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Running Head: CLINICAL COMPETENCE AND SIMULATION

Simulation and Baccalaureate Nursing Students' Clinical Competence

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Abstract

Health science students are faced with a reduction in acute care clinical placement opportunities, which are considered essential for developing clinical competence. Education methods using high-fidelity human patient simulation (HPS) may provide a way to ensure students are meeting minimal levels of competence. Using a quasi-experimental design pilot study, clinical competence among 19, third year baccalaureate nursing students was investigated. The experimental group (n = 10) received four days of HPS as part of their clinical practicum, while the control group (n = 9) participated in their regular clinical practicum. Clinical competence was measured using final grades from a medical-surgical theory course and an Objective Structured Clinical Examination (OSCE). There was no significant difference in clinical competence between the groups, as was evidenced by their final theory grades; $t(17) = 1.090$, $p = .291$ and OSCE scores (M = 60 for both groups). The results from this pilot study can guide future research using HPS in health care education. A randomized controlled study with a larger sample needs to be completed to provide more insight into the outcomes of HPS in health care curricula.

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CHAPTER 1

Simulation and Baccalaureate Nursing Students' Clinical Competence

Problem Statement and Background

In Ontario, hospital restructuring has reduced the number of inpatient beds resulting in fewer clinical placements and clinical practice areas for health science students (Council of Ontario, University Programs in Nursing, [COUPN], 2002; Doubt, Patterson, & O'Riordan, 2004; McGraw & O'Connor, 1999). Student enrollment in nursing programs has increased, compounding the problem of finding clinical placement opportunities (Joint Provincial Nursing Committee, 2001).

Systemic pressures are also having an effect on the availability of clinical education opportunities. The demand for nursing care is anticipated to increase due to a number of demographic trends in Ontario, including an aging population and an increase in chronic health conditions (O'Brien-Pallas, et al., 2003). It is estimated that Ontario could be facing a shortage of between 11,794 to 12,897 full-time registered nurses by 2008 unless recommendations, such as increasing the enrollment of nursing students, are implemented (Canadian Nursing Advisory Committee, (CNAC), 2002; O'Brien-Pallas, et. al, 2003). This increase in enrollment will compound the problem of finding acceptable clinical placements for nursing students.

Clinical education in acute care settings is considered an important element in the development of competent practicing nurses (COUPN, 2002). To become a Registered Nurse (RN) in Ontario, students must meet the Entry to Practice Competencies mandated by the College of Nurses of Ontario [CNO] (CNO, 2005). Those competencies are achieved through a balance of theoretical and clinical knowledge in undergraduate nursing programs (CNO, 2005). Clinical placements are an essential arena in which the nursing student learns to integrate nursing theory and clinical practice. Faced with new demands on the availability of clinical placements,

nursing education programs must find innovative ways to maintain clinical practice requirements without compromising clinical education standards (COUPN, 2002; Canadian Association of Schools of Nursing, [CASN], 2003).

One possible way to achieve clinical practice requirements in light of the increased demands for clinical placements is by introducing simulation experiences, using high-fidelity human patient simulators, into health science curricula. Simulation technology is an educational tool that provides students with opportunities to practice skills and apply theoretical knowledge in a realistic context (Alinier, Hunt, & Gordon, 2004). Clinical competence, an important clinical practice requirement, is developed through experiential learning in clinical settings (Benner, 1984). Augmenting clinical practice with simulation experiences may facilitate the development of clinical competence in nursing students, thereby helping them achieve clinical practice requirements. Therefore, nursing students and educators may find high-fidelity human patient simulation (HPS) is an acceptable addition to nursing curricula in order to meet clinical outcomes and reduce the burden on clinical practice settings (Medley & Horne, 2005).

Furthermore, there are current demands for integrating HPS into health science curricula. The Government of Ontario has budgeted 20 million dollars for clinical simulation equipment in undergraduate nursing programs, and suggests that it is an important innovation in nursing education (Ministry of Health and Long Term Care, 2005). Given that the equipment is being rolled out, the effects of HPS on the attainment of clinical competence must be investigated so that educators can make informed decisions regarding the best implementation of HPS in their curricula.

Purpose

The purpose of this pilot study is to determine how HPS affects the attainment of clinical competence in third year baccalaureate nursing students. There is a need for more comparative

studies examining the outcomes of implementing HPS in nursing curricula (Medley & Horne, 2005). Currently there are only six published studies that have examined the use of HPS in nursing education, most of which are descriptive. I decided to measure clinical competence because it is considered to be an essential outcome of clinical education and practice (Benner, 1984; CNO, 2005). I hypothesized that the students in the HPS group would perform equally well or better on both the OSCE and in their final grades from their medical-surgical theory course than the students who participated in their regular clinical experience. These expectations were based on previous research that supported the attainment of clinical competence in nursing and related health disciplines utilizing HPS (Alinier et al., 2004; Good, Gravenstein, Mahla, et al., 1992). Other studies using different forms of simulation, such as standardized patients (SPs) have concluded that simulation supports the development of clinical competence (Ebbert & Connors, 2004; Fletcher, et al., 2004). More research is required to determine the best way to provide health care students with opportunities to meet clinical competence outcomes, particularly in nursing programs using HPS.

Research Aim/Research Question

The aim of this research study is to investigate the effect of a HPS experience on the attainment of clinical competence by third year baccalaureate nursing students. The research question is: Does the inclusion of a HPS component in a clinical practicum improve clinical competency?

CHAPTER 2

Literature Review

Introduction

In this chapter I will review the current literature on simulation, HPS in nursing education, clinical competence, and the relationship between HPS and clinical competence. I will also describe Dillon's Model for Nursing Student Professional Development, which is the conceptual framework that guided my research.

Simulation

Simulation has been used as a tool in health care education for the last 40 years (Good, 2003; Nehring, Lashely, & Ellis, 2002; Peteani, 2004). Simulators are categorized according to their level of fidelity, or accuracy in mimicking reality (Seropian, Brown, Gavilanes, & Driggers, 2004). According to Seropian et al. (2004), low-fidelity simulators are static and are often used to introduce and practice psychomotor skills; an example is the use of foam pads to practice injections. Moderate-fidelity simulators provide more realism and increase the opportunity for users to develop more complex competencies, such as learning CPR with Resusci-Annie™ mannequins (Seropian et al., 2004). High-fidelity simulators provide the ability to develop complex competencies, while additionally providing a more realistic simulated patient experience using mannequins that emulate more "human" characteristics and responses such as talking and blinking (Seropian et al. 2004).

I am interested in studying full-scale, high-fidelity HPS that uses computerized mannequins, specifically SimMan™. High-fidelity human patient simulators can be programmed to emulate "real" patient situations. They resemble actual patients in their physical features and can respond to interventions such as medication administration by presenting changes in vital signs (Peteani, 2004). High-fidelity human patient simulators can be programmed to display a

variety of customized health conditions through their corresponding physical features such as heart sounds, pulses, and breath sounds (Nehring et. al., 2002; Peteani, 2004). For example, a high-fidelity human patient simulator such as SimMan™ can be programmed to provide a critical incident such as hypotension progressing to cardiac arrest complete with the corresponding cardiac rhythms, physical parameters and verbal cues. A typical simulation experience will have students in a laboratory setting with high-fidelity human patient simulators assigned as patients. Students are expected to assess and manage critical incidents using their knowledge, critical thinking, technical skills, and teamwork (Nehring et al., 2002; Spunt, Foster, & Adams, 2004).

HPS in Nursing Education

Within the last 10 years, undergraduate and graduate nursing schools have begun incorporating HPS into their nursing curricula, due to improvements in technology and increased access to these tools (Nehring & Lashley, 2004). The interactive and dynamic nature of HPS has enabled health care educators to use this technology in many aspects of the teaching and learning process (Nehring & Lashley, 2004). Because HPS is an experiential learning tool it enables students to apply theoretical knowledge to simulated practice scenarios in a safe and controlled environment (Cioffi, 2001; Medley & Horne, 2005). It has also been used as an evaluation tool in nursing education. Summative evaluations, such as Objective Structured Clinical Examinations (OSCE), have been conducted using HPS (Alinier, 2003; Alinier, et al, 2004). Used as a formative evaluation tool, HPS can encourage students to reflect on their actions and improve their performance (Nehring, Ellis, & Lashley, 2001; 2002). HPS has been used to consolidate skills, promote teamwork, teach critical events, assessment and technical skills (Nehring & Lashley, 2004). The potential for HPS to be used as a remediation tool has also been described in the literature (Haskvitz & Koop, 2004).

HPS is relatively new to nursing curricula and seems to show promise as a safe and effective educational tool for both students and educators. It is being adopted for many different educational purposes, such as learning how to respond to complex emergency situations or refining basic assessment skills.

Relationship between HPS and Clinical Competence

Many authors have described the benefits of HPS in health care education, based on research studies and anecdotal accounts (Feingold, Calaluce, & Kallen, 2004; Good, 2003; Nehring et al., 2001; Rauen, 2004). There is evidence that implementing HPS has a positive impact on health care students' attainment of clinical competence, though it is based on a limited number of experimental and descriptive studies. Health care students report being satisfied with HPS as an educational tool. They also seem to meet or improve their clinical competence outcomes when HPS replaces or is used as an adjunct to traditional clinical education methods.

Health care students have reported increased confidence (Block et al., 2002; Feingold et al. 2004; Henrichs 2002) and improved preparation for clinical (Feingold et al. 2004; Henrichs 2002) after using HPS technologies. HPS was reported as helpful in clinical skills attainment (Block et al, 2002; Cleave-Hogg & Morgan, 2002), critical thinking and decision making skills (Henrichs, 2002). It enabled students to apply their knowledge in a realistic environment, and facilitated the application of theory to practice (Cleave-Hogg & Morgan, 2002). Reflection on personal learning (Cleave-Hogg & Morgan, 2002), and identification of knowledge gaps (Cleave-Hogg & Morgan, 2002; Morgan, Cleave-Hogg, Desousa, & Tarshis, 2003) were also described as benefits of using HPS. HPS also seems to decrease the amount of time needed for medical students to attain clinical competence. Abrahamson, Denson, and Wolf (1969) published a classic study that described the effects of training with HPS on the competence of anesthesia residents and compared it to those who did not train with the simulator. The

researchers found that professional competence in endotracheal intubation on 'real patients' was achieved in less time and with fewer trials by those residents who received the simulation training than for those who only trained in the operating room.

There seems to be a marked improvement in students' performances initially when using HPS, however there is also an apparent equalization phenomenon that occurs when implementing traditional and non-traditional education methods. Good, Gravenstein, Mahla, et al., (1992) conducted an experimental study where novice anesthesia residents were placed into an experimental group that received 10 training sessions with HPS, or in a control group that received didactic sessions covering the same educational material. The HPS group achieved higher clinical evaluation scores at weeks three and 8. The groups did not differ in clinical scores at weeks one and 13, indicating that both groups' performances were equal by the end of the clinical rotation.

Alinier et al., (2004) used a different methodology to determine the effects of HPS on students' performances. They compared final OSCE scores of nursing students who participated in an additional two-day HPS experience, to the control group of nursing students who participated in their regular nursing courses. The students who participated in the HPS group showed significant improvement on their OSCE scores, compared to nursing students who participated in their regular nursing courses. The addition of HPS to the regular curriculum benefited students by improving their performance on the OSCE.

There seems to be support for integrating HPS into health care curricula based on experimental and descriptive research. HPS shows promise as a tool for attaining clinical competence in the health professions, however the scope of the evidence is limited.

Clinical Competence-Definition

Clinical competence is an important concept to health disciplines and has been discussed extensively in the literature (Epstein, & Hundert, 2002; Watson, Stimpson, Topping, & Porock, 2002). In the context of health care students and practicing professionals clinical competence is often used interchangeably with terms such as professional competence (Epstein, & Hundert, 2002; Kane, 1992; Panzarella, 2003), competence (Giroto, 1993a; Watson et al., 2002) and performance (Fitzpatrick, While, & Roberts, 1997; Giroto, 1993a; Meretoja, Isoaho, & Leino-Kilpi, 2004) leading to confusion about the meaning of the concept. There is an abundance of literature attempting to clarify clinical competence, yet the concept remains poorly defined and difficult to measure (Giroto, 1993b; Robb, Flemming & Dietert, 2002; Panzarella, 2003; Watson et al., 2002). In spite of the limited conceptual clarity there are some commonalities in definitions of clinical competence, which include an outcome and a developmental process.

Clinical Competence as an Outcome. One conception of clinical competence is as an outcome, which is demonstrated through the successful performance of clinical indicators or competencies by students (Lofmark, Solveig and Wikblad, 1999; May et al., 1999) or practicing professionals (Meretoja et al, 2004; Panzarella, 2003). Clinical indicators or competencies are usually grouped under specific domains (Benner, 1984) or categories of practice such as the helping role, or knowledge and skill application (May et al, 1999; Meretoja et al., 2004). The related indicators or competencies, range from the application of research findings to clinical practice (May et al, 1999) to planning individualized patient care (Meretoja et al., 2004). Expected practice outcomes will vary depending on the level of expertise of the individual or the specific clinical practice area (Benner, 1984; Lofmark et al., 1999). For example, a practicing professional would be expected to perform at a higher level than a student in the same practice setting (Panzarella, 2003). Professional and educational standards reflect the minimal level of

competence expected by the public and define the level of performance required for the successful achievement of work expectations (CNO, 2004a; Watson, Stimpson, Topping, & Porock, 2002). The College of Nurses of Ontario (CNO) is the regulatory body for nurses in Ontario (CNO, 2004a). The CNO (2002) defines competence as “the nurse’s ability to use his/her knowledge, skill, judgment, attitudes, values, beliefs, to perform in a given role, situation and practice setting.”(p.5). Competence is assessed through Professional Standards, which provide a framework for the practice of nursing (CNO, 2004a).

Not only do health care professionals and students need to demonstrate specific indicators or competencies at a minimal standard of performance, they need to be able to successfully coordinate them for effective practice outcomes. Although there might be variations in the terminology, authors describe the coordination of these competencies in similar ways. Clinical competence has been described as an integration or application of cognitive skills (Canadian Nurses Association [CNA], 2002; Davis & Harden, 2003; Girot, 1993a; McGaughey, 2004), technical competence (Davis & Harden, 2003), judgment (CNA, 2002), personal attributes (CNA, 2002), and affective skills (Davis & Harden, 2003; Girot, 1993a; McGaughey, 2004) required to practice safely and ethically in a specific role or health care setting (CNA, 2002; Davis & Harden, 2003; McGaughey, 2004). Clinical competence is characterized by collaboration, coordination and the holistic management of situations (Meretoja, Eriksson, & Leino-Kilpi, 2002).

Clinical competence has been described as an outcome in both the literature, and professional and educational standards. Clinical competence is manifested in the successful performance and coordination of competencies at a minimal standard of practice in health care settings.

Clinical Competence as a Developmental Process. Clinical competence has also been described as a developmental process through which nursing students and practicing nurses progress through stages of development as they gain knowledge and experience in the clinical setting. (Benner, 1984; Neary, 2000; Ramirtu and Barnard, 2001). Benner (1984), in addressing the competence of practicing nurses, described competence based on the Dreyfus Model of Skill Acquisition. She found that practicing nurses progress through five stages of development, from novice to expert, as they gain clinical experience. Competence is the third stage of development where the nurse cares for patients in a planned and deliberate manner. According to her theory nurses need to practice for 2-3 years in similar environments or situations to achieve competence. During each developmental stage nurses also demonstrate competencies under specific domains of nursing practice.

Similar to Benner, Neary (2000) suggested that nursing students' clinical competence develops over time in the clinical practice setting. Over time, using Neary's responsive assessment techniques, assessors provide students with continuous feedback in the clinical setting thereby enhancing the development of nursing students' competent practice (Neary, 2000).

Ramritu and Barnard (2001) completed a phenomenographic study where they interviewed six new nurse graduates about their views on competence. The authors proposed a holistic and developmental model of competence, in which competence is multifaceted and evolves based on clinical time and experience. Competence includes eight conceptions including knowledge, safe practice, resource utilization, time and workload management, limited independence, ethical practice, skill performance and competence as evolving, all falling under the umbrella of safety.

Clinical competence has been described as a developmental process, leveled from novice to expert, depending on the amount of time and experience a health care professional or student has in a clinical setting. Clinical competence is holistic and there are a number of ways in which it can be conceptualized. It should be noted, however, that there are two related, though distinct, concepts of clinical competence defined here (Panzarella, 2003). The first should be seen as the clinical competence as expected at the student level, while the other should be viewed as the clinical competence expected of a practicing nurse. Though there may be similarities in the developmental stages or processes, the overall level of competence achieved by members of each group will differ according to the different expectations placed on each group by their respective environments.

As such, though there are commonalities in conceptions of clinical competence, the definition of the term will vary depending on the specific needs of the organization or individual, or level of practitioner (student or professional). Consequently, clinical competence remains an unclear term that has different meanings for many different people depending on the context in which it is applied.

For this research study, clinical competence is defined as an outcome. Clinical competence is achieved through the application of knowledge, skill, judgment, attitudes and beliefs at a minimal standard of performance expected for a third year baccalaureate nursing student. Clinical competence can be assessed through the demonstration of nursing knowledge and the safe and ethical performance of nursing actions.

Clinical Competence-Measurement

There is a substantial amount of literature pertaining to the assessment and measurement of clinical competence in health care providers and students, however the best way to measure clinical competence continues to be debated (Giro, 1993b; Norman et al., 2002; Watson et al.,

2002) and no universally accepted measure has been adopted (Robb, et al., 2002). Clinical competence has been measured using a variety of methods ranging from written examinations to direct observation in the clinical setting. I will describe some of the common methods of measuring clinical competence and outline the benefits and limitations of each of the methods.

Written Examinations. Health care professionals are often required to take written examinations in order to become licensed or registered to practice. For example, Canadian nurses must successfully pass a competency-based written examination in order to become eligible to practice nursing. The examinations typically consist of multiple choice and/or short answer questions (CNO, 2004b). It is suggested that written examinations provide an objective and reliable measure of knowledge and skills required for competent practice, however, they have been criticized when used in isolation of other assessment methods that use a more comprehensive approach (Epstein & Hundert, 2002; Kane, 1992) or an approach more relevant to clinical practice (Ross et al., 1988). For example, Epstein and Hundert (2002) suggest that students might conduct a literature search, participate in an encounter with a standardized patient (SP) related to the content of that literature search, and then write a post encounter examination based on that same content. An assessment of the students' ability to acquire and apply knowledge, communication skills and clinical reasoning can be conducted using this multimethod approach (Epstein & Hundert, 2002). When more than one method of competency assessment is adopted, a more representative assessment of a student's competency level may be achieved (Epstein & Hundert, 2002; Norman, et al, 2002).

Objective Structured Clinical Examination (OSCE). Educators have proposed that OSCEs might be an objective and beneficial method of assessing nursing students' clinical competence (Alinier, 2003; Alinier, et. al, 2004). OSCEs have been used in medical education since the 1970's (Harden, Stevenson, Downie, & Wilson, 1975) and are currently used as part of

the nursing registration exam in Québec (Ordre des Infirmières et Infirmiers du Québec, 2003). An OSCE consists of a series of stations where students must demonstrate specific technical, assessment, communication skills and problem solving techniques in a specified time frame, using SPs. A SP is a person who is trained to portray a certain type of patient with whom students interact (Ebbert & Connors, 2004). SPs should have little variability in their interactions with students in order to provide a standardized encounter for each student (Ebbert & Connors, 2004). Evaluators, who are present during the exam, rate students' performances using standardized checklists or rating scales (Bartfay, Rombough, Howse, & Leblanc, 2004). OSCE's are considered advantageous because of the objective, reliable and valid nature of the assessment, and the ability to test students' performances using a variety of clinical scenarios (Bartfay et al., 2004; Watson et al, 2002). Although the OSCE has been used as an objective tool for competency measurement in medical education, it is relatively new to nursing (Bartfay et al., 2004). There is empirical support for the use of OSCEs in competency assessment but students may perform differently in the OSCE setting compared to the clinical setting (Epstein & Hundert, 2002). Bartfay et al. (2004) indicate that OSCEs should not be used as the only method of evaluating clinical competence, because they cannot capture every domain of a student's educational process. Epstein and Hundert (2002) state that written examination and OSCE scores are not correlated and they suggest that these tools measure different skills. These findings suggest that clinical competence is complex and a combination of assessment approaches should be used.

Self-Assessment. Self-assessment has been suggested as an effective method for measuring clinical competence. Self-assessment can include measurement tools such checklists and rating scales (Redfern et al, 2002; Shumway & Harden 2003). For example Meretoja et al. (2004) proposed using a 73-item scale that can be used by practicing nurses to rate their

competence in the hospital setting. Strengths of self-assessment include the development of self-reflection and appraisal skills, which can contribute to lifelong learning and identification of knowledge gaps (Redfern et al, 2002; Shumway & Harden, 2003). In the educational setting students' self-assessments and teachers' assessments are not always congruent (Redfern, 2002). More to the point students' self-assessments are not always considered as meaningful as those completed by teachers (Shumway & Harden, 2003).

Clinical Setting. One of the most common ways of assessing clinical competence is direct observation of the health care provider's (student or practicing professional) performance in the clinical setting by an assessor. Educational and health care institutions often develop their own assessment tools based on specific curriculum or practice requirements. Health care providers might be assigned a numerical or letter grade or pass/fail for their clinical performance. Other generic measurement tools have been developed for use in the clinical setting including King's Nurse Performance Scale (1997).

Direct observation in the clinical setting provides the most relevant and direct method of evaluating actual performance with patients (Benner, 1984; Kane, 1992; Ross et al, 1988) because of the unpredictable and complex nature of the clinical environment (Redfern et al, 2002). Direct observation has been criticized due to the limited number of reliable and valid assessment tools, subjectivity of the assessor, and the discrete number of behaviours which can be observed by the assessor (Kane, 1992; Neary, 2000; Ross et al., 1988).

There are many proposed methods for evaluating clinical competence, though there is no single assessment method that is universally accepted by health care professionals and educators. At best, there is a consensus that clinical competence is complex and should be measured using a variety approaches for the most representative assessment of a health care provider's abilities.

Gaps in HPS and Clinical Competence

While there are many anecdotal accounts of how HPS is being used as an educational tool in health care professions, there is a paucity of research regarding the best practices for designing, implementing and evaluating HPS in educational settings. Medical anesthesia has generated the majority of research in HPS however other health disciplines, such as nursing, are adopting HPS for use as teaching and evaluation tools. In order to maximize the potential benefits of this educational tool, all health disciplines, including nursing, need to generate more research related to HPS. More rigorous studies need to be completed that compare traditional learning strategies with methods that incorporate HPS (Medley & Horne, 2005). Assessments using measurable outcomes that are considered important to health care professions, such as clinical competence, are also required to provide direction for the optimal use of HPS in educational programs.

Conceptual Framework- Dillon's Student Nurse Developmental Stage Model

The model that I used to guide my research was Dillon's Student Nurse Developmental Stage Model (1998) (as cited in Dillon, 2002). Dillon (2002) created this model by synthesizing several of the components of Benner's seminal work on novice to expert nurses, Kolb's Experiential Learning Theory and Zambok and Klein's Naturalistic Decision Making Theory that she identified as relevant to undergraduate nursing students. She proposed that undergraduate nursing students progress through three hierarchical stages of development: novice, advanced beginner and competent. Their progress is reflected in their cognitive, competence and confidence development (Appendix A). According to Dillon (2002) novice nursing students are in the first year of their undergraduate nursing program, have no clinical experience, and are developing a theoretical base. She described advanced beginner nursing students as those who have completed their first year of clinical education and have some context

for their theoretical knowledge. Competent nursing students have completed the last semester of their baccalaureate nursing program, and have a strong theoretical base and clinical experience (Dillon, 2002). In order for nursing students to progress through these developmental stages, they need time, clinical experience and theoretical knowledge (Dillon, 2002). Pattern recognition and new knowledge develop as a result of repeated clinical experiences over time (Dillon, 2002). Dillon (2002) also described domains of practice for nursing students (knowledge, caring, communication, patient teaching, and professional roles) that are consistent for each developmental stage. In other words, nursing students' performance in the various domains of practice will differ depending on their developmental stage, but the set of domains remains the same at each stage (Dillon, 2002). For example nursing students are expected to perform with assistance at the novice stage of development and progress to independent performance in the domains of practice by the competent stage (Appendix B).

There are three aspects of Dillon's model that helped guide my research. First, Dillon studied competence in a nursing student population, therefore her analysis highlighted aspects of the educational process that were directly applicable to my interests, such as assessing specific outcomes of student nursing practice. According to her model, competence will be reflected in students' performances in specific domains of student nursing practice. I hypothesized that baccalaureate nursing students who experienced a clinical practicum that incorporated HPS would be able to develop clinical competence equal to or greater than those who experienced a traditional clinical practicum. My assumption was that students in the HPS group would perform equal to or better than students in the non-HPS group in the specific domains of nursing practice. Second, Dillon identified relevant domains of student nursing practice that were useful in developing aspects of the measurement tools (OSCE) and simulation scenarios. Dillon developed domains of practice for her model with related competencies based on her own clinical

experience, evaluation tools and the literature. Students' performances could be assessed in the domains of practice. I decided to use a similar process to Dillon's to develop the simulation and OSCE scenarios that were relevant to the nursing curriculum at Algonquin College. The specific domains and relevant competencies that Dillon described in her model were similar to mine, although not identical to the ones I developed for this study. I used my own clinical experiences, a variety of evaluation tools and literature to develop the scenarios. Third, Dillon's model described the benefits of both theoretical and experiential learning in attaining competence in a nursing student population. She hypothesized that baccalaureate nursing students can develop competence over time, through a combination of theoretical knowledge and practical experience with real patients in the clinical setting. While Dillon (2002) referred to experiential learning only in the context of the clinical setting, I was interested in including HPS along with clinical practice as the context of experiential learning. It should be noted that Dillon's silence on the use of HPS should not be interpreted as a rejection of it. Simulation was just not addressed in her model. HPS has been described as a beneficial experiential learning tool that is useful for repeated practice of patient scenarios, application of theory to practice, and self-reflection on performances during and after scenarios (Cioffi, 2001; Cleave-Hogg & Morgan, 2002; Medley & Horne, 2005). It was my assumption that HPS would act as a suitable adjunct to clinical practice and facilitate the attainment of clinical competence of the undergraduate student nurse as manifested in the specific domains of student nurse practice.

CHAPTER 3

Method

Research Hypothesis

Participants who have HPS as part of their clinical practicum will perform equally well or better in clinical competency testing, than those who only experience clinical placements, as determined by OSCE scores and final grades in a medical-surgical theory course.

Design

Originally, I had planned to conduct a randomized controlled trial to compare clinical competency scores between third year baccalaureate nursing students who have HPS as part of their clinical practicum (experimental group) and those who do not (control group). Due to low recruitment numbers it was necessary to modify my pilot study and implement a quasi-experimental design, where the experimental and control groups were not randomized.

During the fall semester 2005, my study was incorporated into the third year nursing curriculum at Algonquin College, which has a collaborative partnership with the University of Ottawa to deliver a four-year Baccalaureate Nursing Program. The first two years of the curriculum focus on individuals and families who are healthy, or have some degree of risk, or are experiencing chronic illness. Students practice in clinical areas such as maternity units, primary schools and long term care facilities. Upon entering their third year, students are introduced to concepts of acute illness in children and adults and complete clinical practicums in acute care hospitals on a variety of medical and surgical units. Since it was becoming more difficult to obtain clinical practice placements for nursing students in acute care settings, HPS was incorporated for four days into the third year practicum course for the experimental group to assess the effect of substitution.

Historically, Algonquin College has incorporated simulation into the nursing curriculum in all levels of the program. For example, first year students practice health assessment skills on each other and rely on gel pads to practice injections in their second year. The use of HPS as a teaching tool was in its infancy at Algonquin College when I began this research study. Only a small group of students entering their third year of the nursing program had been exposed to HPS in the previous year in their maternity skills laboratory. However the college has made a major investment in realistic laboratories and high-fidelity simulators. In coming years, the number of students who experience HPS will increase dramatically.

Participants

Sixty nursing students, entering their third year of a 4-year baccalaureate nursing program at Algonquin College, were approached to participate in the study. The third year class consisted of 93 students, of which 60 met the inclusion criterion of completing their medical-surgical clinical practicum with adult populations. Students who were completing their practicum with pediatric populations were excluded because the simulation intervention and OSCE only consisted of scenarios with adult medical-surgical patients. A power analysis was completed to establish the appropriate sample size for the study, and was based on the standard deviation from a previous study comparing OSCE scores between clinical clerks who received simulation and those who completed their regular clinical course in trauma (Gilbert, Hutchinson, Cusimano, & Regehr, 2000). To estimate sample size, a standard deviation is required (Hirsch & Riegleman, 1996). It was difficult to find previous studies that used a similar methodology, and that reported the standard deviation for the mean of the differences between groups. One nursing study used an OSCE and simulation interventions, but the standard deviation for the OSCE was not reported (Alinier et. al., 2004) further complicating an accurate sample size calculation. Based on the information available, a sample size of 78 was required for a power of .80,

revealing that there were too few students in the class to participate in the study, if adequate power was to be obtained. Due to the restrictions in sample size and underdeveloped methodology for my study, the best approach for this research project was determined to be a pilot study.

Procedure

Human Rights Protection and Recruitment. Ethics approval was received from the University of Ottawa and Algonquin College Research Ethics Boards. A brief explanation of the research study was included in the third year nursing students' course outline for their clinical practicum course (Appendix C). The students had access to the course outline prior to the beginning of the semester. Students were approached by a neutral party during their classes and asked to participate in the study. A script was utilized to ensure consistency in the information that was delivered (Appendix D). All of the students were assured that their participation in the study was voluntary and would have no impact on their status as students in the nursing program. Students were informed of their right to withdraw at any time. The students were given the investigators' names and contact information in case they had any questions about the study. In order to maintain confidentiality, the students who wished to participate in the study signed a consent form, while those who chose not to participate returned a blank consent form during the recruitment times (Appendix E). Participants were assigned study numbers to maintain confidentiality. All of the collected data was kept in my locked office and will be destroyed after five years.

Sample Size and Response Rates. During the initial recruitment, only 10 out of the sixty eligible students chose to participate in the study. The initial recruitment was conducted during an orientation session on the first day of class following the students' summer vacation. During this orientation class the students were given their clinical schedule and practicum placement,

among many other details pertaining to their regular course of study. The professors present in the class during the initial recruitment felt the students were overloaded with information and that it was not an ideal time to ask the students to participate in the study. Therefore, a second recruitment was conducted three weeks later when the students were in small groups. The hope was that they might feel more comfortable asking questions about the study. Enough time had passed to allow the students to process the information from the first recruitment day, but no additional students chose to participate in the study. Due to the low participation I asked the 10 initial volunteers if they would be willing to become the experimental group, which resulted in my study changing from an experimental design to a quasi-experimental design. Eight of the 10 students agreed and signed a modified consent form which was approved by the ethics boards (Appendix F). One week later 2 students approached me and asked if they could participate in the study and be in the experimental group. The final size of the experimental group was 10 participants. The entire third year class was approached again three weeks later, for recruitment of the control group. From the 50 potential participants, 10 agreed to participate in the control group. They also signed a modified consent form (Appendix G). Of the ten, 5 participated in the OSCE and 9 consented to providing their final medical-surgical theory marks. All 10 students in the control group originally agreed to participate in the OSCE, but on the day of the OSCE, some students cancelled for various reasons such as family emergencies or lack of transportation.

Scenario Development for the HPS Intervention. I created the scenarios for the simulation intervention based on the expected student outcomes from their medical-surgical theory and clinical practicum courses, personal experience, a simulation manual created by Caputi and Dreher (1998), and the OSCE preparation guide from the Ordre des Infirmières et Infirmières du Québec (2003). I also discussed simulation strategies with two other professors at Algonquin College who had used simulation in their laboratories and had attended simulation

workshops. The professors who were teaching the medical-surgical theory course provided me with access to their lecture notes and supplemental materials, so that the content in the scenarios would be similar to the materials delivered in the theory course. Overall, seven different scenarios were created for the simulation intervention. (Table 1). The scenarios

Table 1

Simulation Intervention Scenarios

Scenario	Description of Scenario
Scenario 1	Post-operative assessment of a stable patient
Scenario 2	Surgical patient experiencing pain
Scenario 3	Surgical patient experiencing hypovolemia
Scenario 4	Diabetic patient requiring medication and teaching
Scenario 5	Diabetic patient with hypoglycemia
Scenario 6	Medical patient with heart failure experiencing dyspnea
Scenario 7	Medical patient with heart failure experiencing angina

varied in complexity and acuity of the patient. For example, during the morning of each simulation day the participants were presented with a scenario involving a stable patient and in the afternoon they were presented with the same patient in a more complex situation. This allowed the participants to have some familiarity with the patient and build on previous knowledge and experience

In order to make the scenarios as “real” as possible, they were reviewed by two expert medical-surgical professors. This led to the addition of patient charts that included typical patient information such as medical history, medication administration records, and current laboratory values for the scenarios. Chart dates were consistent with the date on which the

student was completing the simulation. I created scripts and guidelines, which provided the participants with direction for each scenario.

Timelines. The clinical practicum course was scheduled two days per week over 11 weeks, including skills laboratories, clinical unit experience, and simulation experience. Each clinical practicum day was six hours in length. I scheduled the simulation intervention in the middle of the clinical practicum course because I wanted the participants to have some experience on their clinical units. I thought that some clinical experience would help provide context for the simulation scenarios, and that the participants might be able to apply what they learned in the simulation laboratory when they returned to the clinical setting. It was also my hope that participants' anxiety would be lessened, by providing them with time to settle into the semester and become familiar with their new clinical practice area. Both groups completed the OSCE during week 12, and wrote their final medical-surgical theory examination during their regular examination schedule in week 15. Refer to Figure 1.

Simulation Intervention. The four simulation days were facilitated by an expert medical-surgical professor who had previous experience working with HPS. I collaborated with the professor prior to the simulation sessions to provide direction on the delivery of the content. We also met after each simulation day to discuss the appropriateness of the content and timeframes allotted for completion of the scenarios (Appendix H). During the first simulation day the participants were oriented to the simulation laboratory. The expectations of the simulation experience were discussed and the participants had a chance to practice using the equipment. The participants also completed one scenario and debriefing session during the orientation day to familiarize themselves with the different roles and responsibilities they would assume during each scenario. Each subsequent day the participants completed two scenarios followed by

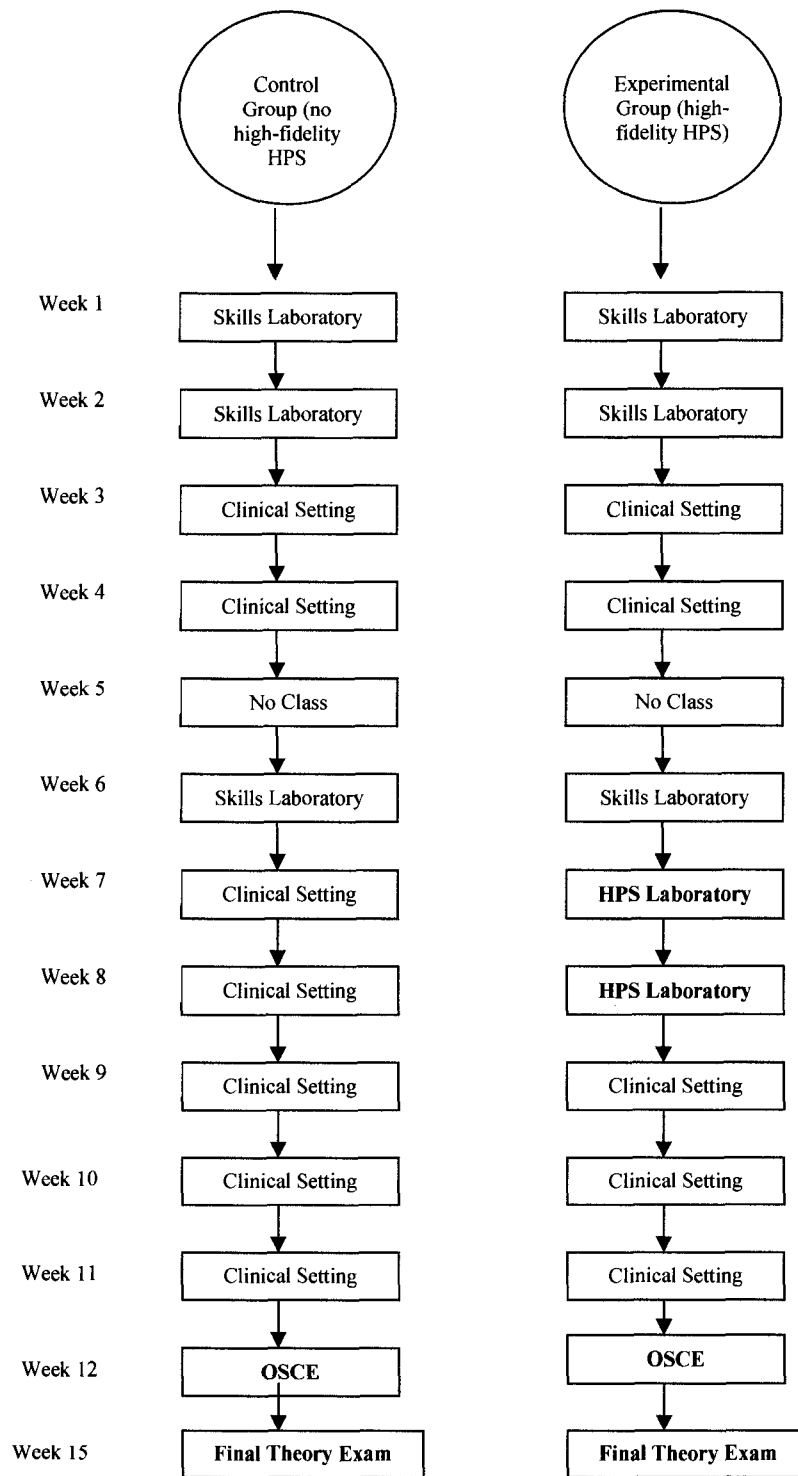


Figure 1. Timeline of Events with the Control (no HPS) and Experimental Groups (HPS)

debriefing sessions. The participants worked in two groups of 5 with each SimMan™ and had designated roles in each scenario. In a typical scenario: one participant would be the lead nurse; 1 participant would be the second nurse; 1 participant would work in the control room and be the voice of the simulator (patient) and change the parameters such as vital signs; 1 participant would be the observer and determine if the objectives had been met; and the final participant would take the role of the doctor or family member depending on the scenario. The participants changed roles for each scenario so everyone had a chance to be the lead nurse (Appendix I). Every participant was assigned a role during each scenario because I wanted them to be actively engaged in the learning process. All of the scenarios were videotaped and were followed by group debriefing sessions to discuss and analyze the participants' actions during the scenarios. The time allotted for completion of the scenarios was equal to the time for debriefing (1.5 hours each) as suggested by the educators with whom I collaborated. As the participants became more comfortable, it took them less time to complete the actual scenarios and more time was spent debriefing.

Setting. The simulation intervention took place in the simulation laboratory at Algonquin College, located in Ottawa, Ontario. The simulation laboratory consists of a conference room, a 9-bed patient unit, a 3-bed Intensive Care Unit, an operating room and control room for the simulators. The simulators were set up at opposite ends of the 9-bed patient unit, with audio and video recording equipment set up at each bed (Appendix J).

Instruments

Objective Structured Clinical Exam. I evaluated the participants' clinical competence with an OSCE. The OSCE consisted of five, 10-minute stations, with a 2-minute break between each station (Appendix K). The OSCE scenarios were different than those of the simulation intervention and used SPs, so the experimental group would not be advantaged. Each station

included a SP who was scripted to portray a specific type of patient. Stations two through five had an evaluator present during the exam. It was necessary to videotape station one because the evaluator for that station was unavailable during the day of the OSCE and she marked the participants' videotaped performances at a later date. All of the evaluators used a standardized checklist and global ratings scale to evaluate each participant at their designated station. The checklist ratings were used for assessment and intervention competencies, while the global ratings scale was used for communication competencies. I used a scale from one to 5 for the global ratings; 1 = fail, 2 = poor, 3 = good, 4 = very good, and 5 = excellent. The total score for each station was the sum of checklist and global ratings scores. Newble (2004) suggests that using both checklist (binary) and global (non-binary) ratings provide a more balanced approach to assessment during an OSCE.

Each OSCE station included a medical or surgical clinical scenario that centered on specific domains of nursing practice, each with relevant competencies. Each station included assessment, intervention, and communication domains, however the emphasis of each domain and relevant competencies varied at each station. For example, station one involved a regular post-operative assessment focusing on assessment competencies. Station two included a post-operative patient with nausea, focusing on assessment, intervention and communication competencies. Station three had a post-operative patient with urinary retention focusing on communication competencies. Station four included a patient being discharged home, requiring teaching on subcutaneous anticoagulant medication, centering on intervention (Appendix L), competencies. Station five included a medical patient with hypertension focusing on assessment and intervention competencies.

OSCEs had not been previously used at Algonquin College, therefore it was necessary to create one for the research study. I created the OSCE based on the format used in the Quebec

Nursing Registration Examination, observations from an OSCE at Heritage College in Quebec, my personal clinical experiences and from the OSCE literature. The material tested in the OSCEs was also influenced by the content of the medical-surgical theory course and clinical practicum units the participants attended. This was similar to the process Dillon (2002) used in creating her domains of student nursing practice.

Two weeks prior to the implementation of the OSCE, the evaluators and SPs were asked to participate in a practice session in order to improve the face validity of the OSCE. During the practice session, two medical-surgical nursing professors played the role of participant. I made changes to the OSCE scenarios based on the feedback from the evaluators, professors and the SPs. The practice session was also necessary in order to have consistency in the delivery of the SP scripts and the evaluation process. During the actual OSCE the evaluators and SPs were blinded as to who was in the control group and experimental group.

Final Medical-Surgical Theory Grades. I also evaluated participants' knowledge aspects of clinical competence via their final grades from their requisite medical-surgical theory course. The medical-surgical theory course provided the foundational knowledge for the third year nursing students for their practice in the clinical setting. The 13-week course was delivered in lecture format, for three hours per week. Students were evaluated with a group research assignment, midterm and final examinations. The research assignment required each clinical group to identify a practice problem and complete an annotated bibliography related to that problem. The midterm and final examination consisted of multiple choice questions and short answer case studies, which were relevant to clinical practice. The theory course included content for both pediatric and adult medical surgical populations. Two medical-surgical theory professors reviewed the midterm and final examinations prior to implementation. The majority

of the multiple choice questions had been used in the previous year with a different group of students, thus improving the face validity of the examinations.

Justification of Assessment Methods. The literature supports using multimethod approaches in assessing health care students' levels of clinical competency because a more representative and accurate assessment might be achieved (Epstein and Hundert, 2002). I decided to use an OSCE and the participants' final theory grades from their required medical-surgical theory course because using both outcome measures would provide a more accurate assessment of clinical competence than one method alone. My decision was based on the literature review and availability of assessment methods in the present nursing curriculum at Algonquin College.

The OSCE and final theory grades were attractive assessment tools for many reasons. Both tools have the ability to provide objective, valid, and reliable assessments of clinical competence using the same standardized experiences for every participant (Alinier, 2003; Alinier, et. al, 2004; Auewarakul, Downing, Jaturatamrong & Praditsuwan; 2005). Since the medical surgical theory course provided the foundational knowledge for the clinical practicum course, I inferred that the assessment outcomes would provide insight into the knowledge aspects of participants' clinical competence. It was also feasible to create and incorporate an OSCE into the current curriculum based on the content from the medical-surgical theory and clinical practicum course. In addition, the development of an OSCE allowed for the possibility of targeting specific domains of students' nursing practice similar to those described in Dillon (2002). The OSCE would serve as an outcome assessment of participants' clinical performance in a simulated setting. Even though all of the participants were completing their medical-surgical clinical practicums during this study, I decided not to use their final clinical evaluations

as part of their clinical competence assessment. At Algonquin College students are evaluated in the clinical setting with pass/fail criteria, which is problematic for empirical measurement.

While there is no gold standard for measuring clinical competence, it seems as though multiple evaluation methods can provide more complete and accurate outcome assessments. Even though there are limitations to all clinical competency assessments, I decided to use final medical-surgical theory grades and an OSCE for this study based on the evidence and available resources.

Demographic Data. The participants were asked for their age, previous simulation experience, sex, and highest level of education (Appendix M). This data was collected upon completion of the OSCE.

Standardized Patient Recruitment. It was necessary to recruit and train the SPs prior to the OSCE day. Algonquin College has a Theatre Arts department where students have the opportunity to take a variety of courses including acting. I met with a group of theatre arts students who had expressed an interest in volunteering their time to participate as SPs in the OSCE. The students had an opportunity to ask questions and sign a consent form if they wished to participate in the study (Appendix N). Seven students agreed to participate as SPs. The students participated in practice OSCE session and the actual OSCE day. They were given the OSCE scenarios ahead of time so that they could ask questions and become familiar with the standardized patients that they would portray in the scenarios.

Outcome Assessment. One week after the clinical practicum course ended (week 12) the participants completed the OSCE. The participants were greeted as they arrived and were directed to the station at which they would be starting. The participants were given name tags with their study numbers on them for both identification purposes and in order to maintain confidentiality. I was responsible for timing the stations and gave direction to the technical

support person who was responsible for videotaping each participant's performance at OSCE station 1. The DVDs from station one, were given to the absent evaluator for marking at a later date. The OSCE evaluation forms were collected and the participants' final scores were totaled.

After the participants' completed the OSCE they were directed to a conference room where they completed the demographic questionnaire and were encouraged to ask questions, and comment on the OSCE. Participants were informed that they could access their OSCE evaluation forms and DVDs in January. The feedback collected after the OSCE was not relevant to the research objective, but will be used to inform further implementation of this approach. I gained access to the participants' final theory grades in January 2006 from the Chair of the Nursing Program at Algonquin College.

Data Analysis

All of the data was analyzed using Statistical Packages for the Social Sciences (SPSS) version 10.0. An alpha level of .05, two-tailed was used for all statistical tests. The demographic data was analyzed with descriptive statistics including means, frequencies and ranges. An independent measures t-test was also used to compare the mean age between groups. I planned to analyze the OSCE scores and medical-surgical theory grades using both parametric and non-parametric tests. I planned to use an independent measures t-test to determine if there was a significant difference between the groups' total OSCE scores, OSCE station scores, OSCE domain scores (assessment, intervention and communication) and the final theory grades. The independent measures t-test evaluates the mean difference between two treatment conditions (simulation and no simulation) (Gravetter & Wallnau, 2004). According to Gravetter & Wallnau (2004) there are three assumptions that must be met when using the independent measures t-test. "The observations within each sample must be independent; the data for two populations from which the samples are selected must be normally distributed; and the two populations from

which the samples are selected must have equal variances” (Gravetter & Wallnau, 2004, p.330). My sample size was small, creating difficulty in meeting the normality assumption of the independent measures t-test (Gravetter & Wallnau, 2004). The Mann-Whitney *U* non-parametric test is a useful alternative, to the independent measures t-test, since it does not require normal distributions (Gravetter & Wallnau, 2004) and was used to further explore the data. A power analysis of the final theory grades was completed to determine if a type II error was committed. I decided that a 5% difference in grades was significant, based on the standard marking scheme from University of Ottawa/Algonquin College Collaborative Nursing Program. For example the difference between a B+ and A- is 5%. A Spearman's rho correlation was also calculated to determine if there was a correlation between OSCE scores and final theory grades.

CHAPTER 4

Results

Sample

There were 15 participants in the OSCE, provided demographic information and OSCE feedback (10 from the experimental group and 5 in the control group). Nineteen participants released their final medical surgical theory grades (10 from the experimental group and 9 from the control group). Refer to Table 2 for a summary of characteristics of the sample.

Sex. The groups were similar regarding sex. There were 9 females and 1 male in the experimental group and there were 8 females and 1 male in the control group for final grades. The control group for the OSCE consisted of 1 male and 4 females.

Age. Participants' ages were compared with an independent measures t-test. No significant difference was found between the groups, $t(13) = .85, p = .41$. The mean age for the experimental group was 31.4; the oldest participant was 47 and the youngest was 21 years old. The mean age for the control group for OSCE scores was 27.2; the oldest participant was 43 and the youngest was 20. The data for age was missing for 4 participants in the control group for final grades.

Simulation Experience. There was not enough information to draw any conclusions about participants' previous simulation experience. Four participants in the experimental group reported some previous experience with simulation, 4 others reported no previous experience with simulation and 2 participants did not answer this question. In the control group 4 participants reported no previous experience with simulation, and 5 participants did not provide the information. Simulation was interpreted by students in different ways which may account for differences or gaps in reporting. For example, as part of the four year nursing curriculum at Algonquin College all students must participate in a health assessment course in first year where

they practice assessment skills on each other. Some participants reported this as a simulation experience while others did not. Some participants reported using simulation in other programs of study in which they were previously enrolled such as a paramedic or dental hygienist. Other participants reported using simulation in their previous nursing labs such as maternity. Some students misinterpreted the question and reported their feelings about the simulation experience in this section. For example, some students stated that they enjoyed the experience and felt simulation should be incorporated into the curriculum.

Educational Experience. All students entering the Baccalaureate Nursing Program at Algonquin College must have a high-school diploma or equivalent; however there was not enough information provided from all participants to draw further conclusions on educational experience. In the experimental group two participants indicated that they had completed some college courses, 1 stated she had a college diploma, 2 had baccalaureate degrees and 5 did not provide any information. One participant in the control group stated he had a high school diploma and 4 participants did not provide any information.

Clinical Practicum Unit. All participants completed their clinical practicum at three different acute care hospitals in the Ottawa region. This data was collected originally in order to contact the clinical professors regarding their students' planned absence from the clinical setting for four days. In the experimental group two participants completed their practicum on a medical unit, 5 on a medical-surgical unit and 3 on a surgical unit. In the control group, one participant completed the practicum on a medical unit, 1 on a medical-surgical unit and 7 on surgical units.

Table 2

Characteristics of the Sample

Characteristic	Experimental Group	Control Group
Number in Group	10 OSCE, 10 final grades	5 OSCE, 9 final grades
Sex	1 male, 9 female	1 male, 4 female OSCE; 1 male, 8 female final grades
Age	M = 31.4 (SD = 8.67)	M = 27.2 (SD = 9.68) Missing 4 for final grades
Previous Simulation	Yes=4	Yes=4
Experience	No=4 Information Not Provided=2	No=0 Information not provided=5
Highest Education Level	Some College Courses=2 College Diploma=1 Baccalaureate Degree=2 Information not Provided=5	High School Diploma=1 Information not Provided=4
Type of Hospital Unit for	Medical-2	Medical-1
Clinical Rotation	Medical-Surgical-5 Surgical-3	Medical-Surgical-1 Surgical-7

OSCE Scores

The final mark for each OSCE station was totaled and averaged to obtain each participant's final OSCE score. The original total OSCE score was calculated out of 197 points.

Station one was graded out of 33; station two out of 37; station three out of 52; station four out of 40; and station five out of 35. The final OSCE tallies were converted to scores out of 100. The mean for the group that received simulation ($M = 60.0$, $SD = 14.38$) was the same as that for the group that participated in the usual clinical experience ($M = 60.1$, $SD = 7.78$). Refer to Table 3. The means indicated no significant difference between groups, and no further data analysis was conducted. If the means had been different I would have proceeded with the t-test calculation and Mann-Whitney U calculation to determine if there was any difference in the OSCE scores between the groups. The final OSCE scores are included in Table 4 to illustrate the similarities between the groups.

Table 3

Mean and Standard Deviation for OSCE Scores

Group	N	M	SD	Std. Error Mean
Simulation	10	60.10	14.38	4.55
Non-Simulation	5	60.00	7.78	3.48

Table 4

Comparison of Final OSCE Scores

	Simulation Group (n = 10)	Non-Simulation Group (n = 5)
Final OSCE Scores (out of 100)	31, 41, 55, 60, 64, 66, 66, 68, 71, 79	51, 57, 58, 62, 72

OSCE Station Scores

OSCE station scores were totaled for each participant. The resulting total station scores were averaged for the simulation and control group. Refer to Figure 2. The OSCE station means

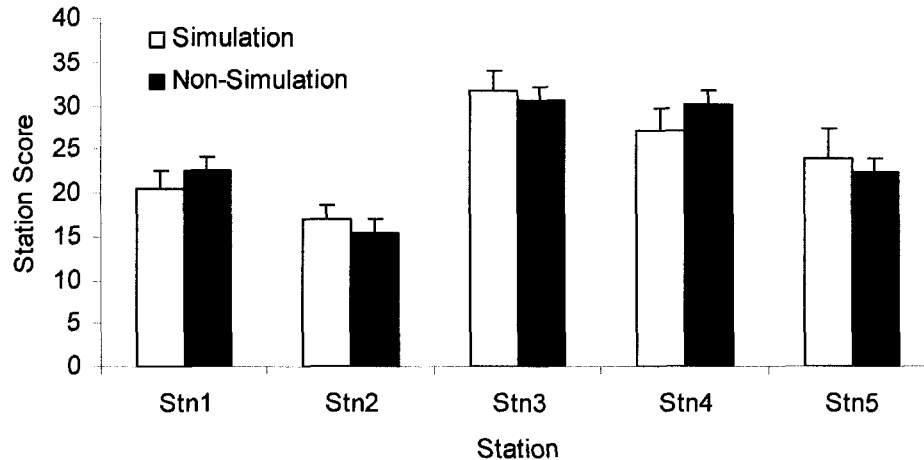


Figure 2. Mean OSCE station scores (+SE) for simulation (n = 10) and non-simulation (n = 5) groups in station 1, station 2, station 3, station 4 and station 5.

for each group were compared using an independent measures t-test. The results of the t-test indicated there was no significant difference between the simulation group and the non-simulation group in any of the five OSCE station scores. Refer to Table 5.

Table 5.

Comparison of Station Scores Using the t-test

	t	df	p	Mean Difference	Std. Error Difference	95% CI	
						Lower	Upper
Station 1	-.71	13	.49	-2.10	2.94	-8.46	4.26
Station 2	.71	13	.49	1.70	2.41	-3.51	6.91
Station 3	.32	13	.75	1.10	3.40	-6.25	8.45
Station 4	-.79	13	.44	-3.00	3.78	-11.17	5.17
Station 5	.35	13	.73	1.80	5.09	-9.21	12.81

The data was further explored with a Mann-Whitney U test and no significant difference was found between the experimental and control group. Refer to Table 6.

Table 6.

Comparison of Station Scores with the Mann-Whitney U Test

	Group	N	Mean Rank	Sum of Ranks	U	P
Station 1	Simulation	10	7.45	74.50	19.50	.51
	Non-Simulation	5	9.10	45.50		
Station 2	Simulation	10	8.70	87.00	18.00	.44
	Non-Simulation	5	6.60	33.00		
Station 3	Simulation	10	8.20	82.00	23.00	.86
	Non-Simulation	5	7.60	38.00		
Station 4	Simulation	10	7.75	77.50	22.50	.77
	Non-Simulation	5	8.50	42.50		
Station 5	Simulation	10	8.85	88.50	16.50	.31
	Non-Simulation	5	6.30	31.50		

OSCE Domain Scores

Each OSCE domain score was totaled for each participant and mean domain scores were calculated for the control and experimental group. Refer to Figure 3. The assessment domain was calculated out of 34 points; the intervention domain out of 28 points; and the communication domain out of 135 points. An independent measures t-test was used to compare the means in each domain between the simulation and non-simulation group. The results of the t-test indicated no significant difference between the groups for their total scores in each domain.

Refer to Table 7.

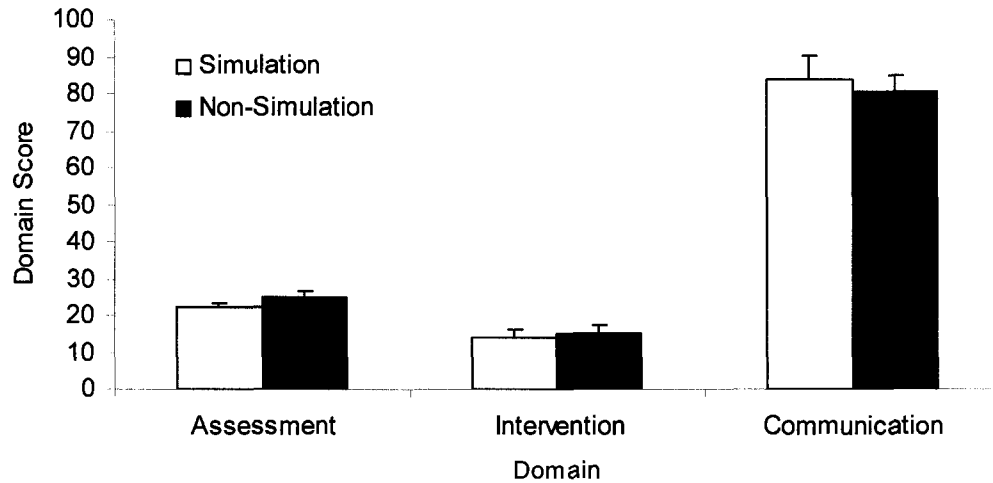


Figure 3. Mean OSCE domain scores (+SE) for simulation (n = 10) and non-simulation (n = 5) groups in assessment, intervention and communication domains.

Table 7.

Comparison of Domain Scores Using the t-test

	t	df	p	Mean Difference	Std. Error Difference	95% CI	
						Lower	Upper
Assessment	-1.62	13	.13	-2.70	1.66	-.30	.90
Intervention	-.30	13	.77	-.10	3.31	-8.15	6.15
Communication	.35	13	.74	3.20	9.27	-16.83	23.23

The data was further explored with a Mann Whitney *U* test and no significant differences were found between the group that received the simulation intervention and the group that did not. Refer to Table 8.

Table 8.

Comparison of Domain Scores with the Mann-Whitney U Test

	Group	N	Mean Rank	Sum of Ranks	U	P
Assessment	Simulation	10	6.85	68.50	13.50	.17
	Non-Simulation	5	10.30	51.50		
Intervention	Simulation	10	8.00	80.00	25.00	1.0
	Non-Simulation	5	8.00	40.00		
Communication	Simulation	10	8.55	85.50	19.50	.51
	Non-Simulation	5	6.90	34.50		

Final Theory Grades

Participants' final grades from their medical-surgical theory course were initially compared using an independent measures t-test. The results of the t-test indicated there was no significant difference between the simulation group ($M = 76.7$, $SD = 8.04$), and the non-simulation group ($M = 80.11$, $SD = 5.09$), $t(17) = -1.09$, $p = .29$. Refer to Tables 9 and 10. A power analysis was completed to determine the type II error rate using a 5% difference in grades. The resulting power was less than 40% to detect a difference in marks of 5%.

Table 9

Mean and Standard Deviation for Final Theory Grades

Group	N	M	SD	Std. Error Mean
Simulation	10	76.70	8.04	2.54
Non-Simulation	9	80.11	5.09	1.69

Table 10

Comparison of Final Theory Grades Using the t-test

	t	df	p	Mean Difference	Std. Error Difference	95% CI	
						Lower	Upper
Final Grades	- 1.09	17	.29	- 3.41	3.13	-10.02	3.19

The raw data for the final theory grades is included in Table 11 to demonstrate the similarities between the simulation and non-simulation groups.

Table 11

Comparison of Final Theory Grades

	Simulation Group (n = 10)	Non-Simulation Group (n = 9)
Final Theory Grades (out of 100)	66, 66, 72, 73, 75, 83, 84, 86, 88	73, 74, 77, 79, 81, 81, 82, 85, 89

The original final grades were rank-ordered and a Mann-Whitney U test was used to compare the ranks for the $n = 10$ participants in the experimental group, versus the $n = 9$ participants in the control group. The results indicated no significant difference between the participants who received the simulation intervention and those participants who did not, $U = 34$, $p = .37$. Refer to Table 12.

Table 12

Comparison of Final Theory Grades with the Mann-Whitney U Test

Group	N	Mean Rank	Sum of Ranks	U	p
Simulation	10	8.90	89.00		
Non-Simulation	9	11.22	101.00	34.00	.37

OSCE Scores and Final Theory Grades

A correlation between OSCE scores and final theory grades was calculated using the Spearman's rho; $r_s = .62$, $p = 0.02$. There is a statistically significant, moderate positive correlation between the OSCE scores and final theory grades. Refer to Figure 4.

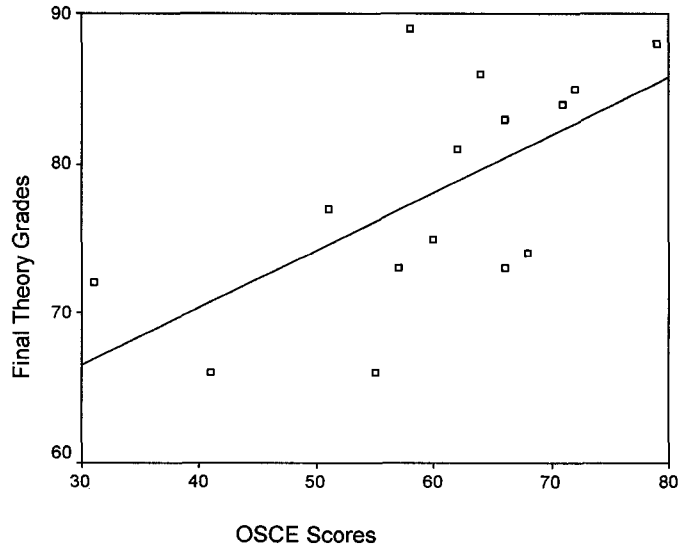


Figure 4. Correlation Between OSCE scores and Final Theory Grades

Summary

Overall, there were no significant or practical differences or equivalencies in clinical competency scores between students who received HPS as part of their clinical practicum and those who did not, as measured by an OSCE or final grades in an adjunct medical-surgical theory course. However, the raw data demonstrates similarities between both groups' final scores. There was also a moderate positive correlation between final theory grades and final OSCE scores.

CHAPTER 5

Discussion and Recommendations

The purpose of this pilot study was to determine how HPS affected the attainment of clinical competence by third year baccalaureate nursing students. It was hypothesized that those participants who have HPS as part of their clinical practicum would perform equally well or better in clinical competency testing, compared to those who experience their usual clinical placements only, as determined by OSCE scores and medical-surgical theory course final grades. There was not enough statistical power to draw definitive conclusions about the participants' clinical competency scores, however, when examining the raw OSCE scores and final theory grades, similarities are evident between the simulation and non-simulation groups. There was a moderate positive correlation between OSCE scores and final medical-surgical theory grades. My findings also suggest expanding aspects of Dillon's Student Nurse Developmental Stage Model.

OSCE Scores

There were no statistically significant differences or equivalencies between the groups' final OSCE scores, OSCE station scores, and domain scores. The study had inadequate power to determine if the findings were valid. However, there were similarities in the all of the raw OSCE scores. My findings are both refuted and supported in the literature related to the final OSCE scores. There was no literature available that discussed OSCE station scores and domain scores after an HPS intervention.

Giulio et al. (2004) found that gastroenterology students who received ten hours of preclinical training in upper endoscopy using HPS, compared to those students who did not receive the training, performed better on upper endoscopy procedures on actual patients. The simulation group was more independent, received more positive feedback from instructors, and

performed more complete endoscopies than the non-simulation group. The time required to achieve a complete procedure was the same for both groups.

Wayne et al. (2005) used a randomized crossover design comparing the performances of medical students who received four-2 hour sessions with HPS, with those who participated in their usual clinical experience. Students' management of a simulated Advanced Cardiac Life Support scenario was evaluated and compared. Wayne et al. (2005) found that students' performances were significantly better in the HPS group than the group who had their regular clinical experience.

Hall et al. (2006) completed a randomized study examining paramedic students' rates of successful endotracheal intubation using two different teaching methods. The experimental group received 10 hours of learning with HPS, and the control group received the usual instruction of 15 intubation attempts in the operating room with actual patients. Both groups were assessed on their rates of successful intubation on patients in the operating room after the intervention. No significant difference was found in the success rates of intubation between groups, indicating that competence in endotracheal intubation can be achieved with clinical practice on actual patients, or using high-fidelity HPS.

In conclusion, the literature supports the use of HPS in two ways. Health care students are able to meet or exceed clinical outcomes using HPS compared to traditional forms of clinical education. It should be noted that the current literature focuses on task oriented outcomes, while the outcomes in my study were multidimensional.

Final Theory Grades

I was not able to support my hypothesis that participants who experienced HPS would perform equally well or better on their final theory course grades, although there were similarities between groups' raw scores. I could not find any literature that compared

participants' final theory grades after a HPS intervention, however there were two studies that utilized a multiple-choice quiz to determine the effects of a HPS intervention. Morgan, Cleave-Hogg, Desousa and Lam-McCulloch, (2006) used a pharmacology pre and post test to determine if a HPS simulation intervention had any effect on participants' written pharmacology test scores. The pharmacology test scores were significantly higher after the simulation intervention (Morgan & Cleave-Hogg, 2006). Mueller, et al. (2005) also found that students who used an Advanced Life Support mannequin in their drug therapy course performed better on a multiple choice test compared to those students who did not have the simulator as part of their instruction.

There were no studies available that determined the effects of HPS on final course grades. However, the literature suggests that HPS has a positive impact on final multiple choice quiz scores.

Correlation Between OSCE Scores and Final Grades

I found a moderate positive correlation between OSCE scores and final theory grades. While Epstein and Hundert (2002) indicated OSCE scores and written tests are not correlated, my findings were similar to the results in other health care literature. For example, final OSCE scores were positively correlated with written evaluation scores, such as with final board examinations or other general knowledge tests (Carraccio & Englander, 2000; Jain, Delisa, Nadler, Kirshblum, Banerjee, et al., 2000; Merrick, Nowacek, Boyer, & Robertson, 2000). The moderate positive correlation between OSCE scores and final theory grades provides support for concurrent validity of the OSCE as a competency assessment tool in this study. The OSCE utilized in this study was new and was only evaluated for face validity prior to implementation. If there were a wide discrepancy between final theory grades and OSCE scores it might demonstrate that the OSCE was unsuitable for the evaluation of the participants, or that it

assesses different skills as suggested by Epstein and Hundert (2002). However, the positive correlation suggests that the content of the OSCE was appropriate for the population under study.

Application of Findings to Dillon's Student Nurse Developmental Stage Model

Dillon (2002) hypothesized that baccalaureate nursing students progress through three hierarchal stages of development in their educational programs, as they gain theoretical knowledge and clinical experience with “real” patients. Dillon suggested that nursing students develop competence in experiential learning environments that include clinical practice settings with real patients. As stated earlier, she is silent on the use of HPS. I hypothesized that students could develop competence using HPS as an experiential learning tool in conjunction with the clinical setting. While I could not draw definitive conclusions from my results, the raw data from my study suggests that HPS might be a suitable adjunct to clinical practice in the development of clinical competence. When examining the raw data, both groups had similar final theory grades and OSCE scores, suggesting that learning strategies including HPS might be acceptable alternative for meeting competency outcomes. In other words, students might be able to achieve similar clinical competence outcomes using either traditional clinical practicum placements or non-traditional methods that incorporate HPS. Therefore, it might be warranted to expand Dillon's model (1998) to include HPS along with clinical practice as part of the experiential learning process that enables baccalaureate nursing student to develop clinical competence.

Limitations

There are several limitations to my study, which limit the generalizability of the findings. Of greatest concern is the small sample size, which limits the interpretation of the results. There are also limitations with the simulation intervention and the tools used to measure clinical competence.

Sample Size

The sample size was small, which contributed to my inability to find statistically significant differences or equivalencies in clinical competency measures between the groups. Additionally, I had planned to use a randomized design, but needed to change to a non-randomized design due to the low recruitment numbers. Participants who originally signed up for the study were asked to become the experimental group, and might not be representative of the third year nursing population at Algonquin College. The problems with recruitment and sample size limit the interpretation of the findings.

Simulation Intervention

The simulation intervention was newly developed for this research project and there was little evidence to support the best methods of implementing this educational strategy. The intervention might not have been realistic or relevant enough for the participants. Participants might not have had enough individual practice or preparation time to optimize the simulated learning experience.

Measurement Tools

There might have been problems with the validity and reliability of the OSCE and final theory grades as measures of clinical competence. The OSCE was newly created for this research study and might be limited in its ability to measure clinical competence. For example two of the SPs and two of the evaluators did not attend the practice OSCE session, which may have introduced variability their interactions and evaluation of the participants. The participants also expressed concern about the lack of consistency of the SPs' scripts during the OSCE which might introduce too much variability in each scenario. The OSCE must be standardized in order to produce valid and reliable assessments.

Participants' final medical-surgical theory grades were based on examinations that consisted of adult and pediatric content. The examinations might not be discrete enough to accurately measure clinical competence with adult populations. The annotated bibliography was also a group project, further compounding the problem of its use as a measurement tool for each participant.

There are specific issues with the simulation intervention and measurement tools which I felt were necessary to address. However, I acknowledge that the small sample size was the greatest limitation in my study and overshadows any other potential problems.

Recommendations for Future Research

Although I did not have enough statistical power to draw definitive conclusions about the clinical competency of participants, this pilot study might have utility for educators and researchers investigating the outcomes of implementing HPS in their educational programs. I have made suggestions for improving the research design, recruitment, sample size, simulation intervention and clinical competence measures.

Research Design, Sample Size and Recruitment

A randomized-controlled study using a larger sample across educational facilities needs to be implemented, measuring clinical competence in order to improve the generalizability of the findings and power of the study. As discussed in the literature review, it was difficult finding a similar study that reported the standard deviation in order to calculate the appropriate sample size for a power of .80. Based on the standard deviation from the final theory grades in this pilot study, a sample size $N = 233$ will be needed in the future in order to have a power of .80.

Recruitment was an issue in this study and I have suggestions that might improve recruitment numbers. Ross et al., (1999) completed a systematic review of barriers to recruitment of patients to randomized controlled trials. Although the study reviewed clinician

and patient barriers to participation in research studies, some of their ideas might apply to the population that I studied. For example, Ross et al.'s (1999) review indicated that patients were reluctant to participate in research when it may involve additional expenses or inconveniences such as travel and travel costs. Also, when the benefit of a treatment is uncertain or there is a strong aversion to a particular treatment, participants were less likely to participate in the research study (Ross et. al., 1999). The authors also found that potential research participants needed a simple presentation of the information and time to process the information before deciding whether or not to participate in the study (Ross et. al., 1999). They suggested that the delivery of the study information might be delivered in a variety of ways such as written, oral or video (Ross et. al., 1999).

Based on this review, there are some changes I would make to the recruitment process. I would not recruit students during their orientation class, or on their first day back from summer vacation. Students are overloaded with information during the first week back to class and might feel overwhelmed about participating in an optional research study. Another problem with recruiting too early in the school year is that students need to have some information regarding their clinical practicum posting prior to being approached for a study affecting that posting. That information could help them decide if they would like to participate in a research study that may replace some of their clinical days. At Algonquin College, students find out where they are completing their clinical practicum during the first day of class. In this scenario, I would suggest recruiting students a few weeks into the semester, once they have had an opportunity to settle into the term, and following up one to two weeks later with an email or telephone call. With these changes recruitment might be more successful.

Changes to the OSCE could also help improve the sample size in future research. The OSCE took place during two days where the students did not have any scheduled classes. It

might be prudent to schedule the OSCE during the students' last week of clinical practicum when they usually have class, to mitigate travel concerns. It might also help to provide the coverage of some incurred costs such as parking and/or other travel. Scheduling the OSCE over a two day period may also help mitigate unforeseen circumstances. For example one student had a family emergency and had not slept the night before the OSCE. Having an alternate time might also reduce attrition rates.

Greater familiarity with the simulation intervention might also improve participation in future studies. Improving the student's familiarity with HPS might help them feel less uncertain about the intervention and less adverse to it. Traditionally a clinical practicum in a health care agency is something that students are more familiar with, as opposed to a clinical practicum occurring in a simulated laboratory setting. Students might have felt they would have been disadvantaged if they did not complete all of their clinical practicum on a clinical unit with real patients. Additionally students might have felt they were perpetuating the use of simulation experiences in place of clinical unit experiences, which would deter them from participating in the study. The written and oral presentation of the information might not have been sufficient to alleviate uncertainty about the simulation process. Students who are unfamiliar with simulation might benefit from a visual display of the actual process, such as through a video clip presented during the recruitment period.

Students might also feel concerned or confident about their academic performance in their coursework which may have prevented or encouraged them in their participation in the study respectively. Students who are academically stronger might have felt more confident in sharing their final grades while those who were not as academically strong may have been reluctant to participate, feeling that better students would be better candidates. Also, weaker

students might not have wanted to jeopardize their study time at the end of the term. This phenomenon can also lead to problems with recruitment of adequate numbers of participants.

Simulation Intervention

There is a dearth of literature describing the best methods of designing and implementing HPS interventions for health care students and professionals. However, authors are beginning to address this research gap, which has implications for the simulation sessions which I implemented in this study. Jeffries (2004) completed a review of simulation literature and proposed a simulation framework for nursing to help in the development, implementation and assessment of simulations. She proposed that five factors, (teacher, student, educational practices, design characteristics and simulation, and outcomes), each with associated variables, (ex. debriefing, objectives) need to be considered when implementing simulations, for the most beneficial learning experience (Jeffries, 2004). Similarly, Issenberg et al, (2005) published a review of features and use of high-fidelity medical simulation that leads to effective learning. Issenberg et al., (2005) presented ten features of high-fidelity simulations that lead to effective learning, such as providing feedback to the learner, repetitive practice of scenarios and integrating simulation into the curriculum. McGaghie, Issenberg, Petrusa and Scalese (2006) further examined the data from Issenberg et al's (2005) review, and determined that repetitive practice using HPS had a direct and positive relationship for a learner's ability to meet desired learning outcomes. They suggested that more practice with high-fidelity simulations resulted in better outcomes (McGaghie et al, 2006).

The simulation intervention that I implemented had strengths, however based on the findings from the review articles I would recommend some changes. Areas that I would address include repetition of scenarios, scenario realism, curriculum integration and the timeframe in which the simulations are integrated.

Issenberg et al., (2005), Jeffries, (2004), and McGaghie et al., (2006) all agree that repetitive practice is essential in delivering a high-quality simulation and improving learning outcomes. Learners have the opportunity to improve their performance using simulations by correcting their errors and refining their skills (Issenberg et al., 2005; Jeffries, 2004; & McGaghie, 2006). Due the structure of my simulation intervention, participants only had the opportunity to be the “lead nurse” twice over the four simulation days. Once participants completed a scenario in the role of the lead nurse, they did not immediately have the chance to repeat their performance. The participant only had the opportunity to become the lead nurse for a second time on another day using a new scenario. It might be more effective for the same participant to repeat the same scenario immediately after the debriefing in order to correct and refine his/her performance.

All of the authors agree that the simulation should be as realistic to clinical practice environments as possible (Issenberg et al., 2005; Jeffries, 2004; & McGaghie, 2006). Although the simulations were reviewed for face validity prior to implementation, they had not been previously used with nursing students. Feedback from students actually using the simulations would be helpful in improving their realism, and hopefully improve attainment of the learning outcomes.

Issenberg et al (2005) also suggested that when high-fidelity simulation is integrated into the curriculum and included as part of the regular evaluation process, learning is more effective. The participants were not formally evaluated on their simulation performances for this study, as it was not part of their usual curriculum. If simulation was included as part of the regular curriculum and evaluated accordingly, the participants might have been more engaged in the process, which might have resulted in higher outcome scores.

Another issue which is not addressed in the literature, but might be important to the attainment of learning outcomes, is the timeframe in which the simulation intervention was delivered. In my study, the participants were away from the clinical practice setting for a total of four concurrent weeks (weeks 5-8). It might be more pedagogically sound to stagger the simulation intervention in between clinical practice weeks, or introduce high-fidelity HPS into the skills laboratories.

Overall, there are strengths in the simulation intervention that I implemented, however based on the new evidence I would consider making some changes. Incorporating changes to the simulation intervention might improve learners' experiences with HPS, making it a more effective learning experience.

Measurement Tools. The literature supports using multiple assessment methods for evaluating clinical competence in health care students (Epstein & Hundert, 2002; Norman, et al, 2002). Multimethod approaches provide a more representative assessment of a student's performance. I used a newly developed five-station OSCE and the final grades from the medical-surgical theory course as measures of clinical competence. I will describe ways in which these tools could be improved, and also suggest implementing other measures to gain a more representative portrayal of a participant's clinical competence. The OSCE and final theory grades were appropriate measures for the scope of this study, however using tools for direct assessment in the clinical setting might provide a more representative assessment of participants' clinical competence.

OSCE. In order to improve the validity and reliability of the OSCE as a measurement tool for clinical competence, there are changes which should be considered.

Content validity could be improved by increasing the number of OSCE stations in order to ensure the course content is appropriately covered in enough depth (Carraccio & Englander, 2000), thereby increasing the validity of the OSCE as a measurement tool.

Interrater reliability could be assessed by videotaping the OSCE scenarios and having more than one rater evaluate each student's performance (Wilkinson et al, 2003). Greater input from the evaluators in constructing the scenarios and evaluation tools could also contribute to greater interrater reliability (Wilkinson et al, 2003). In this study the evaluators were given the opportunity to provide feedback regarding the evaluation tools, however they were not heavily involved in creating the scenarios and evaluation tools.

Construct validity of the OSCE could be assessed by implementing the OSCE with different levels of students and comparing their final scores (Carraccio & Englander, 2000). In such a scenario, higher OSCE scores should be seen with higher levels of students (Carraccio & Englander, 2000).

Concurrent validity could also be assessed by comparing OSCE scores with clinical evaluation scores and final theory grades (Carraccio & Englander, 2000). Using scores from all three measures would provide a more comprehensive and valid measurement of clinical competence (Carraccio & Englander, 2000).

Issues of reliability and validity should be considered in order to improve the clinical competency measures. The issues of validity and reliability need to be balanced with the costs, time commitment and human resources that are needed to implement an OSCE.

Final Theory Grades. It might be more useful to only examine the results of the adult multiple choice questions and case studies from the medical-surgical theory course. This might provide a more reliable and valid measure of the participants' individual clinical competence.

Direct Assessment in the Clinical Setting. At Algonquin College, students are evaluated in the clinical practice setting with a non-graded pass or fail, which is why clinical practicum assessments were not utilized in this study as a measure of clinical competence. In order to gain a more representative picture of each participant's clinical competence, self-assessment and clinical teachers' assessments might be utilized. The current clinical evaluation tool at Algonquin College might be converted to a likert-type scale similar to the one used in May et al's (1999) study, or other tools might be adopted for use such as the King's Nurse Performance Scale (1997) or Nurse Competence Scale (2004) at the end of the clinical practicum. The same tools could be utilized by clinical teachers and individual participants to gain a more holistic view of each participant's clinical competence.

Multi-method assessment is crucial in assessing clinical competence in health care students. I would refine the tools currently used in this study and consider adopting other tools for more representative and sensitive measures of clinical competence.

Importance of Findings

Incorporating simulation using HPS needs to be investigated further in order to make the best choices about its integration into health care curricula. There are many variables to consider when using this educational tool, including best educational practices, costs, human resources, and outcomes. Each of those variables needs to be studied for proper integration, but until the literature is more complete educators faced with integrating HPS into their curricula can take guidance from the various peripheral materials and processes used in the development of the study.

Even though there was not enough statistical power in my study to draw definitive conclusions about participants' clinical competence, the materials and processes that were developed during the course of this study are currently being used in the academic setting.

Simulation scenarios and educational methods created for this study have been integrated into the curriculum for the third year baccalaureate nursing students at Algonquin College. There is a dearth of literature describing the best methods of designing and implementing educational interventions using HPS but the developmental work in my study is helping to fill this gap until more research studies are conducted.

The educational methods developed in this study also have implications for interprofessional education. The processes that were used for teaching and evaluating nursing students are transferable to interprofessional simulation experiences.

I have also refined a methodology for future research into the outcomes of using HPS in health care curricula, specifically related to nursing. Previous studies did not report adequate statistical results for use in the calculation of appropriate sample sizes for this type of study. Not only have I reported a complete set of statistical results for future studies, but I have also provided an explicit sample size required to replicate the study with adequate power. Details of the OSCE development were provided both for future use in replicating studies, and for curricula development.

HPS in nursing education is understudied and more research is needed to support how it is best implemented in nursing programs. It is expected that students will achieve the minimum standard of competence at the end of their clinical rotation, reflected in their knowledge, skill, judgment and performance. Students might be able to achieve clinical competency outcomes through a combination of traditional and non-traditional methods, for example using a combination of HPS and standard clinical placements.

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Appendices

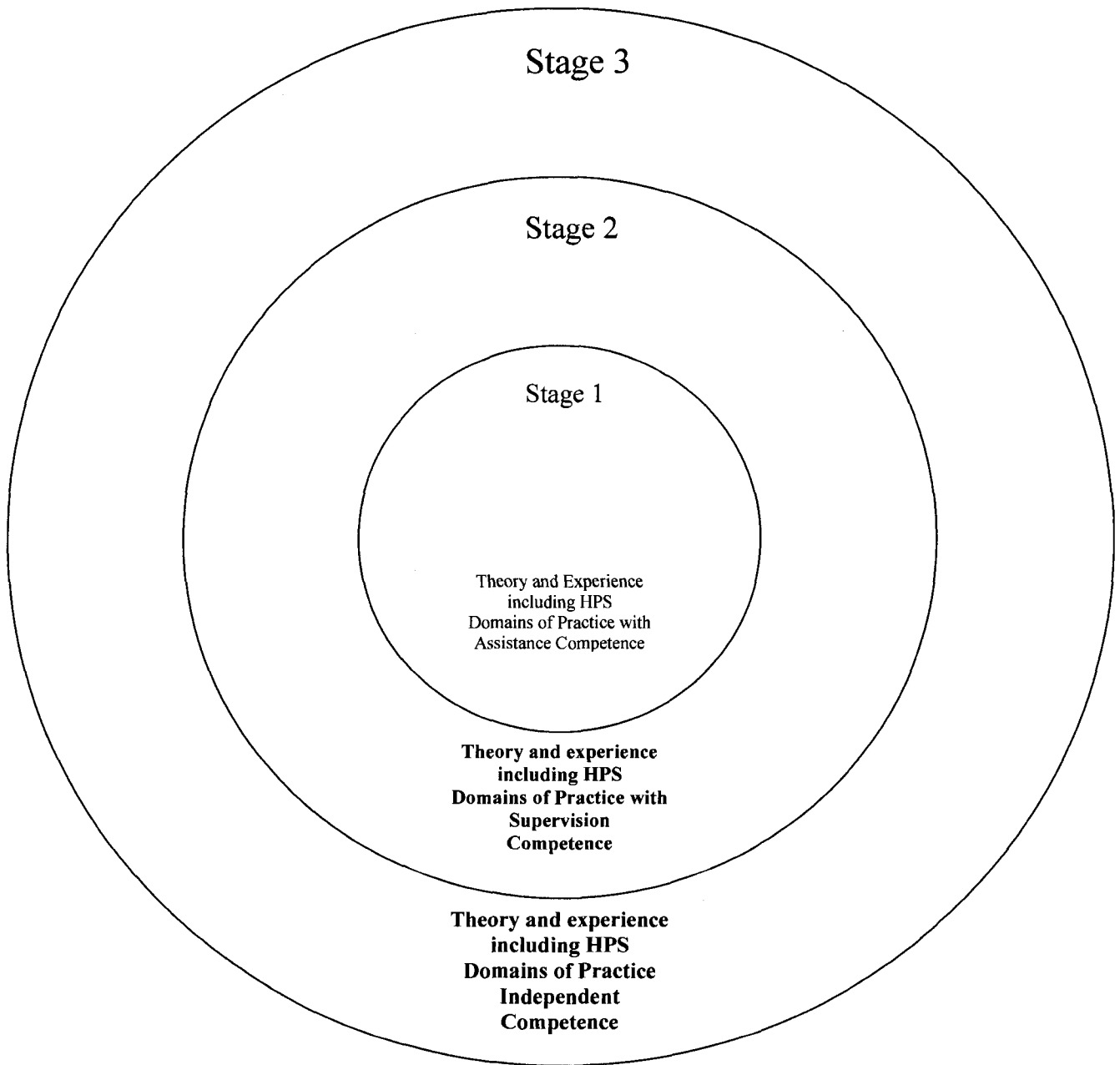
Appendix A

Dillon's (1998) Levels of Development of Nursing Students (pp.46-47)

Stage 1-Novice	A student in this stage is the first year nursing student. The nursing student begins with no clinical experience, but is developing a theoretical base. Without experience abstract rules guide the nursing students' decisions. The novice has instructor assistance with the domains of nursing for students. The operational definition of the novice, Stage 1, was the beginning nursing student with no clinical experience. The nursing student was beginning the academic year of the nursing program with the first clinical experience and developing a theoretical base.
Stage 2-Advanced Beginner	A student who has successfully completed his/her first year of baccalaureate nursing education that includes clinical practice begins stage 2. By this point the nursing student has had some clinical experience to add to the theoretical base. The nursing student has acquired some meaningful aspects of the situation based on the experience and combines these attributes, theory based components, to direct practice. The operational definition of advanced beginner, stage 2 was the nursing student who has successfully completed the first year of a baccalaureate-nursing program with clinical experience.
Stage 3-Competent	Upon successful completion of a baccalaureate nursing program the student should be at the competent level. The nursing student can now see actions in terms of long-range goals or plans. Through conscious, deliberate planning the nursing student achieves efficiency and organization, and can manage more than one client. Learning is both rational and contextual. The operational definition of competent, stage 3, was the baccalaureate-nursing student who has successfully completed four years nursing program at the end of last semester, prior to graduation.

Appendix B

Dillon's Model of Student Nurse Development in the Domains of Practice, Competence and Theory and Experience (Adapted by M. Morley)



The circular line represents time. The increasing font size represents the development of nursing practice through the stages. HPS influences the development through the stages.

Appendix C

Outline of the Research Study to be Included in the Course Syllabus

**Research Study Associated with NSG 3135
Simulation and Baccalaureate Students' Clinical Competence**

Students who are enrolled in NSG 3135 will have the opportunity to participate in a research study. During the first week of classes, students will be asked if they would like to volunteer to participate in the research study. Students, who are completing their clinical practicum with pediatric populations, will not be eligible to participate in the study.

The study is entitled "Human Patient Simulation and Baccalaureate Nursing Students' Clinical Competence." The purpose of the study is to find out if the interaction with a Human Patient Simulator, such as SimMan™, enhances the attainment of nursing students' clinical competence.

Students who volunteer to participate in the study will be randomly assigned to a control group or an experimental group. The control group will participate in the usual clinical and lab experiences, and the experimental group will participate in an alternate clinical experience. The alternate clinical experience will be exactly the same as the control group, except during 4 clinical days, where the students will attend educational sessions in the simulation lab at Algonquin College. During the educational sessions students will participate in critical incident, clinical scenarios that are common to medical-surgical hospital units. Students will be asked to care for the human patient simulators as they would for their patients on their respective clinical units. Nursing faculty members will facilitate the sessions. Students will be videotaped during the educational sessions. Debriefing sessions will occur at the end of each of the scenarios, through group analysis of the videotaped sessions.

All of the students in the control group and experimental group will be asked to participate in an Objective Structured Clinical Examination (OSCE) after they have completed their respective clinical experiences. The OSCE will occur in the lab at Algonquin College, during November 29 or November 30, 2005. An OSCE is a method of evaluating clinical competence using simulated clinical experiences. The OSCE will take 1 hour to complete. Students will be asked to apply problem solving skills in clinical scenarios with patient actors. Students will be given information about a patient and asked to respond to the patient's needs accordingly. The patient actors will portray common medical-surgical patients. Students will be given written feedback and a DVD copy of their performance from one of the OSCE stations. Students will also be asked to release their grades from NSG 3131, Illness Experiences. Students OSCE scores and final grades from NSG 3131 will be compared to see if the simulation education sessions made a difference or not.

Participation in this research study is completely voluntary and students may withdraw from the study at any time. **The OSCE scores will not contribute to your final grades in the nursing program. The OSCE scores will be used for research purposes only. You will be expected to attend the 4 simulation days in the lab, if you are in the experimental group. Attendance will be taken in the simulation labs. Your clinical teacher in NSG 3135 will be notified if you are absent from any simulation labs. You will not be graded on your performance in**

the simulation labs, however the 4 days in the simulation lab will provide an alternative clinical experience, which should help you meet your clinical objectives for the clinical practicum course. Your clinical teacher will evaluate you on your clinical performance for the 5 weeks you attend the clinical setting.

Appendix D

Script for Recruitment of Participants

I am here to tell you about a research study that is being conducted this fall, and to find out if you would like to volunteer to participate in the study. I am distributing 2 identical information sheets and consent forms about this pilot research study. The study will be part of your clinical practicum course NSG 3135 if you choose to participate. You can find a description of the study on the sheets that I am handing out. I will describe the study, who is eligible to participate, risks and benefits of participating in the study and how to sign up if you are interested.

The primary investigator of the study is Michelle Morley. Michelle is a Master of Nursing Science student from the University of Ottawa, who is also a nursing professor at Algonquin College. If you would like to contact Michelle her telephone number is 562-5800 x8348. Michelle's thesis supervisor is Dr. Betty Cragg who is a Professor of Nursing at the University of Ottawa. Her telephone number is 562-5800 x8348. Dr. Kirsten Woodend will also be involved in the study as a co-investigator. She is also a Professor of Nursing at the University of Ottawa. They are conducting a pilot study called "Simulation and Baccalaureate Nursing Students' Clinical Competence. The aim of this research is to investigate the effect of a human patient simulation experience on the attainment clinical competence by third year baccalaureate nursing students. The research question is: Does the inclusion of a human patient simulation component in a clinical practicum improve clinical competency?

There are 60 students who are eligible to participate in this study. Students who are eligible to participate in this study are only those who are completing their medical and surgical practicum placements with hospitalized adults. Students who are completing their rotation with pediatric populations will not be eligible to participate in the study. Students must be proficient in the English language in order to participate in the study, since the study will be conducted in English.

This study will be a randomized controlled trial. If you decide to participate in the study you will be randomly assigned to a control group or an experimental group. The control group will participate in the usual activities of the clinical practicum course, NSG 3135. NSG 3135 consists of 3 weeks of regular skills labs, and 7 weeks of clinical practice on an acute care medical or surgical wards. The experimental group will participate in an alternate clinical experience which will consist of 3 weeks of regular skills labs, 5 weeks of clinical practice on an acute care medical or surgical ward, and 2 weeks of simulation labs. The simulation labs will replace your regular clinical experience during weeks 8 and 9 only. (Figure 1 will be shown on an overhead screen to explain the timeline of events). During the simulation labs, you will participate in critical incident, clinical scenarios that are common to medical-surgical hospital units, such as a postoperative patient developing hypotension. You will be asked to care for the human patient simulators as you would for patients on your respective clinical units. Two nursing faculty members will facilitate the sessions. Each day participants will work in 6 separate groups, consisting of 5 participants each. Each group of 5 will have their own simulated patient. Each group of 5 will take on a role in caring for the simulated patient. For example 2

participants will be the nursing student, 1 student will be the family member, 1 student will be the team leader, and 1 student will be the nurse educator. Participants will alternate roles in each scenario. Each group of participants will be given the same scenario and supporting documentation and information about the patient, including medications, chart, and written report. Each scenario should take 1-1/2 hours to complete followed by a 1-1/2 hour debriefing session. One group will be videotaped while everyone is completing the critical incident scenarios. Debriefing sessions will occur at the end of each of the scenarios. As part of the debriefing session the videotape of the group who was recorded will be played for group analysis. Participants will be expected to provide feedback to the videotaped group, and discuss their own strengths and identify areas for improvement.

At the end of your clinical rotation you will be evaluated on your performance in an Objective Structured Clinical Examination (OSCE), lasting 1 hour. The OSCE will take place on November 29 or 30, 2005. The OSCE will consist of 5 different medical-surgical stations where the you will be asked to demonstrate specific problem-solving techniques and skills in a 10 minute time frame, using patient actors. You will have a 2 minute rest break between each station. A nursing professor will evaluate your performance at each station. A total score will be calculated for your performance. The scores from the experimental group and the control group will be compared to see if there is a difference or not. Your performance will be videotaped at one station during the OSCE. After the OSCE you will be asked to provide information including your age, gender, and previous simulation experience. You will also have the opportunity to participate in a debriefing session after the OSCE. You will receive a written evaluation of your performance and a DVD copy of your performance in January 2006.

You will be given the option to release your final grade or not from NSG 3131, Illness Experiences. If you agree, The Chair of the Nursing Program will release your grade from NSG 3131 to the investigator. The grades from the control group and experimental group will be compared to see if there is a difference or not.

The OSCE scores will not contribute to your final grades in the nursing program. The OSCE scores will only be used for research purposes. You will be expected to attend the 4 simulation days in the lab, if you are in the experimental group. Attendance will be taken in the simulation labs. For example if you are absent due to illness, you will be expected to call the simulation teacher to let them know you will be unable to attend. Your clinical teacher in NSG 3135 will be notified if you are absent from any simulation labs. You will not be graded on your performance in the simulation labs, however the 4 days in the simulation lab will provide an alternative clinical experience, which should help you meet your clinical objectives for the clinical practicum course. Your clinical teacher will evaluate you on your clinical performance for the 5 weeks you attend the clinical setting.

The research data and videotapes will be stored at Algonquin College under lock and key for five years after which it will be destroyed. If you decide to withdraw from the study at any point, the data gathered from you will be destroyed and will not be used.

There are potential risks if you decide to participate in this study. You may experience stress or anxiety during the during the educational sessions with the human patient simulator or during the OSCE. You might make mistakes in front of your peers. These are possible reactions and

situations that could arise during any educational and testing sessions. You will also be asked to volunteer 1 hour and 25 minutes of your time, beyond the usual time involved in the clinical practicum course. This time will be used to complete the OSCE, demographic information and OSCE debriefing session.

There are potential benefits of participating in this study. You may receive a direct benefit from your participation in the study by completing critical incident scenarios in a simulation lab with SimMan. You may experience different patient scenarios that you would not experience in the clinical setting, thereby enhancing your learning. You will also be able to repeat and practice scenarios in a safe and controlled environment. You may find that simulated learning meets your learning needs more effectively than other educational delivery modes. Your confidence may be increased through this learning mode. Participation in this research will also help our understanding of the effects of SimMan on students' clinical performance, which will guide us as to how SimMan is best used in nursing education. You will also have the opportunity to review and debrief your performance in the OSCE, which will allow you to reflect on your knowledge and practice. You will be able to identify your strengths and weaknesses which will help you meet your learning needs.

The study investigator, thesis supervisor and co-investigator will have access to your data. The data will be identified by study numbers and not with your name. You will not be identified in any publications or presentations. No records bearing your name will leave the project centre. If you are in the experimental group your clinical teacher will be notified that you are participating in the simulation labs.

The OSCE will be evaluated by nursing professors from Algonquin College and the University of Ottawa. The professors do not teach in year three of the baccalaureate nursing program at Algonquin College. The patient actors may consist of acting students from Algonquin College and/or former graduates from the nursing programs at Algonquin College.

Participation in this research is completely voluntary. You are free to choose to participate or not to participate in this research study. If you agree to participate in this study, you may choose to withdraw your participation at any time. This will not affect your status as a student in the nursing program.

If you agree to participate in the study please fill in all of the blanks on page 4 of the consent form. I have handed you 2 copies of the consent form. Please sign both copies if you agree to participate and please keep 1 copy for your own records.

Potential Questions and Answers

Q: Is there any compensation for participating in the study? Will I get paid for participating?

A: No there is no financial compensation

Q: What if I decide I don't want to participate in the study anymore?

A: You are free to withdraw at any time. It will have no impact on your status as a nursing student in the program

Q: What happens if I fail the clinical practicum?

A: The same policy and procedures of the University of Ottawa will apply, if participants are unsuccessful in meeting the learning outcomes of their clinical practicum. The policy and procedures regarding academic failure are found on the University of Ottawa Web site at http://www.uottawa.ca/academic/info/regist/crs/ssanEN/SSAN_7.htm. Please refer to section k, which deals with appeal procedures for failure in an academic course. Every student may appeal a failing grade in a clinical course. These same policy and procedures will apply if you participate in the research study or not.

Q: Will participating in this study affect my marks?

A: The scores on the OSCE will not contribute to your final marks. The OSCE score is for research purposes only. You will be expected to attend the 4 simulation days in the lab, if you are in the experimental group. Attendance will be taken in the simulation labs. For example if you are absent due to illness, you will be expected to call the simulation teacher to let them know you will be unable to attend. Your clinical teacher in NSG 3135 will be notified if you are absent from any simulation labs. You will not be graded on your performance in the simulation labs, however the 4 days in the simulation lab will provide an alternative clinical experience, which should help you meet your clinical objectives for the clinical practicum course. Your clinical teacher will evaluate you on your clinical performance for the 5 weeks you attend the clinical setting.

Q: What if I am in the experimental group and I find I don't like the simulation lab?

A: You can withdraw from the study at any time. It will have no impact on your status as a nursing student in the program.

Q: Why can't I participate if I am completing my placement with children?

A: Students who are completing their clinical practicum with children will be at a disadvantage in the OSCE. The simulation scenarios will focus on adult medical-surgical patients and the patient actors during the OSCE will be adults.

Q: What will happen during the debriefing session?

A: The debriefing session is voluntary. You can sit with the investigator and discuss your experiences and feelings about participating in the OSCE.

Appendix E

Student Volunteer Information Sheet and Consent Form**Simulation and Baccalaureate Students' Clinical Competence**

Investigator: Michelle Morley, Master of Nursing Science Candidate,
University of Ottawa

Office B214, Algonquin College

Supervisor: Dr. Betty Cragg, Professor of Nursing, University of Ottawa
562-5800 x8348, bcragg@uottawa.ca
RGN 3040, University of Ottawa

Co-Investigator: Dr. Kirsten Woodend, Professor of Nursing, University of
Ottawa, 562-5800 x8433, kwoodend@uottawa.ca RGN3247b, University of
Ottawa

Please read this student volunteer information sheet and consent form carefully and ask as many questions as you like before deciding whether to participate. If you decide to participate in this study, please sign and keep one copy of this form for your records.

Introduction:

You are being asked to participate in a pilot research study. The purpose of this research is to see if simulated learning with SimMan™ is an effective way of enhancing the attainment of clinical competence in nursing students. Sixty nursing students will be approached to participate in the study during the fall 2005 semester as part of their medical-surgical practicum, NSG 3135.

Procedure:

If you decide to participate in the study you will be contacted by the investigator who will inform you of the group to which you have been randomly assigned. You must be proficient in the English language in order to participate in the study, since the study will be conducted in English.

Student volunteers will be randomly assigned to a control group or an experimental group. The control group will participate in the usual activities of the clinical practicum course, NSG 3135. NSG 3135 consists of 3 weeks of regular skills labs, and 7 weeks of clinical practice on an acute care medical or surgical ward. The experimental group will participate in an alternate clinical experience which will consist of 3 weeks of regular skills labs, 5 weeks of clinical practice on an acute care medical or surgical ward, and 2 weeks of simulation labs at Algonquin College. The simulation labs will replace your regular clinical practicum during October 25, 26, and November 1, 2, 2005. During the simulation labs, students will participate in critical incident, clinical scenarios that are common to medical-surgical hospital units, such as a postoperative

patient developing hypotension. Students will be asked to care for the human patient simulators as they would for their patients on their respective clinical units, working in groups of 5. Nursing faculty members will facilitate the sessions. One group will be videotaped while everyone is completing the critical incident scenarios. Debriefing sessions will occur at the end of each of the scenarios. As part of the debriefing session the video recordings will be played for group analysis. Participants will be expected to provide feedback to the videotaped group, and discuss their own strengths and identify areas for improvement.

At the end of the clinical rotations every student volunteer will be evaluated on their performance in an Objective Structured Clinical Examination (OSCE), lasting 1 hour, on November 29 or 30, 2005, at Algonquin College. The OSCE will consist of 5 different medical-surgical stations where the students will be asked to demonstrate specific problem-solving techniques and skills in a 10 minute time frame, using patient actors. Students will have a 2 minute rest period between each station. A nursing professor will evaluate your performance at each station. A total score will be calculated for your performance. The scores from the experimental group and the control group will be compared to see if there is a difference or not. Your performance will be videotaped at one station during the OSCE. After the OSCE you will be asked to provide information including your age, gender, and previous simulation experience. You will also have the opportunity to participate in a debriefing session for 20 minutes after the OSCE. You will receive a written evaluation of your performance and a DVD copy of your OSCE performance in January 2006.

You will also be asked to release your final grades from NSG 3131, Illness Experiences. In January 2006, the Chair of the Nursing Program will provide a copy of your grades to the investigator. The grades from the experimental group and the control group will be compared to see if there is a difference or not. If you choose not to release your grades from NSG 3131, we will only use your OSCE scores in the study.

The OSCE scores will not contribute to your final grades in the nursing program. The OSCE scores will only be used for research purposes. You will be expected to attend the 4 simulation days in the lab, if you are in the experimental group. Attendance will be taken in the simulation labs. Your clinical teacher in NSG 3135 will be notified if you are absent from any simulation labs. You will not be graded on your performance in the simulation labs, however the 4 days in the simulation lab will provide an alternative clinical experience, which should help you meet your clinical objectives for the clinical practicum course. Your clinical teacher will evaluate you on your clinical performance for the 5 weeks you attend the clinical setting.

The research data and videotapes will be stored at Algonquin College under lock and key for five years after which it will be destroyed. If you decide to withdraw from the study at any point, the data gathered from you will be destroyed and will not be used.

Risks and Discomforts of Participating:

You may experience stress or anxiety during the during the educational sessions with the human patient simulator or during the OSCE. You might make mistakes in front of your peers. These are possible reactions and situations that could arise during any educational and testing sessions.

You will also be asked to volunteer 1 hour and 25 minutes of your time, beyond the usual time involved in the clinical practicum course. This time will be used to complete the OSCE, demographic information and participate in the debriefing session.

Benefits of Participating:

You may receive a direct benefit from your participation in the study by completing critical incident scenarios in a simulation lab with SimMan™. You may experience different patient scenarios that you would not experience in the clinical setting, thereby enhancing your learning. You will also be able to repeat and practice scenarios in a safe and controlled environment. You may find that simulated learning meets your learning needs more effectively than other educational delivery modes. Your confidence may be increased through this learning mode. Participation in this research will also help our understanding of the effects of SimMan™ on students' clinical performance, which will guide us as to how SimMan™ is best used in nursing education. You will also have the opportunity to review your performance in the OSCE, which will allow you to reflect on your knowledge and practice. You will be able to identify your strengths and weaknesses which will help you meet your learning needs.

Compensation/Remuneration:

There is no payment for participating in this study.

Confidentiality:

The study investigator, supervisor and co-investigator will have access to your data. The data will be identified by study numbers and not with your name. You will not be identified in any publications or presentations. No records bearing your name will leave the project centre. If you are in the experimental group your clinical teacher will be notified that you are participating in the simulation labs.

Anonymity:

Your clinical practicum teacher will be notified that you will be absent from clinical if you are assigned to the experimental group. The professors who will be evaluating your OSCE performance will be nursing faculty at Algonquin College and the University of Ottawa, however they do not teach in the third year of the BScN Program at Algonquin College. The patient actors may consist of acting students from Algonquin College and/or former graduates from the nursing programs at Algonquin College.

Ethics:

If you have any questions about the ethical conduct of this study, please contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5, tel.: 613-562-5841, email ethics@uottawa.ca.

Participation:

Participation in research is completely voluntary. You are free to choose to participate or not to participate in this research study. If you agree to participate in this study, you may choose to withdraw your participation at any time. This will not affect your status as a student in the nursing program.

I understand that I am being asked to participate in a research study that will see if simulated learning with SimMan™ is useful in enhancing the attainment of nursing students' clinical competence. This study has been explained to me by _____.

I have read and understood this Student Volunteer Information Sheet and Consent Form. All my questions at this time have been answered to my satisfaction. If I have any further questions about any part of this study, I may contact Michelle Morley _____) or by email _____

I have received a copy of this Student Volunteer Information Sheet and Consent Form.

I agree to have a copy of my final grade from NSG 3131, Illness Experiences, go to the investigator. yes no

I voluntarily agree to participate in this study.

Participant's Name _____
Participant's Signature _____ Date _____

Email Address _____

Telephone Number _____

I am completing my clinical practicum in NSG 3135 on unit _____ at _____ Hospital.

Appendix F

Student Volunteer Information Sheet and Consent Form-Experimental Group

Simulation and Baccalaureate Students' Clinical Competence

Investigator: Michelle Morley, Master of Nursing Science Candidate,
University of Ottawa

Office B214, Algonquin College

Supervisor: Dr. Betty Cragg, Professor of Nursing, University of Ottawa
562-5800 x8348, bcragg@uottawa.ca
RGN 3040, University of Ottawa

Co-Investigator: Dr. Kirsten Woodend, Professor of Nursing, University of
Ottawa, 562-5800 x8433, kwoodend@uottawa.ca RGN3247b, University of
Ottawa

Please read this student volunteer information sheet and consent form carefully and ask as many questions as you like before deciding whether to participate. If you decide to participate in this study, please sign and keep one copy of this form for your records.

Introduction:

You are being asked to participate in a pilot research study. The purpose of this research is to see if simulated learning with SimMan™ is an effective way of enhancing the attainment of clinical competence in nursing students. Ten nursing students who have already agreed to participate in the study will be approached to see if they are willing to be the experimental group for the study during the fall 2005 semester as part of their medical-surgical practicum, NSG 3135.

Procedure:

If you decide to participate in the study you will be assigned to the experimental group in the study. You must be proficient in the English language in order to participate in the study, since the study will be conducted in English.

The experimental group will participate in an alternate clinical experience in their clinical practicum course, NSG 3135. The alternate clinical experience will consist of 3 weeks of regular skills labs, 5 weeks of clinical practice on an acute care medical-surgical ward, and 2 weeks of simulation labs at Algonquin College. The simulation labs will replace your regular clinical practicum during October 25, 26, and November 1, 2, 2005. During the simulation labs, students will participate in critical incident, clinical scenarios that are common to medical-surgical hospital units, such as a post-operative patient developing hypotension. Students will be asked to care for the human patient simulators as they would for their patients on their respective clinical units working in groups of 5. Nursing faculty members will facilitate the sessions. One group will be videotaped while everyone is completing the critical incident scenarios. Debriefing

sessions will occur at the end of each of the scenarios. As part of the debriefing session the video recordings will be played for group analysis. Participants will be expected to provide feedback to the videotaped group, and discuss their own strengths and identify areas for improvement. A control group will be completing the regular clinical experience during the semester.

At the end of the clinical rotations every student volunteer will be evaluated on their performance in an Objective Structured Clinical Examination (OSCE), lasting 1 hour, on November 29 or 30, 2005, at Algonquin College. The OSCE will consist of 5 different medical-surgical stations where the students will be asked to demonstrate specific problem-solving techniques and skills in a 10 minute time frame, using patient actors. Students will have a 2 minute rest period between each station. A nursing professor will evaluate your performance at each station. A total score will be calculated for your performance. The scores from the experimental group and the control group will be compared to see if there is a difference or not. Your performance will be videotaped at one station during the OSCE. After the OSCE you will be asked to provide information including your age, gender, and previous simulation experience. You will also have the opportunity to participate in a debriefing session for 20 minutes after the OSCE. You will receive a written evaluation of your performance and a DVD copy of your OSCE performance in January 2006.

You will also be asked to release your final grades from NSG 3131, Illness Experiences. In January 2006, the Chair of the Nursing Program will provide a copy of your grades to the investigator. The grades from the experimental group and the control group will be compared to see if there is a difference or not. If you choose not to release your grades from NSG 3131, we will only use your OSCE scores in the study.

The OSCE scores will not contribute to your final grades in the nursing program. The OSCE scores will only be used for research purposes.

The research data and videotapes will be stored at Algonquin College under lock and key for five years after which they will be destroyed. If you decide to withdraw from the study at any point, the data gathered from you will be destroyed and will not be used.

Risks and Discomforts of Participating:

You may experience stress or anxiety during the OSCE. You might make mistakes in front of your peers. These are possible reactions and situations that could arise during any educational and testing sessions. You will also be asked to volunteer 1 hour and 25 minutes of your time, beyond the usual time involved in the clinical practicum course. This time will be used to complete the OSCE, demographic information and participate in the debriefing session.

Benefits of Participating:

The OSCE will provide an opportunity for you to integrate your theory and practice knowledge. You will also have the opportunity to review your performance in the OSCE, which will allow you to reflect on your knowledge and practice. You will be able to identify your strengths and weaknesses which will help you meet your learning needs.

Compensation/Remuneration:

There is no payment for participating in this study.

Confidentiality:

The study investigator, supervisor and co-investigator will have access to your data. The data will be identified by study numbers and not with your name. You will not be identified in any publications or presentations. No records bearing your name will leave the project centre.

Anonymity:

Your clinical practicum teacher will be notified that you will be absent from clinical. The professors who will be evaluating your OSCE performance will be nursing faculty at Algonquin College and the University of Ottawa, however they do not teach in the third year of the BScN Program at Algonquin College. The patient actors may consist of acting students from Algonquin College and/or former graduates from the nursing programs at Algonquin College.

Ethics:

If you have any questions about the ethical conduct of this study, please contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5, tel.: 613-562-5841, email ethics@uottawa.ca.

Participation:

Participation in research is completely voluntary. You are free to choose to participate or not to participate in this research study. If you agree to participate in this study, you may choose to withdraw your participation at any time. This will not affect your status as a student in the nursing program.

Consent to Participate in Research

I understand that I am being asked to participate in a research study that will see if simulated learning with SimMan™ is useful in enhancing the attainment of nursing students' clinical competence. This study has been explained to me by _____.

I have read and understood this Student Volunteer Information Sheet and Consent Form. All my questions at this time have been answered to my satisfaction. If I have any further questions about any part of this study, I may contact Michelle Morley _____) or by email

I have received a copy of this Student Volunteer Information Sheet and Consent Form.

I agree to have a copy of my final grade from NSG 3131, Illness Experiences, go to the investigator. yes no

I voluntarily agree to participate in this study.

Participant's Name _____ Date _____
Participant's Signature _____

Email Address _____

Telephone Number _____

I am completing my clinical practicum in NSG 3135 on unit _____ at _____ Hospital.

Appendix G

Student Volunteer Information Sheet and Consent Form-Experimental Group**Simulation and Baccalaureate Students' Clinical Competence**

Investigator: Michelle Morley, Master of Nursing Science Candidate,
University of Ottawa

Office B214, Algonquin College

Supervisor: Dr. Betty Cragg, Professor of Nursing, University of Ottawa
562-5800 x8348, bcragg@uottawa.ca
RGN 3040, University of Ottawa

Co-Investigator: Dr. Kirsten Woodend, Professor of Nursing, University of
Ottawa, 562-5800 x8433, kwoodend@uottawa.ca RGN3247b, University of
Ottawa

Please read this student volunteer information sheet and consent form carefully and ask as many questions as you like before deciding whether to participate. If you decide to participate in this study, please sign and keep one copy of this form for your records.

Introduction:

You are being asked to participate in a pilot research study. The purpose of this research is to see if simulated learning with SimMan™ is an effective way of enhancing the attainment of clinical competence in nursing students. Fifty nursing students will be approached to participate in the study during the fall 2005 semester as part of their medical-surgical practicum, NSG 3135.

Procedure:

If you decide to participate in the study you will be assigned to the control group in the study. You must be proficient in the English language in order to participate in the study, since the study will be conducted in English.

The control group will participate in the usual activities of the clinical practicum course, NSG 3135. NSG 3135 consists of 3 weeks of regular skills labs, and 7 weeks of clinical practice on an acute care medical or surgical ward. An experimental group will be completing an alternate clinical experience during the semester.

At the end of the clinical rotations every student volunteer will be evaluated on their performance in an Objective Structured Clinical Examination (OSCE), lasting 1 hour, on November 29, 2005, at Algonquin College. The OSCE will consist of 5 different medical-surgical stations where the students will be asked to demonstrate specific problem-solving techniques and skills in a 10 minute time frame, using patient actors. Students will have a 2 minute rest period between each station. A nursing professor will evaluate your performance at each station. A total score will be calculated for your performance. The scores from the

experimental group and the control group will be compared to see if there is a difference or not. Your performance will be videotaped at one station during the OSCE. After the OSCE you will be asked to provide information including your age, gender, and previous simulation experience. You will also have the opportunity to participate in a debriefing session for 20 minutes after the OSCE. You will receive a written evaluation of your performance and a DVD copy of your OSCE performance in January 2006.

You will also be asked to release your final grades from NSG 3131, Illness Experiences. In January 2006, the Chair of the Nursing Program will provide a copy of your grades to the investigator. The grades from the experimental group and the control group will be compared to see if there is a difference or not. If you choose not to release your grades from NSG 3131, we will only use your OSCE scores in the study.

The OSCE scores will not contribute to your final grades in the nursing program. The OSCE scores will only be used for research purposes.

The research data and videotapes will be stored at Algonquin College under lock and key for five years after which they will be destroyed. If you decide to withdraw from the study at any point, the data gathered from you will be destroyed and will not be used.

Risks and Discomforts of Participating:

You may experience stress or anxiety during the OSCE. You might make mistakes in front of your peers. These are possible reactions and situations that could arise during any educational and testing sessions. You will also be asked to volunteer **1 hour and 25 minutes** of your time, beyond the usual time involved in the clinical practicum course. This time will be used to complete the OSCE, demographic information and participate in the debriefing session.

Benefits of Participating:

The OSCE will provide an opportunity for you to integrate your theory and practice knowledge. You will also have the opportunity to review your performance in the OSCE, which will allow you to reflect on your knowledge and practice. You will be able to identify your strengths and weaknesses which will help you meet your learning needs.

Compensation/Remuneration:

There is no payment for participating in this study.

Confidentiality:

The study investigator, supervisor and co-investigator will have access to your data. The data will be identified by study numbers and not with your name. You will not be identified in any publications or presentations. No records bearing your name will leave the project centre.

Anonymity:

The professors who will be evaluating your OSCE performance will be nursing faculty at Algonquin College and the University of Ottawa, however they do not teach in the third year of the BScN Program at Algonquin College. The patient actors may consist of acting students from Algonquin College and/or former graduates from the nursing programs at Algonquin College.

Ethics:

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Participation:

Participation in research is completely voluntary. You are free to choose to participate or not to participate in this research study. If you agree to participate in this study, you may choose to withdraw your participation at any time. This will not affect your status as a student in the nursing program.

Consent to Participate in Research

I understand that I am being asked to participate in a research study that will see if simulated learning with SimMan™ is useful in enhancing the attainment of nursing students' clinical competence. This study has been explained to me by _____.

I have read and understood this Student Volunteer Information Sheet and Consent Form. All my questions at this time have been answered to my satisfaction. If I have any further questions about any part of this study, I may contact Michelle Morley: _____, or by email _____.

I have received a copy of this Student Volunteer Information Sheet and Consent Form.

I agree to have a copy of my final grade from NSG 3131, Illness Experiences, go to the investigator. yes no

I voluntarily agree to participate in this study.

Participant's Name _____
Participant's Signature _____ Date _____

Email Address _____

Telephone Number _____

I am completing my clinical practicum in NSG 3135 on unit _____ at _____ Hospital.

Appendix H

Schedule for Simulation Intervention

Simulation Days: October 25 and 26, Nov 1 and 2 from 8-2
Working in Groups of 5 students per patient

Day 1	
8-930	Orientation to Simulation Expectations Interact with Equipment Introduction to the roles
930-945	Break
945-1130	Regular Post operative assessment-head to toe of a stable client Includes medication calculations IV monitoring
1130-1200	Lunch
1200-200	Debriefing Includes video analysis of group Includes concept mapping of key points

Orientation Day**1. Introduction to lab**

- will meet on Oct 22 in front of B257 (might move to new lab)
- will be in B257 or new lab depending on functionality of equipment
- 2 simulators for 5 students each
- will run from 8-2 (6 hours per day)
- introduce each other (? Why did they want to participate in this experience?)

2. Dress code

- uniform, name tag, stethoscope

3. Expectations

- What do they expect from the sim labs over the next 4 days? Do they have any specific needs? (If they do I can make some last minute changes to the scenarios as needed. This may become evident after the first day)
- professional
- participation with simulator and debriefing, group work, confidentiality, role playing, respect for each other
- transferability to clinical environment-we cannot cover every clinical event; however we want them to have knowledge, judgment and skills that they can use in future clinical situations
- the professor will facilitate the session. She will direct you to any resources and answer questions as needed (will point students in the right direction for information)

4. Scenarios

- students will be given the patient's chart and a brief scenario
- they are expected to act as they would on their clinical unit
- students will be expected to prepare the night before (ex. The teacher can give the students the chart and care plan of the client the day before so they can look up necessary information, will provide text books, CPS, drug books
- the scenarios will involve patients with low levels of uncertainty in the morning and higher levels of uncertainty in the afternoon
- each student will be expected to participate in certain roles -ex. 2 students are the nurse, 1 student is the patient, 1 student is the observer, 1 student is the doctor

5. Debriefing

- will view the video of the students' participation
- each group will be taped (only tape one group per session and then switch)
- while the video is being viewed the students will create an individual concept map, based on the scenario
- the students have experience in year 2 and 3 with concept mapping/brainstorming related to problem based learning. This will be slightly different, because the students are solving the problem first and then debriefing the scenario.
- the purpose of the debriefing is for the students to reflect on the group's strengths, and areas for improvement. They will need to analyze gaps in knowledge and how they will discover this knowledge

6. Concept map example with questions

1. What are your strengths? (can include knowledge, skills, critical thinking, self-confidence)
2. What are your knowledge gaps/areas for improvement?
3. What was unique about this situation that could help you in the future? How can this knowledge help you in the future?
4. What did you learn that could help you make a decision in the future? (satisfaction with learning)

7. Orientation to the Equipment

- all students will need to check BP, listen to the simulator, become comfortable with the control room and speaking into the microphone as if the client
- the students will be responsible for recording the session (will need instructions on how to record and listen and speak into the microphone)
- Dave is looking into having the ability to speak with 2 sim men at the same time
- med carts, equipment
- students will have a loose script with cues
- doctor will have set script with cues

Day 2	
8-930	Scenario 1 Surgical Patient-Pain

930-1100	Debriefing
1100-1145	Lunch
1145-1245	Scenario 2 Surgical Patient-Hypovolemia
1245-200	Debriefing

Day 3	
8-930	Scenario 1 Medical Patient-regular diabetic administration of meds and teaching
930-1100	Debriefing
1100-1145	Lunch
1145-1245	Scenario 2 Medical Patient-diabetic hypoglycemia
1245-200	Debriefing

Day 4	
8-930	Scenario 1 Medical Patient-CHF
930-1100	Debriefing
1100-1145	Lunch
1145-1245	Scenario 2 Medical Patient-SOB, crackles worsen
1245-200	Debriefing

Appendix I

Example of a Simulation Scenario with Scripts/Guidelines for Each Group Member

Simulation Scenario-Post Operative Patient with Total Knee Replacement

Objectives

Assess a post operative client

Apply theoretical knowledge to provide safe post operative client care

Prioritize care for a post operative client

Collect data from all relevant sources

Select appropriate nursing interventions for a post operative client

Anticipate a post operative client's needs

Evaluate patient outcomes

Demonstrates appropriate decision making skills

Provide support for family members of a post operative client

Collaborate with members of the health care team

Document and communicate relevant information

Identify learning needs

Modifies performance based on self-evaluation, peer evaluation and teacher evaluation

Student Preparation

Students should have knowledge of post operative client care, specifically related to a total knee replacement (TKR). Students should understand the pathophysiology of osteoarthritis. Students should be able to complete a head to toe assessment, apply the nursing process, know principles medication administration, IV therapy, Patient Controlled Analgesia (PCA), patient teaching and communication. Students should understand how to document patient care and find relevant information in the client's chart.

Roles and Responsibilities of Group Members

Student Nurse 1-care for the patient

Student Nurse 2-care for the patient

Patient-in control room, being the voice, recording the scenario, manipulating the vital signs and other assessment parameters

Operating Room Nurse-gives report to student nurses

Husband-asks questions, provides support to patient

Clinical Situation-for all group members

Mrs. Cox is a 60 year old woman who was admitted to hospital for a planned total knee replacement of her left knee. She was admitted the same day of her surgery. Mrs. Cox has a history of osteoarthritis. Mrs. Cox is married and her husband is in good health.

Instructions:

1. Receive a verbal report from the operating room nurse.
2. Admit Mrs. Cox to the surgical unit on which you are a student nurse.
3. Complete a head to toe assessment of Mrs. Cox.
4. Document your findings

THIS IS WHAT THE OPERATING ROOM/RECOVERY ROOM NURSE WILL TELL THE STUDENT NURSES**Operating Room Data**

Surgery

Started: 8:30

Ended: 10:15

Anesthesia

Started: 8:20

Ended: 10:30

Total Blood Loss 350 mls

Verbal report data from the operating room/recovery room nurse at 12:00

Vital Signs: BP 110/76; Pulse, 80/ min, regular; Respirations 16 per min, regular; Clear air entry to all lung fields; Temperature (Oral), 36.0 C., Oxygen Saturation, 98% on 2L NP. Patient denies pain.

Patient had spinal anesthesia

Patient has been alert and oriented to person, place and time. Glasgow Coma Scale 14.

Movement in all extremities. Pedal pulses 2+ bilaterally.

No nausea and vomiting

Bilateral Colour, pink; Sensation, full; Movement; able to wiggle toes

Abdominal Sounds absent

Indwelling catheter draining clear amber urine. Total urine output: 1500mls

IV Ringers lactate running at 100 mls per hour in right forearm. PCA pump morphine running.

Total Fluid Intake: 2000 mls

NPO, tolerating ice chips q 30 minutes.

Patient has Jones dressing on Left leg dry and intact. Hemovac intact and has drained 60 mls of sanguineous fluid in last 2 hours.

GUIDELINES FOR PATIENT/SIMMAN-Pain

1. Remember you are a 60 year old healthy woman. You are married to Jonathan Michael Cox. You have 2 children in their late 20's.
2. Your vital signs are resp 16, BP 124/78, HR 85 and regular, O2 sat 98%. When the student takes the observer will state that it is 36.5.
2. You are slightly anxious after the surgery. You are concerned about walking after the surgery, because you wan the pain to go away. You have been suffering with pain in your left knee for the 3 years and it has become worse in the past 6 months. You have a lot of stairs in your house. You are also an active woman and enjoy hiking in Gatineau Park, which is something that you have not been able to do for the past 6 months.
3. When the nurse assesses you, your pain is NOT under control. You report that your pain is 7 out of 10 and that you are afraid to use the pump because you will become addicted to the morphine. Your pain is localized to your left knee. You are afraid to move your leg because it hurts. It is a constant and burning type of pain that is different than before the surgery. Your husband agrees with her and states that he has heard that patient's can become addicted to pain medication. You do not know how to use the PCA pump.
4. If the nurse needs to elaborate more continue to ask questions and show concern about using the PCA pump. You can say "I am not sure that I understand. Are you sure I won't get addicted? How do I use this machine? How will it make sure I don't get too much? When is the best time to use the PCA?"
5. Once the nurse has answered your questions, explained how to control your pain, state "Thanks nurse I feel better about using the pump. I know I need to use the machine to help my recovery and be comfortable."
6. You do not have any nausea, and are taking small amounts of ice chips with out difficulty. You are alert and oriented x3. You have no shortness of breath. You are not passing gas.

GUIDELINE FOR SIMMAN-Pain-Husband

1. You will be sitting in a chair beside your wife.
2. When your wife rates her pain and states that she is worried about getting addicted to the pain medication, you agree with her and state "that I have also heard that patient's can become addicted to pain medication, and that I am worried about my wife."

Medical Orders

IV 2/3 and 1/3 100mls/hour until drinking well
 Ancef 1 g IVPB q 8 hours x 3 doses
 Ibuprofen 400mg q 6 hours
 Tylenol 325-650 mg q 6 hours
 Colace 100mg bid
 Advance clear fluids as tolerated
 Bed rest with BRP
 Ambulate prn, non-weight bearing on left leg
 Lovenox 30 mg SC BID x 14 days
 Indwelling catheter
 Encourage DB + C
 CPM machine 2-3 hours post op day 1
 Gravol 25-50 mg po/IV prn q 4-6 hours
 Benadryl 25 mg IV q 6 h prn
 Hemovac d/c in 24 hours
 PCA morphine 5 mg/ml, 30ml cartridge, bolus dose 1.5 mg, dosing interval 6 minutes, maximum 40mg in 4 hours.

Questions:

What is the relevant information in this situation?

What do the instructions mean?

What is the relevant information in the available in the documentation?

Teacher Information

What is the relevant information in this situation?

Total knee replacement
 Time back form the OR
 Immediate post-op period

What do the instructions mean?

Postoperative monitoring
 Assessment-head to toe of post operative patient
 Medical Orders
 Type of surgery
 Recovery room report
 Synthesis the information between data collected and patient assessment
 Identify and intervene with appropriate nursing interventions

What is the relevant information in the available in the documentation?

GCS

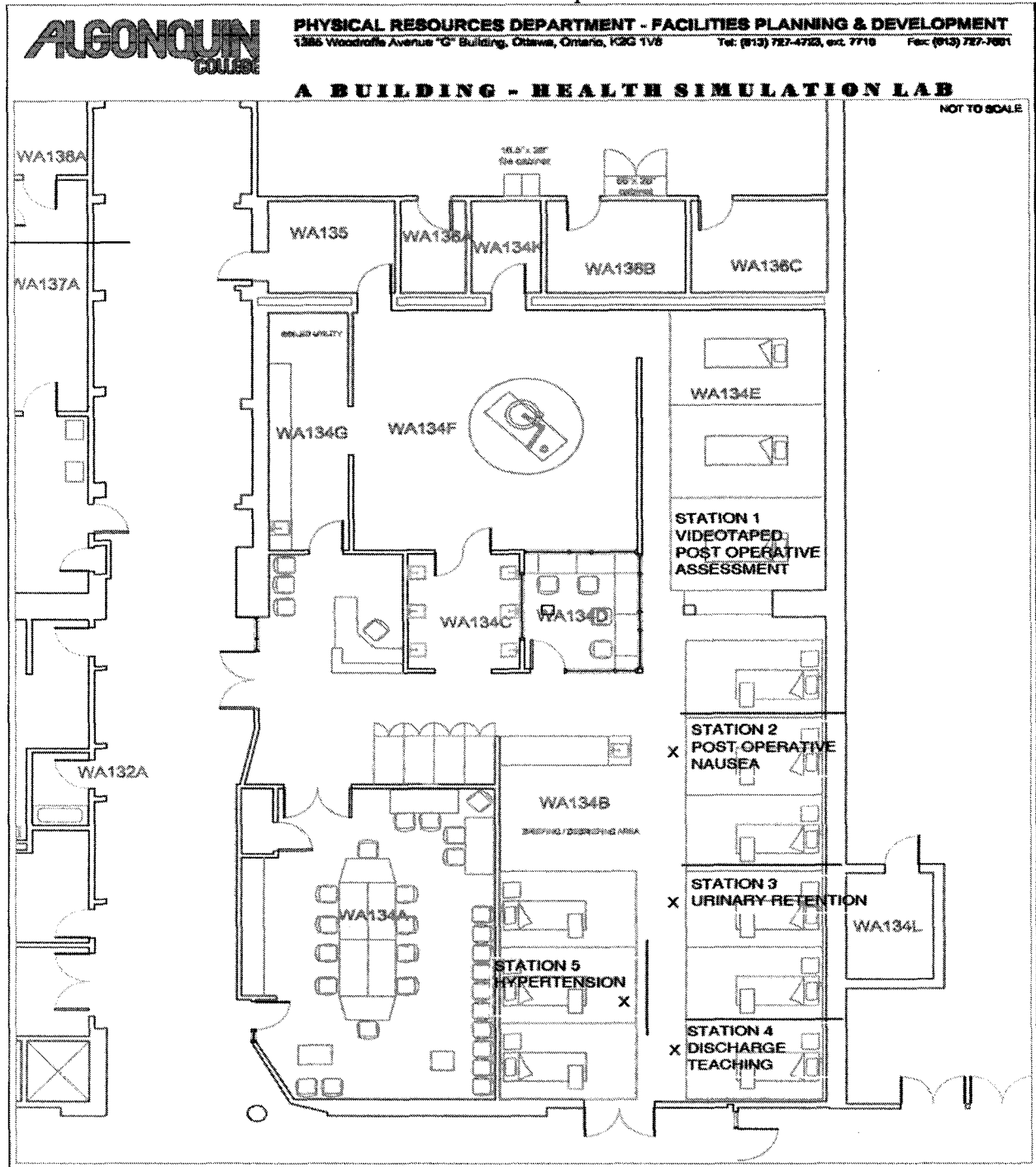
VS compared to baseline
IV change
Catheter
Removal
Dressing
Fluid balance
Medications
PCA and pain assessment
Head to toe assessment

SimMan's Condition in Room/Equipment

Lying in bed, head of bed 30 degrees, bed rail up
Respiration 16, lungs clear
BP 124/78
HR 85 regular
IV Ringer's Lactate infusing at 100 mls per hour in right forearm
PCA morphine infusing in same line 5 mg/ml, 30ml cartridge, bolus dose 1.5 mg, dosing interval 6 minutes, maximum 40mg in 4 hours.
Foley catheter and drainage bag, 100 mls in bag clear amber urine
Jones dressing on L knee clean and dry, hemovac coming out of Jones dressing with 10 mls of sanguineous fluid (blood)
Wearing hospital gown
ID band on wrist
BP machine
Stethoscope
O2 Sat monitor
Incentive spirometer
Measuring can for urine
Measuring can for hemovac
Emesis basin
Towel
Washcloth
Basin
Soap
Medication Cart-
Gravol 25-50 mg po/IV prn q 4-6 hours
Benadryl 25 mg IV q 6 h prn Lovenox 30 mg SC BID x 14 days
Ancef 1 g IVPB q 8 hours x 3 doses
Ibuprofen 400mg q 6 hours
Tylenol 325-650 mg q 6 hours
Colace 100mg bid
Chart for Mrs. Cox
Drug book
CPS

Appendix K

Simulation Lab Set Up for OSCE



Legend
 X Station Evaluator
 _____ Dividers Between Stations

Appendix L

Station 4**Objectives**

- 1. The nurse will teach a client how to administer a subcutaneous tinzaparin (tinzaparin is a low molecular weight heparin, blood thinner) injection.**
- 2. The nurse will describe the effects and side effects of anticoagulant therapy specifically related to SQ tinzaparin and oral coumadin.**

Script for the Patient

Reason for Hospitalization-Idiopathic Pulmonary Embolus

Name- Jana McIntyre

Age-31 years old

Socioeconomic Status

- you are single
- you are a PhD student at Carleton University in Psychology
- your family lives in Vancouver
- you have lived in Ottawa for 3 years
- you live alone
- you have a few very good friends in town from your program
- you are very active and enjoy hiking, biking and running

Dress

- hospital gown and pyjama pants

Position

- you are lying in the bed with you head up 45 degrees
- you are reading a magazine
- your body is under the covers with your arms exposed
- there is oxygen tubing beside you in the bed which you were wearing

Behaviour During the Interaction

- you are cooperative
- you show interest when the nurse is talking to you
- you are interested in how to administer the medication

The goal of this station is to assess the nurse's ability to:

- teach you how to self-administer a tinzaparin injection (using a inject-a-pad- not you)
- teach you the risks and considerations of using the medication heparin

Present Situation

- you were admitted to the hospital 2 days ago due to shortness of breath
- you came to the emergency room

- they did "some tests" (like an chest x-ray and took blood) and found out that you had a small blood clot in your lungs
- you are on a medical unit
- they made you wear oxygen at first but your breathing is fine now
- you no longer have any shortness of breath
- you are being discharged home today
- you are going to be self-administering tinzaparin at home for the next 5 days
- you are also going to be taking Coumadin at home

Instructions at the Start of the Scenario

- you are awake and want to go home

Physical Condition

- you are a healthy and active 31 year old
- you have some bruising on your abdomen from the injections
- your shortness of breath is gone
- you are independent and have been walking around the room

Emotional State

- you are anxious to go home, you have never been in hospital before
- you are a little concerned about giving the injections to yourself

Social Network

- you have close friends from school

Instructions for the Interaction

- you understand the nurse's instructions
- you return-demonstrate how to give the injection in the injection pad
- you ask what the side effects of the medication are
- you ask how often you need to administer the injection and what time
- you ask how you should store the medication
- you ask how the blood clot in your lungs "goes away"
- you ask why you are taking a pill and the injections-since they do the same thing
- you already have your prescription-the pharmacist came in earlier

Material

- inject-a-pad
- syringes
- ampule with water
- gown
- pyjama bottoms
- drug book

Instructions for the Nurse

Reason for Hospitalization-Idiopathic Pulmonary Embolus

Name- Jana McIntyre

Age-31 years old

Clinical Setting-Medical Unit

Clinical Situation

Ms. MacIntyre was admitted to the hospital 2 days ago for a pulmonary embolus of unknown origin. She came into the emergency room complaining of shortness of breath. She was started on oxygen and anticoagulant therapy. She is a healthy and active woman who is a PhD student at Carleton University. She is scheduled for discharge home today. She needs to go home on 2 anticoagulants-subcutaneous (SQ) Tinzaparin (10 000 IU daily), which is a low-molecular weight heparin and oral Coumadin (warfarin) 5 mg po daily. The tinzaparin will be in pre-filled syringes.

Instructions:

You have 10 minutes to:

1. Teach Ms. MacIntyre how to administer the Tinzaparin using a vial of water and an inject-a-pad. Ms. MacIntyre should demonstrate how to inject the medication on the inject-a-pad. The syringes for practice will already be filled with sterile water from pharmacy.
2. Discuss the effects and side-effects of anticoagulant therapy.

Observation Checklist

Assessment	S	U	Comments
1.1 Addresses the client by name			
1.2 Introduces self to the client			
1.3 Asks the client if she is ready to begin the teaching and learning session			
1.4 Asks the client what her knowledge is about the medication and therapy			

Intervention	S	U	Comments
Correctly explains procedure for administering SQ injection:			
2.11 Correct site for injection (abdomen)			
2.12 Time of day for administration (1 time per day)			
2.13 Rotation of sites			
2.14 Not to pinch area			
2.15 Not to rub area			
2.16 Clean site prior to injection			
2.2 Correctly explains the side effects of anticoagulant therapy			
2.3 Correctly explains how the medication should be stored (room temperature)			
2.4 Correctly describes how to dispose of the needle			
2.5 Correctly describes how the "clot" goes away (absorbed by the body)			
2.6 Correctly describes the effects of the 2-types of medication (short acting and longer acting anticoagulant)			

Communication	1	2	3	4	5	Comments
Fail, Poor, Good, Very Good, Excellent						
3.1 Asks the client if she feels ready to give the injection (readiness)						
3.2 Asks the client if she has any more questions						
3.3 Provides positive feedback						
3.4 Provides clear information						
3.5 Checks that the patient understands the information						

Appendix M

Demographic Data and Feedback Form

Please answer the following questions:

Name: _____

Study Number: (P1, P2 etc.) _____

Age: _____

Gender: _____

Educational Experience: _____

Simulation Experience: (amount of time, experience ex. Health assessment)

Feedback about the OSCE:

What did you like?

What would you change?

Any other suggestions or comments?

Thank you again for participating in this experience.

Appendix N

Objective Structured Clinical Exam Volunteer Information Sheet and Consent Form**Simulation and Baccalaureate Students' Clinical Competence**

Investigator: Michelle Morley, Master of Nursing Science Candidate,
University of Ottawa

Office B214, Algonquin College

Supervisor: Dr. Betty Cragg, Professor of Nursing, University of Ottawa
562-5800 x8348, bcragg@uottawa.ca
RGN 3040, University of Ottawa

Co-Investigator: Dr. Kirsten Woodend, Professor of Nursing, University of
Ottawa, 562-5800 x8433, kwoodend@uottawa.ca RGN 3247b, University of
Ottawa

Please read this Objective Structured Clinical Exam (OSCE) volunteer information sheet and consent form carefully and ask as many questions as you like before deciding whether to participate. If you decide to participate in this study, please sign and keep 1 copy of this form for your records.

Introduction:

You are being asked to participate as an actor in a pilot research study. The purpose of this research is to see if simulated learning with SimMan™ is an effective way of enhancing the attainment of clinical competence in nursing students. Sixty nursing students will be approached to participate in the study during the fall 2005 semester as part of their medical-surgical practicum, NSG 3135. Seven nurses and/or student actors are being asked to participate as patient actors in an OSCE. Two of the seven actors will serve as alternates. You must be proficient in the English language in order to participate in the study, since the study will be conducted in English.

Procedure:

At the end of the course, NSG 3135, every nursing student volunteer will be evaluated on their performance in an Objective Structured Clinical Exam (OSCE), lasting 1 hour, on November 29, 2005, at Algonquin College. The OSCE will consist of 5 different medical-surgical stations where the students will be asked to demonstrate specific problem-solving techniques and skills in a 10 minute time frame, using patient actors. Students will have a 2 minute rest period between each station. A nursing professor will evaluate each nursing student's performance at each station. A total score will be calculated for each nursing student's performance. The scores from the experimental group and the control group will be compared to see if there is a difference or not. Each nursing student's performance will be videotaped at one station during the OSCE. Each nursing student will receive a DVD copy of their OSCE performance in January 2006.

If you volunteer to be a patient actor in the study you will be given a script and scenario to act out for one designated station. You will act as a patient with a specific illness. You will repeat the same scenario with each nursing student volunteer in the OSCE. The nursing student volunteers will interact with you as if you are a real patient, and be marked on their performance. The station in which you are assigned may be videotaped. The nursing student volunteers will keep a DVD copy of their performance and interaction with you if you are assigned to the videotaped station.

The research data and videotapes will be stored at Algonquin College under lock and key for five years after which it will be destroyed.

Risks and Discomforts of Participating:

You will be asked to volunteer for a practice OSCE session on November 22, 2005 for 2 hours at Algonquin College. During this practice session you will practice your assigned patient role with nursing professors acting in the nursing student role. You will be asked to volunteer your time on November 29, 2005 for 6 hours. This date is when the OSCE session will occur with the nursing student volunteers. You might become tired during the OSCE sessions. The nursing student volunteers might complete interventions during the OSCE such as taking your blood pressure or temperature. You might also be videotaped during the OSCE session.

Benefits of Participating:

Participation in this research will help our understanding of the effects of SimMan™ on students' clinical performance, which will guide us as to how SimMan™ is best used in nursing education. You will also gain insight into nurse-patient interactions. You will also gain acting experience.

Compensation/Remuneration:

There is no payment for participating in this study.

Confidentiality:

The study investigator, supervisor and co-investigator will have access to the videotaped performance. You will be identified by a station number and not with your name. You will not be identified in any publications or presentations. No records bearing your name will leave the project centre. You are asked not to disclose any information about the participants in the study.

Anonymity:

The professors who will be evaluating the OSCE and participating in the practice session will be nursing faculty from Algonquin College and the University of Ottawa. The patient actors may consist of acting students from Algonquin College and/or former graduates from the nursing programs at Algonquin College.

Ethics:

If you have any questions about the ethical conduct of this study, please contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5, tel.: 613-562-5841, email ethics@uottawa.ca.

Participation:

Participation in research is completely voluntary. You are free to choose to participate or not to participate in this research study. If you agree to participate in this study, you may choose to withdraw your participation at any time.

Consent to Participate in Research

I understand that I am being asked to participate in a research study as an actor that will see if simulated learning with SimMan™ is useful in enhancing the attainment of nursing students' clinical competence. This study has been explained to me by _____.

I have read and understood this OSCE Volunteer Information Sheet and Consent Form. All my questions at this time have been answered to my satisfaction. If I have any further questions about any part of this study, I may contact Michelle Morley (_____) or by email _____.

I have received a copy of this OSCE Volunteer Information Sheet and Consent Form.

I voluntarily agree to participate in this study. I agree to be videotaped and a copy of the videotape will be released to the nursing student volunteers and research investigators.

I agree not to disclose any information about the participants in the study.

Participant's Name _____
 Participant's Signature _____ Date _____

Email Address _____
 Telephone Number _____