest, respiratory distress, and traumas) and involve patients across the life span. Theoretical content can be integrated into patient care scenarios in the simulated environment, thereby allowing learning to be transferred to the clinical environment in a more natural progression (Hill, 2017). Opportunities to apply theoretical knowledge in a safe environment reduce the theory-practice gap, increase patient safety, decrease student's error, and minimize patient harm (Gibbs, Trotta, & Overbeck, 2014).

HFPS facilitates students' development of clinical judgment, which directly affects their nursing actions and ultimately the health and well-being of their patients (Fedko & Dreirfuerst, 2017). The quality of nursing care is based on the students' ability to solve real-time problems and prioritize care, rather than simply regurgitating content knowledge (Fullan & Langworthy, 2014). Failure to include clinical reasoning, teamwork, communication, and professionalism when learning patient care may lead to future adverse events. The National Council of State Boards of Nursing's [NCSBN] (2014) landmark study on simulation reported that there is

> evidence to support that substituting high quality simulation experiences for up to 50% of traditional clinical experiences produces comparable end-of program educational outcomes and new graduates that are ready for clinical practice. (Hayden et al., 2014, p. S3)

These results support HFPS as an effective teaching strategy to prepare nursing students for practice.

There is evidence to support the effectiveness of simulation-based learning on undergraduate students' learning outcomes. HFPS is associated with significant gains in knowledge compared with didactic teaching alone (Baptista, Martins, Pereira, & Mazzo, 2014; Fedko & Dreifuerst, 2017; Gibbs et al., 2014; Hill, 2017; van Gelderen, Krumwiede, & Christian, 2016). In addition to increased psychomotor skills, the benefits of HFPS include improved communication skills, increased confidence, increased student satisfaction, decreased anxiety, increased critical thinking skills, and increased clinical reasoning (Hill, 2017). Although they are more difficult to measure, affective characteristics, such as empathy, care and compassion, can also be nurtured when using HFPS as a pedagogical strategy (Hendricks et al., 2016).

While most nurse educators endorse the idea that simulation facilitates learning and ultimately patient care, some have voiced concern that technology rather than pedagogy is driving the advancement of simulation in nursing education (e.g., Harder, 2010; Harder, 2015; Parker & Myrick, 2008; Schiavenato, 2009). These authors and others point to limitations in the quality and character of the evidence on the effectiveness of simulation-based teaching and learning (e.g., Norman, Dore & Grierson, 2012) and to the transferability of learning from the simulation suite to patient care. These concerns point to the need for simulation based research to inform best practices for simulation.

Best-Practice Standards for Simulation

INACSL (2016) developed standards of practice for simulation-based experiences rooted in best practices from adult learning, education, instructional design, clinical standards of care,

and simulation pedagogy. According to the INACSL (2016) standards, simulation experiences require purposeful and systematic, cyclical planning to achieve expected curriculum outcomes. The standard format for patient simulations consists of pre-briefing, patient scenario, and debriefing. Attention to scenario details (i.e., selection of preparation resources, patient scripting) and attention to physical, conceptual, and psychological aspects of fidelity contribute to students' suspension of disbelief during the scenario. Muckler (2017) found that suspension of disbelief is key to the effectiveness of simulation as it enables students to immerse themselves in the experience.

The pre-briefing period consists of students' preparatory work prior to attending the simulation. As part of their pre-brief activities, students may review videos of nursing skills and content, read articles related to the patient's diagnoses, and/or review class notes. At the simulation centre, the nurse educator, who is facilitating the HFPS, usually provides an orientation to the equipment and various supplies. During the HFPS, students typically work in pairs and take turns employing the nursing process and providing patient care. Students who are not providing care observe the simulation. The final step in the simulation scenario is the debriefing. Led by the nurse educator, both student care providers and student observers participate in the debriefing sharing their reactions, reflections, and feedback.

According to INACSL (2016), debriefing is a reflective process facilitated by the instructor immediately following the HFPS.

> Participants' reflective thinking is encouraged, and feedback is provided regarding the participants' performance while various aspects of the completed simulation are discussed. Participants are encouraged to explore emotions and question, reflect,

> and provide feedback to one another. The purpose of debriefing is to move toward assimilation and accommodation to transfer learning to future situations. (p. S41)

The reflection and feedback assists students to examine the significance of their actions and inactions during the patient care experience, which facilitates the development of new understandings and knowledge (Decker et al., 2013).

Debriefing is a compulsory component of simulation experiences as it encourages students to reflect on the care experience (INASCL, 2016; Kutzin & Janicke, 2015; Luctkar-Flude, Wilson-Keates, Tyerman, Larocque, & Brown, 2017). Students who provided care during the simulation begin the debriefing by sharing their reflections on the experience. Peers are then encouraged to provide additional feedback. Working collaboratively, the care providers and peers reflect on the following questions (Nash & Harvey, 2017): What happened? What were you (the care providers) thinking and feeling? What sense can be made about the situation? What else could have been done to change the patient outcome? If the clinical decision arose again, what would you do? Nurse educators support the debriefing process by guiding students to extract relevant knowledge from the patient context, transforming it into new patient situations.

Repeating a HFPS Following Debriefing

Repeating the same HFPS immediately following debriefing is a pedagogical strategy used by some educators (Abe, Kawahara, Yamashina, & Tsuboi, 2013; Tofil et al., 2014). In the repeated scenario, students have the opportunity apply the constructive feedback offered during the debriefing in a safe and predictable environment. Repeating the same scenario allows students to progress further in managing patient care events with minimal support, while advancing their clinical reasoning skills and clinical judgments.

According to Ericsson (2008), debriefing best practices include the provision of immediate feedback to learners, stimulation of reflection, corrective guidance, and opportunities to practice again. Verbal debriefing or debriefing using video recordings are the most common methods of reflection used in HFPS. Few studies (Abe, 2013; Abelsson et al., 2017; Sivertsen, McNeill & Müller, 2016) have examined the potential value of repeating the same simulation scenario as a learning strategy to promote transfer of learning outcomes to patient care or to improved knowledge retention. Given the importance of debriefing for achieving learning outcomes beyond the immediate patient scenario, this study explored the value of deliberately practicing the same HFPS scenario.

Statement of the Problem

Some research reports suggest that HFPS can be anxiety provoking for students and cause cognitive overload (Chen, Grierson & Norman, 2015; Josephsen, 2015). Cognitive load theory states there is a limit to the amount of information a learner can simultaneously take in, process, and store (Reedy, 2015). When faced with a very challenging task or too much information, learners experience cognitive overload and the resulting anxiety and stress often causes students to forget simple tasks and lead to poor performance and inability to recall information. When students are unfamiliar with the patient situation or the HFPS scenario is too complex, they can quickly feel inadequate, lose confidence in their abilities, compromise patient safety, and risk personal injury. Students' ability to integrate new, important information or alter stored information becomes limited when they are overwhelmed with information or with fear, stress, or anxiety, which has direct implications for their ability to learn and to provide patient care (Harry et al., 2018). The complexity of patient care can be cognitively exhausting for students learning to acquire and synthesize healthcare information essential to provide safe,

quality nursing care (Harry et al.). The opportunity to repeat a HFPS can affirm students' knowledge, increase their self-confidence, improve their fluency in assessments, responses, and interventions, and aid in long-term retention (Lestander, Lehto, & Engström, 2016).

Purpose of the Study

The purpose of this study was to explore undergraduate students' experiences of learning from repeating a HFPS after debriefing.

Significance of the Research

The appropriateness and quality of clinical experiences greatly influences students' learning. Shortages in clinical placements and lack of appropriate clinical learning experiences negatively affect students' opportunities to acquire and practice skills and achieve learning outcomes. The NCSBN (Hayden et al., 2014) reports that approximately 25% of new nurses leave a position within their first year of practice due to high levels of stress, persistent feelings of being overwhelmed, professional isolation, and intense fear of making patient care mistakes. New graduates often have difficulty recognizing and intervening in patient crises and reporting this information to physicians (Fero et al., 2010). HFPS is gaining prominence as a strategy to address the knowledge to practice gaps prior to graduation and support students' transition to professional practice.

Approaches to teaching and evaluating clinical skills have changed very little in nursing education. Faculty continue to use many of the same teaching-learning strategies employed by their own instructors, despite numerous changes in health care environments (Ironside et al., 2014). Although HFPS experiences are increasingly used in nursing programs, debriefing strategies vary due to a lack of consensus on best practices (Neill & Wotton, 2011). More research is needed to understand how the students' learning outcomes are affected by repeating a

HFPS scenario immediately following the debriefing. There is evidence suggesting that repeating the same scenario will help students make additional connections between theoretical concepts and practical applications while strengthening their ability to recall and implement theoretical knowledge into patient care (Luctkar-Flude, Wilson-Keates, Tyerman, Larocque, & Brown, 2017).

Research Questions

1. What are undergraduate nursing students' perceptions of HFPS as a learning strategy?
2. What are undergraduate nursing students' perceptions of repeating a HFPS scenario as a learning strategy?
3. How do different pedagogical strategies for high fidelity simulation impact students' learning outcomes?
4. What suggestions do undergraduate nursing students have for improving their HFPS experiences?

Conceptual Framework

The conceptual framework for this study draws on Vygotsky's (1978) *Social Development Theory*, Kolb's (1984) *Experiential Learning Cycle,* and the National League for Nursing/*Jeffries' Simulation Theory* (2012; Jeffries, 2005).

Vygotsky's Sociocultural Theory

Vygotsky's was a Russian psychologist whose sociocultural theory of cognitive development influenced the development of social constructivism (Lourenco, 2012). Constructivism is a theory of learning whose philosophical roots can be traced to Dewey, Hegel, and Kant and rests on the ontological belief that while an external reality may exist, it can only be known through experience (Doolittle, n.d.). Constructivism exists on a continuum with

cognitive constructivism and radical constructivism at the extreme ends and social constructivism laying somewhere in between (Doolittle, 2014). Although these types of constructivism differ in some respects, they all endorse the epistemological position that learners are active agents in knowledge creation; experience is vital to the knowledge creation process; and that knowledge reflects different representations of reality (von Glasersfeld, 1996).

Social constructivism stresses the interactional nature of knowledge creation through interactions between the learner and the environment, including other learners. Vygotsky (1978) believed that knowledge acquisition is the product of interactions with peers and teachers using culturally relevant signs (e.g., language, writing, number systems) and tools (e.g., HFPS, pencils, and computers). From this view, knowledge creation is the "process of building internal models or representations of external structures as filtered through and influenced by one's beliefs, culture, prior experience, and language, based on interactions with others, direct instructions, and modeling" (Doolittle, 2014, p. 487)

Social constructivism differs from the traditional view of the teacher as the knowledge expert, whose responsibility it is to transmit knowledge to the student (Kay & Kibble, 2016). In the latter, students are considered passive recipients of this information and the emphasis is on development of knowledge outside the context in which it may be used (Fox, 2001; Stoilescu, 2016). Teaching, assessments, and evaluations are separate functions in these types of teacher-centred paradigms. The teacher controls the learning experience, while students are expected to work alone on activities and tasks and are accountable for making their own decisions and progress (Stoilescu, 2016). In contrast the central tenet for teaching and learning from the social constructivism perspective is the social and cultural nature of knowledge (Fox, 2001; Stoilescu, 2016). Social constructivists believe that teaching and learning involves sharing and negotiating

knowledge creation and are influenced by their experiences (Stoilescu, 2016). Learning is an ongoing process rather than an outcome (Yilmaz, 2008) and the teacher is not the expert and holder of all knowledge, but assumes the roles of facilitators and coach within the culture of learning, which is cooperative and collaborative. Students are equal participants in the learning process and contribute their life experiences, beliefs, and worldviews (Bigge & Shermis, 1999). Learning success is linked to how well students learn as individuals and work together as a team (Uschi, 2005).

Central to Vygotsky's (1978) sociocultural theory are the concepts of zone of proximal development (ZPD) and scaffolding.

Zone of Proximal Development. According to Vygotsky (1978), the ZPD is the distance between the learner's current level of knowledge/ability and the level of knowledge/skill that may be achieved through interactions with a more knowledgeable other (MKO); (e.g.; teacher and peers). (See Appendix A).

Scaffolding. Scaffolding is the support and guidance MKOs provide to learners as they help in the developing of new knowledge. Scaffolding involves building interest in the subject and engaging the learner; breaking large tasks into sub-tasks; focusing on the subtasks as goals for achieving the global task; and supporting the student through modelling and completing the task, allowing the student to internalize the process (Bigge & Shermis, 1999). The MKO uses scaffolding to extend the range of what a learner can do by providing support only when needed, which allows the learner to accomplish new tasks (Bigge & Shermis, 1999). It is through the collaborative process of discussing ideas and completing tasks that learners develop new understandings and knowledge (Bigge & Shermis, 1999).

According to Vygotsky's (1978) sociocultural theory, cognitive learning happens through social interactions before it is internalized. This is important for educators when planning HFPS scenarios because they provide students with opportunities to observe and to model how to provide nursing care and to link theory to practice. The HFPS scenario provides a psychologically safe environment in which to facilitate students' engagement in the learning process either as care providers or as observers. When they begin the scenario, students are in the ZPD (Vygotsky, 1978) and the instructor's careful scaffolding of the HFPS scenario allows students to build on their prior knowledge and life experiences through their interactions with MKO. Scaffolding the learning activity means that the knowledge and skill required to meet the learning objectives are just a step above what the students are capable of on their own without support. Repeating the HFPS scenario offers opportunity for the deliberate practice required for students to gain more confidence and competence. Vygotsky's (1978) informs the organization of learning activities that students are expected to master throughout the curriculum in a sequential order.

Kolb's Experiential Learning Theory

Kolb's Experiential Learning Theory (ELT) also offers a fundamentally different view of the learning process than traditional theories of learning. ELT is similar to constructivism in how it conceptualizes knowledge construction. Building on the theoretical works of Vygotsky, Dewey, Lewin, and Piaget, and ELT focuses on students' experiences as central to the learning process (Kolb, 1984).

The following propositions underpin the ELT (Kolb & Kolb, 2005):

- The primary focus is on engaging students in a process that enhances their learning and this process includes feedback on the effectiveness of their learning efforts

- All learning is relearning; drawing on students' beliefs and ideas about a topic that can be explored, tested, and integrated into new, refined ideas.
- Difference, disagreement, and conflict are the motivating factors in the learning process, which stimulate reflection, action, feeling, and thinking.
- Learning is a holistic process integrating thinking, feeling, perceiving, and behaving from previous experiences with new experiences.
- Knowledge is created and re-created based on the learner's experience.

Kolb (1984) visualizes the ELT cycle as a four stage circular model involving experience, perception (reflection), cognition (thinking), and behaviour (acting). According to Kolb, optimal learning occurs when students have moved through the complete cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation. (Appendix B: Kolb's Experiential Learning Cycle). The ELT begins with a concrete experience (e.g., a HFPS) that provides a focal point for learning, giving context and subjective meaning to abstract concepts, while providing a shared reference point for testing implications and validating ideas created during the learning process (Kolb & Kolb, 2017). Reflection is the second stage in the ELT. Students reflect on and share their experience from many perspectives. Abstract conceptualizing is the third stage where students create and apply concepts that integrate their observations into logically sound theories. In active experimentation, students develop new theories to base future decisions upon and solve problems (Kolb & Kolb). It is important to note that each stage is equally important in contributing to the learning process (Kolb & Kolb).

> Experiential learning cycle is actually a learning spiral. When a concrete experience is enriched by reflection, given meaning by thinking, and transformed by action, the new experience created becomes richer, broader, and deeper. Further iterations

of the cycle continue the exploration and transfer to experiences in other contexts. (Kolb & Kolb, 2017, p 81)

Like Vygotsky's (1978) sociocultural theory, ELT emphasizes that students are active in constructing new knowledge and understanding from what they already know and believe, based on their previous experience. Furthermore, what becomes an appropriate response will depend on the perspective used to judge it. Experiences that activate vivid sensory attention and emotions, like those associated with HFPS, are more likely to produce strong episodic memories and facilitate long-term knowledge retention (Kolb & Kolb, 2017).

Kolb's (1984) ELT informs HFPS in that learning is a cyclical process that is continually modified and recreated within each individual based on experiences. Everyone enters the HFPS scenario with prior knowledge and set of expectations based on their life experiences. The experience during the HFPS along with reflection and critical discussions in the debriefing help students facilitate the creation of new knowledge about patient care. Reflection and discussion also helps students develop critical thinking skills, which are necessary for subsequent transfer of knowledge into practical situations. Repeating the HFPS scenario provides students the opportunity to immediately practice feedback strategies discussed during the debriefing. The repeat HFPS also provides another opportunity to re-reflect and compare both patient care experiences further enhancing learning outcomes.

Jeffries Simulation Theory

The National League for Nursing (NLN)/Jeffries Simulation Theory (Jeffries, 2012; Jeffries, Rodgers, & Adamson, 2015) aligns well with Vygotsky's (1978) social constructivism and Kolb's (1984) ELT. "The simulation experience is characterized by an environment (context) that is experiential, interactive, collaborative, and learner centered" (Jeffries et al.,

2015, p. 292). Effective teaching and learning outcomes using simulation are dependent on educator and student interactions, expectations, along with the roles of each during the simulated experiences (Jeffries, 2005). The NLN/Jeffries Simulation Theory consists of five major concepts: facilitator (nurse educator), education strategies, participant (student), design characteristics, and outcomes. Appendix C illustrates how these five components interact which are described below.

Educator. In the NLN/Jeffries Simulation Theory, nurse educators are essential to the success of simulation activities (Jeffries, 2005). The educator plans the patient scenario that links learning outcomes and course objectives to students' levels of knowledge and abilities. The simulation experience can be used either for learning or evaluation purposes. The educator's role will vary according to the purpose of the simulation experience. The usual educator's role is to provide the emotional preparation of students "to support them in their discovery of learning throughout the simulation experience" (Adamson, 2015, p. 285).

Educational Strategies. Educational strategies integrated into simulation experiences that advance students' simulation-based learning include active participation, prompt feedback, and reinforcement of learning (Jeffries, 2005). The creation of realistic clinical problems engages students in the learning process. The more authentic the patient experience (i.e., the higher the fidelity) the greater success students have in suspending their disbeliefs to fully engage with the scenario. Educators can also build in multiple scaffold strategies, such as cuing, altering patient responses, encouraging peer collaboration, and changing student roles (family members, charge nurse), to support students' learning, to guide students' performances, and to reinforce knowledge. During the simulation experience, the educator can also adjust the flow of the planned progression along with the timing of activities, allowing students the opportunity to

reflect on their progress within the simulation. During post-scenario debriefing, students are encouraged to reflect on alternative clinical approaches that differ from their own. Research has identified that the strategies of feedback, expert modeling, and interaction between facilitators and peers improves students' learning and performances (Abe et al., 2013).

Students. Students are responsible for their own learning. The expectation is that they prepare and engage in the simulation learning experience (Jeffries, 2005; Jeffries, 2015). Jeffries also acknowledges that student attributes, such as age, level of anxiety, personal goals, readiness to learn, preparedness, and self-confidence, affects their learning experiences. Role-playing different roles, such as nurse, family members, observer, patient, or other healthcare team members, can expand students' understanding of the patient's problem from different perspectives. Role-playing engages students and promotes full immersion in simulation activities.

Simulation Design. The simulation design must support course objectives, students' knowledge, skill competencies, and learning outcomes. Educators must carefully consider each component of the patient care experience: the learning outcomes, fidelity, complexity, cues, and debriefing. The fidelity of the environment engages the student and enhances the quality of the simulation experience (Jeffries et al., 2015). The scenario begins with relatively limited patient information. As students' progress through the scenario completing assessments and interventions, they receive more details about the patient's healthcare problem(s). Debriefing of the patient experience allows students to reflect on their progress in achieving the learning outcomes.

Outcomes. The NLN/Jeffries Simulation Theory focuses on three areas: participant, patient, and system outcomes (Jeffries et al., 2015). Most of the nursing research has focused on

participant (student) outcomes of learning (changes in behaviour, skills, and attitudes), reaction (satisfaction and self-confidence), and behaviours (how learning transfers to the clinical environment) (Jeffries, et al.).

Terminology

Many of the definitions used in this study are adapted from the INACSL Standards of Best Practice: Simulation Glossary (2016).

Clinical judgement: a process of noticing, interpreting, responding and reflecting. It is the way nurses and nursing students come to understand the problems, issues, or concerns of patients, to attend to salient information, and to respond in concerned and involved ways (Tanner, 2006). Effective clinical judgment is necessary to ensure patient safety and quality nursing care (Fedko & Dreifuerst, 2017).

Clinical practice: an actual or simulation-based experience related to the care of an indiviudal and their family which permits opportunities for application of knowledge, skills, and attitude (INASCL Standards Committee, 2016).

Clinical reasoning: more than critical thinking as it also "focuses on the ability to adapt in changing clinical situations, including the ability to take the context, patient and relatives into account" (Jeppesen, Christiansen, & Frederiksen, 2017, p.119). It blends cognition and reflective thinking (metacognition) with the goal of delivering safe, quality patient care (INASCL Standards Committee, 2016).

Competence: overall display by a nurse, in the professional care of client(s), of the knowledge, skill, and judgment required in the practice situation (INASCL Standards Committee, 2016).

Competency: ability to perform a specific role or skills based on standardized criteria (INASCL Standards Committee, 2016). The critieria includes a set of defined behaviours that guide the

identification, development, and evaluation of one's ability to perform a specific role. (INASCL Standards Committee, 2016).

Critical thinking: validation of data and assumptions through the process of conceptualizing, analyzing, synthesizing and evaluating information gathered from one's observations, experiences, relfections, reasoning, or communication (INASCL Standards Committee, 2016). This is a purposeful, goal-directed thinking process based on evidence (INASCL Standards Committee, 2016).

Debriefing: a form of interactive, 'reflective practice' that is critical to maximizing learning during and following the simulation experience (Sawyer, Eppich, Brett-Fleegler, Grant, & Cheng, 2016). During debriefing students are encouraged to explore their emotions, perspectives, and clinical decisions with the support of peers and educators. The purpose of debriefing is to support students' transfer of learning to future patient care situations.

Deliberate practice: repeat performance of targeted skills or concepts coupled with frequent assessments of performance and specific feedback within a controlled setting, with the intent for improvement (Joyce, Bryne, O'Connor, Lydon, & Kerin, 2015).

Educator: a faculty or clinical instructor who guides and supports students during clinical or simulated learning experiences.

Fidelity: degree to which a simulation approaches reality. Simulation fidelity includes the physical, contextual, and emotional realism created that allows the participant to become immersed in the simulated scenario (The INASCL Standards Committee, 2011). Clinical realism is the integration of the patient scenario, environment, equipment, props, and the mannequin or standard patient (Kable et al., 2018).

High fidelity simulation: "as a technique, not a technology to replace or amplify real experiences with guided experiences, often immersive in nature that evokes or replaces the real world in a fully interactive fashion" (Gaba, 2004, p. i2).

Immersion: degree to which a student becomes engages in the learning experience responding to the simulated learning experiences using problem solving, critical thinking, and clinical judgment skills (Kable et al. 2018).

More knowledgeable other (MKO): this concept comes from Vygotsky's (1978) sociocultural theory and refers to an experienced or knowledgeable person who is willing to guide another in developing similar knowledge and expertise.

Outcome: changes in knowledge, skills, or attitudes as a result of the simulation experience (INASCL Standards Committee, 2016).

Patient safety: involves "continually working toward the avoidance, management, and treatment of unsafe acts within the healthcare system" (National Steering Committeee on Patient Safety, 2002, p. 37)

Perception: a mental image or the interpretation of something, that one creates through knowledge, experiences, attitudes and beliefs. (Glerean, Hupli, Talman, & Haavisto, 2017).

Pre-brief: an information and orientation session held prior to the start of the simulation scenario in which instructions and preparatory details are given to students (Kim, Noh, & Im, 2017).The pre-brief also includes a discussion of confidentiality, outline of learning objectives, and notification of any video or audio recordings.

Reflection: being mindful of self, either within or after an experience, in order to confront, understand, and move towards resolving contradiction between one's vision and actual practice. It is a learning tool and considered an essential component of professional practice that allows

for the discovery of new knowledge that has the potential to change practice (Smit & Tremethick, 2017).

Scaffolding: this concept comes from Vygotsky's (1978) sociocultural theory and refers to the process by which concepts and skills are first introduced followed by the gradual withdrawal of support as the learner progress to becoming more independent in clinical reasoning and clinical judgments (Kable et al., 2018).

Scenarios: deliberately designed simulation experiences that provide students with opportunities to meet identified objectives. The scenario provides a context for the simulation and can vary in length and complexity, depending on the learning objectives and students' knowledge and skill abilities (INASCL Standards Committee, 2016).

Simulation: pedagogical strategy for teaching and learning that is based on real-life situations (Jung, Lee, Kang, & Kim, 2017). It is designed to provide students with a safe environment for learning and practicing clinical care without the risk of patient injury.

Zone of proximal development (ZPD): this concept comes from Vygotsky's (1978) sociocultural theory and refers to the difference between what a learner knows/can and what they could learn/do with the help of a more knowledg other.

Summary

This chapter provided a summary statement of the problem, the purpose of the study, and its significance to nursing education research. Vygotsky's (1978) sociocultural theory, Kolb's (1984) ELT, and the NLN/Jeffries Simulation Theory (2012) was presented as the conceptual framework for this study along with an explanation for repeating the patient simulation scenario after debriefing. Patient care is becoming increasingly complex, so to develop confidence in providing provide safe, quality patient care, nursing students require multiple opportunities to

practice core competencies. As an experiential learning strategy where educators control the learning environment, high fidelity simulations allow students to learn through practice, feedback, and reflection. Although there is a growing body of research on student outcomes, there is no consensus on best-practices of debriefing, relating specifically to method and confirmation of learning.

Chapter 2

Literature Review

Nursing is a Practice-Based Discipline

Patient safety concerns, technological advances, shortages of clinical placements, and inadequate patient care are driving changes in nursing curricula. Patients, governments, licensing boards, insurance agencies, and the public want assurances that nursing graduates have the foundational competencies for professional practice. The expectation is that graduates can apply theory, understand clinical manifestations of patient conditions, prioritize nursing care, make sound clinical judgments, collaborate as equal members of the interprofessional healthcare team, adopt new healthcare technologies, and provide increasingly complex patient care. The shift to program outcomes encompasses all aspects of nursing (CASN, 2015) and raises questions about current pedagogies used in classrooms, laboratory practice, and clinical experiences.

Nursing is both an academic discipline and a practice-based profession. Nursing curricula integrates theoretical knowledge, laboratory skills, and diverse hands-on patient care experiences. Clinical experiences are considered the gold standard in nursing education that supports students' capacity to link knowledge and practice (Benner, 2004; Jeffries, 2015b). The quality of clinical practice environments affects students' learning and their ability to apply theory, understand the clinical manifestations of patient conditions, learn organizational skills, prioritize nursing care, collaborate with peers, practice clinical decision-making, and develop sound clinical judgment. Clinical experiences allow students to understand patient experiences from a holistic approach (Walton, Chute, & Ball, 2011). However, in these times of rapidly advancing technologies, increasing complexity of patient care, and continuing external pressures

placed upon the profession, nurse educators are re-evaluating strategies used to ensure nursing students to have the required competencies to meet entry practice standards (CASN, 2015).

Clinical Standards for Practice Environments

In Canada, provincial regulatory nursing bodies have established standards of professional nursing practice, as well as, the foundational competencies students require for graduation (Saskatchewan Registered Nurses' Association [SRNA], 2013). The standards reflect the values and priorities of the profession and provide direction for nursing practice. Standards are the desired and achievable level of performance against which actual performance can be compared (SRNA, 2013). They are the minimum level of expected performance students are required to achieve prior to graduation. Clinical environments provide opportunities for nursing students to learn experientially, converting theoretical knowledge to patient care. Optimal clinical learning environments have a positive impact on students' professional development. The unpredictability of clinical environments risks students' development of self-confidence and their ability to achieve learning outcomes (CASN, 2015; Jamshidi, Molazen, Sharif, Torabizadeh, & Kalyani, 2016).

The CASN *National Nursing Education Framework* (2015) identifies six domains of practice learning at the baccalaureate level in Canada. These domains are knowledge, research and critical inquiry, nursing practice, communication and collaboration, professionalism, and leadership. The outcome expectations of these practice domains provide direction for the types of learning students require during their nursing program. Both classrooms and practice sites provide critical opportunities for students to apply and integrate theoretical knowledge with actual events. Nursing students learn to discern between relevant and irrelevant aspects of the

patient situation by relying on rules to direct their practice and the guidance of clinical instructors and nursing educators (Benner, 2004).

Nursing students typically participate in clinical practice courses in small groups of six to ten students and are supervised by clinical nursing faculty or clinical preceptors. The role of clinical faculty and nurse preceptors is to provide guidance and support to students as they enact the nursing process (i.e., assess, implement, and evaluate patient care), provide feedback and evaluation, and encourage reflection. Faculty feedback is important in helping students learn how to provide safe and competent care; gaining independence and confidence; and solidifying the development of one's professional identity. Constructive feedback helps students solidify their clinical reasoning, decision-making skills, and clinical judgment skills (Sawyer et al., 2016; Sundler, Pettersson & Berglund, 2015).

It is the role of nurse educators to ensure that nursing students acquire the necessary competencies by finding the most purposeful teaching methods and by encouraging learning through meaningful learning opportunities (Poikela, Ruokamo, & Teräs, 2015). The following section provides an overview of factors that affect the quantity, quality, and availability of clinical placement sites, and students' learning outcomes raising questions on best methods for implementing clinical education.

The Changing Nature of Clinical Practice Environments

Demographic changes, increases in patient acuity, shifts in health care services, advances in technology innovations, and increased patient safety concerns are influencing students' experiences in clinical environments (Gibbs et al., 2014; MacKinnon et al., 2015; Thomas & Mraz, 2017). Competition for student placements on speciality units, such as maternity, pediatrics, and mental health, results in limited opportunities for students to practice and

demonstrate clinical competence in these area (Curl, Smith, Chisholm, McGee & Das, 2016; Edwards, Boothby, Succheralli, & Gropelli, 2018; MacKinnon et al., 2015). Many nursing education programs are using alternative community placements, such as daycares, homeless shelters, obstetrician offices, outpatient departments, parishes, corrections, and international sites (Baumann & Chung, 1998; Lubers & Rossman, 2017). As these community placements become more difficult to access, or are saturated with student numbers, nursing programs are increasing the percentage of high fidelity simulations as a replacement for clinical experiences (CASN, 2015; Hayden et al, 2014; MacKinnon et al., 2015).

***Demographic changes*.** Seniors are the fastest growing demographic sector in Canada. In 2017, for the first time in history, the number of Canadians 65 years or older is greater than the number of children 0 to 14 years of age (Statistics Canada, 2015). By 2024, Canadians 65 years and older will account for over 20% of the population (Statistics Canada, 2015). Medical advances allow aging populations and those with chronic conditions to live longer, often with more comorbidities (Gruneir et al., 2016). This change in population demographics will require a shift of emphasis in nursing education to include a holistic understanding of the management of chronic disease care and related complexities (Gillespie, 2017).

The demand for nurses to provide continuing care to seniors in homes, community, and facility living settings is projected to grow, as the proportion of seniors in the Canadian population will rise from 16.9% to 21% over the next 10 years (Gibbard, 2018). Currently seniors make up one-fifth of the Canadian population, but consume nearly half of all health care dollars (Gibbard). Meeting the health care needs of an aging population will drive the costs of health care for the average senior higher compared to the rest of the population. Increases in chronic diseases, complex social and health needs, and the desire to remain in one's home

environment are significant issues for seniors, governments, and health care providers. To address the growing needs of older adults, nurse educators will need to expand curricula content on gerontology, chronic disease management, and end-of-life choices. The management of caring for frail older adults presenting with non-specific falls, delirium, and incontinence problems can be as challenging and complex as the management of shock, respiratory distress, and cardiopulmonary arrest. Clinical assessments, diagnoses, and holistic, problem-solving approaches needed to manage the comorbidities and complexities of older adult care require a coordinated team approach to ensure the frail elderly retain as much autonomy and functional capacity as possible. To ensure nursing students can deliver the quality of care required by seniors facing worsening chronic disease outcomes, nurse educators will need to target geriatric experiences and care in the nursing curriculum.

The complexity of care required by the geriatric population will also require a coordinated team approach. For most of the health care curricula this means a shift in teaching from silos with little interaction among disciplines to interprofessional education where students from different professions "learn about, from, and with each other to enable effective collaboration and improved health outcomes" (Hermann, Head, Black & Singleton, 2016). Adding multiple interprofessional educational experiences to already content-ladened curricula is a challenge that requires additional faculty resources, time commitments, and careful scheduling (Hermann et al.).

***Shorter patient length of stay*.** Changes in the delivery of acute care services and patient care means more intense, but increasingly shortened patient-nurse interaction times (Jarvis & Rivers, 2014). Reducing lengths of stay means more rapid patient turnover, increased workload for staff nurses, and the possibility of compromised quality of care. With rapid patient turnover,

discharge instructions become increasingly brief and supplemented with generic handouts yielding minimal individualized care. Shorter lengths of stay make it difficult for educators to select appropriate patient assignments and numbers of patients for each student to provide care (Nehring & Lashley, 2009). For nursing students, the rapid turnover of patients means students are unable to implement care outlined in their care plans. Meanwhile, nurse preceptors encounter time constraints to mentor the students, as the delivery of patient care is the priority over students' learning in clinical settings. Hands-on practice promotes students' application of theory and principles, develops critical thinking and clinical reasoning skills, along with communication skills (Ayers et al., 2015). Inadequate hands-on practice creates risks for patient safety, as students are inexperienced care providers with limited knowledge and assessment skills on which to base their clinical decisions.

Shortened lengths of patient stays mean the responsibility of care shifts from hospitals to family members with an increased focus on home care emerging as an essential element of the health care system to provide more effective and efficient care. Home care clients are becoming increasingly complex requiring nurses to have a broad spectrum of clinical skills and knowledge. The increased use of laparoscopic techniques in surgical care reduces length of patient stays by more than fifty percent. Thirty years ago, cholecystectomies were 'open' surgical procedures requiring seven to ten days of post-operative care in the hospital, whereas today they are 'same' day laparoscopic procedures. The expansion of laparoscopic procedures to cardiac procedures (Mayo Clinic, 2018) and same day total hip arthroplasties (Canadian Agency for Drugs and Technologies in Health, 2017) are options for selected patients. Changes in medical procedures and treatments, and shortening lengths of patient stays require a greater emphasis on patient education, communication, and collaboration among the multidisciplinary team. Laparoscopic

hip arthroplasties require a multidisciplinary approach from the pre-operative assessment through to post-operative rehabilitation and early discharge care. Providing transitional care from hospital to home recovery is key in today's health care context of patient-centered care and for health optimization.

The shift in nursing care delivery affects students' learning experiences and their access to diverse yet similar patient care experiences. Students need more than one patient care opportunity to facilitate their understanding of key principles, concepts, and nursing care. Using maternal care for example, the average length of stay for normal deliveries continues to decrease from five days in the 1980s, to three days in the 1990s, to 2.3 days in 2016 (CIHI, 2018). Early maternal and newborn discharges reduce hospital costs and shifts maternal care responsibilities to family members with early home visits by public health nurses. Without adequate quantity and quality of clinical placements, students may not have sufficient opportunities to practice required maternal-infant assessments to demonstrate their ability to meet course outcomes and clinical competencies (CASN, 2015; Choi et al. 2016; MacKinnon et al. 2015; Missen, McKenna & Beauchamp, 2016; Terzioglu et al. 2016).

As hospitals treat fewer patients and discharge them earlier, the number of students that clinical units can accept at one time is also decreasing (Baumann & Chung, 1998). Access to clinical sites dictates whether educational programs can secure enough clinical placements for students to achieve entry to practice competencies. Nursing education administrators continue to explore alternate clinical placements for students' learning such as obstetrician and midwife practices.

***Higher patient acuity*.** Higher patient acuity, shorter patient encounters, restricted clinical group sizes, and limited time spent on nursing units mean students may be receiving more

observational experiences than 'hands-on' nursing care practice (Bland & Tobbell, 2015; Choi et al. 2016; Cummings & Connelly, 2016; Hayden et al. 2014; Smith, Spadoni & Proper, 2013). Nursing faculty at the University of Toronto and McMaster's University found anecdotal evidence indicating client care in acute care settings is becoming too complex for nursing students and is not compatible with teaching basic concepts and fundamental nursing skills.

> The acuity level of patients in hospitals and long-term care facilities challenges the skills of beginning level students, threatening their self-esteem and the safety of patients.…. Many community health agencies are prepared to support the needs of more advanced students but may not be prepared to provide more than observational experiences for students learning communication, teaching, health assessment… (Baumann & Chung, 1998, p. 2).

Patient care must always be prioritized over student learning experiences. Clinical group sizes, demanding patient workloads, and increased acuity levels influence the quality time nursing educators and preceptors can provide to support and guide one-on-one teaching for students. Some preceptors perceive supervising and facilitating nursing students in clinical settings as an additional responsibility, limiting students to only observing their practice thereby further reducing opportunities for students' hands-on practice experiences (Missen et al., 2016).

An integrative review on patient deterioration found that most adverse events are preventable if nurses can recognize and respond to the signs in a timely manner (Massy, Chaboyer, & Anderson, 2017). Observational experiences are not sufficient for students to develop competence in delivering safe patient care. Multiple patient care interactions benefits students' abilities to build a solid foundation of knowledge for future practice, thus resulting in fewer adverse events and an increase in patient safety.

Students need to be actively involved in patient assessments and nursing interventions to develop their organizational skills, situational awareness, critical thinking skills, clinical judgments, self-confidence, and competencies. Students require more than one opportunity with patients, (with particular diagnosis) to learn the intricacies of their assessments and care. Repetition increases students' abilities to recognize and identify early cues, which may indicate a change in patient condition, and requirements for further nursing interventions. Kolb's (2014) Experiential Learning Cycle suggests that repeating patient assessments and interventions could expedite students' learning outcomes by allowing them to test new care hypotheses and validate their clinical reasoning skills.

***Competition for clinical placement sites*.** The competition for clinical placements among various health care programs continues to increase with specific challenges in speciality units such as maternity, pediatrics, and mental health (Edwards et al., 2018; Hooven, 2014; Zournazis, Marlow & Mather, 2018). Nursing students tend to have fewer shifts on these units, minimizing their exposure to clinical experiences, and hindering their ability to demonstrate clinical competencies to meet course outcomes (Edwards et al.; Jarvis & River, 2014). Furthermore, students may not develop the critical reasoning skills required to care for patients with specialized needs (Edwards et al.). Strategies to address decreasing availability of hospital clinical placements include the use of non-traditional placements, such as schools, childcare centres, and rural clinical sites. However, some nursing students in non-traditional placements feel disconnected from the nursing profession, perceiving practice outside a hospital setting to be a less rigorous type of nursing practice especially when they are beginning to develop their nursing identities (Studnicka & O'Brien, 2016).

Edwards et al. (2018) used high fidelity simulation in an unfolding case study. The scenario begins with a patient's prenatal visit at 36 weeks gestation. As the scenario evolves, the pregnant patient at 38 weeks goes into labor and experiences a prolapsed cord. During the postpartum period, she hemorrhages. Six months later, the baby attends a well visit, followed by a visit at 10 months when the baby presents with vomiting, diarrhea, and signs of dehydration. Nurse educators developed this unfolding maternal scenario and integrated pediatric content to target specific learning outcomes and competencies. Using high fidelity mannequins, educators control the pace of the patient scenario, allowing students to administer medications and nursing care that is not achievable in fast paced or inaccessible clinical practice settings.

***Technological innovations*.** Health care technology is changing patient-nurse interactions and affecting students' clinical experiences. Technology-based equipment allows the delivery of patient care through different processes. Fetal and cardiac monitoring allows nurses to spend greater amounts of time away from the bedside, assessing and watching machine recordings and their outputs (Bowen & Prentice, 2016). From the patient's perspective, shifts in personalized assessments and care are balanced with the comfort of knowing that deviations can be noticed immediately, even when nurses are not co-located within the room. The use of technology has become a 'normal' component of nursing care and our lives. Nurses are responsible for managing many of the monitoring devices, ensuring proper attachment, and responding to system alarms (Brown & Prentice). The electronic capturing of patient information means more observational experiences for students because they cannot assume responsibility for patient monitoring systems.

Technological innovations are also reducing other patient safety risks. Electronic medication administration systems and electronic health records reduce medication errors,

streamline medication process, improve documentation, and communication between nursing unit staff and community services (Hassol et al., 2016). The ability to share and exchange patient information between care providers reduces the risk for gaps in patient care especially medications, treatments, and diagnostic results. The CIHI and the Canadian Patient Safety Institute 2016 report, on patient injuries in acute care hospitals, found 1 of every 18 hospital stays involved at least one harmful event for patients. Medication errors, missed general care, infections, patient accidents, and falls account for more than 65% of patient errors. The frequency and costs of medication errors is a significant threat to both patient safety and hospital operating budgets (Zimmerman & House, 2016).

Breitkreuz, Dougal, and Wright (2016) compared the risk perception attitudes of nursing students who received the standard error education (reviewed medication error content and watched movies about error experiences) to an experimental group of students who reviewed medication error content and participated in simulated error experiences (an adult and an infant scenario with two error situations embedded). Both education strategies increased students' intentions to be more cautious when administering medications; however, the simulated error experiences made participants more aware of how easily errors can occur. They found that nursing students correctly identified allergy risks (99%) but were less successful in identifying incorrect fluid rates (66%) and intravenous solutions (30%) during their patient assessments and care. Eighty-one percent of the students failed to identify at least one of the four embedded errors in the two scenarios (Breitkreuz, Dougal, & Wright, 2016). The use of HFPS technology allowed students to learn from their mistakes without detrimental patient effects.

Wilson and Maeder (2015) state tele-health and wearable monitoring devices are becoming more prevalent in healthcare. The use of tele-health and tele-monitoring permits

patients to self-monitor and self-manage their conditions with access to personalized feedback of emotional support and life-style coaching. Black et al. (2014) used remote monitoring and nurse coaching for patients diagnosed with heart failure. Nurses contacted patients weekly and then monthly after discharge to reinforce discharge teaching information and offer coaching on lifestyles changes. The ongoing follow-up telephone consultations provided patients with emotional support and averted re-admissions. Other tele-health studies were equally successful in supporting patients' self-care monitoring of blood glucose levels (Hanley et al. 2015) and heart failure outcomes when compared with traditional physician appointments for follow-up (Callender, 2016).

These studies highlight how technology is changing nurses' roles and the delivery of patient care. Business Communications Company (BCC) Research (2016) predicts remote patient monitoring devices will be the fastest growing segment of healthcare technology over the next five years. Decreases in physical size of monitoring devices, enhanced utility, usability, and portability of devices will enable more self-monitoring at home. Nursing roles will evolve to include case management and client navigation services offered by digital technology that assist patients in managing the complexities of their chronic diseases. Technology will greatly influence the delivery of future nursing care.

Summary of Changes in Clinical Environments

Innovative technologies are disrupting all aspects of health care –new knowledge, new problems, new treatments, new models of care, and new communication processes (Deutsch et al. 2016). Clinical practice environments are an integral part of undergraduate nursing education and have a major impact on students' learning. The quality of clinical practice placements affects students' abilities to link theory to practice, to meet nursing competencies, and to achieve course

outcomes. Patient experiences enhance students' development of psychomotor, communication, critical thinking, leadership, collaboration, and clinical judgement skills. New technological innovations are challenging clinical experiences for preparing students for practice suggesting they may no longer be functioning the way they were intended (Hooven, 2014). Being cognizant of limited opportunities to practice patient care, nurse educators are exploring innovative pedagogical strategies to address clinical shortfalls. More research is needed to understand when, how often, what group sizes, and which strategies are effective for using HFPS to support students' attaining program outcomes and competencies (Chen et al., 2015; Shin, Park, & Kim, 2015; Tun, Alinier, Tang & Kneebone, 2015).

Reviewing what has shaped the pedagogical strategies for simulation in nursing assists in the understanding of taken-for-granted assumptions about the way nurses are educated and encourages trying new pedagogical approaches. The next section provides an historical overview of simulation as a teaching resource in nursing education.

Simulation-Based Teaching and Learning in Nursing Education

Gaba (2004), a pioneer in simulation, defines simulation "as a technique –not a technology –to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner" (p. i2). More recently, the INACSL (2016) defined simulation as

> an education 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. (p. S44)

History of Simulation in Nursing Education

Throughout history, nurse educators have sought effective strategies to help students understand theoretical concepts and become competent nurses. Simulation, in its many forms, continues to be an integral part of nursing education. Early simulation models consisted of dolls and deceased babies. Physicians and midwives used these models to teach delivery techniques reducing maternal and infant mortality rates during the 18th century (Jones, Passos-Neto & Braghiroli, 2015). As in medical training, nursing education followed the apprenticeship model where learning occurred through observation and life experiences. Women would observe and assist an experienced midwife, attend friends and family childbirths, assisting during and after the birth (Gilkison, Giddings, & Smythe, 2013). Education, at the time, did not require any formal educational process. Midwives gained knowledge through their own childbirth experiences, the experiences of other women's labour, and alongside more experienced nurses or doctors, or by sharing practice stories (Gilkison et al.).

The early 19th century brought about changes in nursing training as many hospitals established schools of nursing. With every hospital having a school of nursing there was little control over the formal curriculum and the kinds of clinical experiences students received (Matejski, 1985). Hospital-based nursing programs "marked the end of the apprenticeship-style of learning through experience as the only form of learning", with the shift to an approach where knowledge was obtained from formal lectures given by doctors, senior nurses, midwives, and textbooks (Gilkison et al., 2013, p. 19).

When nursing education moved from the hospitals to educational institutions, the challenge of where and how to teach psychomotor skills become apparent (Anderson, Conklin, Watson, Hirst, & Hoffman, 1985). Nurse educators believed students who understood the theory

and principles behind nursing interventions would acquire the associated technical skills in practice (Anderson et al., 1985). However, this shift placed a burden on hospitals to provide extensive orientation programs to novice nurses for the practice of various skills (Anderson et al.). Students were also frustrated by the deficiency in technical skill preparation, which led to the return of skills laboratory classrooms where students demonstrated, practiced, and underwent testing of psychomotor skills prior to being allowed to practice on actual patients (Anderson et al.).

Skills Laboratory

The original structure of the psychomotor skills laboratory experiences relied on a range of teaching strategies to support students in achieving competencies in psychomotor skills. The strategies included completing assigned readings, watching videos of the task, observing a nurse educator demonstrate the skills, and following checklists outlining the sequence of steps (Anderson et al., 1985; Synder, Fitzloff, Fiedler, & Lambke, 2000). Although the skills laboratory lacked the contextual reality of the clinical setting, it did offer a controlled, safe setting where students could practice and perform skills (Synder et al.). Educators would question students' thinking processes, encouraging them to engage in peer observations, dialogues, and problem-solving to facilitate their understanding (cognitive abilities) as well as perform skills (psychomotor) (Synder et al.). Synder et al. reports that "students were prompted by faculty to consider factors that might influence their approach to delivery of the psychomotor skill and to think how they would adapt the skill to the hospital, home, or extended care setting" (p. 230).

Mrs. Chase debuted in 1911 as the first life-size mannequin to support students' learning of how to dress, turn, and transfer patients (Aebersold, 2018); however, *Resusci-Annie*

modernized simulation in the early 1960s (Bradley, 2006). Considered to have an advanced level of fidelity (realism), *Resusci-Annie* simulated learning and training of resuscitation concepts. The simulation of a dying patient, not breathing and lacking a heartbeat, allowed for training of ABCs (airway, breathing, circulation). Overlaying technology onto *Resusi-Annie* brought the first true computer-controlled mannequin called Sim One™. This mannequin had the capability of pulses, blood pressure, eye blinking, and responses to four intravenously administered medications and gases (Cooper & Taqueti, 2008). Very costly and ahead of its time, Sim One™ did not achieve mass acceptance for training (Cooper & Taqueti).

Introducing Technology

In comparison, military and aviation sectors both have a long history in simulation with early attempts reflected in chess, jousting, and war strategies (Bradley, 2006). In 1929, the first flight simulator called the 'Blue Box' was invented (Jones et al., 2015). The cockpit's technology controls could simulate flying motions and sensation (Jones et al.). The flight simulator provided a safe, controlled environment where trainers could be exposed to different levels of high-risk conditions that they would rarely experience in order to achieve flight expertise (Jones et al.). In the 1970s, the aviation industry made another training advancement; namely the 'crew resource management' program to address the human error aspects of air crashes and reduce miscommunication among flight crew members (Bradley, 2006). The objective for crew resource management is to train individuals to think and act as a team with safety as the common goal (McConaughey, 2008). This team approach to providing patient care and addressing work place issues has been adapted into the competency standards in nursing, medicine, and supporting therapies curricula.

Over the past thirty years, health education has adopted various elements of technology innovations that had become common in aviation training. Harvey, introduced in the late 1960s, is a half-bodied mannequin capable of reproducing cardiac and respiratory sounds (Jones et al., 2015). Harvey's effectiveness for teaching cardiac and respiratory skills was soon established in medical curricula, when students trained using Harvey showed increased confidence and ability to interpret similar findings on patients (Cooper & Taqueti, 2008). Patients did not report different behaviours for those trained with Harvey compared to students trained through traditional clinical methods (Cooper & Taqueti). The technological accuracy of cardiac and respiratory sounds that Harvey can present made it a platform for standardised testing of medical students and specialists (Cooper & Taqueti). Nursing standards have not integrated standardized testing of patient assessments or care to ensure competency to date.

Patient Safety

In 1999, the publication of "To Err is Human: Building a Safer Health System" brought patient safety to the forefront in health care (Kohn, Corrigan, & Donaldson, 2000). Patient errors cause injury and death, as well as increased costs to the health care system, and an emotional toll on patients, families, and care providers. Patients, who have a harmful event during their hospitalization, are four times more likely to die in hospital than those who did not experience such an event (CPSI, 2016). Patients, families, professional organizations, and governments are increasingly demanding assurances that health care students graduate with the necessary collaborative skills to provide quality patient care. To address these patient safety issues and societal pressures, educators from different disciplines are implementing interprofessional learning opportunities into their curricula (Behan & Van Der Like, 2017). Education that has traditionally been delivered to discipline-specific student groups by educators from that

discipline are being shifted to interprofessional learning opportunities (Behan & Van Der Like, 2017). Simulated healthcare environments allow students to concentrate on effective communications among professions while they learn details of each other's roles and responsibilities. Through collaborative practice, students become more effective functioning care providers with the goal of improving patient safety. Addressing patient safety issues in health care is comparable to crew resource management programs integrated in aviation curricula.

Simulations are classified according to their realism or fidelity and include anatomical models, part-task trainers, role playing, standardized patients, virtual reality, and low-fidelity to high-fidelity mannequins (Gaba, 2004; Nehring & Lashley, 2009). Although anatomical models, task trainers, and role-playing have been used for the past century, technology enhanced models have only been introduced into nursing education in the past 30 years (Nehring & Lashley).

High Fidelity Simulation to Teach Psychomotor Skills

High fidelity patient simulations are computerized mannequins, programmed to present a range of patient signs and symptoms, reflective of complex physiological responses to various disease processes. The purchase of computerized mannequins requires an initial capital investment as well as ongoing investments for faculty development. "A skilled educator is a prerequisite for effective simulation-based learning" (Bøje et al., 2017, p. 54).

HFPS are learning strategies targeting patient care experiences used to support students understanding of healthcare. Simulations are immersive learner-centered strategies that require students' engagement and suspended disbelief to enhance their learning (Rooney, Hopwood, Boud, & Kelly, 2015). In advance of students' simulated experiences, educators can carefully select and control the contextual variables reflective of students' level in the nursing program (Beroz, 2017). Patient care scenarios range from stable to unstable patients with common to

uncommon diagnoses. In comparison to the random presentation of patient conditions in hospitals, simulation experiences can be planned with predictable outcomes. Educators can match patient scenarios to course objectives, classroom theory, and an individual or student group's level of knowledge and understanding. HFPS is one of many pedagogical strategies used to develop students' professional identity as safe healthcare providers.

HFPS scenarios provide students the opportunity to learn from theory-practice gaps without the fear of consequences of action or patient injury. Well-designed simulation strategies support students' understanding about the consequences of their actions or inactions, and the need to reduce errors to prevent recurrence. Students' errors in clinical decisions or judgments can continue to their natural conclusion helping to crystalize theory into practice. The mannequin programmed to support this learning outcome, contextualizes the learning experience (Causer, Barach, & Williams, 2014).

The simulation technology also allows the timeline of patients' events to be slowed or advanced. Adjusting the timeline allows students' to more readily evaluate the systematic impact of their actions and decisions. The scenario of an adolescent receiving perinatal, delivery, and postnatal care presented previously provides an example of an adjusted patient timeline using high fidelity simulation. Parish et al. (2008, p. 5) states students can 'stop the world' and 'step outside of the patient encounter to review and understand it better.' Immediate feedback focuses learning on teachable moments, with the opportunity to repeat the learning experience, rather than being dependent on future patient presentations in clinical environments (Bugaj & Nikendei, 2016; CASN, 2015). According to Bugaji and Nikendei (2016), HFPS learning occurs as a result of "actions into knowledge" versus "theory into practice".

Simulation-based learning activities guarantee experiences for all students. Simulated patient scenarios can reduce learning variability and increase standardization, as well as being customized for individual learning needs (Dunnington, 2014). Simulation experiences allow students to practice technical and non-technical skills including communication, teamwork, delegation, and leadership. Borrowing from aviation's crew resources management, interprofessional patient scenarios provide students the opportunity to practice their role as members of the healthcare team. Learning and practicing as a team will improve patient care outcomes as students become more comfortable with receiving feedback about their clinical performance and as members of the healthcare team (Lestander et al., 2016).

In summary, the rapid changes occurring in healthcare necessitate new pedagogies in nursing education programs to prepare students for practice. The use of HFPS enables experiential learning in a safe environment. However, more research is required to identify best practices for students' learning that will transfer to patient care and improve patient outcomes using HFPS.

Replacing Clinical Practice Hours with Simulation

Norman's (2012) systematic review on simulation outcomes in nursing education, from 2000-2010, found simulation to be useful in creating a learning environment that contributes to students' knowledge, skills, safety, and confidence. However, there was a gap in the literature pertaining to the transfer of learning outcomes to the clinical setting. Stroup's (2014) integrative review concurs with Norman's results. Stroup (2014) used Kirkpatrick and Kirkpatrick's Four Levels of Evaluation (2005) to review simulation usage in nursing fundamental courses. Studies showed that simulation was equivalent to traditional teaching methods for cognitive and psychomotor skills. Level one of Kirkpatrick and Kirkpatrick's tool assesses the reactions of the

participants to simulation scenarios. Stroup (2014) found faculty and students were satisfied with simulation as an educational strategy. Faculty viewed the ability to develop scenarios linking theoretical content to clinical areas as a definite strength for simulation. Kirkpatrick and Kirkpatrick's Level two evaluation criteria assess students' learning as a result of the simulation experience. Some students were unable to apply previously tested cognitive knowledge to patient care during simulated scenarios (Stroup). Levels 3 and 4 of Kirkpatrick and Kirkpatrick's evaluation criteria assess students' ability to transfer simulation knowledge to patient care along with their long-term professional implications. Level 3 evaluation criteria assess students' behavioural changes and improvements after applying the skills in practice. Level 4 evaluation criteria assess the results on patient care outcomes. No studies in Stroup's review met Level 3 or 4 criteria. More research is needed to identify best practices for transferring learning to patient care in undergraduate nursing programs related to HFPS.

A review conducted by Cant and Cooper (2017) on simulation experiences for 2010 to 2015 concurred with Stroup's analysis. Their review included 25 systematic reviews of simulation literature in nursing education comprising more than 700 students, conducted during the previous 15 years. They found simulation experiences improved nursing students' knowledge and clinical skills, self-efficacy, confidence, and competence. However, they noted most of the research outcomes were self-reported. The lack of high quality research designs and multiple measuring instruments affected study comparisons and limited review findings.

In 2014, the NCSBN revealed the results of its large-scale, randomized, controlled simulation study comparing three groups of students (Hayden et al., 2014). The students had 10%, 25%, or 50% of their traditional clinical hours replaced with simulation. The study sample included students entering the fall term of 2011 from initial nursing programs, accelerated BSN,

or degree completion programs. Over a thousand nursing students, from 10 undergraduate nursing programs in the United States enrolled in the study with over 660 participants completing the study requirements.

Researchers found no significant differences in learning outcomes based on cognitive assessments and clinical competencies across simulation/traditional groups. Comprehensive knowledge assessments and NCLEX examinations results were used to evaluate cognitive learning outcomes. Preceptors and clinical educators evaluated clinical competencies and were unable to identify any significant differences among student practices. Nursing managers evaluated readiness for practice and overall clinical competencies for the cohort group of participants for six months after employment. The nursing managers could not identify difference among students who had varying amounts of clinical hours replaced with simulation. Results from this national study provided the nursing community the needed evidence for substituting clinical simulations for clinical time, provided the standards of best practice for simulation are adhered to (Hayden et al. 2014). Zulkosky, Husson, Kamerer and Fetter (2014) also recognize the importance of having trained faculty to champion simulation integration in nursing curricula.

Pedagogy of Simulation Education

The NCSBN multisite, randomized controlled study provides evidence that simulation works as a substitute for up to 50% of clinical practice if based on best-practice standards. Nonetheless, many questions remain about how, why, when, for whom, and under what circumstances simulation may or may not be effective. One distinction differentiated between simulation-based education and simulation-augmented education pedagogies is the nature of the education experience (Haji et al., 2014). Haji et al. distinguished between *knowledge builders*

and *knowledge users*. The former are involved in simulation research that generates evidence on the use of simulation as a pedagogical tool while the latter use this evidence in the education and training of nurses and other healthcare practitioners. Simulation-augmented educators are interested in developing a robust understanding of strategies and best practices for curriculum integration.

Knowledge Users

Balancing Simulation with Clinical Experiences

Comparable to the NCSBN study, Curl et al. (2016) evaluated the effectiveness of using HFPS to replace 50% of traditional clinical experiences. Using a ratio replacement time of one hour of simulation experience for two hours of clinical time, the researchers targeted obstetrics, pediatrics, critical care, and mental health clinical experiences. The control group attended traditional clinical learning experiences while the intervention group received a blend of traditional clinical experiences and simulation experiences. Curl et al. found significant differences between the high fidelity simulation group and the control group based on specialty exam scores using NCLEX-RN success as the measuring instrument. The intervention group achieved higher examination scores, ostensibly related to strategic scheduling of high fidelity simulation case scenarios to correspond with didactic course content. It is noted that no details were included on the students' performances except for the pediatric group where students reported that the trauma and accident simulation experiences improved their critical thinking and increased their confidence in technical skills.

Ongoing research is required to understand how the alignment of didactic classes to simulation and clinical experiences influence patient outcomes. Kimhi et al. (2016) studied the placement of HFPS either before or following clinical experiences. They measured students'

confidence for implementing the nursing process. They focused on students' assessments, communications, data collection, specific interventions, ability to develop nursing diagnoses and evaluation. Using a randomized, double-crossover design, Kimhi et al. measured students' self-efficacy three times during the study: prior to any clinical or simulation experiences; during the time that students switched to the opposite learning event; and at the end of both activities. Kimhi et al. found that the overall influence of clinical experiences was stronger. However, the order of the two interventions, specifically clinical experiences before simulation or simulation before clinical experiences, made no difference in the final analysis. The additional time students spent in clinical area compared to HFPS experiences is a possible explanation for the stronger influence of the clinical experience.

Lighthall, Bahmani, and Gaba's (2016) study also evaluated the effect of didactic content prior to simulation experiences for other health care learners. Lighthall et al. assumed lectures would have a positive impact on medical students' performances allowing them to conduct more effective patient care. Educators used quizzes to establish baseline measurements of students' understanding of theoretical knowledge prior to the HFPS scenario. The performance scores of both interns and residents for managing septic shock were no better when the lecture preceded the simulation, despite increased theoretical knowledge scores.

Lighthall et al. (2016) reported that the transfer of knowledge from lecture to patient care is difficult to assess for beginning or advanced students. "The effectiveness of a lecture in embedding knowledge can be measured with a written test (knows) but that cannot determine the degree to which such knowledge becomes 'deployable' (knows how)" (Lighthall et al., p. 19). This lack of knowledge transfer from classroom lectures to patient care raises questions of students needing time to process, consolidate, and compare information prior to deployment of

that information. Lighthall et al. questioned the value of lectures prior to simulations; the possibility of cognitive overload related to the simulation activity and that knowledge does not always transfer into action; the need for deliberate practice; and the importance of multiple clinical experiences for students to apply critical thinking and decision-making skills. In today's technology-based learning environments, the transmission of knowledge is no longer simply linear from educator to student; it has become circuitous, non-logical, and socially constructed (Mackintosh-Franklin, 2016).

Using HFPS in the Classroom

Hooper, Shaw, and Zamzam (2015) evaluated the effect of using high fidelity simulations as a teaching method to replace didactic lectures in a large classroom. Their goal was to determine if students' knowledge would increase on quiz scores when only a few individuals actively participated in the simulation and the majority of students observed the simulation. Would student observers, considered passive learners of the simulation experience, achieve learning outcomes equal to students who actively engaged in providing patient care? Hooper et al. presented six medical-surgical high fidelity simulations over a three-week period. Scenarios were video streamed from the laboratory into the classroom. Observers in the classroom completed a performance check sheet assisting them in identifying critical tasks for each simulation. Both care providers and observers participated in the facilitated debrief. Hooper et al. found that large classroom simulations did have a positive impact on learning outcomes. When comparing large classroom outcomes for traditional students to second-degree students, those who already have a bachelor's degree in another field, the traditional group of students achieved greater increases in post-simulation quiz scores. The possibility of being randomly selected to be the care providers may have contributed to students' classroom preparation and improved their

learning outcomes. This study only reported cognitive outcome scores, although students, in the classroom, would have observed and assessed the care providers' performance skills, noted their critical thinking, skill fluency, and clinical judgments skills. The use of performance checklists guided observers to be more critical of students "onstage performances" during the simulation scenario. Observers could identify mistakes in nursing care interventions, poor decisions, or missed communication opportunities. As role models, the care providers support observers' learning when providing proficient nursing care, as well as when they make missteps in clinical decision affecting patient care outcomes. Both positive and negative learning experiences contribute to students' learning outcomes without the risk of patient injury, but with the opportunity for further discussion and clarification. During the classroom debrief the care providers discuss their anxiety about performing in front of a large group along with rationales for their clinical decisions and care; however, the study did not reports theses details (Hooper et al., 2015).

Hooper et al. only included students' cognitive scores with a noted comment about a decrease in the pulmonary embolism post-simulation scores. This interesting comment makes readers wonder about the care providers performance discussed in the debrief that contributed to the decrease of the class's overall cognitive scores. Did any of the students complete the pre-briefing course resources? Did the checklist accurately reflect the nursing care for a patient with a pulmonary embolism? Was the nursing care critically evaluated or questioned during the debriefing and how was it compared to the checklist?

Berndt et al. (2015) integrated an unfolding HFPS case study as a classroom strategy. The HFPS scenario involved morning care for a surgical patient diagnosed with congestive heart failure, who develops complications requiring additional nursing interventions. In this study,

students observing in the classroom could communicate and offer guidance to the care providers via web camera. As per INACSL standards, students received background information on the patient prior to assuming responsibility for the patient's care. The scenario lasted 15 minutes and then the entire classroom debriefed, prior to the next group of students assuming the ongoing care provider roles. The classroom debrief helped students' linking practice to theory. Educators validated that students could identify the patient's priority concerns along with nursing interventions to manage those problems. Debriefing throughout the unfolding case study ensured students 'shared the same situational understanding' about what situation was being addressed; the status of the patient problem; and how the group of care providers were going to respond to the situation and coordinate their actions to achieve that response (Harris, Eccles, & Shatzer, 2016). The debriefing session continued throughout the unfolding case study after each small group of students completed their patient care. Each group of care providers would determine the effectiveness of the previous group's interventions, prioritize their assessments, and continue planning the next steps of patient care. This process continued until every group of care providers had an opportunity to participate in the HFPS scenario. Debriefing each section of the case study reduced students' ambiguity that another care provider would provide the appropriate care. According to Harris et al. ambiguity in one's role is a common feature contributing to patient safety, with "one caregiver could (erroneously) assume that another caregiver would provide the appropriate care" (p. 214).

Students identified the debriefing discussions giving them a clearer understanding of the patient situation and helped them anticipate future patient needs (Berndt et al., 2015). Mirroring teamwork as in clinical settings, nurse educators can identify students' level of knowledge, integrate scaffolding concepts, and reshape errors into learning opportunities. In Berndt et al.'s

study, 39% of students' acknowledge the importance of collaborating with their team of care providers and peer observers during the scenario, although some students preferred to have more time to think prior to receiving input from the large classroom. As in any learning situation, student diversity means educators must balance providing immediate feedback with allowing additional contemplation time for students' to link theoretical knowledge with practice.

Kirkbakk-Fjaer, Hedelin, and Moen's (2016) study explored nursing students' experience during the debriefing phase using large groups of students. The HFPS scenario was planned around a patient suffering from severe depression. The majority of classroom group sizes ranged from 16 to 24 students except for one group, which consisted of nine students. During the scenario, half of the classroom group observed the objective and subjective data of the patient while the other half of the classroom focused on the nurses' conversation with the patient. All students evaluated the learning experience as very good. However, some students commented they did not have enough time to verbalize their feelings before the educator began to comment. INASCL (2011) standards for debriefing state the skills of the educator debriefing the scenario are important to ensure the best possible learning. Many researchers and educators acknowledge the debriefing process is the most critical component of the HFPS. According to INASCL's standards for debriefing, the educator should be competent in the process of debriefing, have observed the HFPS experience, use evidence-based debriefing methodologies, and support open communication, trust, and reflection.

Kirkbakk-Fjaer et al., (2016) also noted that young students, less than 25 years of age, with little or no clinical praxis, identified the debriefing helped resolve unsettled feelings in comparison to mature students, those older than 25 years, who have some life experiences. Debriefing is important to link theory to practice and help students with limited experiences to

process their feelings. It is important for educators to allow students time to work through unresolved feelings that often appear in the debrief reaction phase. Emotions and uncertainty have "primacy in determining whether we learn and what we learn, and that negative emotions such as fear and anxiety can block learning" (Kirkbakk-Fjaer et al., 2016, p. 363). The studies by Kirkbakk-Fjaer et al., and Berndt et al., (2015) illustrate that HFPS in larger classes can produce clinical experiences encompassing the affective, cognitive, and psychomotor domains essential for nursing practice that are more cost effective and efficient use of limited resources.

Kirkbakk-Fjaer et al.'s (2016) study coincidentally reinforced that classroom sizes influence students' experiences in HFPS scenarios. They found that smaller sized debriefing groups supported novice students' sense of trust, allowing them to explore and express their feelings, stereotypes, and prejudices. "Students in the small and the medium group experienced that their questions were significantly answered more in the debriefing than students in larger group (21-24 participants) experienced" (Kirkbakk-Fjaer et al., p. 364). Debriefing is powerful in supporting students' awareness of their subconscious behaviours and values that may influence future performances and reactions to patient situations.

Targeting Patient Care Concepts and Practices

In 2016, the Canadian Patient Safety Institute (CPSI) identified anticoagulants, hypoglycemic agents, opioids, and electrolytes as the most common medication errors resulting in serious consequences for patients and legal repercussions for nurses. Using HFPS, educators can duplicate these high-risk patient scenarios and assist students in developing a standardized approach for reducing and avoiding risks for making patient errors. HFPS adds a learning dimension that moves beyond passive learning methods of rote memory that also aids in knowledge retention (Gibbs et al., 2014). The opportunity for the deliberate practice of critical

events prior to providing patient care has the potential to increase patient safety and decrease provider error and patient harm.

Pedagogical strategies. Gibbs et al.'s (2014) study compared the effectiveness of HFPS to a case study in teaching diabetes education. The researchers used a quasi-experimental, two-group pre-test and post-test design. Pre-test scores were identical for both groups prior to the intervention. Post-test scores were slightly higher for the case study group; however, on the clinical evaluation instrument, the simulation group scores were significantly higher. The post-lesson survey results were also higher overall for the HFPS experience on evaluative statements of "stimulates critical thinking", "transfers to clinical", "should be included in the program", and "will make me less nervous in clinical" (Gibbs et al., p. 62). The following student's comment summarizes the value of different pedagogical approaches in nursing education, "the case studies give information, but that the simulation gave them "things to think about and do" (Gibbs et al., 2014, p. 63). This study also highlights the value of multiple engagement strategies to achieve that achieve different cognitive, behavioural, and reflective outcome.

Medication errors. Breitkreuz et al.'s (2016) study compared two pedagogical strategies that evaluated third and fourth-year nursing students' attitudes towards medication errors and patient safety risks. The control group watched movies based on third party stories while the intervention group participated in two HFPS scenarios. Educators designed the HFPS scenarios to mimic the emotional and psychological impact of being involved in two potentially fatal errors in an adult and a pediatric scenario. The script instructed students to perform nursing assessments, administer medications, and implement written orders, all standard nursing tasks for administering medications. Although students were able to identify more adult medication errors compared to pediatric medication errors, 81% of students failed to identify at least one of the

four embedded errors in the two scenarios (Breitkreuz et al, 2016). Breitkreuz et al. reported no significant differences between third and fourth-year students with respect to error detection performance. Both teaching strategies were successful to teach students about the potential harm of medication errors. The movie made students aware of the devastating consequences of errors, whereas the HFPS scenarios provided a memorable experience as one patient was an infant, and, as students performed alone, this exposed their own fallibility when they missed a medication error.

Supplementing content. Konieczny (2016) used HFPS to connect theoretical pharmacology knowledge to practice. In many nursing curricula, pharmacology courses are taught as a separate course creating a perceived disconnect between theoretical knowledge and opportunities to practice administering medications, contributing to potential medication errors (Konieczny). Students administered medications to low fidelity or high fidelity patients diagnosed with endocrine, cardiac, and respiratory conditions. Increases in post-test scores were statistically significant for HFPS compared to low fidelity simulation. The average pre-test mean score was 5 out of 10, and post-tests scores were 7.2 out of 10 for low fidelity and 8.15 out of 10 for the HFPS. The additional context of the HFPS experience allowed students to engage with the learning activity to a greater degree than the low fidelity models.

HFPS with its increased fidelity allows students to perceive a more holistic component of the patient care environment reducing students' anxiety for future practice. For example, students frequently place nasal prongs in backwards. The opportunity to see how the nasal prongs angle into the mannequin's nostrils compared to the outward angle, benefits their understanding of how to apply them properly. The use of HFPS allows for a more accurate interpretation of reality or "mental model" of an encountered situation facilitating future knowledge transfer and the

anticipation of potential responses in advance of a patient situation (Harris et al., 2014). The safety of simulation environments provides the context for students to learning how their actions and inactions may contribute to detrimental patient outcomes without actually harming the real patient. Error detection and correction are powerful learning strategy for mitigating future patient injury.

***Surrogate practices*.** HFPS functions as a surrogate for actual patient encounters to provide students with clinical practice experiences. Burbach and Thompson's (2014) study used HFPS to teach students how to identify cues suggestive of impending crises. Aqel and Ahmad (2014) used HFPS to strengthen students' cardiopulmonary resuscitation skills. The realism of palpating and checking for pulses, providing effective breathing and compressions, while minimizing interruptions in chest compressions improved students' retention of their knowledge and skills. Aqel and Ahmad found that 85% of the students in the HFPS group retained their skills three months after the experience. In comparison, Smith et al.'s (2008) study reported that students in their study encountered skill deterioration of 37% within three months and 42% at twelve months after low-fidelity simulation training. As a tool, simulation technologies allow for the deliberate practice of acquiring and maintaining expert performance (Harris et al., 2017). Deliberate practice includes the repetitive performance of skills in a focused domain, along with rigours skills assessment that provides students with informative feedback, resulting in enhanced skills performance, in a controlled setting (Issenberg, McGaghie, Petrusa, Lee & Scalese, 2005). Generally, deliberate practice tends to be associated with individual performance; however, it is increasingly being used for interprofessional team training and crew resource management as a method of error prevention training (Harris et al., 2017).

HFPS can provide students with rarely encountered patient care events, but universally essential in nursing practice. Flood and Higbie's (2015) study found that 85% of students reported they had no experience with any type of blood product administration, and even less opportunity to witness and manage rare adverse reactions. The immediate identification of an adverse event can reduce the seriousness of injury for patients. HFPS allows students to apply the process of assessment, situation analysis, salient concerns, and prioritization of nursing actions and evaluation of those actions all within a framework appropriate to their level of learning without risking patient injury (Lubbers & Rossman, 2016). Being able to visualize the blood reaction and potential disastrous outcomes aids students' memory recall when administering these products in future patient care situations such as traumas and hemorrhages.

Simulation can be used to develop students' critical thinking skills and clinical reasoning. HFPS contextualizes the learning experience where students' gaps in theory, or errors in clinical decision-making and judgments can continue to their natural conclusion, crystalizing theoretical concepts. Well-designed simulations aid students in understanding the consequences for their actions and inactions.

Educators can help students gain an understanding of the illness experience in relation to chronicity of palliative care, disabilities, and mental health illnesses. Educators can integrate phenomena beyond the usual concentration on individual symptoms, to those related to family practice areas of chronicity, fear, uncertainty, and feelings of being overwhelmed (Eggenberger, Krumwiede, & Young, 2015). The illness of an individual is a shared experience with families having a powerful influence on the health and the course of a chronic condition (Eggenberger et al.). It is important for nursing students to develop competence in the humanistic and relational skills of family nursing care as well as individualized patient care. Eggenberger et al.'s (2015)

study used scripted simulation videos to contrast patient-centered versus family-centered care. Students role-played family members of the critically ill patient, facilitating their empathy with the fear and anxiety of a family illness experience. Students experienced how nurses developed or did not develop a family relationship to ease the suffering of the family and patient. “How does it feel for the family when the nurse does not introduce oneself and walks into the room to begin a procedure?” “How does the patient experience care with and without the presence of a family member?” “What actions did the nurse take that made the family feel included, supported and comforted during the scenario?” During the debriefing, nursing students who played family members shared their feelings of frustration if the nurse did not address their concerns. Students learned the importance of exploring family members’ perceptions of threats with illnesses, inviting questions, and repeating information as often as needed reduced family anxieties and fears. Students learned that providing consistent information while providing care was comforting and assuring for families. “I totally understand a family not wanting to leave the side of their family member in the hospital and now I know how to invite them into the room” (Eggenberger et al., 2015, p. 592).

Lubbers and Rossman (2016) adapted the simulation scenarios to focus on community nursing practices. Beginning nurses were taught how to apply the nursing process while caring for pediatric patients at home, attending school, or visiting a health clinic. Lubbers and Rossman’s scenarios included a school nurse caring for a student with a seizure and a student with asthma, a parish nurse caring for an abandoned newborn, a clinic nurse caring for a patient with poorly controlled diabetes, and a home care nurse caring for a medically complex child in their home. Delivering care in community settings means there are no monitors, intravenous products, and other advanced technologies; nurses need to rely intensively on their assessments,

situational analysis, salient concerns, and prioritization of nursing actions, and evaluation. Students learned how to think about alternative care methods for example, how to assess the oxygen status on an abandoned newborn when a pulse oximeter is not available. Lubbers and Rossman reported that novice students' self-confidence in assessment and planning of care improved by participating in these pediatric community scenarios.

Eggenberger et al.'s (2015) and Lubbers and Rossman's (2016) studies highlight the diverse simulation scenarios that can be developed to support students' clinical experiences and learn about the diverse nursing roles in community settings.

Evaluating HFPS

The use of HFPS as a strategy in nursing curricula to evaluate clinical practice continues to evolve. Nurse educators are being challenged to move simulation to the next level and use it as a tool for evaluating clinical competency (Leigh et al., 2016). HFPS can help educators and students define quality performances and promote awareness on critical components in a performance (Renjith, George, & Renu, 2015). Educators can then use HPFS to design a wide range of scenarios to address clinical shortfalls and improve scaffolding of course content, including opportunities for deliberate practice and remediation. Evaluations using HFPS can deliver assurances for graduates, employers, accrediting agencies, and educators that students have the necessary competencies for professional practice.

The use of simulation for assessment occurs primarily in medical education for licensure and speciality certification, such as Advanced Cardiac Life Support and Advanced Trauma Life Support. NCLEX-RN examinations evaluate the cognitive domain of learning. Integrating HFPS allows educators to evaluate the psychomotor and affective domains of learning. Bussard's (2018) study used simulation to evaluate students' clinical judgement skills throughout their

medical-surgical course. A convenience sample of diploma nursing students participated in four progressive HFPS scenarios: patients with diabetic ketoacidosis, fractured leg, pneumonia patient (complicated by an ischemic stroke), and a bowel obstruction (complicated by a pulmonary embolism). Students were evaluated based on criteria focusing on the receiving report, assessing the patient, administering medications via different routes, communicating with the patient and peers, changing dressings, educating the patient about the disease process, and incorporating other team skills. Using Lasater's Clinical Judgment Rubric (Lasater, 2007) to ensure consistency and reliable feedback, a nurse educator evaluated each student's performance during the scenario and then shared this feedback with them. Bussard (2018) found students' clinical judgement progressed after participating in the various simulation scenarios; however, confounding variables, such as course grades, clinical background, previous life and clinical experiences, contribute to students' development of clinical judgment skills throughout the semester.

Bensfield, Olech, and Horsley (2012) evaluated nursing students at the end of their program using the Quality and Safety Education for Nurses competencies (Altmiller, 2017). Students received a learning guide two weeks prior to the scheduled simulation experience detailing the patient history, initial physician orders, and preparatory questions. Small groups of five students provided patient care while three educators evaluated their performance separately. The scenarios were also video recorded to review as evidence for ensuring interrater reliability among the educators. Students received individual feedback immediately following the scenario. Those students, who did not meet the scenario objectives, repeated the simulation. If the student was not successful on their second attempt, they were required to participate in further remediation learning activities. Bensfield et al. (2012) reported that 25% of the senior class

required remediation. In these cases, students were unsuccessful in completing a physical assessment relevant to the patient diagnoses, committed multiple medication safety errors, failed to identify the patient prior to administering medications, violated universal precautions, and failed to collaborate as a team. The most concerning study outcome noted by Bensfield et al. (2012) was that some students, who had high grade point averages on cognitive evaluation tools, did not perform well in the HFPS and required remediation. The unsuccessful attempts of high achieving students to perform well in the simulation triggered nursing educators to complete an extensive review of the curriculum. Their investigation revealed that healthcare institutional policy changed and restrictions limited students' opportunities for medication administration and psychomotor skill experiences in clinical practice (Bensfield et al.). Changes in institutional policies affected student opportunities to practice to their full scope, risking potential patient injury in future practice.

Leigh et al. (2016) highlighted many advantages for adopting HFPS-based assessments in nursing curricula as an assessment method. HFPS allows patient variability to be controlled, increasing the validity of the student assessment as the focus is solely on the student's performance. Furthermore, the possibility of assessment bias is reduced as independent educators can evaluate the student rather than the clinical instructor (Leigh et al.). Assessment objectively increases validity, reliability, and consistent evaluation of students' competence.

Simulating Clinical Experiences

Multiple scenarios. Most HFPS involves one patient and a team of care providers of the same profession or interdisciplinary. The use of multiple patient scenarios in a single HFPS session is being evaluated as a strategy for senior students to learn delegation, leadership, and teamwork. Multiple patient scenarios allow students the opportunity to manage competing care

needs that mimic a busy nursing unit (Kaddoura, Vandyke, Smallwood, & Gonzalez, 2016). This strategy of using multiple patient scenarios is a possible solution to nursing administrators' feedback on new graduates 'transition shock' into the workforce (Blodgett, Blodgett, & Bleza, 2016). A simulated nursing unit, while cost and resource intensive, may help address the deficiencies in new graduate abilities by providing a wider breadth of experiences, facilitating students' abilities to recognize patient cues, and engaging in many ongoing patient interactions. Kaddoura et al.'s (2016) used seven medical-surgical scenarios (i.e., patients with acute coronary syndrome, asthma exacerbation, diabetes, fracture, stroke, and older adult patients with a urinary tract infection and delirium) in their study. Accelerated nursing students, those with a degree from another program, perceived this experience improved their critical thinking, clinical competence, confidence, and theory-practice integration skills. However, the experiences also left some students feeling overwhelmed and under intense pressure to perform (Kaddour et al.).

Students feel anxious, fearful, and stressed during HFPS scenarios as they do in clinical practice. Fear of making mistakes, lack of confidence in providing patient care, and discomfort when communicating with members of the healthcare team are common triggers of students' anxieties and fears. To address these concerns, Hollenbach (2016), used simulation as a strategy to reduce anxiety before students began their clinical rotations. Hollenbach (2016) designed an obstetrical workshop incorporating four interactive simulation scenarios, a postpartum assessment, a labour and delivery assessment, a newborn assessment, and postpartum hemorrhage. Students completed the Spielberger *State Trait Anxiety Inventory* (Spielberger, 1983) before the workshop, after the debriefing session, and one week later prior to the start of their initial obstetrical experience. The workshop decreased students' anxiety by helping them feel more confident in their clinical skills. However, the long-term effects of decreased anxiety

were not sustained prior to the actual clinical experiences. A limitation of this study was that the researcher was also the course coordinator and responsible for students' grades, which could have increased students' anxieties about their clinical experiences.

Course electives. Thomas and Mackey (2012) designed and implemented a new elective course entitled Clinical Simulation in Nursing. In their study, they compared whether the HFPS course significantly changed students' level of confidence compared with traditional clinical experiences. The researchers found students in the intervention group (simulation class) were less confident in their abilities at the beginning of the semester compared to the control group. By the end of the semester, the intervention group achieved significant increases in their confidence compared to the control group in their ability to recognize signs and symptoms, assessing patient conditions, and their ability to intervene. Possible explanations for the increases in self-confidence included the integration of deteriorating patient's conditions such as hypotension, medication reactions, respiratory distress, and cardiac arrests. In addition, opportunities to test their decision-making and actions, explore and review alternative interventions and outcomes during debriefing, and then repeat the experience, influenced students' self-efficacy through mastery and social modeling (Thomas & Mackey).

Thomas and Mraz (2017) also evaluated the impact of a simulation-based course elective on students transitioning into practice. The elective course was available for third and fourth-year students. To meet course requirements students had to attend a minimum of ten HFPS classes and provide care in at least three scenarios. Students were responsible for prioritizing and making all patient care decisions without any input from the educator. Students' feedback was very positive, as the HFPS experience allowed them to see the 'big picture' (Thomas & Mraz, 2017).

In summary, this section has reviewed some of the diverse HFPS strategies nurse educators have used to augment clinical experiences. Some educators blended HFPS scenarios with traditional clinical practice to reduce pressures on faculty and use clinical resources more efficiently while other educators integrated simulation into the large classroom to engage students in the learning process. Researchers report that lectures before simulation do not always transfer to practice; however, smaller group sizes during debriefing where found to benefit students with limited patient care experiences. This aligns with Vygotsky's (1978) sociocultural theory as it suggests that debriefing facilitates the meaning-making process through which students construct individual interpretations of their experiences through a process of social negotiation of diverse perspectives.

Researchers also reported that the various HFPS strategies of unfolding cases studies, large versus small group simulations experiences, and targeted patient scenarios addressing specific content or clinical practice areas all showed positive student outcomes. Educators successfully integrated HFPS scenarios to address theory-practice gaps, develop students' competence in skills, increase students' self-confidence, and highlight risks for patient and medication errors. This section ended with educators expanding the use of HFPS as a summative evaluation method for ensuring students have developed the necessary competencies for course outcomes with one nursing programing offering HFPS as a course elective to replace a clinical practicum.

The next section reviews research on best-practice strategies for developing HFPS scenarios. Haji et al. (2014) referred to these educators and researchers as knowledge builders.

Knowledge Builders

Knowledge builders focus on best practices for the instructional design of simulation (Haji et al., 2014). The instructional design provides a better understanding of how simulation contributes to learning (Levett-Jones & Guinea, 2017) and motivates students to learn (Kim et al., 2017). As a pedagogy, the simulation design is based on a structured and systematic approach comprising of a pre-brief, scenario, and debriefing (INASCL, 2016). This structured approach ensures coherent learning experiences for students that begins with detailed preparation for the simulation and ends with the transfer of learning to delivering safe patient care (INASCL, 2016; Levett-Jones & Guinea, 2017).

INASCL's Standards of Best Practice (2016) provide a guide for developing HFPS experiences; these standards are equivalent to best evidence for clinical practice. These standards recognize simulation learning environments have clear expectations regarding professional integrity, confidentiality, and mutual respect among students and educators to achieve expected outcomes. It is important when designing patient scenarios to use sound learning and teaching principles as students' learning is central to the simulation activity (INACSL, 2016; Levett-Jones & Guinea, 2017). Educators must decide on the purpose for the simulation-based experience whether to enhance classroom theory, to promote readiness for clinical practice, to provide standardized clinical experiences, to develop competence, or to be used for evaluation purposes. Based on these decisions, the educator will develop objectives to address the identified needs and optimize learning outcomes.

The educator selects the appropriate type of simulated clinical experience (standardized patient, haptic devices, task trainers, computer assisted reality, or fidelity) and designs a patient scenario to provide the context for the simulation-based experience. Creating immersive and

realistic simulation experiences entice students to engage in the learning activity through suspended disbelief (Levett-Jones & Guinea, 2017). The starting point represents the initial circumstances of the patient problem, whereby role-playing of care provider and family members' roles, students practice skills, apply knowledge, and collaborate with their peers. Designing the simulation with attention to physical, conceptual, and psychological aspects of fidelity contributes to the attainment of the learning objectives and prevents cognitive overload (INACSL, 2016). Educators must be cognizant of scaffolding the patient scenarios to challenge students' knowledge and abilities throughout the immersive learning experience without overwhelming them. Once saturated with too much new information provided too quickly, cognitive overload has occurred and students' learning becomes impaired (Levett-Jones & Guinea). Well-designed simulations provide entry to new and previously inaccessible ways of thinking, challenge students' perceived beliefs, assumptions, and values that results in a transformed way of understanding, interpreting, or viewing nursing care (Levett-Jones & Guinea). The debriefing phase begins when the expected learning outcomes have been demonstrated, time is exhausted, or the scenario can no longer proceed (INACSL, 2016).

Pre-brief

Research on pre-briefing has been limited until recently as the majority of simulation research has focused on debriefing (Chamberlin, 2017). However, its importance is being increasingly recognized (Leigh & Steuben, 2018). The purpose of pre-briefing is to create a framework for understanding, to assist students to perform and learn from the immersive learning experience (Leigh & Steuben, 2018; Page-Cutrara, 2015). Pre-briefing provides direction for the HFPS experience, outlining student expectations, time allotment, and orientation to the equipment and general environment (Leigh & Steuben, 2018; Meakim et al. 2013; Page-

Cutrara, 2015; Paige-Cutrara & Turk, 2017). Depending on the learning needs of the students, demonstrations of clinical skills may also be included in the pre-brief before the scenario to accommodate for the lack of background knowledge or experiences for whom the specific learning needs were recognized (Page-Cutrara, 2015).

The pre-brief can also help reduce students' anxiety stemming from not knowing what to expect. Pre-briefing can facilitate students' abilities to notice aspects of the clinical situation, anticipate patient needs, and focus on the application of existing knowledge to meet simulation objectives may be beneficial for developing critical thinking and clinical judgments. It is the educator's responsibility to convey concepts of mutual respect, professional integrity, and confidentiality in providing the safe learning environment for students and reducing learning anxiety (Chamberlain, 2017; Page-Cutrara, 2015; Paige-Cutrara & Turk, 2017; Stephenson & Poore, 2016).

If the pre-brief is overlooked or under delivered, students may begin their simulation without adequate preparation or orientation and not achieve the goals of the simulation, leaving them frustrated and dissatisfied with the simulated experience (Stephenson & Poore, 2016). Chamberlain (2017) evaluated the impact of simulation pre-briefing on nursing students' perceptions of overall effectiveness, learning, and self-confidence. Using a quasi-experimental design, Chamberlain compared four groups of undergraduate students at two different schools using no pre-briefing, pre-briefing with orientation tasks, pre-briefing with learning activities, and pre-briefing with both orientation tasks and learning activities. The pre-brief orientation tasks included a review of the learning objectives, student roles, the equipment and mannequin used in the simulation. The pre-brief learning activities included watching a video on respiratory

assessment, completing a worksheet, and participating in a discussion regarding the care plan for respiratory distress clients.

Chamberlain's (2017) study highlights the significance of pre-brief orientations and learning activities related to patient care. Students who received no pre-briefing did not like the simulation as they felt unsure of the patient situation, had difficulty taking the initiative to provide patient care, did not have insight into the cues provided during the scenario, and demonstrated minimal dialogue among team members providing nursing care. In contrast, students who received both learning engagement activities and the orientation activities felt prepared for the scenario and engaged in the learning activity. Chamberlain's study identified difference between the two pre-brief activities. The group who participated in the learning activities provided positive feedback of increased confidence; however, these students felt they could have learned more if they had received clearer directions for the learning objectives. The group receiving the orientation tasks reported their learning could have benefitted from more patient care details.

Kim et al.'s (2017) study compared the effects of three prebriefing activities for junior and senior students' clinical competence, confidence, and satisfaction during simulation. All students received a verbal orientation of the scenario goals and an introduction to the scenario. The first experimental group received a verbal orientation and an introduction to the HFPS mannequin, environment, and equipment. The second experimental group received the verbal orientation, orientation to the mannequin and equipment, and the opportunity to deliberately practice skills required in the upcoming scenario. Clinical competencies were evaluated by students and educators using checklists. Similar to Chamberlain's findings on prebriefing, Kim et al. (2017) also found students' clinical competency, satisfaction, and self-confidence were

significantly higher when the triad of verbal orientation to the scenario, practice with the mannequin, and deliberately practiced the scenario based skills.

Other researchers found similar learning benefits from the simulation pre-brief. Enlow, Horning, Scherer, and Cobb (2014) found students' performance and self-confidence was greater when structured pre-briefing strategies were used in their obstetrical scenarios. Allowing students time to ask questions decreases their anxiety, improves confidence, and increases their engagement, enriching the learning experience from the beginning of the simulation process (Page-Cutrara, 2015). McDermott (2016) emphasized that the quality of pre-briefing is also reflected in the debriefing of the simulation-based learning experience. "Pre-briefing is essential for successful debriefing, and that learners who are better prepared may be more reflective during debriefing" (McDermott, p. 224).

Scenario

It is the educator's responsibility for managing the entire simulation-based experience. Educators need to make sure the scenario links to the course objectives and aligns with current evidence-based practice, guidelines, standards, and literature (INACSL, 2016). A structured simulation scenario using an unfolding patient situation provides the context for the learning experience. As educators have become more comfortable using HFPS as a pedagogical strategy there has been a shift in focus to everyday low-risk, high frequency situations that enhance both technical and nontechnical skills, from an earlier focus on technical skills and high-acuity, low opportunity events (Levett-Jones & Guinea, 2017).

> Over the last decade, there has been an increasing shift and recognition of the need for simulations to address nontechnical skills such as communication, clinical reasoning, leadership, situational awareness, empathy, and resilience, in order to

improve patient outcomes (Levett-Jones & Guinea, 2017, p. 558).

Cueing

The HFPS scenario begins with a brief patient vignette shared with nursing students via hand-off report. Additional patient care cues can be found in the patient's chart, revealed through inquiries with the patient, family members, and other care providers, provided by telephone calls from other health care departments, or triggered by equipment in the room. Using a consistent method and mode for delivering cues educators can ensure a standardized learning experience across cohorts of students. Cues can be predetermined or unplanned to draw students' attention to critical or noncritical information related to the context of the scenario and help students move toward the expected outcomes (INACSL, 2016). Based on INACSL (2016) standards, predetermined cues are incorporated into the simulation design because they are based on common and anticipated actions by students. Cues are a means by which MKOs can help to scaffold learning during the scenario (Vygotsky, 1978).

Paige and Morin's (2013) literature review on simulation cues identifies two types of cues, reality and conceptual. Reality cues are available as prompts in the hand-over report, patient statements, family members' questions, or monitoring devices. The cues help students interpret and engage in the simulated reality. Conceptual cues are instructional strategies used to help students reach the learning outcomes (Paige & Morin). The intent of conceptual cueing is to provide the students with further information or feedback that will allow them to progress in the scenario and deal with anticipated or unanticipated actions. Paige and Morin used cues as a lifeline for students in their study. During the scenario, students could re-group to clarify patient care details. They compared the scenario pause in patient care to the clinical environment where a novice nurse would seek the direction and expertise of a charge nurse or manager. Allowing

students to access peers during the scenario provided a more realistic context for learning. Paige and Morin found cues helped students' critical thinking and clinical reasoning abilities, as well as reduced the risk of adverse events.

Burbach and Thompson (2014) focused on the number and types of cues students recognized compared to expert nurses. Based on Benner's (1984) *Novice to Expert Theory*, there are five stages of clinical competence, novice, advanced beginner, competent, proficient and expert. Novice nurses, such as students, have no or little experience on which they are expected to perform. As nurses gain experience, competence, and confidence, they progress through the various levels of nursing practice with the goal of becoming expert nurses. Burbach and Thompson (2014) found huge variations in the types of cues noticed by undergraduate nurses when providing patient care. Successful nursing practice depends on nurses' abilities to recognize subtle and overt clinical cues indicating changes in the stability of the patient's condition. Burbach and Thompson found that missed cues led to inappropriate responses; however, being able to recognize cues did not consistently result in appropriate action by students. Beginning nursing students had difficulty identifying and interpreting single cues, resulting in missed opportunities or responses. Shelestak, Meyers, Jarzembak and Bradley's (2015) study described nursing students' clinical decision-making process based on their interpretation of patient cues. They found differences in students' abilities to recognize, interpret, and respond to patient cues at two critical decision points during a simulated scenario. Fewer than half of the students correctly recognized the patient's cues related to a vagal response while straining to have a bowel movement at the first critical decision point. Students, who responded incorrectly, believed the change in the patient's condition was due to pneumonia or renal failure.

At the second critical decision point, 71% of the students correctly recognized the patient was in cardiac arrest.

Based on further analysis of students' clinical decision-making, Shelestak et al. (2015) found some students correctly identify the patient's cues but provided incorrect nursing interventions or did not understand the urgency of the situation. Other students provided the correct nursing interventions although they did not correctly interpret the patient's cues. It is important for students to be able to recognize, interpret, and respond to patient cues in order to provide appropriate nursing care. Students who cannot identify patient cues are more likely to make incorrect clinical decisions risking patient injury, extending their length of hospital stays, and increasing health care costs (Shelestak et al.). Simulation experiences provide opportunities to dissect and repeat patient scenarios as a means to teach students how to identify and understand the significance of the patient cues, develop a care plan, and implement it, to prevent the patient from deteriorating. Assisting students to identify and reflect on the significance of the patient cues helps to scaffold students' learning (Vygotsky, 1978) and their application of theory to nursing practice.

According to Benner (1984), novice care providers require continual verbal and physical cues. Deliberate practice and repeating of learning opportunities are required, as these students cannot use discretionary judgements. Novice care providers cannot separate out relevant pieces of patient information in the situation; instead, all patient cues are equally important. As students gain experience and confidence, they begin to recognize recurring, meaningful patient cues to help guide their nursing care. These students, known as advanced beginners, are task-oriented and rule focused (Benner, 1984). The advanced beginner will be able to focus on the needs of the patient and their responses with more clinical experiences.

Educators who use simulation need an awareness of how the diversity of students participating in the HFPS scenario may influence the learning experience (INASCL, 2016). Educators need to create a partnership in learning, coaching, promoting critical thinking, and providing feedback. Although students reflect on the scenario during the debriefing phase, educators must make a decision on how errors in decision-making, clinical rationale, and judgments, are managed during the scenario. For example, should the simulation scenario progress with or without interruptions to correct and explain alternate patient care approaches?

Lifelines

HFPS experiences can increase stress, anxiety, feelings of being overwhelmed, and excessive cognitive overload especially when knowledge gaps occur as students are providing nursing care. When students' cognitive load becomes too high, they are unable to absorb any more information and learning cannot take place (Josephsen, 2015; Reedy, 2015). One strategy to limit cognitive overload is to integrate graduated patient cues or 'lifelines' when planning scenarios. During challenging moments, patient care is briefly suspended to allow care providers access to peers or the educator for support. Vygotsky (1978) identified these resource people as MKO. Lifelines are methods for 'regrouping one's thinking', 'regaining one's self-confidence,' or 'clarifying confusing care details' (Paige & Morin, 2013). Knowing when to seek assistance supports the development of critical thinking, clinical reasoning, clinical judgements, and reduces adverse events. Lifelines are also used to redirect students when they provide unanticipated care (Dieckmann, Lippert, Glavin, & Rall, 2010).

Eppich, Hunt, Duval-Arnould, Siddall, and Cheng (2015) used a lifeline system in their study referred to as 'micro-debriefing". 'In time' feedback was instrumental for reflection-in-action, which provided students an opportunity to stop one another and ask questions of

particular actions. Encouraging students to reflect on their actions and make meaning of them reinforces concepts, principles of care, knowledge, and promotes critical thinking (Eppich et al.). Micro-debriefing is frequently used to validate the students', patients', and families' understanding of nursing care, medications, treatments, and surgical procedures. For example, teaching family members how to administer insulin, change dressings, discharge instructions, and procedural preparation requires validation of understanding to prevent injury and delays in care.

Managing Mistakes

Patient errors are devastating for everyone, patients, families, students, and nurses. Educators must consider the best approaches for facilitating students' learning after errors are identified. Using HFPS scenarios educators can control and manage students' learning and understanding of clinical errors. Educators can withhold their assistance, allowing students to learn from the consequences of their actions or inactions. For some students, their anxiety increases when no assistance is forthcoming when they are struggling. For other students, they prefer the 'let me think it through' method or be given extra time to work things out in their minds if they get off track or interrupted (Paige & Morin, 2013). HFPS allows patient errors to be reframed as learning opportunities where the scenario can be stopped or re-wound to practice an alternative course of care that supports new understandings without harming the patient. Fostering a reflective process is consistent with ELT, where the focus is on both process and outcomes.

Van Heukelom, Begaz, and Treat (2010) compared in-simulation scenario debriefing to post-simulation debriefing. In-simulation debriefing means students are informed at the time of an error or when they failed to act at a critical time affecting patient care outcomes. Post-

simulation debriefing occurs at the end of the scenario during the reflection processes. Van Heukelom et al. found post-simulation debriefing group scores were significantly higher than the in-simulation participants' scores, with students' preferring the post-simulation debriefing method. Students felt that post-simulation debriefing experiences helped them learn more effectively, better understand the correct and incorrect actions, and was more effective compared with in-simulation debriefing.

In contrast, Rapid Cycle Deliberate Practice (RCDP) is an in-simulation pedagogical strategy increasingly used in medical education (Kutzin & Janicke, 2015; Taras & Everett, 2017). RCDP was adapted from the sports, aviation, and music. In RCDP, students rapidly cycle between deliberate practice and directed feedback within the simulation scenario until mastery is achieved (Taras & Everett). The RCDP strategy breaks the scenario into small chunks of learnable skills that the students continually repeat until they understand and perform the skills at a mastery level and then progress to more challenging scenarios (Kutzin & Janicke). Educators provide immediate feedback to students in the form of coaching at the time of the error. Students then practice the corrective interventions (Taras & Everett). RCDP is based on three main principles of learning: immediate repetition, constructive feedback, and psychological safety (Taras & Everett). Medical education has achieved good success with RCDP as studies tend to focus on psychomotor skills and competency testing for chest tube insertion, ultrasound guided central line insertion, intubation skills, and resuscitation skills. Limited research exists on RCDP use in nursing practice and no research on its use with undergraduate nursing students is identified.

Luctkar-Flude et al. (2017) compared instructor-led versus student-led simulation facilitation methods for novice students. They found novice students preferred instructor-led

simulation for HFPS. Instructors provided more instruction and prompting throughout the simulation. Students "described instructor-led simulation as advantageous because the instructor remains present for guidance and clarification" and "instructor-led simulation provided opportunities to correct mistakes as they occurred, avoiding reinforcement of errors" especially for students who could not identify when they did something incorrectly (Luctkar-Flude et al., p. 267). For some students, the instructor's presence was helpful in decreasing their anxiety and cognitive load. This expectation is congruent with the educator's role to create a safe, supportive environment that encourages learning and boosts confidence (INACSL, 2016). However, other students found student-led simulations more realistic when the instructor was out of the room as students relied on each other for the things they did not know. Students had to problem-solve collaboratively and the management of incorrect responses was delayed until the post-debriefing phase. This study highlighted that as students gain nursing care experiences, they progress from being dependent to independent problem solvers who increasingly rely on peer support (Luctkar-Flude et al.). The progression from instructor-led to student-led simulation may enhance learning as students' knowledge and confidence increases.

The use of embedded patient and environmental cues is important to help undergraduate nursing students develop situational awareness and understand patient care. Failure of nurses to recognize, acknowledge, and explore patient cues may results in patients' unrecognized needs having untoward consequences (Chan, 2014). HFPS allows educators to support students in the development of their abilities to recognize and interpret patient cues as they learn to deliver safe, quality patient care.

Debriefing Strategies

Researchers agree debriefing is the most critical component of HFPS experiences (Cheng et al. 2014; Dreifuerst, 2015; Forneris et al., 2015; Hall and Tori, 2017; Levett-Jones & Lapkin, 2014; Meakim et al., 2013; Paige et al., 2015; Shinnick, Woo, Horwich & Steadman, 2011; Waznonis, 2014) as it is the time when most learning occurs (INASCL, 2016). According to Kolb's (1984) ELT, reflection helps students identify inconsistencies between their experiences and understandings. Reflection gives rise to new ideas and modifies existing abstract concepts learned from previous experiences. Debriefing fosters deep learning by promoting reflection and metacognition as it helps learners make inferential links between thinking and doing; thereby enhancing clinical reasoning (Decker et al., 2013; Dreifuerst, 2015; Forneris et al., 2015; Meakim, 2013; Paige et al., 2015; Waznonis, 2014).

'Debriefing is key to learning in simulation-based education' (Paige, 2015) including both feedback and reflection with the goal of improving future practices (Waznonis, 2014). Feedback is communicated to participants regarding their performance and behaviours during the high fidelity patient scenarios, while reflection involves participants thinking about the experiences (Waznonis) and how those experiences may impact future patient care (Decker et al., 2013).

Multiple frameworks are available to guide debriefing as HFPS research lacks sufficient evidence to support a single strategy to achieve best learning outcomes (Dufrene & Young, 2014; Husebø, O'Regan, & Nestel, 2015). Diverse debriefing methods are identified in the literature (Cheng et al., 2015; Dreifuerst, 2015; Dufrene & Young, 2014). Debriefing strategies include group discussions with or without the use of videotaped recordings of students' performances (Sundler, Pettersson, & Berglund, 2015); self-debriefing methods using videotape

recordings (Garden, Le Fevre, Waddington, & Weller, 2015); facilitator lead debriefing with and without the use of videotape recordings, in simulation and post-simulation (Van Heukelom et al. 2010); journaling and no debriefing (Garden et al., 2015). Debriefing for meaningful learning consists of student engagement, evaluation, exploration, explanation, elaboration and extension of actions and reactions that occurred during the simulation (Dreifuerst, 2015). Debriefing helps students learn how to reframe previous thinking and create new paradigms for handling future situations with similar circumstances (Mariani et al., 2013).

Educator-guided post-debriefing is the most commonly reported method of debriefing (McMullen et al., 2016; Sawyer et al., 2016). The role of the educator is to facilitate the debrief while ensuring that the relevant learning objectives, which occurred during the simulation scenario or were identified in the pre-brief, are discussed. The nursing educator is the subject matter expert and positions himself/herself not as an authority or expert, but as a co-learner (Sawyer et al.). The educator uses open-ended questions, silence, mild probing, and circular questions to encourage students to reflect on various components of the patient scenario. Debriefing helps students identify gaps in their knowledge and understand how their values and perceptions influence their patient care. Caution needs to be heeded by facilitators to avoid making the debriefing didactic teaching sessions especially when students have limited simulation experiences.

Nurse educators have utilized video-recordings of students' activities during simulation debriefings. Specific purposes for video include reviewing students' performances in search of specific behaviours or competencies for feedback and/or evaluation along with curricula revisions related to deficits in students' learning outcomes. Video recordings allow students and educators to analyze students' action and interactions in relations to achieving learning

outcomes, interpreting patient cues, and meeting performance standards and competencies. Video recordings can draw attention to characteristics of speech and action, facial expressions, gestures, emotions, social interactions, and tone of voice, elements of the affective domain that are important in patient care but difficult to practice when one is unaware of them (Bland & Tobbell, 2015). Videos allow students to deconstruct why they reacted in the way they did contributing to self-reflection. Bland and Tobbell used video recordings in their study, which allowed students to analyze the emotional components of learning and identify subtle interactions between students as they collaborated during the scenario.

Regardless of the debriefing method selected, students learn best when they are actively engaged, the learning is meaningful to their life situation, and there is potential for immediate application of their learning. The concepts identified in Vygotsky's sociocultural theory. The HFPS educator's role is to support students to identify illogical and ill-conceived assumptions by asking open-ended questions. This approach allows students to derive answers or to achieve deeper awareness of the limitations of their knowledge (Dreifuerst, 2015). Open-ended questions allow facilitators to obtain students' rationales and underlying thought processes as a means for thinking beyond the boundaries of one situation and to anticipate the next. During debriefing students are encouraged to work out what happened, what they thought or felt, why, who was involved, and when, in addition to considering what patients and families might have experienced, thought, and felt during the care experience (Husebø et al., 2015). This critical reflection process and social discourse enables students to develop peer-evaluation skills and collaborative, student centred learning communities (Parker & Myrick, 2010).

Repeating HFPS Scenarios in Nursing

Abe et al. (2013) used repeated scenario simulation to improve the competencies of critical care nurses. Small groups of three students rotated through four different simulations in one session. At the completion of each scenario, observers and participants completed a self-assessment using a previously validated rubric. Post-simulation debriefing was also provided after each scenario. Study outcomes found that the repeated simulation scenarios improved individual nurses' technical skills and to a lesser degree their non-technical skills.

Sivertsen, McNeill, and Müller (2016) also used a redo station for final year practicum nursing students. Following participation in a HFPS scenario, students had access to an unstaffed redo station to improve their learning experience and practice what they would do differently. Students' feedback was collected using a five-point Likert scale and open-ended questions evaluating their experience. Students suggested the same fidelity environment should be used in the redo station and to have an educator available to guide students in their practice.

Repeating HFPS experiences provides students the opportunity to practice alternative care interventions or develop additional confidence in those interventions proven to be beneficial for the patient. Repeating the scenario is less anxiety provoking and less stressful. The opportunity for self-discovery furthers one's understanding of actions and inactions that create a new context for reframing knowledge. This study builds on the idea that debriefing is the most critical component of the HFPS scenario. Assuming this statement to be true, the deliberate practice to apply feedback received during the debriefing session should increase students' confidence, competence, and retention of cognitive information. The immediate opportunity to correct clinical judgment errors based on feedback in HFPS would improve the quality and safety of patient care enhancing its transfer from a simulated environment to clinical settings.

In summary, Knowledge Builders focus on understanding the breadth and quality of HFPS as a pedagogy in nursing education. The simulation design of pre-brief, scenario, and debrief, integrates the mastery of required knowledge, psychomotor skills, clinical reasoning, and reflective thinking skills (Kunst, Henderson, & Johnston, 2018). This section identified the importance of the pre-brief for establishing the psychological safety of the learning environment. Pre-briefing includes orientation to the equipment and patient, reviewing the learning objectives and expectations, and facilitating students' understanding that making mistakes is injury free for the HFPS patient and an opportunity to enhance learning. Patient scenarios, based on authentic care situations, are either likely to be commonly encountered and/or have significant impact with learning outcomes that can be measured against professional standards for practice (Kunst, Henderson, & Johnston, 2018). A structured debriefing immediately following the patient scenario is critical to support reflection and optimize learning as students assess areas for improvement and consider alternative care actions. Debriefing helps students reflect on practice, evaluate their abilities, knowledge, communication skills, and caring, and explore transfer of learning into future patient care situations. Repeating the scenario allows students to practice new or alternative care decisions further reinforcing and enhancing their learning. Being aware of what to look for, what to anticipate, and how to respond to what happens, assists students in learning how to provide safe, quality nursing care. Repeating HFPS scenarios, supports students' theoretical understanding by making the practice concepts more transparent, reducing the theory-practice gap. Repeating HFPS scenarios supports students learning how to manage and process difficult theoretical concepts along with their own frustrations and attitudes towards different patient scenarios. Repeating the patient scenario optimizes student's learning of behavioral, cognitive and attitudinal changes in an efficient manner as possible with the support of peer and

facilitator feedback. The goal for repeating HFPS is to improve the provision of nursing care, ensuring patient safety, and improving future, patient care experiences. Harder (2015) states that HFPS has demonstrated the ability to meet many of the outcomes required of the current clinical model; therefore, students should have the experiences that benefit their learning the most. “In the era of evidence-based practice, is evidence-based nursing education not equally important?” (Harder, 2015).

Chapter 3

Methodology

Kelly, Berragan, Hüsebo, and Orr (2016) state that creating meaningful and robust learning experiences through HFPS can benefit students' subsequent clinical performance. This qualitative study explored undergraduate nursing students' perceptions of repeating the HFPS scenarios following debriefing to integrate feedback as a pedagogical strategy to guide their deliberative practice and improve learning outcomes. Although it is not well studied, repeating HFPS scenarios is associated with improved learning outcomes, including critical thinking, confidence, competence, and theory practice integration (Kaddoura, Vandyke, Smallwood, & Gonzolez, 2016).

Effective teamwork among nurses has been linked to the improved quality and safety of nursing care, patient outcomes, and nursing satisfaction. Therefore, learning how to deliver safe, quality care as a member of the healthcare team is also important. HFPS scenarios allow students to practice patient care in a safe environment where they can learn from their mistakes, take risks in providing nursing care, practice communication skills and collaborative care coordination, and receive immediate feedback from peers and faculty. This study built on the premise that the size of clinical groups are also important for engaging in dialogue on teaching strategies used in nursing curricula that best meet their clinical learning outcomes.

Methodology and Methods

Qualitative Research

Qualitative research is a systematic, interactive, and subjective approach to describing and exploring the meaning of human experiences (LoBiondo-Wood & Haber, 2014). Qualitative research methods are discovery oriented and used to explain a phenomenon from the

participants' perspectives. Based on a constructivist approach, it is assumed multiple realities exist, are socially constructed, influenced by the participant's previous life experiences, and dependent upon the context of the current experience (LoBiondo-Wood & Haber, 2014). The data collected from the participants facilitates an understanding of the experience (Freeman, 2006).

My simulation experiences have grown from my role as an educator in the previous Nursing Education Program of Saskatchewan (NEPS) and being the Simulation Coordinator. I taught first and second-year students in the NEPS program in the classroom and clinical practicums. Prior to NEPS becoming a bachelor degree program, the nursing program was a diploma certificate. I taught in that program for seven years.

As the Simulation Coordinator, I attend international conferences and supported the hosting of a national conference. I also was the Simulation Development Coordinator for the Dilawri Simulation Centre. As the first coordinator, I was responsible setting up the centre and evaluating the mannequins and task trainers required to support the training of medical students and orientating hospital nursing staff. The Dilawri Simulation Centre hosted conferences to support the training of health care professionals in HFPS and debriefing techniques. I also orientated the co-facilitator to the simulation centre and debriefing process used in this study.

Focus Groups Method

This exploratory study used focus groups as its method to explore nursing students' perceptions of repeated HFPS scenarios as a strategy for enhancing their learning outcomes. Gill, Stewart, Treasure and Chadwick (2008) define a focus group as a group discussion on a particular topic organized for research purposes and is guided, monitored, and recorded by a research facilitator. Focus group methodology can be traced back to Emory Bogardus, who used

it in 1926 for social psychological research (Liamputtong, 2011). In the 1950s, focus groups were generally associated with product development and marketing (Sharts-Hopko, 2001). More recently, researchers are using focus groups discussion as data collection methods in health and social science (Kidd & Parshall, 2000). For example, focus groups have advantages to explore and investigate the views of patients and care providers. Sutcliffe, Roe, Jasper, Jolley, and Challis (2015) used focus groups to identify gaps in the quality of patient care for people with dementia, their family care providers, and the support services offered by government health care services. Donley and Wright (2012) used focus groups to understand homeless people's resistance to homeless shelters.

When used in market research, focus group discussions between participants and the moderator tend to be structured and directional as the data is generally used to support future business decisions. In comparison, the moderator's role in social science research is to facilitate discussion among group participants, helping to understand each other's meanings and interpretations (Liamputtong, 2011). Each focus group constructs its own disposition that provides the researcher insight into a wide range of views that people have about a specific issue, as well as, how they interact and discuss these issue (Liamputtong, 2011). Focus group discussions are a dynamic social process that allows for spontaneity of responses.

The intent of focus groups is to explore important issues and gain revealing dimensions difficult to capture by more conventional research collection techniques, such as surveys and individual interviews (Kitzinger, 1994). According to Kitzinger, focus group discussions challenge people's taken for granted reality and encourage discussion of inconsistencies both between participants and within their own thinking. Group discussions generate more critical comments than individual interviews as participants tend to be encouraged by other group

members to expound on their point of view and illuminate the rationale for their thinking. Focus group discussions can challenge people to articulate their ideas and cognitive constructions, which may not have been verbally formulated (Kitzinger) or provide support for people who cannot articulate their thoughts easily (Liamputtong, 2011). In addition to promoting self-disclosure, a key feature of focus groups is the active interaction among participants to explore viewpoints and insights into sources of complex behaviours and motivations leading to a deeper understanding of the issue at hand (Jayasekara, 2013; Sharts-Hopko, 2001; Webb & Kevern, 2000). The opportunity to observe the extent and nature of participants' agreement and disagreement is a unique strength of focus groups (Jayasekara).

An advantage of focus groups over individual interviews is that they can capitalize on the interactions among participants who share similar experiences, which can further expand the understanding of that experience. Through discussion, participants explore and clarify individual and shared perspectives, which contribute to the construction of new knowledge (Wong, 2008). The focus group discussion allows the researcher to capture participants' knowledge, perspectives, and attitudes about issues, and obtain explanations for behaviours in ways that are less easily accessible in response to direct questions, in a one-to-one interview (Wong). For many participants, focus groups can be less threatening especially if there is a sense of perceived cohesiveness among participants who shared the event or activity (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). If the environment is comfortable, non-threatening, and non-judgmental, focus groups discussions can lead to a greater understanding of participants' attitudes, behaviours, or perceptions of the research topic (Liamputtong, 2011).

The focus group method allows the researcher to gain insights, generate ideas, and pursue topics in greater depth by clarifying similarities and differences in expressed opinions and/or

values (Freeman, 2006). It is not necessary for the group to reach consensus or to disagree; rather participants are encouraged to make additional comments as they hear others' responses and ideas (Robinson, 1999). "The prime objective is to obtain accurate data on specific issues and within a social context where people consider their own views in relation to others" (Robinson, p. 906).

Participant Recruitment

Multiple strategies were used to recruit nursing student participants including global emails, posters, Facebook postings, and snowballing methods. A global email introducing the study and inviting nursing students to participate was sent via the U of S CON Dean`s office, to all second, third and fourth-year nursing students. The SCBScN program notified their second, third, and fourth-year students through a notification on the students' communication portal. The notification consisted of a poster invitation and podcast about the study.

Snowball sampling was also used by inviting the first focus group participants to invite their nursing peers to volunteer for this study. Snowball sampling is a non-probability sampling technique used when participants can be difficult to connect with or find. Snowballing entails the use of social networks and the fact that friends tend to have characteristics in common, to connect with other friends who have similar characteristics that would meet the eligibility criteria of the study participate in the study (LoBiondo-Wood & Haber 2013).

Recruitment posters were also placed on communication boards in highly visible locations at the Regina General Hospital, Pasqua Hospital, Wascana Rehabilitation Center, St. Paul's Hospital, City Hospital, and University of Saskatchewan Hospital. (Appendix D: U of S Recruitment Poster; Appendix E: U of R Recruitment Invitation). Finally, I advertised the study

through collegial relationships with faculty and staff nurses and posted the recruitment poster and invitation on Facebook to attract student interest in the study.

Inclusion Criteria

Potential participants were asked to contact me by email, text, or telephone if they were interested in finding out more about the study. I responded to all inquiries with details about the study. Students were enrolled into the study if they met the following inclusion criteria: had previously participated in a HFPS scenario, were enrolled in a Bachelor of Nursing program, and could participate in a focus group with other nursing students from a similar academic year. Students were excluded from the study if they were enrolled in a diploma-nursing program (Registered Psychiatric Nursing program or Practical Nursing Program) or had not participated in a HFPS experience. Students with no previous HFPS experience would have limited ability to compare simulation learning strategies and evaluate their effect on the scenario learning outcomes.

Eight students from the U of S, Saskatoon site and four U of R instructor lead clinical groups expressed interest in participating in the study, however, two challenges proved to be barriers to their participation. Firstly, students' participation was restricted to times outside of class, laboratory, or clinical hours. Many students wanted to participate in this study as a component of their clinical experience, more specifically as a post-conference learning opportunity. With the Dilawri Simulation Centre located at the Regina General Hospital, where many students had a clinical placement, the centre provided a convenient location to access an additional learning opportunity for post-conference. When I explained the study had to occur after clinical hours, several students expressed their disappointment and declined to participate due to time constraints outside of their curriculum. Secondly, it was difficult to arrange

scheduled simulation times that allowed at least six students from the same academic year to participate in the HFPS experience. Preplanning for six students per HFPS scenario allowed for the possibility of students encountering conflicts and not showing for the scenario; thereby, impacting the focus group discussion.

Participant Characteristics

Focus group participants were undergraduate nursing students enrolled in either the University of Saskatchewan (U of S), College of Nursing (CON) program or the University of Regina (U of R)/Saskatchewan Polytechnic, Saskatchewan Collaborative Bachelor of Science, Nursing (SCBScN) program. Eleven students volunteered for the study. The focus groups were coordinated to reflect participants' academic year of study. One focus group consisted of four, fourth-year students and the other focus group consisted of seven, second-year students. Student volunteers ranged in age from 20 to 28 years of age, all were female except for one male, and were completing their first degree. No third year students volunteered for the study although they met the inclusion criteria of having participated in medium and high fidelity patient simulation experiences that required a holistic nursing care approach for a specific health care problem.

First year students did not meet the inclusion criteria of having participated in a HFPS scenario from either nursing program. At the U of S, first year students complete their core courses and electives in an interdisciplinary learning environment with other health care students such as pharmacy, physiotherapy, nutrition, and pre-medicine. After first year courses, each health care student continues on their own program journey until degree completion. It is during second-year nursing students are introduced to medium and HFPS. During third year, students participate in HFPS regularly in the high acuity courses for both semesters. They participate in about ten scenarios. Fourth-year consists of community and preceptored placements in many

rural and remote locations limiting students' participation in additional HFPS experiences. Students at the U of S attend HFPS experiences in small group sizes that reflect clinical group sizes.

During the first year in the U of R/SaskPolytechnic Nursing program, nursing students practice assessment skills on each other and are introduced to low fidelity simulation. During second year, students participate in one to two HFPS scenarios. Students attend these HFPS scenarios as part of a clinical day. Third year students attend a HFPS scenario every six weeks complementing their pediatric, maternity, acute, and mental health rotation. In the U of R/SaskPolytechnic program students attend the HFPS experiences in pairs. During the fourth-year, students attend preceptored experiences across the province and do not participate in simulation experiences.

Ethical Considerations

This research was reviewed by the Behavioural Research Ethics Committee at the University of Saskatchewan and harmonized with the University of Regina Behavioural Research Ethics Committee and the Regina Qu'Appelle Health Region's Ethics Board. (UofS Beh 16-24; UofR 2016-139; RQHR REB-16-96).

Informed consent was obtained from each student who participated in the study prior to orientating students to the simulation room. The students were also given a signed copy of the consent for their records. The researcher ensured confidentiality of the scenario and debriefing discussions, but could not guarantee students did the same. Students were instructed to be respectful towards their peers during the simulation experience and refrain from disclosing any details about the simulation experience outside of the debriefing session. However, there is a risk some students may violate the confidentiality of their peers by discussing details of the HFPS

learning event. Reminders to maintain confidentiality were stated at the start of the HFPS experience and during the study's closure. Nursing students were assured participation was voluntary and their performance during the simulation would not influence their grades. No faculty or clinical instructors were present during any component of the simulation scenarios, debriefing, or focus group. In addition, student phrases will only be published in aggregate form, so no individual student can be identified.

Setting and Materials

The study took place in the Dilawri Simulation Centre located at the Regina General Hospital, a medium sized urban teaching hospital. At the time, the simulation center was operated through a collaborative partnership between the University of Saskatchewan, Academic Health Sciences and Regina Qu'Appelle Health Region (RQHR). The centre continues to serve as an on-site laboratory for medical students and RQHR employees. In 2017, the Saskatchewan government amalgamated the twelve regional health authorities under one provincial health authority. The Dilawri Simulation Centre partnership continues to evolve under the new provincial partnership.

The Dilawri Simulation Centre was a neutral location for nursing students from the U of S, CON program and the U of R/SaskPolytechnic, SCBScN program, as both nursing programs have their own laboratories with simulation capacities. None of the participants had any previous learning experiences in the Dilawri Simulation Centre and the majority were unaware of the centre's existence prior to this study.

The Dilawri Simulation Centre consists of two large HFPS rooms, two debriefing rooms, four small group sized classrooms, and two interviewing rooms. The rooms can be set-up to replicate actual hospital environments, such emergency departments, nursing units, or speciality

departments. Room equipment includes oxygen, suction, air value pressure, cardiac monitoring, code buttons, trauma equipment, intravenous and medications. The centre's HFPS simulators include a preterm baby, an infant, a toddler, child, Noelle (who has capabilities of simulating pre-natal and post-natal care) and Hal. In addition, the centre has the cardiopulmonary simulator referred to as Harvey, who is used to assess physicians and medical specialists for licensing. The two large HFPS rooms also have video recording equipment to support students'/participants debriefing.

Staging and Mannequin

The scenario took place in a simulated patient room on a medical unit. The patient was dressed in a gown and had a nasal, oxygen cannula *in situ* on the patient's forehead. The patient was mildly disoriented, lips were slightly cyanotic, and legs were edematous. A 20 gauge peripheral intravenous was infusing normal saline at 100 mL/hour on an infusion pump. Other vital signs included crackling wet sounding lungs, respiratory rate at 20, increased heart rate of 116, elevated blood pressure 150/96.

Resources

Intravenous lines, normal saline solution, saline lock, medication pumps, various medications –labelled in medication cupboard, oxygen equipment –masks, non-rebreather masks, call bell, vital sign equipment, urinal, catheter equipment

Roles

During the scenario, students took on one of the following roles:

- Primary nurse –assess patient, engage in communication, direct/ask for assistance from secondary nurse
- Secondary nurse –administer medications, follow up with physician using SBAR

- Documentation nurse

Initial Parameters

Patient is awake, short of breath, respiratory rate is increased, lips cyanotic, pulse increased –sinus tachycardia, elevated blood pressure, lungs have crackles throughout the lower bases, patient complains of being short of breath, mouth breathing, slight confusion

Learning Objectives

1. Define congestive heart failure (CHF).
    a. Pathophysiology
    b. Risk factors
    c. Causes
2. List common signs and symptoms of CHF.
    a. Assessment –cardiac, respiratory, neurological, peripheral, gastro-urinary
    b. EKG
    c. Laboratory results
    d. X-ray results
3. Explain the common treatments for CHF.
    a. Nursing (position, diets, smoking, exercise, activity, weight, volume measurements)
    b. Medications
4. Explain the purpose for the various test ordered by the physician.
5. List common elements of an action plan for CHF self-management in the home.
6. Identify community resources available to assist patients diagnosed with CHF.

Study Design

The standard HFPS includes pre-briefing, the scenario, and debriefing (INACSL, 2016). This qualitative study expanded on this process by repeating the HFPS immediately following the debriefing (i.e., pre-briefing, HFPS scenario, debriefing, and repeat HFPS). Following the second scenario, students participated in a focus group to discuss their experience on repeating the HFPS scenario. (Appendix F: Model of Standard HFPS Process compared to this study's Model of Repeating the HFPS Scenario)

Welcome and Pre-brief

Students were welcomed on their arrival at the Dilawri Simulation Centre by the receptionist and me. A debriefing room with multiple chairs and two small tables was used to welcome students and provide nutritional snacks. This room was also used for the debrief and focus room discussions. The study co-facilitator, a retired nurse with twenty-five years of experience on various medical units, was also present in the room and introduced to the student participants. The co-facilitator remained present throughout the remainder of the study including students' orientation to the simulation centre, the mannequin and equipment, scenario, debrief, and focus group discussion.

During the pre-brief, students were offered refreshments and provided an outline for the two-hour session. I explained the purpose of the study, provided an orientation to the centre, and explained how HFPS was a safe learning environment. I discussed how confidentiality, trust, open communication, self-analysis, and reflection were important components of the HFPS experience (Decker et al., 2013). Students were also assured that all components of the simulation experience would remain confidential and that the HFPS was a learning opportunity for them and no information would be shared with any of their clinical or classroom instructors. I

reminded participants that they could withdraw at any time from the study without explanation or penalty and explained my obligation of confidentiality. After the participants and I signed the consent forms, copies were provided to the students for their records (Appendix G). The originals were retained and stored confidentiality as per Behavioural Research Ethics requirements.

Students decided amongst themselves which roles they wanted to assume for the scenario: primary care provider, medication nurse, documentation nurse or observers. I operated the computer in the control room located behind a one-way viewing window into the HFPS room. The one-way mirrored window allowed me to observe the care providers while also listening to their responses as I role-played the patient voice. Ceiling cameras and recording devices also allowed me to observe the care providers from various views.

Students who were observing watched the scenario from the control room and behind the one-way mirror. The co-facilitator remained in the patient's room supporting the nursing team. After the initial scenario, students went to the debriefing room and completed the Seattle Student Evaluation Form (Mikasa, Cicero, & Adamson 2013; Appendix H), prior to being debriefed by the co-facilitator and researcher.

HFPS Scenario

The HFPS scenario began with morning shift report. I assumed the role of the night nurse and gave the following report to students who were assuming the role of nurses on the day shift.

> Mr. Smith, a 75-year-old man, was brought to the Emergency Department around midnight by ambulance. His neighbour found him wandering outside of his home in his pyjamas. According to the neighbour, Mr. Smith's wife was recently deceased and his health had deteriorated. Mr. Smith appeared disheveled, was slightly

confused, has shortness of breath, a wet sounding cough, smells of urine, and has swollen feet. Blood tests, a chest x-ray and an EKG were completed. He has an intravenous infusing at 100 mL/hour. He was given a dose of Lasix in ER. His B-type Natriuretic Peptide (BNP) is elevated while his Troponin levels are only mildly elevated. He denies any chest discomfort. Further orders are pending.

The scenario for this study was developed after reviewing multiple online simulation scenarios (Ontario Simulation Alliance, 2018; Queen's University Internal Medicine, 2018), discussion with local two nursing educators and three clinical educators, and reflection on personal experiences. Students were expected to recognize the patient's increased level of anxiety and increased respiratory distress. To do this, they had to conduct a focused cardiopulmonary assessment and apply appropriate interventions, such as repositioning, provide oxygen, review the orders, laboratory results, and x-ray report; call for assistance using Situation, Background, Assessment, and Recommendations (SBAR), safely administer medications, and re-assess the patient. The patient's condition would improve with appropriate and timely interventions.

Pilot testing the scenario. The HFPS scenario was pilot tested in preparation for scaffolding the scenario to students' levels of knowledge and abilities and to plan the integration of verbal patient cues. Two masters' prepared nurse educators with more than twenty years of teaching experience reviewed the CHF scenario validating that the learning objectives complemented the nursing curriculum and simulation outcomes. The first nursing educator has facilitated students' clinical practice on one of the medical teaching units located in the same facility as the Dilawri Simulation Centre for the past ten years. The other nurse educator, after many years as a critical care nurse, was also one of the Program Coordinators for the Dilawri

Simulation Centre. These nurse educator's were selected based on their years of teaching experience and current practice. The researcher developed the accompanying patient chart details including physician orders, medication records, and laboratory results to enhance the fidelity of the scenario. The laboratory and diagnostic details were selected from patients previously admitted to an acute care unit and diagnosed with congestive heart failure.

The co-facilitator and I (researcher) conducted two practice runs role-playing possible novice and senior students' thought processes. Equipment props including oxygen tubing, intravenous equipment, medications, and edematous legs were used during the dry run testing of the scenarios. We ran the first scenario with multiple stops based on our experience as nursing faculty teaching students. We would stop the scenario, asking ourselves how novice students would view the patient. What assessments would novice students compared to advance students consider that would influence the patient care that they provided? For example, would novices reposition the patient? Would students know to adjust the method of oxygen administration? Would novice students identify the flow rate of the intravenous solution when completing their assessment? How would students administer the necessary diuretic medication? Could they administer the diuretic by intravenous methods? How much practice did second year students have with administering intravenous medications. In comparison, fourth year students would be fluent in administering intravenous medications. Would we expect advanced students to follow hospital policies and procedures when administering the diuretic, which would mean they could administer it as an intravenously pushed medication. Would we expect fourth year students to practice to their full-scope of practice as Registered Nurses? How fluent would third year students be in administering intravenous medications? How would we manage cues to support students' learning during the first scenario in regards to patient assessments and locating

supplies? Throughout the dry runs, the researcher and trained co-facilitator discussed and planned possible alternative decision paths the students might consider while providing patient care.

To increase the credibility of the HFPS scenario, two second year student volunteers pilot tested the CHF scenario, they provided patient care, participated in a debrief, and then they practiced the re-run of the scenario. These volunteers were very positive about the opportunity to repeat the HFPS experience and improve in providing patient care.

Debriefing

The debriefing session explored the student care providers' initial feelings and emotions of the scenario, then details on how they identified the patient problem, what assessment details were noted, obtained physicians orders, and implemented nursing interventions to resolve the patient's problem. During the debriefing, the facilitator explored and discussed the care providers' strengths and areas for improvement. Students also reflected on their scoring of the Seattle Student Evaluation Form discussing low and high scores along with strategies for improvement. The debriefing sessions were summarized with linking the patient scenario to past and future clinical experiences. Students then returned to the simulation room and repeated the same HFPS scenario. After repeating the scenario, students completed the Seattle Student Evaluation form a second time prior to participating in the focus group discussion lead by the researcher.

Focus group

The focus group discussions were clearly identified as a focus group dialog rather than a second debriefing by a couple of procedures. First, the researcher led the focus group discussions. The co-facilitator led the initial scenario debrief and became the note-taker during

the focus group discussion. Second, the researcher shifted the discussion from patient care to the teaching-learning strategy. The HFPS debriefing concentrated on the patient care experiences while the focus group discussion concentrated on the teaching-learning strategy of repeating the HFPS scenario and students' perceptions of the strategy. Furthermore, to guide the focus group discussion and provide consistency among focus groups, the researcher followed a list of guided questions asking about their different simulation experiences.

Data Collection

I led the focus group discussion and used an interview guide of open-ended questions (Appendix I). I developed the interview guide based on a literature review of debriefing methods and strategies (Decker et al., 2013; Dufrene & Young, 2014; Lavoie, Pepin & Boyer 2013; Lestander, Lehto & Engstrom, 2016; Mikasa, Cicero & Adamson, 2013). Students were asked to elaborate on questions such as "how do you believe the repeated scenario affected their learning" or "how did today's HFPS process compare to their previous HFPS experiences and how may today's HFPS teaching strategy impact the patient care they may provide in the future?" The focus group discussions lasted 25 to 45 minutes on average and were audio-recorded. After students departed, the co-facilitator and researcher debriefed the study process and added notes to the researcher's field notes.

Seattle University Evaluation Tool

Student care providers and observers completed the *Seattle University Evaluation Tool* (Mikasa, Cicero, & Adamson, 2013) after the initial and repeated HFPS scenarios. The tool was used as a guide for self and peer reflection during the debriefing discussion and for comparison during the focus group discussion. The tool consists of five components targeting assessment, critical thinking, direct patient care, communication and collaboration, and professional

behaviour. Students rated themselves or the care provider's performance on a 6-point Likert-type scale where five exceeds expectations and zero means below expectations. The assessment component included evaluation of the students' ability to gather information: subjective and objective, verbal and technical, prioritize care, and evaluate care outcomes. Critical thinking was evaluated by the students' ability to interpret patient information presented during the scenario such as elevated blood pressure readings and cyanosis (blue facial lighting), along with their decision-making skills in relation to these assessments. Direct patient care included the organization of care, correctly administering medications, and safely implementing procedures. Communication skills included listening to the patient's concerns, collaborating with team members, and communicating changes in patient status to the physician using the SBAR communication tool. Professionalism was evaluated by the way students interacted with the client and other team members.

Data Analysis

The data was analysed using thematic analysis. This technique relies upon the interpretation of descriptive data to reveal patterns in the findings, categorizing the findings, and discerning the significance in the students' experience (Speziale, Streubert, & Carpenter, 2011). The researcher began by listening to the audio-recordings repeatedly and transcribed the tapes verbatim. The transcriptions were checked repeatedly to identify and correct any errors or omissions. This method also allowed me to become increasingly familiar with the participants' expressions and voices and enabled me to immerse myself and to organize, repeated words, phrases, and ideas, into clusters and then into preliminary categories. The categories were gradually merged, re-named, and streamlined until the final themes emerged. The following table is an excerpt of this process.

Date	Comment 4nd year	Cluster	Category
Feb 2017	Your think about that when you get into practice, if you forget a med on the MAR in the simulation lab you're like "Oh no, I need to focus on looking at the MAR and I should actually give all the meds for a certain time" and that's with me, I missed meds on simulations, it's really rare for me to miss meds, I haven't missed meds.	Emotion Medication error Carry forward learning	Anxiety Mistake outcome
	But even then if you would do something that would hurt the dumbie, you're not hurting someone in real life, so you might as well make those mistakes now, then when	sim mistakes vs clinical mistake & repercussions	Valuing learning from mistakes (repercussions – negative/too harsh)
April 2017	Comments 2nd year		
	You walk away and talk about all the things you did wrong; but then you didn't practice the things you were supposed to do. So it kinda of turns into a blur and you don't actually learn from it.	debriefing mistakes; balancing feedback; emotion learning	Improving from mistakes frustration
	made us think with change of responses, on that he did not take his medication for the past few days	Missed medication compliance	Insight to medication compliance

According to Rabiee (2004), this stage requires researchers to use creativity and analytical skills "to see the relationship between the quotes, and the links between the data as a whole" (p. 658). Observational notes taken during the discussions and summary notes written immediately following the discussion were also reviewed with the recordings and transcription (Rabiee).

According to a number of researchers (Braun & Clarke, 2006; Thorne, 2000) thematic analysis has become a foundational method for qualitative analysis which is contrary to the traditional role as a tool (Ryan & Bernard, 2000). With the former position, thematic analysis gains utility across epistemologies (Norell, Norris, White, & Moules, 2017; Ryan & Bernard, 2000). Thematic analysis is flexible, relatively simple, and accountable/rigorous (King, 2004), although it is sometimes seen as lacking coherence (Holloway & Todres, 2003). The literature is replete with references to conducting or including thematic analysis (Guest, MacQueen & Namey, 2011), but lacks details on the pragmatic processes associated with thematic analysis (Norell et al., 2017). The 6-phase model by Braun and Clarke (2006) was followed in this research.

Phases
1. Familiarizing yourself with the data
2. Generating initial categories/codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Reporting

In phase 1, the researcher undertook immersion in all the qualitative data including transcripts from the focus groups and field notes as described by Thorne (2000) and Tuckett (2005). Included below is a sample of my field notes as I pondered learning from feedback on medication errors.

These fourth year students rolled with the simulation process of accepting mistakes and limitations during the scenario. When the student share his experience about

missing medications during his simulation and how his practice is that much safer, I really wonder how he felt at the time. I bet he was devastated. He is extremely thorough now –he could make a video of the steps. I gave wrong medication once, I do not think I am that methodical. He talks about it as a benefit now I wonder how long it took to get to acceptance; like Kubler-Ross's grieving steps. I wonder how other years-of-students understand the value of making medication errors?

As suggested by Braun and Clarke (2006), it was important to read through the entire data set before beginning the identification of patterns. Lincoln and Guba (1985) suggest that immersion in the data enables researchers to capture and reflect holistically on thoughts, theories, and values which predicates the development of codes, categories, and themes.

In phase 2, the repeat revisiting of the data assisted in identification of important sections of the data, essentially becoming familiar with 'what is going on' (Morse & Richards, 2002). Some researchers establish codes (King 2004) while others create categories (Creswell, 2014) and others develop thematic networks (Attride-Stirling, 2001).

In Phase 3, the researcher sought themes that reflected significant concepts and ideas from within the data as described by DeSantis and Ugarriza (2000). Themes are normally derived either inductively or deductively; either being derived from the data or from theory and prior research respectively (Boyatzis, 1998). In this study, an inductive approach was utilized in which no pre-existing organizing structure was used. According to Braun and Clarke (2006), this is data-driven thematic analysis, which fit with this study's intention to look solely beyond existing knowledge. Appendix J is a sample of the key words identified in the focus group discussion transcripts when searching for beginning themes.

Phase 4 allowed the researcher to review the tentative themes and begin to coalesce into patterns. It is critical in this phase to ensure that any missing or under highlighted elements be brought forward and refined, while conversely addressing and removing any overlapping emerging themes (Braun & Clarke, 2006; King, 2004). This phase allowed the research to ensure that all data was reflected and that the developing themes were well grounded in the data (Lincoln & Guba, 1985).

Phase 5 was a critical point in this research in which the themes were clarified and labelled. According to Braun and Clarke (2006), this is the point to create the story of the theme and provide a name that captures the essence of the theme. Once this process was completed, the supervisory committee was consulted to review and provide feedback on the clarify of the themes which aligns with the recommendations of King (2004) and Lincoln and Guba (1985).

Phase 6 reflects the final analysis of the findings reflected in Chapter 4 of this document. According to Braun and Clarke (2006), the challenge is to capture the results of the analysis to ensure the reader understands the logic, interpretation, and complexities are addressed. This is achieved through provision of direct quotes (King, 2004) which bring life and voice to the themes and linking to the literature (Aronson, 1994).

Rigour

According to LoBiondo-Wood and Haber (2014), "rigour refers to the strictness with which a study is conducted to enhance the quality, believability, or trustworthiness of the study findings" (p. 307). The goals for qualitative researchers is to account for the method and the data, which must be independent so that another researcher could analyze the same data in the same way and come to essentially the same conclusions; and to produce a credible and reasoned

explanation of the phenomenon under study (LoBiondo-Wood & Haber, 2014). Rigour includes credibility, auditability, and fittingness.

Credibility is the truth of findings as judged by participants and others within nursing education. Are the findings reflective of the lived experience of the participants, can others relate to the study outcomes (Demuth, 2013). Auditability is the follow up on information that leads the reader through the study, from the research questions, through the raw data and its analysis, to the interpretation of findings (LoBiondo-Wood & Haber, 2014). Fittingness follows as the degree to which the study findings are applicable to situations beyond the study and are meaningful to individuals not involved in the research (LoBiondo-Wood & Haber, 2014). This study achieved these rigour criteria as follows.

Notes taken during the discussion supported the focus group audio recordings. In addition, discussions between the facilitator and researcher and the researcher's own reflective notes, written immediately after the focus group interview, are all important for establishing confirmability, dependability, and trustworthiness of the data (Rabiee, 2004). This trail of evidence increases the rigour of the study by facilitating another researcher's ability to verify or replicate the study's findings (Rabiee). Differences between members of focus groups were explored during discussions with the help of the nursing student participants. The researcher checked her assessment and understanding of the group's discussion by summarizing the main discussion points and then, again by comparing the understanding with the co-facilitator as a form of 'member checking'. During data analysis, the researcher carefully determined whether an issue constituted a theme for the group or merely a strongly held viewpoint of a member or two (Kidd & Parshall, 2000). The researcher noted if the issue came up in both groups and whether the issue was raised multiple times (Kidd & Parshall, 2000).

Study Limitations

The number of nursing students who volunteered was a limiting factor for this study. Attempts to recruit students using the snowballing process of personal contacts through students and instructors, global emails sent by programs administrators, and posters were successful; however, without credit for time towards clinical hours and course outcomes, students opted to withdraw from the study or not participate. Usually, HFPS studies are completed as a component of clinical practice and integrated into nursing curriculum (Lestander, Lehto & Enstrom, 2015; Poikela, Ruokamo & Teräs, 2015) as compared to this study where no credit was allowed. Potential participants for this study asked that their participation be incorporated into their clinical post-conference. Recruitment numbers may have been improved by allowing students to receive credit for participating in this study as a clinical post-conference.

The recruitment challenges encountered in this study limits its transferability. Student feedback is an important component for the ongoing updating of nursing curricula and evaluation of pedagogical strategies. Thus, students' feedback on teaching strategies, especially technology based strategies that replace clinical experiences, is critical for curricula planning using valuable resources and supporting faculty development. Although the goal for this study was to understanding students' perceptions of repeating HFPS scenarios as a learning strategy; immediately repeating the scenario could be considered a limitation because students only had a brief time to reflect on the scenario outcomes. However, the opportunity to immediately practice feedback discussed during the debriefing and explore alternative nursing actions when the scenario outcomes are known, is also a strength of this study. Focus group feedback provided by the second-year students identified their frustration of not having an opportunity to practice skills

and suggestions received during the debrief. The students left their HFPS experiences with doubts about their patient care skills.

Another study limitation could be considered researcher bias as I developed the congestive heart failure (CHF) scenario, provided the voice of the patient, and facilitated the focus group discussion. To overcome these potential biases, nursing educators teaching within the nursing programs and clinical educators practicing in the acute care setting reviewed the scenario. The CHF scenario was then pilot tested with two students. To ensure consistent scenario presentation, potential student questions and details on how the patient should respond were discussed. As a finally method to reduce bias, the co-facilitator and researcher reviewed the focus group discussion after the students left the simulation centre.

Summary

Chapter 3 explored nursing students' perceptions of repeating simulation scenarios immediately after the debriefing. Focus group discussions were used to obtain students' perspective on scenario repetition as a strategy for HFPS. Using small focus groups similar to those in clinical practicums provided an intimate environment where students felt comfortable discussing their HFPS experiences and comparing them to those they attending during their courses.

Chapter 4

Findings

Students bring different levels of motivation, different attitudes about teaching and learning, and different responses to specific classroom environments and instructional practices (Felder & Brent, 2005). The more thoroughly educators understand these differences, the more likely we will be able to meet the diverse learning needs of all students and ensure they understand and provide safe, quality patient care. The comparative analysis of the two focus group discussions revealed six (6) themes: developing competence, teamwork, cueing, anxiety, making mistakes, and feedback.

Developing Competence

All students perceived the repeated HFPS experience increased their clinical competence and self-confidence. Fourth-year students quickly and confidently recognized the majority of the patient's signs and symptoms of fluid overload and initiated a plan of action by calling the physician and obtaining additional orders. The senior students felt confident in communicating with the patient and in collecting and synthesizing assessment details to justify their clinical decision. The greatest challenge for Year 4 students was notifying the on-call physician about the changes in the patient's condition. Misinterpreted orders could jeopardize patient safety; therefore, the CON prohibits students from accepting physician telephone orders. Simulated experiences allow students to function at the full Registered Nurse's scope of practice without risking patient safety. During the focus group discussion, fourth-year students identified improvements implemented during the repeated scenario, including conducting more holistic assessments and reporting the details to the physician.

If that was our actual patient and I knew there were crackles in the lower lobes,

pitting edema, and he was cyanotic, I would be getting the vitals going and whatever, and then we would be on the phone with the doctor. (Student 4A)

Like the things we missed because of lack of experience, like details when calling the doctor. (Student 4B)

Second-year students focused on performing a systematic assessment, teamwork, and patient education. These students did not interpret the patient's cyanosis, which was simulated by a blue facial light, as a complementary sign indicating a low oxygen saturation level. After debriefing and deconstructing some of the patient assessment details, second-year students focused on noticing and interpreting more of the patient's signs and symptoms and engaging with the patient during the repeat scenario.

I liked knowing what could be improved and having a chance to fix it. (Student 2A)

I liked going back and repeating the scenario because in school I would know what I did wrong, and I would want to go back and fix it, but we don't have that chance. So it was nice to do it again with what I learned and how I can improve. (Student 2B)

I felt things went smoother, more efficient. (Student 2C)

Teamwork

Effective clinical teams require that each member knows their role and the accompanying responsibilities. Fourth-year students had participated in multiple patient simulation scenarios throughout their programs and were comfortable in assuming the care provider roles.

It is just ingrained in our heads. Like these are the roles we need to do; get them done (Student 4B)

The students quickly assumed two clearly defined roles, as either the primary nurse or the medication nurse.

Yeah, the first thing we asked each other when we walked in the room, I said do you want to do meds or the assessments? (Student 4B)

During the repeated scenario, the care providers switched roles allowing the other person to practice the alternate role.

I felt like I was more the follower in the second time, just because of the role I did. I did vitals, medications and ….I had to wait on the orders (in reference to the repeated scenario). (Student 2B)

A student observer commented on the improvement in patient care during the repeated scenario.

Really big improvement in your assessments on both sides, taking orders from the doctor, ….you did really well by saying just a minute. (Student 4C)

In comparison, second-year students were less familiar with HFPS scenarios and required guidance and encouragement from the facilitator to assume the care provider roles. Three students formed the care team: two students provided patient care and the third student documented the care. The care provider roles were selected based on students' comfort.

I did the medications because I had lots of opportunities this semester to administer many intravenous medications. I felt comfortable doing them first. (Student 2A)

Students were also very watchful of each other's approach to patient care and how they provided nursing care.

It was also helpful in watching, like when Sarah (pseudonym) did her assessment first and I did vitals and then we swapped. I was also watching Sarah while we were doing the simulation and she was watching me to see what she picked upon and what I picked up on. (Student 2A)

Observers admitted to learning from their peers without the stress of performing.

I think I even learned from watching them, even though I wasn't a doer.

I still like, recognized things I should pay attention to if I was doing it (Student 2D)

The second-year students identified differences in collaboration with nursing staff on the surgical unit where they had their practicum compared to student peers during the simulation experience. As members of the healthcare team, students feel they are on the bottom of the hierarchy, whereas, in simulation, they felt a collaborative spirit, which positively affected their learning. Below is one student's perception of teamwork on the clinical unit.

I think it is good to work as a team. As nursing students, lots of times we are working as a team, but we are also the lower part of the team. So instead of conversing, we are asking question. Instead of going back and forth with what we think, we say what do you think (to the staff nurse), we don't ever say what we think. (Student 2C)

Another student offered a similar comment, noting the difference in today's simulation experience.

I feel we get directed a lot of the time, whereas today we were sitting down and bouncing ideas off of each other. We could pass on ideas from our knowledge. It was nice to work as a group together. (Student 2E)

The second-year students stated they preferred working collaboratively during the patient scenario where observers could also provide immediately guidance to the care providers.

Cueing

Second-year students were unfamiliar with cueing during the patient scenario. During their past simulated patient experiences, instructors were behind a two-way mirror, out of contact from the care providers. The pair of care providers had to rely only on each other to problem

solve all patient care issues. Students identified those simulation experiences as frustrating and of limited benefit.

> *We spent the last 5 minutes of our scenario time trying to figure out the IV alarm. We did not know all we had to do was push a button. We wasted all our time when we could have been learning something more*. (Student 2F)

Another student expressed her frustration when she could not find a pulse on the manikin.

> *We know what to do, but we just could not find it*. (Student 2B)

These second-year students felt their learning could be improved

> *If the facilitator would quickly come into the room and resolve the issue so students could continue on with learning what they are supposed to.* (Student 2D)

During the initial scenario in this study, the facilitator offered cues to the students to support their patient care. Since the simulation room set-up was unfamiliar to students, the researcher wanted to keep the focus on patient care rather than manipulating and locating supplies within the room. Therefore, the facilitator guided students to locate supplies when requested, such as the medications or oxygen equipment, in order to reduce unnecessary frustration or delay treatment response.

Anxiety

Learning new knowledge, skills, and/or processes can be challenging, overwhelming and, at times, frustrating. Knowing how the scenario was going to progress during the repeated scenario reduced students' anxiety and allowed them to focus on learning and implementing details of care identified during the debriefing.

> *Everyone looked more calm so you could learn better. Everyone knew what to expect. The second time around you could take more time to critically think*

about what you are doing rather than being more panicked on getting things done. You can take time to think about why you are doing each thing. (Student 2C)

Fourth-year students had participated in multiple simulated patient scenarios throughout their programs, so the current HFPS experience was not as daunting. Being observed and receiving peer feedback was expected as part of their usual simulation experience. In comparison, second-year students felt anxious and stressed about having their peers and faculty observe and evaluate their simulation performances. The latter students acknowledged that not knowing or seeing their peers during the simulation experiences increased their level of anxiety.

I wanted them to be in the room versus behind the glass…. I don't mind people watching me but I like to know who is watching me and what they are doing. I feel when they are behind the glass, I think, oh my gosh, they are probably laughing at me because I missed… (Student 2E)

Other second-year students commented:

I even feel if (instructor) was out front during the simulation that would be a lot more comforting then her sitting behind the glass……because we became comfortable with her, she is part of our learning experience…giving little cues, or just seeing her versus not knowing her reaction behind the glass. (Student 2A)

What if she is thinking I taught her this. We went through that last week…..It's just the anxiety in me. (Student 2B)

One's emotional state can affect their learning abilities and outcomes if it becomes overwhelming or accumulates. When under stress, the brain limits the amount of information it can absorb, process, and store which makes it difficult or impossible to retain new information (Stenger, 2018).

Making Mistakes

Simulation is a tool for learning and training as well as for the ongoing assessment of performance (Lateef, 2010). Simulation training helps learners prepare to deal with unanticipated patient care events by allowing students to make mistakes and learn from those mistakes. Using this tool, healthcare professionals can develop and refine their skills, repeatedly, if necessary, without putting patients at risk (Gaba, 2004).

The experience of making mistakes and learning from those mistakes during the simulation differed between the two student groups. Fourth-year students accepted their making of mistakes as a process for learning.

> *I think, what's going to happen? And what are we going to face? And if you don't do well, oh well, we just learn from that.* (Student 4B)

Another fourth-year student also acknowledged feeling embarrassed initially about making a mistake but noted that it was the moving forward which is more important.

> *And you just kinda roll with it, you know your roles, you know how to assess a dummy. As long as you learn from your mistakes. I think it is important not to take those things on with you forever. It's something you need to learn. You might feel pretty silly at first…* (Student 4A)

This fourth-year student goes on to share a personal example of how making a medication mistake in simulated scenario influenced his current practice. He believes he is a safer practitioner since making the medication during the simulated scenario.

> *You think about that when you get into practice if you forgot a med on the MAR in the simulation lab. You're like "Oh no, I need to focus on looking at the MAR and I should actually give all the meds for a certain time" …. I haven't missed*

meds. (Student 4A).

Corrective feedback should be communicated in a clear and concise manner, delivered immediately and respectfully for students' growth and learning as mistakes leave a lasting impression on students who concentrate on skills. Furthermore, some students will require additional demonstrations or practice opportunities as highlighted by a second-year student's perceptions.

> *I feel that you don't learn the right way to do things unless you actually practice them. You walk away and talk about all the things you did wrong; but then you didn't practice the things you were supposed to do. So it kinda of turns into a blur and you don't actually learn from it.* (Student 2E)

Feedback

Completing the *Seattle University Student Evaluation Tool* (Mikasa, Ciero & Adamson, 2013) was used to guide students' reflection and self-evaluation of various components of the scenario during the facilitator-led debrief. This outcome-based tool was developed to evaluate student behaviours related to assessment, critical thinking, patient care, communication, and professionalism. Each of these categories is scored immediately following a simulation experience using a 6-point Likert-type numeric scale (0 = below expectations to 5 = exceeds expectations) based on demonstrated behaviours. For example, in the assessment category, students are scored on the degree to which they collected thorough and relevant assessment data in a timely efficient manner; prioritization and individualization of nursing interventions; and their evaluation and revision of patient care.

In the current study, students' self-evaluations of their communication received the lowest ratings. This category included the following behaviours: use of medical terminology, eye

contact, verbal interaction with the patient, and communication of the patient's assessment using SBAR criteria. Initial post-simulation scores averaged 2.3 out of 5. After repeating the scenario, communication and collaboration scores improved to an average of 3.75. All areas of patient care improved after repeating the scenario per the *Seattle University Student Evaluation Tool* scores (see Table 1).

Table 1. Seattle University Student Evaluation Tool Scores

Category	Average score following initial HFPS n = 5*	Average score following repeated HFPS n = 5*
Assessments/Interventions/Evaluation	3	4.25
Critical Thinking/Clinical Decision Making	3.1	4.25
Direct Patient Care	2.5	4
Communication/Collaboration	2.3	3.75
Professional Behaviours	3.5	4.25

*Scores were averaged to protect participant identities.

Student comments about their evaluation scores after the repeated scenario validated their improved performance.

> *I recognized things I should pay attention to if I was providing the care.* (Student 2F)
>
> *More conscious of what we did. We were told what we did wrong and what we could have done better, so we make sure we did it correctly the second time*. (Student 2A)
>
> *Everyone looked a lot more confident*. (Student 2D)

An additional written comment on the evaluation sheet reflected the differences between the two scenarios:

> *The difference between the two scenarios was amazing. The second run through went much more smoothly. The care providers knew what to do.* (Student 2F)

Insights gained from these students' HFPS learning experiences are discussed in the next chapter to maximise learning outcomes using repeated patient scenarios.

Chapter 5

Discussion

This study employed Vygotsky's sociocultural theory (1978), Kolb's ELT (1984), and the NLN/Jeffries Simulation Framework (2012) as its framework (Groom & Sittner, 2014). The latter consists of five constructs, educator, students, simulation design characteristics, educational practices, and outcomes.

Educator

Traditionally, the educator has been the primary source of instruction and expertise. The current generation of students' immediate access to information and their fluency with technology have changed the expectation of the educator's role in the classroom. In today's classrooms, educators are taking on a less authoritarian role and assume a more facilitative role, which shifts education away from the transmission of information, knowledge and ideas, and toward sense making and engagement by both learners and educators (Caplan, Myrick, Smitten, & Kelly, 2014). This increasingly collaborative approach has generated an interest in diverse learning methods that can sustain students' attention (Price, 2009). Being technologically savvy and socially connected, millennial students prefer to collaborate with peers and educators in less formal learning environments and to use multimedia resources to enhance their learning (Price). The challenge for educators is to make learning outcomes and activities relevant to the course content while using a range of engaging strategies and diverse technologies (Price).

The role for nurse educators in the simulation setting is to create a safe learning environment by conveying mutual respect, professional integrity, and confidentiality (Stephenson & Poore, 2016) all while ensuring that the pedagogical approach is appropriate to the student's level of learning, experience and competency (INACSL, 2016). Essentially, the

educator must build an environment and experience that meets expectations of the student in order to fully engage and achieve the necessary learning outcomes. The social interactions between educators and students dramatically influence students' cognitive development and their learning progresses throughout the curriculum. Students expand their cognitive skills when supported by MKO (Vygotsky, 1978) and experiences are levelled to students' abilities.

The INACSL Standards of Best Practice (2016) contend that the educator's role in simulation is to help students' development by exploring their thought processes; encouraging critical thinking, problem solving, clinical reasoning, and clinical judgment; and applying theoretical knowledge to patient care in a range of health care settings. The social interaction between educators, students, and MKOs, drives cognitive development and helps students expand their ZPD (Vygotsky, 1978). The educator gradually withdraws support as students' knowledge and confidence increase and they become professional nurses. These standards recognize that a failure to engage the students with a HFPS will reduce their opportunities to meet the expected learning outcomes.

Students

In the current study, **s**tudents were in the second and fourth-year of their nursing programs and their ages ranged from 20-25 years. These students belong to the millennial generation – a generation that has been born with the digital version of the proverbial silver spoon. They have grown up with the ability to Google anything they want or need to know and they prefer technology, experiential learning, entertainment, and teamwork (Montenery et al., 2013). Social media culture has changed how students engage and communicate with one another influencing classroom activities and the strategies needed to support learning.

The fourth-year students in this study had completed multiple patient simulation scenarios throughout their academic programs, mostly during their third year. Depending on the course, they had participated in both 'standalone' HFPS scenarios and unfolding case studies. In addition, fourth-year students' knowledge and skills had been evaluated using objective structured clinical examination (OSCE) assessments involving standard patients and medium fidelity simulations, as critical components of their final course grade. Simulation as a formative and summative assessment tool is increasingly used across nursing programs (Kelly et al., 2016). The OSCEs during their second and third years likely contributed to the students' increased confidence levels and their approach during the HFPS scenario in this study.

At the time of this study, the fourth-year students had completed the theoretical content of their programs, and were in the final days of their last clinical rotation. The students' clinical placement was a preceptorship experience on a nursing unit of their choosing (e.g., palliative care, emergency, or rural nursing. Although this group of students were enrolled in the same nursing program, they were only remotely familiar with each other.

In comparison, the second-year students were very comfortable with each other. They belonged to the same medical-surgical clinical group the previous semester. Their clinical placement experience was instructor-led and a typical clinical week involved students researching their patient assignments the day before a 10-hour clinical shift. Students at this stage of their program have completed less than half of their clinical, theoretical, and laboratory experiences. The second-year students were more familiar with task trainers, static mannequins, and role-playing for learning assessments, history taking, and data collection.

With limited patient care experiences, beginning students rely on imitation, modeling, identification, and vicarious reinforcement as learning strategies to support their cognitive

development. Copying the behaviours of another peer or vicariously learning through role modelling and demonstration supports students understanding of nursing roles. These students had limited HFPS experiences, having participated in only two respiratory focused scenarios over the past semester. These experiences allowed them to practice administering intravenous medications, procedures using sterile techniques, and complex cardiac and respiratory assessments.

Participants' patterns of experience with HFPS throughout their programs were consistent with findings from Arthur, Kable, and Levett-Jones' (2011) cross-sectional survey of Australian Schools of Nursing. In that study, 83% of respondents' reported that their simulation sessions become more complex and immersive as students progressed through the undergraduate program. In first year, the focus was on basic skill acquisition with static mannequins and role-playing targeted at patient assessments, communication, and history taking (Arthur et al.). In second-year, students were introduced to more complex clinical skills that required more problem-solving skills and critical thinking while simulation sessions for third year students often involved scenarios with unstable patients requiring real-time responses, clinical reasoning, decision-making, teamwork, and resuscitation (Arthur et al.). Thus, students' level within their nursing program has the potential to influence their perceptions of the value of repeat HFPSs as a pedagogical strategy for achieving the desired learning outcomes.

Simulation provides a method of practice for students to augment learning while in clinical learning situations (Mike, 2018). The deliberate practice in HFPS supports students' socialization to the qualities and behaviours nurses need to provide safe and quality patient care (Vygot. During HFPS, educators can more detailed feedback that contributes to students'

‘meaning-making' which builds confidence and comfort in their ability to provide safe patient care (Mike, 2018).

Simulation Design Characteristics

Environment

The Dilawri Simulation Centre is located within one of the tertiary hospitals where students in this study have many of their clinical practicums. Although student practica take place on multiple units, students were unaware with of the Simulation Centre in the hospital. Student experienced different levels of anxiety and apprehension when they arrived at the simulation centre. Second-year students came as a clinical group led by their instructor, whereas fourth-year students were only remotely known to each other. A nervous energy was apparent within the second-year student group compared to fourth-year students who displayed a more relaxed demeanor. Page-Cutrara (2014) identified that not knowing what to expect and previous simulation experiences, influences students’ anxiety on future simulation activities. It is important for educators to recognize students’ trepidations of HFPS scenarios and create a safe, respectful learning environment.

Page-Cutrara (2014) suggests that novice students may benefit from an intentional introduction of teaching and learning activities or expert role modeling during the pre-brief. In comparison, pre-graduate and experienced nurses may value less structure that mimics the reality of their practice. Novice students need support in developing their abilities to notice aspects of the clinical situation, anticipate patients’ needs, and focus on the application of existing knowledge to meet the simulation objectives and form essential skills such as clinical judgment and thinking (Page-Cutrara).

In this study, a number of measures were taken to reduce students' anxiety. Assurances that the HFPS was not evaluative and that the students' performances would not influence any clinical or classroom grade was one such measure. In addition, no clinical instructor or academic faculty were present during the HFPS scenarios. Students were assured that any feedback they shared would remain confidential and only reported in aggregate form in this study.

Pre-briefing

Pre-briefing provides an opportunity for students to engage more fully in the learning activity by providing an overview of the upcoming HFPS scenario and creating a safe and trusting learning environment (Chamberlain, 2017; INACSL, 2016; Page-Cutrara, 2014). Page-Cutrara's (2014) found that nursing students' anxiety stemmed from not knowing what to expect during the simulation activity and pre-briefing sets the tone to help them focus on achieving learning outcomes. Students were oriented to the general environment and equipment, learning objectives, time allotment, and patient presentation. Students were also informed about the purpose of this study, which was to gather their feedback on the value of repeating the HFPS scenario. Stephenson and Poore (2016) emphasized the importance of completing the pre-brief to reduce the risk of not achieving the goals and objectives of the simulation, thereby leaving students dissatisfied with the learning experience.

Chamberlain (2017) compared different pre-briefing strategies and reported that students who did not receive a pre-briefing were unsure of what was expected of them in the simulation, had limited dialogue, and looked to the instructor for ongoing guidance. In comparison, students who received some type of pre-brief, such as reviewing the learning objectives, viewing a video, 'just in time training' or completing a worksheet, were more apt to listen to given cues and complete tasks accordingly during the scenario. Being able to discuss the learning activity prior

to the scenario helped students feel more prepared, reduced their anxiety, and supported the need to 'suspend disbelief' (Chamberlain).

Lamond et al. (1996) found that students' prior experiences have a very strong effect on self-confidence and performance. This was evident with fourth-year students as they assumed the care provider roles without hesitation and independently decided who would be the primary nurse (assessor) or the secondary nurse (medication nurse). During the repeat scenario, the students switched roles, allowing their peers the opportunity to role-play the alternate role. This reflected their prior experiences with similar teamwork and role divisions in prior HFPS and in their clinical practice. The students identified how they had witnessed the importance of knowing one's designated roles in emergency situations, such as trauma, cardiac arrest, and stroke alerts. According to the student completing her emergency practicum, a trauma or cardiac arrest involves three to four nurses, "a nurse on each side of the patient, a medication nurse, and then the nurse who documents all the activities".

In comparison, second-year students conveyed anxiety, trepidation, and nervousness. There was hesitation about who wanted or should assume the care providers role and most of them stated that they preferred to be observers. Whiteman and Backes (2014) state that quiet students often end up playing minor roles, whereas the more assertive students more often assume the RN role. The student care providers commented that they selected the primary nurse role (assessor) or secondary nurse role (medication nurse) based on their comfort level. In this study, the student who volunteered to be the medication nurse had administered multiple intravenous medications during her current clinical rotation and felt comfortable and confident in doing this task. The same student also stated she was aware that her peer had not administered intravenous medications and assumed she would be less comfortable and confident. This effort to 'protect'

her peer suggests that a high level of cohesiveness exists in this clinical group. Being confident and team oriented are two distinguishing traits of millennial students, as they have grown up in a culture of social media and classroom group teaching, which fosters strong team instincts and tight peer bonds (Erlam, Smythe, & Wright-St Clair, 2018). In the repeat HFPS scenario, the second-year students also switched care provider roles allowing their peer the opportunity to practice the complementary role.

It became evident that the students functioned as a 'community of learning', a place where like-minded people share concerns, knowledge, and expertise in practice in a supportive context (Andrews & Ford, 2013). As the students' anxiety subsided and they felt more comfortable with the HFPS, they opened up and shared stories about previous patient care experiences and the impact these experiences had on their learning outcomes. When a student becomes frustrated, their learning is inhibited; conversely enjoyment creates a comfortable learning atmosphere and builds the solid foundation for gaining deeper knowledge and skills (Poikela, Ruokamo & Teras, 2015).

Scenario

Knowledge constructed through patient care experiences and experiential learning forms the basis of nursing education. Kolb's (1984) experiential learning model depicts how knowledge is continually constructed and evolves based on experiences. Kolb's model is cyclical and consists of four phases: concrete experience, reflective observation, abstract conceptualization and active experimentation. According to Kolb's model, HFPS provides students with a context in which to reflect on current and past experiences and share feedback. This enables them to consider how diverse ideas, experiences, and suggestions from peers resonate with their own ideas and experiences and how these things may influence future encounters. In this study, the repeat

HFPS provided the opportunity to consolidate and apply their newly constructed knowledge in a safe environment and without the risk of causing patient injury, which Kolb's (1984) model labelled as active experimentation.

In this study, the HFPS scenario was introduced as a morning report. Students used their critical thinking and clinical judgments skills as they completed their assessments, administered medications, provided nursing care, and evaluated their care outcomes. The patient's condition was deteriorating and required students to notify the physician and request additional orders. Students were required to use critical thinking, problem solving and clinical judgments during their assessments and nursing care.

As one might expect, there was a significant difference between second- and fourth-year students' abilities to demonstrate critical thinking, make clinical decisions, and act on their judgments. The fourth-year students demonstrated confidence and comfort during the patient scenario. They noticed critical assessment details while auscultating cardiac and respiratory sounds, assessing intravenous fluids and sites, interpreting laboratory results of B-type natriuretic peptide (BNP), and validating physician orders. The fourth-year students focused on providing nursing care, including notifying the physician that the patient's condition was deteriorating. The unfamiliarity of equipment location in this simulation setting was a minor distraction. In comparison, second-year care providers' anxiety and discomfort were noticeable. The care providers raised their eyebrows and made longer eye contact directed towards the observers when they struggled with a clinical decision or could not immediately locate the equipment (i.e., oxygen mask). These facial and body expressions were interpreted as distress signals of uncertainty, requiring some form of validation from their peers and the research co-facilitator who was present in the room.

Benner (1982) described learners' acquisition of knowledge and development of skills in her *Novice to Expert Theory*. Based on Benner's model (1984) second-year students are considered novices. They have very limited experience with patient care situations. Students at this level require additional practice opportunities and prolonged time for learning and applying theoretical concepts. Their ability to apply discretionary judgments is limited. Without experience, novices depend upon rules to help them complete assessments and implement care. Unable to interpret patient cues, the second-year students' ability to individualize patient care is limited, as they apply the rules universally to all patient care situations. In comparison, the fourth-year students are advanced beginners as they have sufficient clinical experiences to demonstrate marginally acceptable performances and to identify recurrent meaningful situational components or aspects of care (Benner, 1982). Students at this level are efficient and skillful in parts of the practice area, but continue to need supportive cues as their knowledge continues to develop.

Burbach and Thompson's (2014) review of the types of cues undergraduate nursing students recognize align with Benner's (1984) description of novice learners. Burbach and Thompson (2014) found wide variations in the types of cues undergraduate nurses noticed in the clinical environment as well. Beginning students frequently miss or fail to respond to less overt cues. Furthermore, familiarity with a particular patient or condition, were more closely associated with improved cue recognition than were the student's academic ability or the level of urgency of the patient situation. Missed cues can lead to inappropriate responses, risking patient safety and incurring additional costs; however, being able to recognize cues did not always result in appropriate responses by students (Burbach & Thompson). Beginning students gather cues sequentially and then concentrating on remembering and applying the rules they were taught in class (Benner, 1982; Burbach & Thompson, 2014). In comparison, expert nurses recognize

multiple cues and cluster cues together when making clinical judgments and decisions. Based on their review, Burbach and Thompson (2014) support using HFPS as a strategy for helping students to learn cue recognition behaviours, as the numbers and types of cues presented during the patient care experience can be regulated by the simulation facilitator.

In this study, year two students failed to recognize the significance of the mannequin's facial blue light as representing cyanosis. When auscultating for respiratory sounds, fourth-year students correctly identified crackles and a heart murmur, while second-year students identified abnormal lung sounds but required the facilitator to validate the sounds. Both groups of students also recognized that the pillow-like leg warmers represented peripheral edema. Using various types of fidelity created the perception of realism, contributed to the attainment of the scenario objectives, and allowed students to engage in a relevant manner.

Debriefing

Many different debriefing strategies are used in HFPS (Dufrenre & Young, 2013; Levett-Jones & Lapkin, 2014) including post simulation, in-simulation, instructor facilitated, video-assisted lead by the instructor, video review by the student, and self-reflection (Levett-Jones & Lapkin, 2014). In this study, students completed the *Seattle University Simulation Evaluation* tool (Mikasa, et al., 2013) prior to the instructor-led debriefing.

The *Seattle University Simulation Evaluation* tool (Mikasa et al., 2013) is based on the American Association Colleges of Nursing BSN competencies, Bloom's taxonomy, and Seattle College of Nursing Baccalaureate program's course objectives. The developers envisioned the tool being used across the curriculum for all simulation activities rather than individual course objectives. The tool includes five global categories with three to five demonstrable behaviours listed under each category. The specific care behaviours included assessments and interventions,

critical thinking and clinical decision-making, patient care, communication and collaboration, and professionalism. Students complete the tool individually prior to conversing with their peers to ensure that individual perspectives are recorded prior to the debriefing. This process encourages students to focus their reflections on the course objectives and the care providers' performance for the group debriefing rather than emotional responses (Mikasa et al., 2013).

After the students completed the *Seattle University Simulation Evaluation* (Mikasa et al., 2013) tool, they were debriefed. Debriefing allows students to verbalize their thoughts on the consequences of their actions or lack of actions (Dufrene & Young, 2013). Being more familiar with the simulation process, fourth-year students provided specific explanations for their assumptions and interventions. They were open to constructive feedback on areas for improvements. In comparison, second-year student discussions were more focused on their patient care assessments, interventions, and completion of tasks. The *Seattle University Simulation Evaluation* tool helped focus students' discussions, to also include areas of collaboration, communication, critical thinking and clinical judgments. Research emphasizes the value of feedback as a powerful tool to enhance learning, clinical performance, clinical judgments, and increase confidence (Andrews & Ford, 2013).

Student Outcomes

Students' perceptions of repeated HFPS scenarios can be linked to their year in the nursing program. Second-year students identified repeating the HFPS scenario as a more motivating strategy for learning compared to fourth-year students. Horst (2013) reports that the first time students encountered a patient situation they begin to absorb some information about the event; however, one encounter seldom provides sufficient experience to support robust learning. In this study, second-year students did not interpret the blue light representing patient

cyanosis and impaired oxygen saturation in their initial patient assessment. Fourth-year students relied on other assessments and recognized deviations such as increased respiratory rate, crackle sounds throughout the lung fields, abnormal vital signs, and patient history details to support their clinical decision of worsening CHF. In comparison, second-year students with only a basic understanding of heart failure are developing their assessment skills, required cueing and patient prompts to help them make sense of the presenting data.

The predictability of the repeated patient simulation, allowed students' attention to focus on what was coming next, helping them to know what to expect, and learning to identify the sequence of events (Horst, 2013). During the second time through the scenario, second-year students reported increased confidence in their assessment skills, prioritization and organization of care, and communication with the patient. Baptista, Pereira, and Martins (2016) phenomenological study of nursing students' perceptions on HFPS identified similar outcomes. Despite moments of great stress and anxiety, students were satisfied with their HFPS experience as it helped to broaden their knowledge and prepare them for patient care (Baptista et al.). Aliakbari, Parvin, Heidari, and Haghani (2015) also found that repeat demonstrations resulted in improved knowledge and performance. Second-year students in this study believed they could manage patients diagnosed with CHF in clinical practice in the future after repeating the HFPS scenario. Simulation scenarios developed around students' learning needs can be repeated multiple times until the desired objectives are met and students feel more confident and competent using a holistic approach to patient care (Scherer, Foltz-Ramos, Fabry, & Chao, 2016).

Repeating the scenario also provided fourth-year students an opportunity to absorb additional relevant information, more notably in their communications with the patient and

physician. Knowing what to expect and being able to identify the sequence of events, senior students practiced including additional health information when administering medications, when assessing the patient, and when reporting to the physician. During the repeated scenario, a fourth-year student made 'throaty noises to represent lung congestion' when explaining the findings of the lung assessment. Consistent with other studies, fourth-year students valued the practice of using SBAR reporting, identifying what constitutes a good report in terms of structure and content, when updating the physician (Cant & Cooper, 2014; Kesten, 2011).

Error detection and correction are an important process for improving the quality of patient care and an advantage when using repeat HFPS scenarios. Second and fourth-year students' perception on the management of patient care errors and the subsequent feedback were perceived differently. Fourth-year students accepted that making mistakes during simulation provided valuable learning for future patient situations. One student gave the example of making a medication error during simulation. He shared how that particular learning event helped him develop a better organizational system and increased awareness for ensuring correct medications administration. It was evident that he had 'learned from the mistake experience' when observing him administer medications. In this study, senior students accepted that mistakes happen during the simulation experience. They understood the forward messaging of patient safety and quality care are the critical underlying messages. However, second-year students suffer emotional turmoil understanding the valuing of learning from mistakes in the two environments.

Although mistakes in health care are serious, second-year students know simulation mistakes have no negative consequences for the patient. However, their perceptions are that errors result from performance failure, mistakes are not tolerated, and students need to be held accountable for the basic skills necessary for minimum safe practice (Zieber & Williams, 2015).

Novice students' lack of knowledge and experiences contributes to their inability to judge the severity of errors and they tend to believe that all errors in health care are the same. The fear of potentially causing a patient harm contributes to students' lack of confidence and anxiety. Unable to cope well with constructive feedback, students often continue on a downward spiral of negative self-talk about the possible consequences of making errors in clinical practice and the risk of causing patient injuries. Beginning students perceive making mistakes as an unpleasant experiences and influence future learning experiences (Zieber & Williams, 2015).

Students blame themselves for errors and it is difficult for them to regain their confidence without the support of peers and faculty. Students reported being selected to be in the 'hot seat' for simulation experiences, to demonstrate their knowledge and understanding. However, after debriefing, students report they continued to focus on their errors rather than reflect on the positive aspects of their nursing care. Junior students continued to struggle on how to balance positive experiences with constructive feedback.

> *You walk away and talk about all the things you did wrong; but then you didn't practice the things you were supposed to do. So it kinda of turns into a blur and you don't actually learn from it.* (Student 2B)

Zieber and Williams (2015) reported that "decision-making skills surrounding mistake prevention and management are crucial to abating the incidence of mistakes and combating the immense negative psychosocial stigma surrounding practice mistakes" (p. 7). Repeating the scenario allowed the students to try new approaches with the support of others. The mistakes made during the first scenario became teachable moments set in the context of where, how, and why they occurred. Repeating the scenario allowed students to leave with a positive experience.

Educational Practices

When comparing the strategies used in this study to their previous scenarios, students identify the importance of teamwork during HFPS scenarios. Being present in the room observing the care providers was more engaging than watching from behind the double-sided glass or viewing from another room. The students who were observing began offering comments (i.e., cueing) when the care providers forgot to include some details of care. Some of them stepped forward and engaged in the scenario, forgetting that they were in the observer role. One student reminded the medication nurse to ask if the patient had any medication allergies prior to administering the medications. These students suggested a team approach to the first HFPS scenario where students problem solve throughout the scenario, and then, repeat the scenario.

Fourth-year students suggested stacking simulation scenarios. They acknowledged feeling confident with the CHF scenario and suggested that stacking a chest pain, myocardial infarction, or cardiac arrest would have been a better pedagogical strategy. The stacking of two slightly different scenarios would have encouraged students to transfer theoretical concepts and knowledge from one patient situation to another.

Limitations

Limitations of this study included the number of focus groups. There were only two groups. The inclusion of a third-year focus group would have increased the generalizability of the findings. Although the scenario selected for this study was designed for nursing students with some HFPS experiences, second-year students felt it was challenging, while fourth-year students preferred a more challenging scenario. A third-year student focus group may have provided valuable insights on scenario repetition as a HFPS strategy for their level of knowledge and experiences. Recruiting students for this study was challenging, as class schedules are very busy

and students were not given time in lieu for their participation in nursing research. The researcher recognized students' obligations outside of their class schedules, family responsibilities and employment; therefore did not send pre-brief articles related to the CHF scenario. Instead, the pre-brief was limited to the orientation of the simulation centre and patient scenario. All eleven students participated in the Dilawri Simulation Centre orientation and the demonstration of the mannequin's functions, which was led by the researcher.

There is a risk of researcher bias in regards to the study's outcomes as I am passionate about learning using diverse HFPS strategies. This passion may have presented to students who volunteered for the study. In addition, biases could have occurred as I developed the scenarios, operated HFPS technology, was the voice of the patient, participated in the debriefing session, and led the focus group discussion. To mitigate potential bias, I had other masters' prepared nursing educators review the patient scenario to ensure it complimented the nursing curricula. An experienced medical nurse was mentored to facilitate the debriefing session. Having a different person lead the debriefing session compared to the focus group discussion support the purpose for the research. After the completion of the focus group discussions, the nurse who did the debrief and I, shared our assessment of the focus group discussions. There was also month time lapse between the two focus groups, this allowed the researcher to transcribe the audio-recordings prior to the year-two student simulation experience and reflect on discussion categories and validate these with the second year focus group.

Nursing Implications

This study offers an initial exploration of students' perceptions of repeating HFPS scenarios as a pedagogical strategy for undergraduate nurses. Similar to other studies, (e.g., Erlam, Smythe, & Wright-St-Clair, 2018; Thomas & Mrza, 2017), students in this study valued

the opportunity to participate in the HFPS experiences and expressed a desire for more simulations. The integration of HFPS into nursing curricula continues to expand to address patient safety concerns, limitations in clinical placements, increased patient acuity, and the influence of evolving technologies have on the delivery of care. Caplan (2014) stated the use of HFPS as a legitimate approach to teaching and learning in nursing education is closer than we realize. Over the past forty years, nursing has progressed from oranges and foam dolls to computerized manikins and testing of nurse robots (Caplan). Caplan suggests that, in the near future, the clinical preparation of nursing students may take place solely within the simulated learning environment with limited, to no patient interactions. Therefore, it becomes important to identify the HFPS pedagogical strategies that will support students' learning of technical and non-technical skills across their academic programs in preparation for employment.

HPFS scenarios present opportunities for students to learn and develop safe nursing practices, enabling them to rehearse the "skilled know-how" required for competent practice (Kelly, Berragan, Husebo, & Orr, 2016). The opportunity to experience a range of complex clinical situations through simulation enables students to deliberately practice and refine the skills and holistic practices of nursing. Simulation facilitates the understanding of clinical situations, development of psychomotor skills, and practice of therapeutic communication skills and responses, while fostering the growth of one's professional identity (Kelly, Berragan, Husebo, and Orr, (2016). Experiential learning opportunities such as HFPS scenario allows students to learn through activities that closely align with practice, facilitating the transfer of knowledge and skills to patient care.

Conclusion

HFPS is an effective teaching strategy used to address the changing clinical environments, decreasing opportunities to perform skills during clinical time, and increased competition among nursing programs for clinical placements. Findings from this study indicate that the standards of best practice for implementing HFPS; pre-brief, scenario, debrief may be improved by repeating the HFPS scenario after the debriefing. This study found that junior students more than senior students valued the opportunity to practice debriefing feedback by immediately repeating the scenario. Students' reported that repeating the scenario reduced their anxiety and stress, allowing them to focus on using critical thinking skills more effectively when providing patient care when the outcomes were known. Repeating the scenario reinforced the learning outcomes, and allowed students to leave the experience with positive reflections of the scenario.

Increasing the efficiency of HFPS as a pedagogical strategy in nursing education continues to be an emerging issue. Specific operational methods of simulation-based education, such as the numbers of simulation exposures, level of fidelity, scenario details, and role assignments (care provider or observer) are ongoing factors considered by program accreditors, regulatory bodies, nursing administrators, and educators to address shortages of clinical placements. The balance of clinical and theoretical components in nursing curricula is important to ensure students' meet course outcomes and achieve entry level standards for safe practice.

Educators can design HFPS scenarios that meet program and course learning objectives, in addition to addressing individual student's learning needs. As a tool, HFPS offers a more holistic context for creating high frequency, low acuity patient situations such as congestive heart failure and post-operative care, as well as low frequency, high acuity patient situations such as

cardiac arrests, hemorrhages, and traumas. The simulated context allows students to actively engage in patient care, providing them the opportunity to observe, assess, and apply their decision-making and reflective thinking. Research has shown HFPS has increased students' knowledge, clinical performance, critical thinking, and self-confidence (Choi, 2016; Erlam, Smythe & Wright-St. Clair, 2018).

As a pedagogical strategy, HFPS allows for standardization of learning opportunities and the opportunity to integrate debriefing feedback when repeating the patient scenario. This study found that the effect of repeating the HFPS was diverse and could be linked to one's year of study and experience in their nursing program. Since patient cues are often missed by novice students, the opportunity to receive immediate feedback, along with the chance to correct one's self, and see positive patient outcomes, encourages learning (Erlam et al., 2016). Second-year students wanted more HFPS learning experiences as they found that repeating the HFPS promoted skill mastery and allowed then to focus on critical thinking and problem-solving. Fourth-year students reported repeating the HFPS increased their teamwork and non-technical skills, especially the use of SBAR, as a means to recruit support from other professionals.

This study found that HFPS should be carefully designed across program years. Opportunities to observe peers provide patient care through modeling, allowed new information to be integrated into one's cognitive schema, allowing students to construct or revise their knowledge. Second-year students appreciated access to their peer and instructor during times of uncertainty. They preferred to collaborate as a team rather than be observed from behind the glass. This also affected their perception of clinical judgement errors which became less devastating be peer and faculty presence in the room during the scenario. In comparison, students

with more HFPS experiences appeared to reframe the emotional effects of making mistakes as beneficial for providing safe patient care in the future.

Teaching millennial students requires educators to adopt different modes of delivery, as this generation of learners prefers collaboration, immersive learning environments, teamwork, and technology. Although HFPS strategies may be resource and faculty time intensive to setup, organize, coordinate, and implement; patient safety, clinical placement shortages, high acuity levels, and student demand will dictate the integration of more HFPS learning experiences in future nursing curricula.

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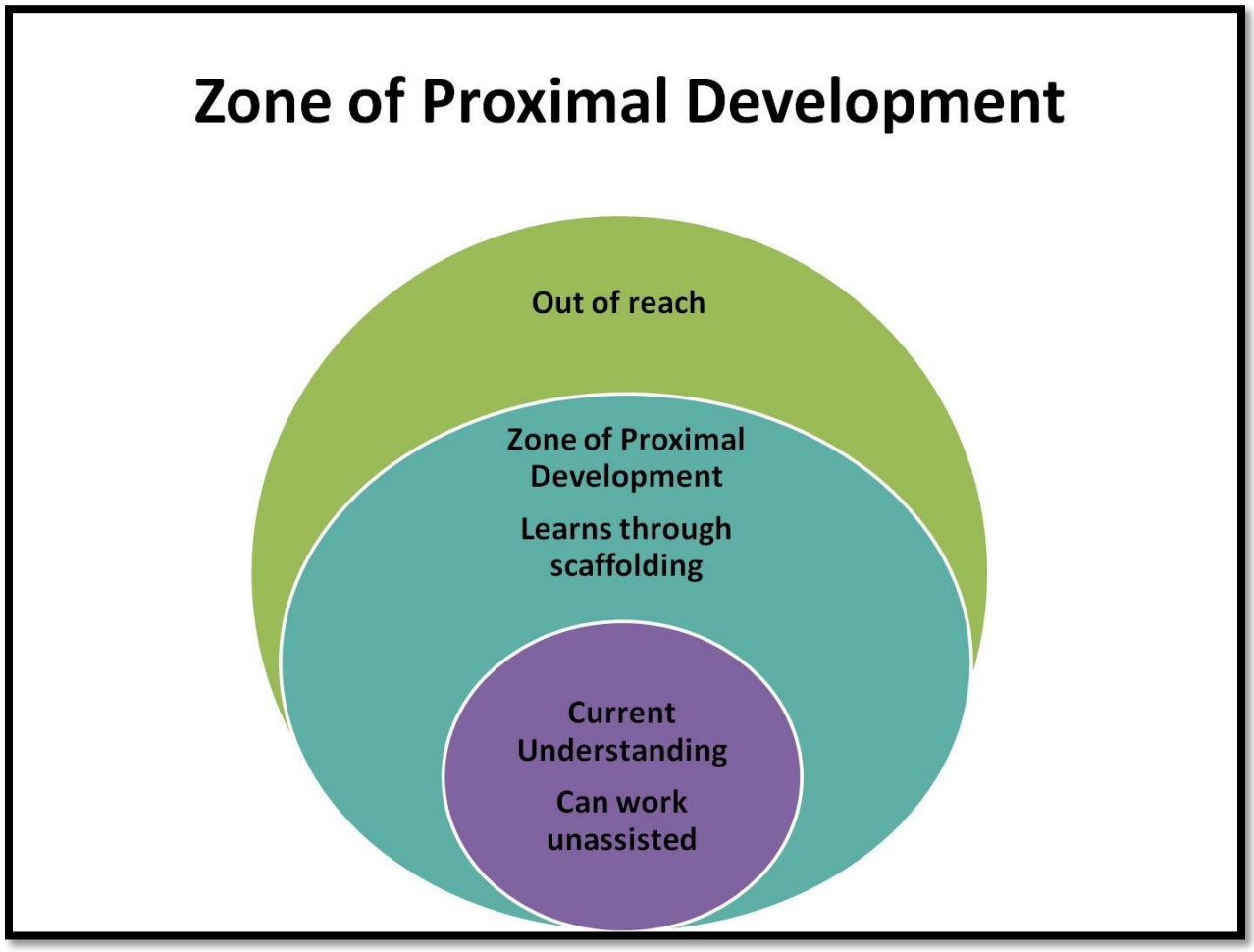
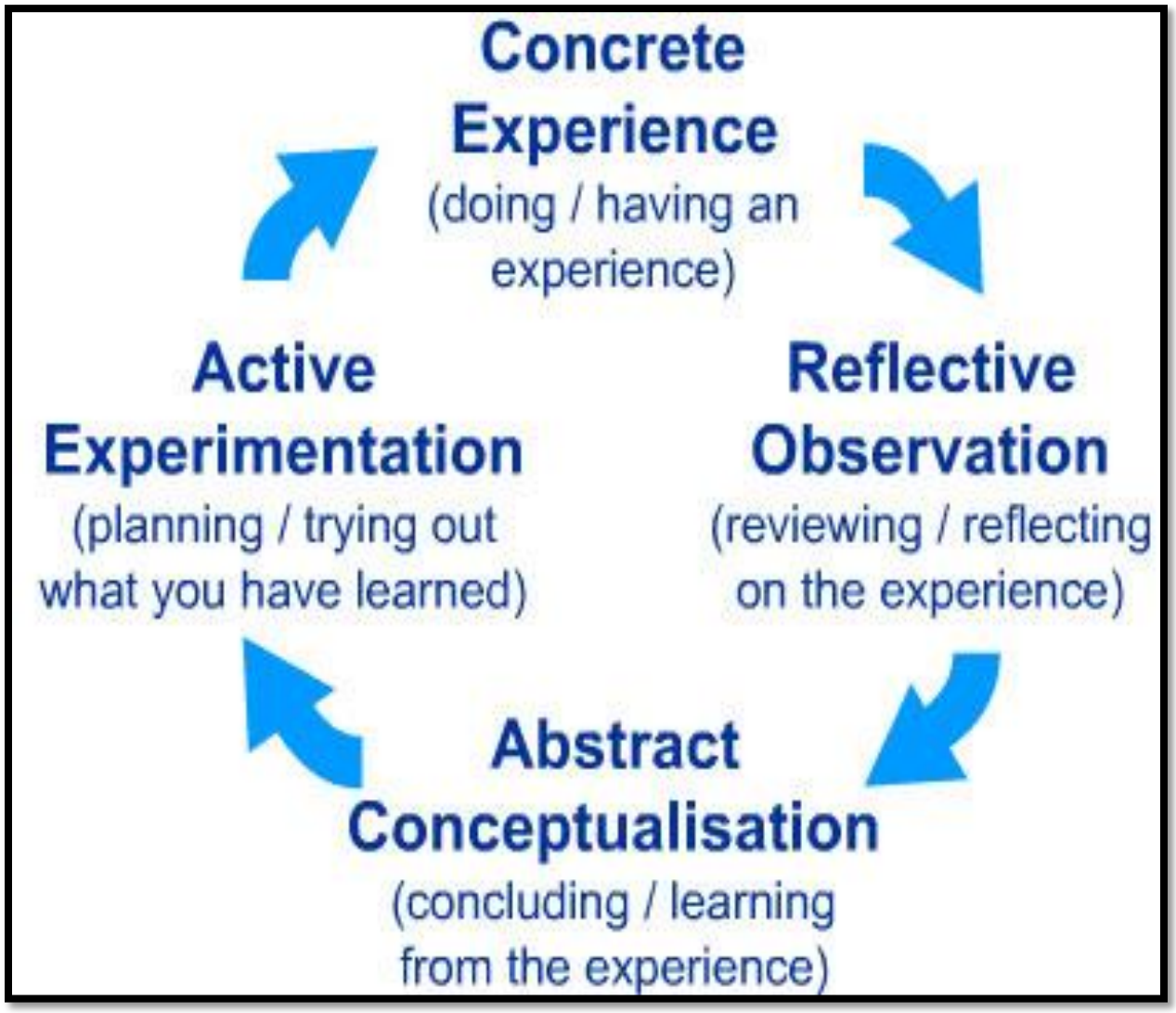
Appendix A

Vygotsky's Zone of Proximal Development



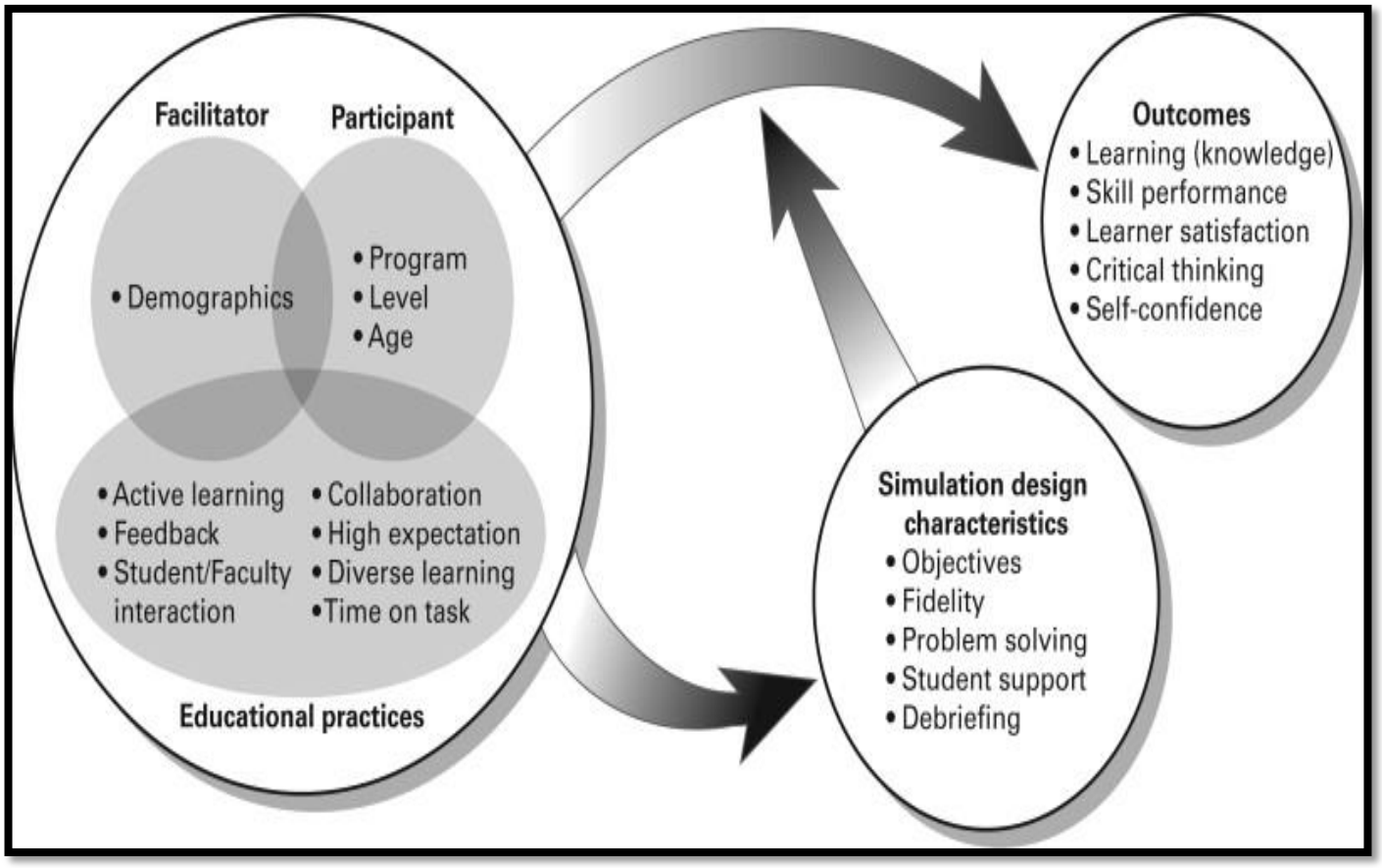
Appendix B

Kolb's Experiential Learning Cycle



Appendix C

National League of Nursing [NLN]/Jeffries Simulation Theory



NLN/Jeffries Simulation Framework. (From Jeffries, P. R. (Ed.). (2012). *Simulation in Nursing Education: From Conceptualization to Evaluation (2nd Ed*). New York, NY: National League for Nursing.

Appendix D

College of Nursing

University of Saskatchewan

NURSING STUDENTS

NEEDED FOR RESEARCH IN

HIGH FIDELITY PATIENT SIMULATION

I am looking for nursing students to participate in a study
on high fidelity patient simulation teaching processes.
As a participant in this study you would participate in a
high fidelity patient simulation scenario
followed by a focus group discussion session.
Your participation would involve approximately 2 hours of time.
For more information about this study
or to volunteer please contact:

Elaine Abrook, RN, MScN, PhD(c)

College of Nursing

by

e-mail: elaine.abrook@usask.ca or

texting: 306-216-9201 or calling: 306-216-9201

This study has been reviewed by and received approval through the
Research Ethics Offices of University of Saskatchewan (UofS Beh 16-24),
University of Regina (UofR 2016-139) & RQHR (REB-16-96)
Contact for U of S Behavioural Ethics Board: 306-966-2975

Appendix E

University of Regina Invitation to Participate

UNIVERSITY OF SASKATCHEWAN | usask.ca

U of R Invitation to Participate
Invitation to Participate in Patient Simulation Research

Are you a nursing student?

Have you participated in simulated patient scenarios?

Do you enjoy learning with your nursing peers?

Come share your perspectives on simulated learning experiences!

For 2 hours of your time:

- Practice providing patient care in a simulated clinical environment
- Collaborate with a team of your peers on diverse patient care approaches
- Share your perspectives on 'high fidelity patient simulation' as a teaching tool
- Support the develop of future teaching approaches for nursing curricula
- Enter a draw to win a gift certificate valued at $50.00 (two draws)

This study provides an opportunity for nursing students to practice patient care without risks to patient safety. The learning environment is focused on student learning outcomes. Nursing students have the opportunity to deliberately practice alternative nursing care approaches

during the repeated simulated patient scenario. Bring some friends, learn together, and then share your perspectives on repeating simulated scenarios as a teaching tool. This study takes place at the Dilwari Simulation Centre located at the Regina General Hospital.

Interested?

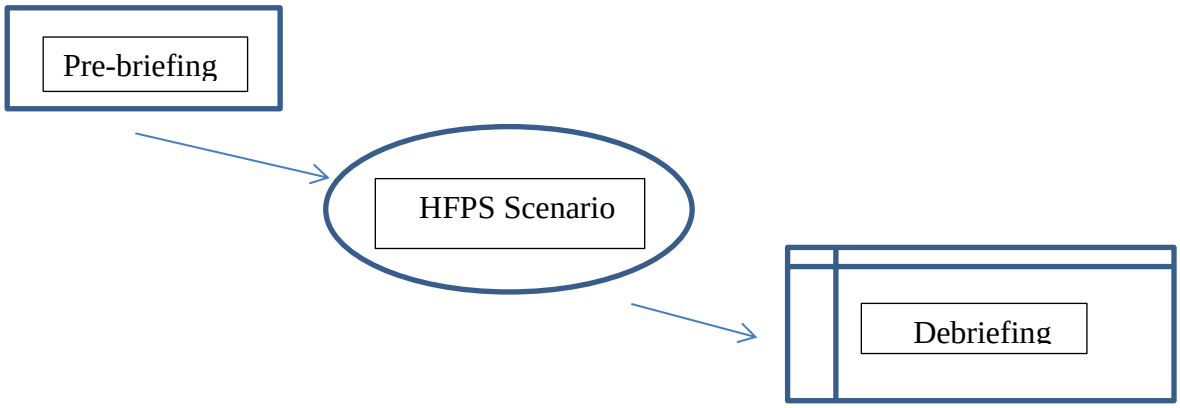
Contact Elaine Abrook RN by texting or calling 306-216-9201.

Thank you!

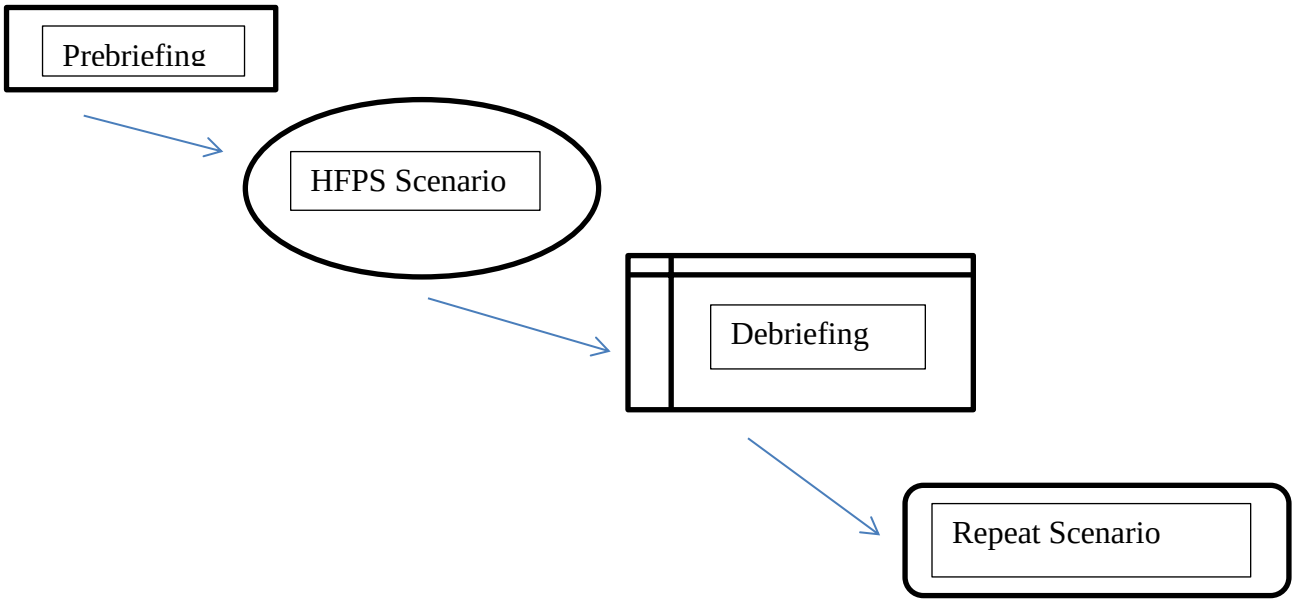
Appendix F

Research Design

INACSL Standard Format for HFPS



Research Design for Repeating HFPS Scenarios



Appendix G: Nursing Student Consent Form

REB-16-96/U of S Beh 16-241/U of R 2016-139

Project Title: Repeating High Fidelity Patient Simulation Experiences: A Qualitative Study of Nursing Students' Perspectives

Researcher(s): Elaine Abrook, RN, MScN, Graduate Student, College of Nursing, University of Saskatchewan, 306-766-6333, elaine.abrook@usask.ca

Supervisor: Dr. Petrucka, College of Nursing, 306-337-3811 pammla.petrucka@usask.ca

Purpose(s) and Objective(s) of the Research:

- The purpose of this qualitative research is to identify pedagogical strategies for implementing high fidelity patient simulation (HFPS) into nursing curricula that improves students' clinical decision making skills and clinical judgements. Improvements in clinical skills enhance students' self-confidence in transferring knowledge and skills to patient care in the clinical environment. The long term objective is to facilitate development of clinical reasoning and judgment skills that improve nursing students' abilities to deliver safe quality patient care.
- The instrument to assess debriefing benefits during the repeated simulation scenario is the *Seattle University Student Evaluation Tool* (Mikasa, Cicero & Adamson, 2013, September). Permission to use this tool has been secured from the developers. This rubric is used by students to assess their own or their peers' clinical performance during the implementation phase of the high fidelity patient simulation scenario. The tool is completed after each scenarios the initial patient scenario and the repeated patient scenario.
- The focus group session of the study is guided by the following research questions:
    - What are nursing students' perceptions of repeating high fidelity patient simulated scenarios as a pedagogical strategy for improving nursing skills such as clinical decision making skills and clinical reasoning?
    - Does repeating the simulated clinical experience after receiving feedback from ones' peers and faculty influence how students provide patient care in the repeated simulated experience?
    - How does repeating simulated patient experiences influence nursing students' perceptions for providing patient care in hospital settings?
- This research study will provide insight on nursing students' ability to transfer knowledge and skills to patient care and contribute to understanding teaching strategies for using high fidelity patient simulation scenarios in undergraduate nursing curricula.

What Will My Participation Involve?

- This study will take place at the Dilawri Simulation Centre located in the Regina General Hospital. The time commitment for this study is approximately 2 hours. During the two hours you will have the opportunity to participate in a High Fidelity Patient Simulation scenario as either the care provider or observer of the care provider. The process for the simulation experience in this study consists of five steps: pre-brief, scenario implementation, debrief, repeat scenario incorporating debriefing feedback, and focus group discussion about this process.
- The pre-brief session includes an orientation to the Dilawri Simulation Centre and introduction to the patient scenario. Two participants will provide patient care while the

remaining group members observe them. The scenario will run for about 20 minutes at which time all participants will complete the *Seattle University Student Evaluation Tool* (Mikasa, Cicero & Adamson, 2013, September) and then participate in the debriefing discussion. The repeat scenario allows participants the opportunity to deliberately practice debriefing feedback suggestions. The focus group discussion following the repeated scenario will explore students' perceptions on this simulation learning strategy.

- The scenario, debriefing and focus group discussions will be audio and video recorded for data analysis purposes. Student confidentiality is assured by the Dilawri Simulation Centre policies; only the researcher and supervisor will have access to the recordings. All data collected for this study will be encrypted and then destroyed after 5 years upon completion of the study.
- If you have any questions about this study please feel free to ask.

Potential Risks:

- There is a small risk to you for participating in this research. Given that other participants are your peers you might find participating in the patient scenario and being video recorded slightly anxiety provoking. In addition, the debriefing discussion may challenge some of your values and assumptions about nursing and patient care, you may not have reflected upon until presented in the patient scenario. If you require support to cope with these anxieties please self-identify to the researcher who can assist you to access counseling services through either the University of Saskatchewan or University of Regina/SaskPolytechnic.
- Participation in this study may improve your ability to link theory to practice and support your self-efficacy. Post scenario debriefing sessions allows participants the opportunity to clarify assumptions and misperceptions in patient care along with the opportunity to deliberately practice different patient approaches. Debriefing feedback will be provided by your peers, faculty and researcher as a process for increasing your knowledge about patient care. Linking theory to practice supports the delivery of future patient care.
- The researcher will safeguard the confidentiality of the high fidelity patient simulation scenario but cannot guarantee other members of the student group will do so. Please respect the confidentiality of other group members by refraining from disclosing any contents of the high fidelity simulation scenario outside of your research group, including debriefing and focus group discussions. All students will sign the Dilawri Confidentiality Agreement and the researcher will remind students multiple times throughout simulated patient experiences about confidentiality. However, be aware your student peers may not respect your confidentiality.

Potential Benefits:

- Best practice standards for high fidelity patient simulation scenarios continues to evolve, your contribution and feedback is important to identify evolving strategies for integrating simulation into nursing curriculum.

Compensation:

- You will be provided with a Dilawri Certificate of Recognition for participating in this study. In addition, your will be entered into a draw for two supper gift certificates.

Confidentiality:

- Your participation is voluntary. You are free to withdraw from the research project at any time with no consequences prior to the scenario implementation phase. Any data provided by you can be removed from the research study up to this time. Withdrawing your participation will not impact your academic standing in your nursing program at the University of Saskatchewan or the University of Regina SaskPolytechnic.
- If you withdraw after the scenario implementation phase your data will be retained as the researcher is unable to remove only your data without jeopardizing the study.
- Data collected from the debriefing group sessions and rubrics will be reported anonymously in aggregate form. No student names are required on the evaluation rubric. Rubric responses will be identified by a confidential numbers to facilitate comparing first and second rubric scores.
- The researcher will undertake safeguards to protect the confidentiality of the scenario, debriefing, and focus group discussion, but cannot guarantee other members of the nursing student group will do so.
- Data collected will be used in the researcher's dissertation with the College of Nursing, University of Saskatchewan to meet partial requirements for Doctorate of Philosophy in Nursing.
- Data will be presented in the form of peer-reviewed research articles or at conferences provincially, nationally or internationally.

Funded by: Not applicable.

Storage:

- Consent forms signed by participants will be stored in a locked cabinet by the researcher for a minimum period of five years post publication. Consent forms will be stored separately from the data collected and away from the list of any identifiable information.
- Data collected during the focus group discussion will consist of audio and video recordings, and transcripts of the session. This data will be housed in a locked cupboard by the researcher's supervisor for a minimum of five years post publication. This data will be stored separately from the consent forms and rubric responses. These recording will be destroyed after five years.

Right to Withdraw:

- Your participation is voluntary and you may choose how and how much you want to participate in the high fidelity patient simulation scenario, debriefing, and focus group discussion. Sharing of personal experiences and your perceptions of nursing care related to the patient scenario is confidential and will not affect your progress within the nursing program.
- The right to withdraw your data from this study without impacting the study data would be prior to participating in the patient scenario. Participation in the debriefing session involves pooled student group discussion data based on nursing care provided during the scenario which makes it impossible to identify a single participant data and withdrawal of the same.

Follow up:

- To obtain results from the study, please email the researcher, elaine.abrook@usask.ca and an electronic copy will be provided.

Questions or Concerns:

- Contact the researcher using the information at the top of page 1.
- This research project has been approved by the University of Saskatchewan, University of Regina and Regina Qu'Appelle Health Region Research Ethics Boards. Any questions regarding your rights as a participant may be addressed to the Ethics committee through the Research Ethics Office ethics.office@usask.ca. or by telephone at (306) 966-2975.

Consent

SIGNED CONSENT

Your signature below indicates you have read and understand the description provided.

I have had an opportunity to ask questions and my questions have been answered.

I consent to participate in the research project.

I agree to have my participation in the focus group audio recorded. Initials: _____

A copy of this consent form has been given to me for my records.

_____	_____	_____
Name of Participant	*Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

Appendix H: Seattle University Student Evaluation Tool

Student number: _____ Course/Simulation: _____

Student Self-Evaluation: Immediately following simulation experience and prior to debriefing session, individual students to complete form. Turn in following debriefing.

Assessment /Intervention/ Evaluation

Collects thorough, relevant assessment data in a timely efficient manner Prioritizes and individualizes nursing interventions Evaluates patient response and revises plan of care *Exceeds 5 4 Expectations*	Collects relevant assessment data Plans interventions specific to patient problems Evaluates patient responses to most interventions *3 2*	Assessments incomplete, irrelevant or disorganized Nursing process absent or unclear Evaluation of interventions missing or disorganized. *1 0 Below Expectations*

Critical Thinking/ Clinical Decision Making

Demonstrates astute clinical judgement making appropriate responses and clinical decisions Demonstrates well developed critical thinking Links multiple nursing concepts and processes during patient care *Exceeds 5 4 Expectations*	Inconsistent use of rationale and nursing concepts for clinical decision making Uses appropriate and logical critical thinking strategies Correlates theory with client data *3 2*	Clinical decision making based on scientific/nursing concepts missing, unclear or inaccurate Critical thinking about concept is illogical or missing Inadequate depth of knowledge or application of nursing principles. *1 0 Below Expectations*

Direct Patient Care

Demonstrates competence and independence in performing nursing care Completes care in an organized timely manner Demonstrated knowledge of medication administration including (route, dose, time, action, patient response) Consistent patient teaching prior to and during nursing care Administers medication with confidence anticipating interactions, therapeutic and adverse effects *Exceeds 5 4 Expectations*	Nursing procedures performed in an accurate, competent manner with occasional guidance Nursing care completed within reasonable time frame Inconsistent knowledge of medication including (route, dose, time, action, patient response) Inconsistent patient teaching prior to procedures and during delivery of nursing care Safely administer medications with accurate calculations. *3 2*	Unable to perform nursing care procedures accurately Disorganized nursing care without focus on patient as an individual Medication knowledge inaccurate, not timely, administered incorrectly Minimal patient teaching during nursing care Not safe in medication administration. *1 0 Below Expectations*

Communication /Collaboration

Utilizes active listen skills with team/patient/family Demonstrates assertive communication with team Accurately and concisely communicates patient assessment data and changing health status using SBAR criteria *Exceeds 5 4 Expectations*	Uses medical terminology appropriately Eye contact and verbal interaction with patient and team for most of simulation experience Communication of patient assessment and changing health status hesitant, not concise or missing some pertinent data *3 2*	Inappropriate medical terminology Absent eye contact, distracting mannerisms, and voice. Ignores patient or team communication Disorganized, incomplete and/or inaccurate communication of patient assessment data and missing many elements of SBAR *1 0 Below Expectations*

Professional Behaviours (Students are assessed individually for their professional behaviours)

Preparation for simulation experience beyond course expectations Recognizes ethical issues related to health care Demonstrates respect for client and team members Seeks guidance or validation appropriately Self-critiques and identifies strengths and weaknesses of self and team through debrief session	Professional appearance in dress, behaviour and interactions Evidence of advanced preparation Unaware of ethical implications, respect of others inconsistent during simulation event Did not always recognize skill limitations or seek assistance appropriately Self-critiques and identifies own strengths and weaknesses through debriefing session	Non-professional appearance and/or behaviour, speech, interactions Did not demonstrate respect for client, peers, or learning experience Not prepared for simulation exercise Lack of participation and self-awareness in self-critique and debriefing session
Exceeds *5* *4* *Expectations*	*3* *2*	*1* *0* *Below* *Expectations*

Comments:

Mikasa, A. W., Cicero, T. F., & Adamson, K. a. (2013, September). Outcome-based evaluation tool to evaluate student performance in high-fidelity simulation. *Clinical Simulation in Nursing*. *9(9)*. E361-e367. http://dx.doidoi.org/10.1016/jecns.2012.006.001.

Appendix I: Interview Guide

1. What are undergraduate nursing students' perceptions of HFPS as a learning strategy?
2. How did repeating the HFPS scenario influence your learning outcomes?
3. What are undergraduate nursing students' perceptions of repeating a HFPS scenario as a learning strategy?
4. How did repeating the HFPS scenario influence your clinical performance with technical and non-technical skills such as teamwork, communication, leadership?
5. How did completing the Seattle University Student Evaluation Tool impact your observations/performance in the repeated HFPS scenario?
6. What suggestions do undergraduate nursing students have for improving their HFPS experiences?

Appendix J: Transcript

Question 2: What are your perceptions of repeating the HFPS scenario as a learning strategy?

Student Statement	Phases/Words	Kolb's Cycle
I liked going back and repeating it	Valued repetition	Active experimentation
because in school, I, um, would know what I did wrong	Error identification	Reflection
and then I would like to go back and fix it	mistake management	Abstract conceptualization
but we don't have that chance	Missed opportunity	Abstract conceptualization
so it was nice to do it again.	Valued repetition	Active experimentation
I liked knowing what I learned	Connecting learning	Reflection
and how I can improve.	Improvement	Abstract conceptualization
I think everyone looked a lot more confident	Confidence	Reflective observation
It definitely went a lot smoother,	Fluency	Reflective observation
more efficient	Competence	Reflective observation
I recognized things I should pay attention to, if I was doing it.	Awareness	Reflective observation
They were more calm,	Emotions	Active experimentation
You can learn better	Learning process	Active experimentation
Because everyone knew what to expect	Outcomes -strength	Concrete experience

Journal:

These second-year students were more cohesive and chatty. They work well together. I remember when I taught clinical how the group members could make or break clinical experiences. It is evident they admire and appreciate (XX), their clinical instructor. Their demeanors sure changed between the initial scenario and the repeat scenario. They were eager to repeat the patient scenario. They did very well the second time too. I am glad we used the Seattle assessment tool. It helped students focus during the debriefing and provide better feedback.