STUDENT PERCEPTIONS OF SOCIALSIM FOR SIMULATION-BASED INTERPROFESSIONAL EDUCATION IN HEALTHCARE

By

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ABSTRACT

STUDENT PERCEPTIONS OF SOCIALSIM FOR SIMULATION-BASED INTERPROFESSIONAL EDUCATION IN HEALTHCARE

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This descriptive qualitative study investigates perceptions of students regarding the use of SocialSim, a tool designed to deliver simulation in a virtual environment using social media as a platform to facilitate inteprofessional education.

There have been exponential changes in U.S. healthcare system in recent years, prompting the need for institutions in higher education to prepare students to function effectively as members of an inteprofessional team. Coinciding with this is advancement in the field of healthcare simulation and virtual methodologies. The incorporation of these three into a learning experience for IPE has not been previously explored and became the impetus for my study.

I developed SocialSim as a novel tool using social media as a platform to deliver a simulation facilitating interprofessional education. I examine the use of this tool and experiences of twenty healthcare professional students at a major public university. Through the analysis of semi-structured interviews, this study examines student perspectives related to the use of SocialSim as a new tool for IPE. The results can inform administrators and faculty decisions in addition to expanding the field of healthcare simulation.

To my family
my husband Timothy James Smith, Jr.
my children T.J., Jolynne, Megan and Danny
and
my first grandchild James

ACKNOWLEDGEMENTS

Michaelangelo said on his eighty-seventh birthday, “Ancora Imparo” which Ralph Waldo Emerson later translated to “Still I learn”. These statements resonate with me as I have traveled this journey on a somewhat crooked path. I began my career as a nurse and discovered the world of healthcare simulation simply by fate. After pursuing a career in academia, I was intrinsically motivated to pursue my doctorate in higher education administration. Juggling a career, family and doctoral studies was no easy task. I most definitely did not travel this road alone and have many individuals to thank who helped me along the way.

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My father, Stuart James Gaumer, earned his PhD at MSU in 1973. He instilled the value of doctoral education during my formative years and I still believe he was the smartest man who ever lived. While he is no longer with me in this physical world, he has been with me every step of my journey.

Last but not least, my husband Tim provided continuous support, unconditional love and never doubted for a minute that I would reach the finish line. My children T.J. (spouse Jolynne),

Megan and Danny…all Spartans….believed in me and my dreams. My first grandchild, James, was born while I was in the program and has so much joy during this period and I look forward to spending more time with him and my future grandchildren now that I am through.

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CHAPTER 1: INTRODUCTION AND PROBLEM STATEMENT

The U.S. health system is one of the most expensive in the world. According to 2015 statistics, the U.S. spends twice what other developed countries spend per person on healthcare (Organisation for Economic Co-operation and Development, 2015). Amidst the high costs of healthcare, quality of care has come under intense scrutiny within the past 15 years. Beginning in 1999, the Institute of Medicine disclosed that nearly 100,000 people die each year because of medical errors. This report served as a catalyst for review of medical and nursing education and a call for significant revision.

The Triple Aim initiative is a national plan developed by the Institute for Healthcare Improvement (IHI, 2010) intended to improve patient care and reduce healthcare costs. The Triple Aim outcomes encompass the domains of quality (the delivery of safe and effective care by healthcare teams as well as patient outcomes); cost (total cost and measures of utilization that drive costs); and experience including patients' experiences and those of healthcare providers working in interprofessional teams (Berwick et al., 2008). The Triple Aim (Berwick et al., 2008) has become a galvanizing force drawing attention to a generalized approach needed to fix the United States healthcare system by simultaneously improving patient experiences of care, improving the health of populations, and reducing the per capita cost of healthcare (Brandt, Lutfiyya, King & Chioreso, 2014).

The Affordable Care Act (ACA) of 2010 has also had a dramatic impact on U.S. healthcare in recent years, particularly related to primary care. Among the Affordable Care Act's many provisions, perhaps the least discussed are those reforms directly targeting primary care. The Affordable Care Act realigns incentives within the health system and create opportunities

for providers to be rewarded for delivering high value, patient-centered primary care. Such a transformation is intended to improve outcomes for patients, increase job satisfaction among physicians and encourage more sustainable levels of health spending for the nation (According to Lathrop & Hodnicki (2014), the ACA "fosters a preventive healthcare model that emphasizes primary care, funds community health initiatives, and promotes quality care. These changes increase the need for well-prepared healthcare professionals" (p. 1).

As a result of national policies driving reform in healthcare, there is need for strategic changes in professional healthcare education programs to respond to both current and future healthcare needs (Dahlberg, Falk, Kjellgren & Dahlgren, 2014). At the forefront of this movement is the need for an interprofessional approach to patient care. The need for healthcare providers to deliver interprofessional care has and will continue to require dramatic changes in healthcare education and transition from professional silos to an integrated approach to education and practice. Thistlewaite (2012) defines this concept as follows:

> If we expect students to learn about teamwork and professional roles, and to be ready for collaborative practice, it seems both logical and educationally necessary that we include teamwork in health professional curricula and, critically, that we also explore the most effective way of delivering learning activities to promote future collaboration (pg. 60).

For the purpose of this study, interprofessional education (IPE) is defined as "that which occurs when students from two or more professions learn with, from and about each other to improve collaboration and improve health outcomes" (World Health Organization, 2010, p. 7). It includes all such learning in academic and work-based settings before and after qualification, adopting an inclusive view of "professional" (Center for the Advancement of

Interprofessional Education, 2002). As with many other behaviors, skills and attitudes expected to be taught and learned in higher education, there are many decisions to be made with regard to methodological approach to IPE in healthcare professional education.

Exponential growth in various technologies presents options for administrators and faculty in higher education that could not have been considered until recent years. One example is the use of simulation in healthcare education. Healthcare simulation is defined as "The imitation or representation of one act of system by another. Healthcare simulations have four main purposes: education, assessment, research, and health system integration. Simulation education is a bridge between classroom learning and real-life clinical experience" (Society for Simulation in Healthcare, n.d.). Healthcare simulation provides a safe environment for learners to apply skills without threat of harming patients. It also affords the opportunity for formative and summative assessment of learners to ensure acceptable professional competencies prior to applying in real clinical environments.

Higher education institutions face major challenges in keeping pace with the evolution of technology, not the least of these is financial. Challenges resulting from fluctuating financial resources are not new to universities as this issue has been present since the 1800s (Thelen, 2011). However, the situation that universities find themselves in now is different. Multiple conditions contribute to a cost model that has been prevalent in the past in order to operate is no longer sustainable (Kirshstein & Wellman, 2012). The rule of thumb of most institutions is that to stay abreast of technology requires an annual investment of 10 percent of the operating budget. For a large research institution, the investment in technologies can amount to hundreds of millions of dollars per year (Duderstadt, 2000). Universities have begun and will continue

examining ways to deliver high-quality and affordable higher education with the use of technologies (Kirshstein & Wellman, 2012).

A significant advance in technology providing innovative and cost-effective options for teaching and learning is that of Web 2.0. The term "Web 2.0" refers to cumulative changes in the manner in which web pages are made and used and differs from the static web sites of earlier times. Key attributes of Web 2.0 applications include: 1) users as independent entities within the system, 2) ability to form connections between users, 3) ability to post content in multiple forms, and 4) ability to embed various rich content types (e.g., Flash videos, YouTube, etc.). According to Greenhow, Robelia and Hughes (2009), "Web 2.0 technologies enable hybrid learning spaces that travel across physical and cyber spaces. Learners have more choices about how and where to spend their learning time" (p. 247).

Because of the evolution of Web 2.0 and associated capabilities, social media soon emerged. Social media "is the social interaction among people in which they create, share or exchange information and ideas in virtual communities and networks" (Kaplan & Haenlein, 2010). Recent studies related to the use of social media in higher education present compelling evidence supporting it as a viable teaching and learning strategy. The number of social media platforms is increasing exponentially and each presents affordances for education. One such platform, Twitter, has been used in both formal and informal learning settings. Kuh (2009) suggests that undergraduate healthcare students' use of Twitter is linked to a number of positive education outcomes including fostering rich discussion of literature by direct conversation with other students, peer questioning, reflection, and engagement.

Statement of the Problem

While interprofessional education (IPE) is not new, it is apparent that attention to IPE education has increased dramatically in recent years. Despite policy and social forces exerting pressure on the response to these needs, healthcare professional education has "lagged dramatically behind changes in practice" (IPEC, 2011). There are a number of significant barriers noted in the literature that explain the lack of progress in interprofessional education over the years. According to the National League for Nursing (NLN, 2011) the varieties of factors limiting the ability of educators to incorporate simulation-based IPE include:

- The challenge of scheduling IPE across multiple programs
- Lack of co-located or geographically proximate health professions programs with which to partner
- Limited resources to develop and implement IPE
- Questions about who will bear the cost of shared programs and resources
- Lack of recognition by administrations that IPE is part of faculty workload
- Faculty and administrative resistance to change
- State-to-state variability on the amount of simulation allowed within programs

Horsbough (2001) points to divergent learning and assessment styles, different curricular periods, lack of commitment of faculty and students and limited resources as being primary barriers. Curran, Deacon and Fleet (2005) claim that the lack of willingness of faculty and students to experiment with new methods of teaching and learning contribute to lack of progress. Additional barriers identified are lack of institutional flexibility with regard to financial and

human resources needed to implement IPE activities, turf battles among faculty in different disciplines, rigid curricula and lack of administrative support (Ho, 2006).

Because of shifts in patient populations, specifically the number of aging baby boomers, increase in chronic diseases, and longer life spans, there is a demand for more healthcare professionals. Shorter hospital stays add complexity to the situation as hospital censuses are lower and learners have less access to patients for clinical practicums. Higher education institutions have responded to this demand by increasing enrollments in healthcare professional programs further compounding the issue related to access. Therefore, alternatives to traditional clinical rotations will need to be considered to prepare healthcare professional students for the workforce.

The complex issues related to changes in healthcare, policy changes, calls to higher education to respond and associated barriers related to implementing interprofessional education have resulted in slow progress and present challenges to educators. New technologies and platforms by which teaching and learning can be accomplished offer viable options for implementing IPE in healthcare education and therefore warrants inquiry.

Purpose Statement

The purpose of this study is to investigate the efficacy of SocialSim as a simulation-based intervention to facilitate IPE and as a means to overcome some of the identified barriers associated with IPE implementation. SocialSim was developed by the research as a means to triangulate the need to develop IPE communication and collaboration skills, healthcare simulation and use of social media, specifically microblogging (e.g., Twitter), as a mode of pedagogical delivery. SocialSim is defined as a simulation tool using a social media platform for

delivery and encompasses a patient care scenario by which learners will interact with the patient, and collaborate with students of other disciplines while allowing scaffolding and guidance of the instructor. The purpose of SocialSim is to provide an opportunity for students of multiple disciplines to communicate and collaborate with each other within the context of patient care delivery thereby facilitating implementation of interprofessional education and preparing students for the workforce.

Research Questions

1. What is the influence of SocialSim on simulation-based interprofessional learning activities for medical and nursing students?
2. What are the affordances and challenges to the use of social media microblogging platform (i.e. Twitter) to deliver SocialSim?
3. What is the influence of SocialSim on communication and collaboration between medical and nursing students?

Statement of Significance

As higher education institutions are compelled to answer the call for IPE by developing the competencies of healthcare professional students for contemporary practice, it is important to identify effective teaching methods to accomplish this. There is little evidence guiding healthcare professional programs as to how to integrate IPE and even less as to how to overcome associated barriers. It is imperative that higher education address these gaps through inquiry that informs the development and use of evidence-based teaching practices.

Simulated activities are increasingly viewed as viable options for educators to consider as they provide a safe environment for students at no risk to patients. The emergence of social media and recent applications to pedagogy illuminate possibilities for IPE. This study aims to

explore the use of social media microblogging (e.g., Twitter) as a platform to facilitate IPE and potentially overcome some common barriers currently prohibiting implementation. Evidence provided by this study will contribute to the current body of knowledge related to effective teaching methods for IPE in the healthcare professions in addition to the field of healthcare simulation. Findings from this study may also inform other disciplines as to the effectiveness of social media to facilitate communication and collaboration among diverse groups of learners within the context of simulation. Due to web-based nature of delivery, the study outcomes may also have relevance to distance and online education.

Lastly, results of the study may provide insight as to whether simulations delivered via social media may be considered as a method to provide opportunity for students to apply knowledge to clinical situations. While it is impossible to replicate real patient encounters, alternative methods such as SocialSim may be able to supplement noted decreases in clinical access.

Dissertation Structure

This dissertation contains five chapters. The purpose of this chapter is to introduce the problem, significance and situate the research questions within the problem as a means to explore a potential strategy from the student perspective. Chapter 2 will explore relevant literature informing the inquiry. Chapter 3 presents methodological approach and research design applied. In Chapter 4, the results of the study are presented including analysis followed by Chapter 5 which provides a discussion of the results and implications for curriculum and further research.

CHAPTER 2: REVIEW OF LITERATURE

This study aimed to investigate how SocialSim as a simulation-based pedagogical tool may be used for interprofessional education (IPE) in addition to perceived benefits and challenges associated with its use. The literature review begins with an overview of medical and nursing education in the United States followed by policies driving interprofessional education and methodologies commonly used. Next, models describing the relationship between IPE and preparation for clinical practice to improve patient outcomes are presented. Healthcare simulation (HCS) is then introduced as a preferred method to facilitate IPE. The use of social media and microblogging is explored as a pedagogical tool for use in higher education. Lastly, this section describes how my study is situated within the existing literature and substantiates how it may contribute to the field of healthcare simulation and interprofessional education.

Medical and Nursing Education.

Historical Perspective

In the 2003 Institute of Medicine Report, "Shaping the Future of Health", the disciplines of medicine and nursing were specifically addressed as being pivotal in broader healthcare reform and institutions providing the education of these disciplines were called upon to improve preparation of learners for contemporary healthcare. In order to address learning needs and appropriate interventions, it is important to understand the basic historical context of medical and nursing education and current preparation for the workforce.

Medical education in the early 19th century did not require a major course of study, training, board exams, or licensing as is required today. Anyone could establish themselves as physicians, and often barbers and clergy claimed the role of physician as well. The red and white striped poles outside barbershops represented bandages and blood because barbers were often

surgeons and the same scissors were used to cut hair and perform surgery (Starr, 1982). In the 1800s, medical education became more standardized as the American Medical Association was formed and assumed responsibility for medical education. The Flexner Report of 1910 prompted medical schools to develop curricula and admission testing and as of 2000, 125 medical schools continued to follow the Flexner curriculum (Duffy, 2011). Today, basic medical education involves four years of undergraduate education, often in the sciences, followed by four to five years of medical education. The first two years consist primarily of didactic and classroom experiences followed by two years of practice in a variety of clinical environments.

According to Keating (2015), nursing programs in the United States have changed dramatically with the past 150 years in response to milestones such as world wars, the Great Depression and changing demographics. Prior to the Civil War, most women provided care in the home to their family. As women began to care for soldiers, they transferred their skills to the battlefield. The New England Hospital for Woman and Children was the first to offer formal academic courses based on Florence Nightengale's guidelines. World War I and World War II increased the demand for nurses and a demand for education to prepare a workforce ready to meet that demand which prompted hospital-sponsored education programs. By the 1950s, baccalaureate nursing education proliferated in colleges and universities and community college programs emerged in the 1960s. Nursing education in the United States is continues to be implemented within university or community colleges, offering four or two-year entry to practice options, respectively. Regardless of the program, nursing education consists of at least two years of practicum in clinical environments.

It is important to consider socio-historical framing in medical and nursing education in order to understand underpinnings of past, current and future implications for the implementation

of interprofesisonal education (IPE). Khalili, Hall and DeLuca (2014) point to competition among professions originating prior to the 1950s as medicine, nursing and pharmacy evolved their regulatory and professional structures. In later years, newly emerging professions, comprised of more women and different levels of class and ethnicity, began to criticize the established ones resulting in established professions raising the bar for entry by requiring higher levels of education and inclusion of research and scholarship as the professional ideology. Professional boundary disputes continued into the 1980s followed by an emergence of professional collaboration and discouragement of interprofessional competition (MacMillan and Reeves, 2014). MacMillan and Reeves (2014) further assert that historical understanding related to the relationship between medicine and nursing is important and will continue to influence IPE when past assumptions go unchallenged and remain invisible.

Policy Impetus for Interprofessional Education

The phenomenon of interprofessional education (IPE) in healthcare professional education is not new. Health professionals and commissions have been recommending a team approach to health care for decades (National League for Nursing, 2011). In the United States, development of interprofessional education can be traced back to World War II with multidisciplinary medical and surgical teams responding to President Johnson's vision of The Great Society, in which the poor and underserved would have access to benefits of good health through the creation of community health centers located in areas of need. The concept of interdisciplinary teams of health professionals was espoused as a means for providing comprehensive and continuous care to populations (Baldwin, 2007). In the 1950's, Silver (1958) supported changes to medical education and advocated for a team approach for preventative and therapeutic family care. In the 1960's, Szasz (1969) found little integration in learning among

the health professions and proposed a plan for how interprofessional education (IPE) might be accomplished.

As a result of national policies such as the IOM reports (IOM, 1998, 2003 & 2008), education has been invoked as a panacea for the ills of the health care system. The IOM reports specifically point to medical and nursing education to prepare a new generation of clinicians proficient in interprofessional skills and abilities to function as effective team members. The thought is that if students are educated together, they will practice more efficiently and effectively together. The Institute of Medicine (IOM) has remained at the forefront of IPE policy beginning with a conference in 1972 that produced a report discussing the importance of establishing substantive relationships between educational programs for the health professions (IOM, 1972). In 2003, the IOM escalated the call for IPE in order to improve health care quality, lower costs, decrease patients' length of stay, and reduce medical errors. Some disturbing realities were revealed such as high error rates, communication failures and that few physicians and nurses were considered either qualified or trained with the skills necessary to improve care and patient safety as a team. The IOM concluded by stating, "interdisciplinary education (IPE) has yet to become the norm in health professions education" (IOM, 2003). In 2010, the IOM further expanded the call by reiterating the need for health professionals to develop interprofessional competencies and emphasizing that interdisciplinary practice should be integrated into educational models.

In 2010, the World Health Organization (WHO) Education and Collaborative Practice Committee prepared the "Framework for Action on Interprofessional Education and Collaborative Practice" as a call to action for policymakers, administrators, and educators to embrace interprofessional education as fundamental for preparing the global workforce and

improving quality of patient care. The report provides information and ideas as to how to implement interprofessional education and collaboration. Based on fifty years of empirical research findings, WHO made the following key points (WHO, 2011):

- IPE occurs when students from two or more professions learn about, from and with each other to enable effective collaboration to improve health outcomes.
- Effective interprofessional education enables effective collaborative practice.
- Integrated health and education policies can promote effective education and collaborative practice.
- Mechanisms that shape interprofessional education are not the same in all systems. Policy-makers should utilize the mechanisms that are most appropriate in their own context.

The Interprofessional Education Collaborative (IPEC) was formed in 2011 with the goal of addressing the integration of interprofessional education by developing a common core of thirty-eight desired competencies for healthcare professionals under four key domains (see Appendix A). IPEC included representatives from the American Association of Colleges of Nursing, the American Association of Colleges of Osteopathic Medicine, the American Association of College of Pharmacy, the American Dental Education Association, the Association of American Medical Colleges, and the Association of Schools of Public Health.

Accrediting bodies for the healthcare professions also incorporate IPE implementation standards in higher education. Medical and nursing accrediting bodies are at various stages of development with regard to the integration of IPE into education. The American Colleges of Nursing has incorporated interprofessional collaboration into its "Essentials for Baccalaureate Education" (AACN, 2008). Leaders within nursing have drawn from the IOM policies to

compose core competencies for pre-licensure students geared toward quality and safety outcome. The Association of American Medical Colleges (AAMC) identified interprofessional education as a priority in 2008 (IPEC, 2011). Curran, Deacon, and Fleet (2005) assert that without inclusion of IPE into accreditation standards, there is little reason for academic programs to engage in IPE. MacMillan and Reeves (2014) further assert that implementation of inteprofessional education remains elusive. Despite recognition of the importance of IPE, standards established by medical and nursing accrediting bodies regarding integration of IPE into curriculum are noted to be generalized, without specific initiatives to be implemented and lacking specific outcomes to be achieved. While this could be perceived as a limitation, it also allows for broad consideration of methodologies to use in IPE and customization within respective curricula at various institutions.

Implementation of IPE in Healthcare Professional Education

According to the WHO "Framework for Action on Interprofessional Education" report, students need to know what to do (e.g., knowledge), how to apply their knowledge (e.g., skills) and when to apply their skills within an appropriate framework using that knowledge (e.g., attitudes and behaviors).

IPE in Healthcare Education

Thistlethwaite (2012) asserted that the purpose of IPE in education is for students to understand their roles and responsibilities, roles of others on the health care team, how to provide care that is patient-centered, and how to reduce medical error by improving communication and teamwork. By introducing shared concepts, skills, language, and perspectives, IPE establishes a common ground for interprofessional practice (Morey et al., 2002). The Interprofessional Education Collaborative (IPEC) states that skills taught, learned and practiced by learners in

different professional programs helps learners gain deeper understanding of their own individual practice in addition to providing opportunities for practice prior to entering the workforce (2011). Because many of the educational experiences of healthcare professional students take place within clinical immersion, the assumption is that IPE is accomplished in this manner. Students may not always be exposed to exemplary teamwork and collaboration in these settings, which can be unsettling for students (Thistlewaite, 2012). Complicating the situation is that medical and nursing students usually have little contact with each other in the process of their education (Baldwin, 2007).

Institutions must consider desired outcomes of IPE and how to measure these given the dynamic nature of the clinical environment and vulnerability of real patients. The most commonly cited goal for IPE is to foster communication and collaborative practice skills, however, educators face major challenges. Literature indicates that lack of authentic collaboration and communication has been linked to a fragmented coordination of care, worsening of patient safety and poor patient outcomes (Reeves, Perrier, Goldman, Freeth & Zwarenstein, 2013). A major challenge for educators is the development of valid, reliable, and feasible assessment of interprofessional learning outcomes, especially those pertaining to teamwork and collaboration. Assessments typically are focused on individual student skills and faculty are assessing students from their own disciplines without consideration of interprofessional skills. Another challenge is the expectation that healthcare education is evidence-based. However, gathering this evidence is complicated if the IPE application is within a real clinical environments and real human patients. Therefore, most empirical data in relation to effectiveness of interprofessional education are conducted at the level of the participant with a few studies reporting changes in knowledge, attitudes or behavior (Thistlewaite, 2012).

IPE Competencies

Barr (1998) presented three types of interrelated competencies expected of healthcare professionals (See Figure 1.1) that continue to be prevalent today. Common competencies refer to skills that are common or overlapping in more than one but not necessarily all healthcare professional areas. Complementary competencies refer to skills that support, coordinate with, or supplement those of other professions. Collaborative competencies are those in each profession necessary to work with others and they serve as the foundation for interprofessional education. As applied to healthcare education, students acquire skills specific to their disciplines and scope of practice (i.e. common), acquire skills similar to others which supplement or support those in other disciplines (i.e. complementary) and acquire those required to work between disciplines different from their own (i.e. collaborative).

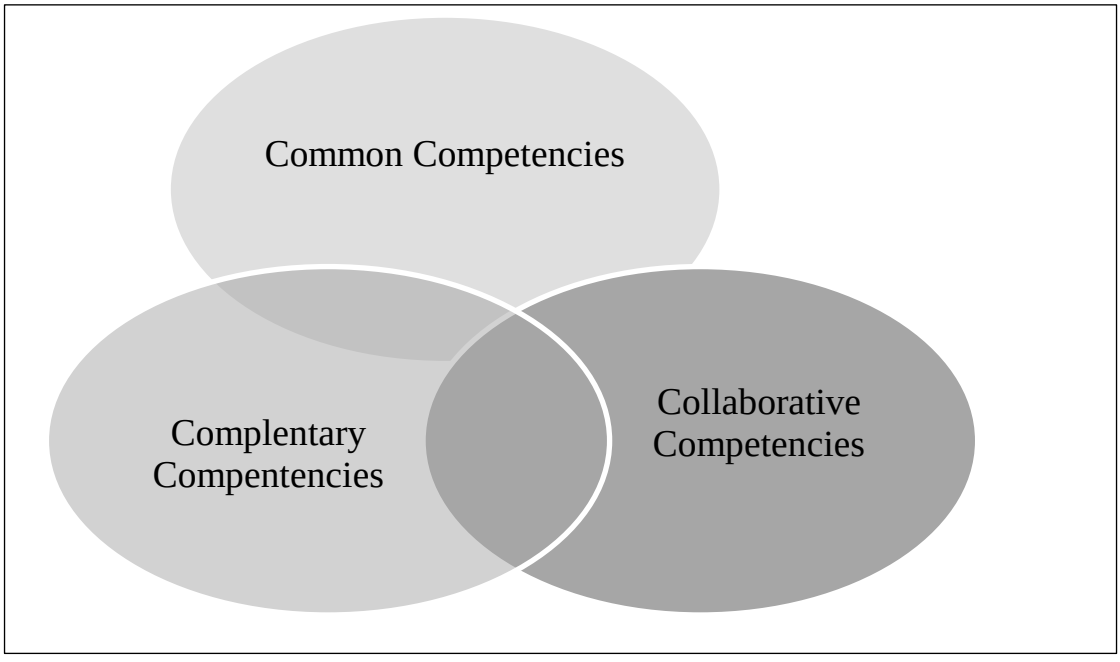

Figure 2.1 Barr's three types of professional competencies

The IOM report identified key processes of communication, cooperation, coordination and collaboration in teamwork, however did not define the interprofessional competencies that underpin the processes. IPEC (2011) elaborated further by interrelating interprofessional teamwork competencies with the IOM core processes. In this integrated model, implementation of patient-centered care is the goal of interprofessional teamwork. The nature of the relationship between the patient and healthcare team is central to competency development for collaborative practice. The other team competencies include informatics or ability to use 21st century technologies for teamwork communication and coordination, evidence-based information for decision making and continuous quality improvement efforts related to teamwork and team-based healthcare. The interrelationship between processes and competencies are illustrated in Figure 2.2.

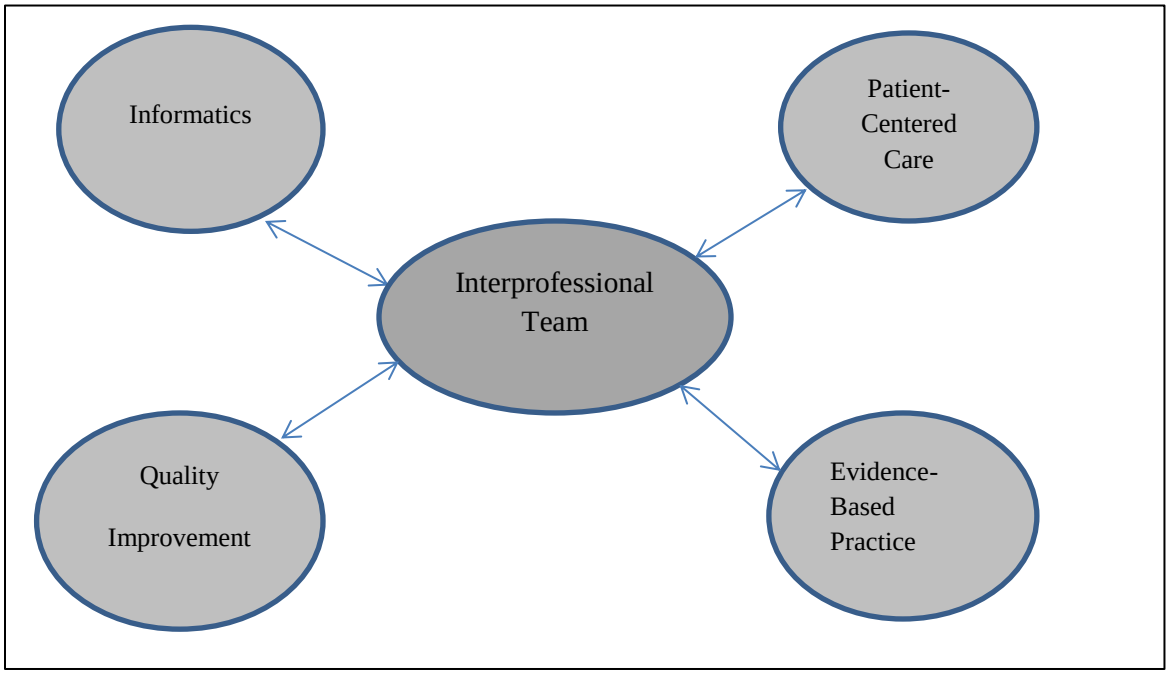

Figure 2.2 Interrelationship between processes and IPE competencies.

A significant amount of literature has focused on defining what IPE is and specific competencies or outcomes which should be developed by IPE. Additional studies articulating integration of IPE have generated significant challenges associated with these initiatives. Attempts at interdisciplinary education have been hampered by: (1) limitations in the amount and timing of such inputs into the curriculum, which seldom provide necessary continuity of learning and experience; (2) lack of functioning interdisciplinary clinical role models in teaching and in practice; (3) limitations inherent in the traditional, linear, 'lock step' model of professional education; (4) professional and disciplinary 'turfguarding'and territorial imperatives; (5) insular certification and accreditation requirements; (6) traditional professional power dispositions; (7) administrative resistance to new forms of organization and education; (8) difficulties in matching academic schedules and student skills levels; (9) initial expense of new programs; and (10) resistance of established programs (Baldwin, 2007). The aim of my study is to explore a new method for IPE delivery in an effort to overcome some of these challenges and contribute to IPE progress.

Relationship between IPE and Collaborative Care

Achieving interprofessional education and collaborative practice requires review and assessment of the mechanisms that shape both (WHO, 2010). Prior to recent years, frameworks designed to illustrate the interrelationship between healthcare education and collaborative clinical practice did not exist. An extensive review of literature and scan of interprofessional international education practices, as well as of case studies and expert interviews informed a framework developed by the World Health Organization (WHO). Mechanisms were organized into broad themes and grouped into three sections including: (1) interprofessional education, (2) collaborative practice, and 3) health and education systems. For each section, possible

interventions are outlined which health policy makers can use to implement IPE within their context.

IPE and Practice

D'Amour and Oandasan (2005) developed a detailed framework illustrating the interdependence between interprofessional education and the practice environment. This framework includes multiple variables that contribute both to the experience of the individual learner and patient within the greater context of education and clinical care. The framework establishes linkages between the determinants and processes of collaboration at several levels, including links among learners, teachers and professionals (micro level), links at the organizational level between teaching and health organizations (meso level), and links among systems such as political, socio-economic and cultural systems (macro level). Research must play a key role in the development of interprofessionality in order to document these linkages and the results of initiatives as they are proposed and implemented. This framework can help inform administrators and educators as they prepare students to practice collaboratively within the greater healthcare system.

The frameworks presented inform my study as it is clear that interprofessional healthcare education is necessary to prepare students to become competent team members in the contemporary healthcare workforce thereby optimizing patient outcomes. At the core of these competencies and evident in these frameworks are communication and collaboration. Therefore, my study and intervention will focus specifically on the development of these two competencies. Figure 2.3 illustrates this relationship and desired outcome.

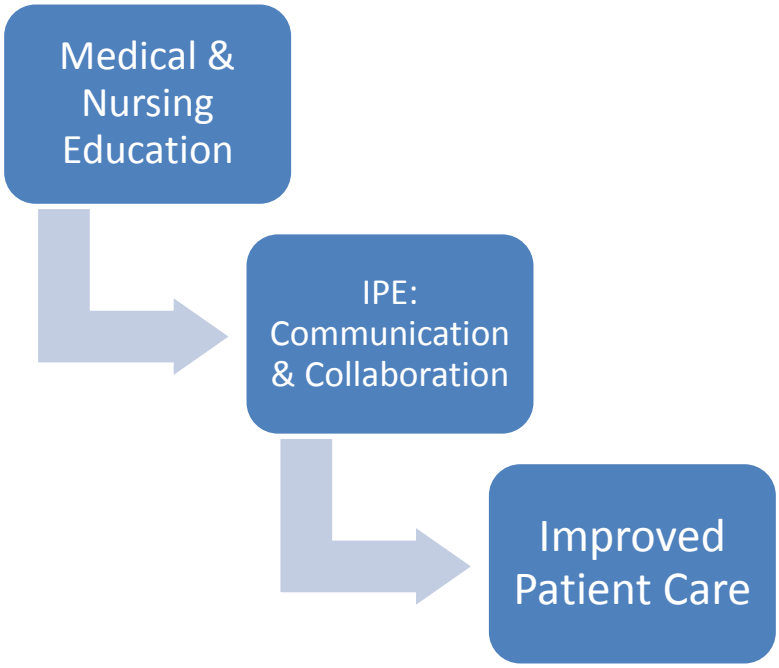

Figure 2.3 Healthcare education incorporating IPE for improved patient care.

Research into IPE has been an area of inquiry for almost four decades beginning with the Institute of Medicine report, "Education for the Health Team" in 1972 (Baldwin, 2004). Despite these efforts, the impact of these on improving population health, reducing healthcare costs, improving the quality of delivered care and/or patients' experiences of care received has not been completely determined. This is not to say that much of the published literature does not situate the importance of IPE in the context of health services and health-related outcomes. It is to say that when the studies are designed, analysis plans developed and data generated and collected, these impacts have not to date been identified (Brandt, Lutfiyya, Kimg & Chioreso, 2014). While much progress has been made with regard to development of frameworks to link interprofessional education and patient care, more empirical research is necessary to link

interprofessional education directly to patient outcomes and quality of care. Coupled with this is the need to determine which teaching methods are most effective to instill interprofessional competencies with the goal of improving patient care. This creates significant challenges given the dynamic nature of the healthcare environment, inconstancies in student experiences and barriers presented earlier.

Use of Simulation for IPE

The Society for Simulation in Healthcare (SSH) defines simulation as "the imitation or representation of one act or system by another. Healthcare simulations can be said to have four main purposes: education, assessment, research, and health system integration in facilitating patient safety." The International Nursing Association for Clinical Skills Laboratories (INACSL) defines simulation at the learner level as "a pedagogy using one or more typologies to promote, improve, or validate a participant's progress from novice to expert" (INACSL, 2013). Practice in simulated settings ("simulation") has been shown to be an effective mechanism for developing individual and team skills (Carlson, Min, & Bridges, 2009). Simulation activities can occur in a wide array of settings (e.g. simulation centers, in situ, virtual settings) using varied techniques including immersive simulations, standardized patients, as well as single and multiplayer "serious games". Regardless of location and format, simulation is increasingly viewed as an enabling technology that transcends traditional educational boundaries and allows students in pre-licensure and post-graduate health care programs to acquire the competencies needed for interprofessional practice (National League for Nursing, 2011). The relationship between IPE and healthcare simulation is illustrated in Figure 2.4 (Palaganas, et al., 2014; Interprofessional Education and Healthcare Simulation Symposium, 2012).

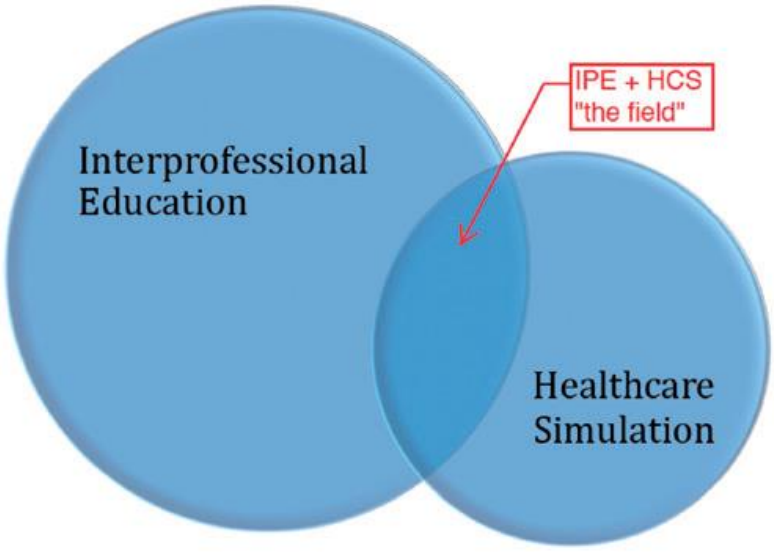

Figure 2.4 Interprofessional education and healthcare simulation

Simulation has been integrated into medical and nursing curriculum in various forms for decades. An extensive literature review indicates the first documented interprofessional education initiative using healthcare simulation (HCS) dates to 1947 (Palaganas, 2012). Contemporary healthcare simulation has evolved from technological advances in the industry coupled with advancements in aviation, computer science and healthcare education (Palaganas, Epps & Raemer, 2014). Developments in healthcare simulation were generated from simulation knowledge and educational theory. Over time, healthcare simulation has developed affordances for the implementation of IPE activities due to the following features (Palaganas, Epps & Raemer, 2014):

- Close resemblance to actual clinical practice
- More objective simulation scores (assessment)
- Ability to assess psychomotor skills
- More relevant feedback
- Learner identification of educational needs

- Ability to vary conditions
- Student motivation to practice specific skills (Pugh, 2008)

Recent studies have resulted in widespread acceptance of the use of healthcare simulation best practice to implement IPE. A literature review by McGaghie, Issenberg, Petrusa & Scalese (2010) indicates that simulation technology produces substantial educational benefits. In another study, it was found that HCS contributed to improvements in communications between professions (Kenaszchuk, MacMillan, Van Soeren & Reeves, 2011). Cook (2011) presented a meta-analysis of technology-enhanced simulation for healthcare professional education indicating that HCS was positively correlated with acquisition of knowledge, skills, and attitudes versus no intervention at all. Cook, Brydges, Zendejas, Hamstra & Hatala (2013) further asserted that HCS is a superior teaching and learning method for IPE.

The cost of simulation activities varies widely and likely influences the decision or ability to use for IPE. Successful simulation depends on the creation of a "plausible environment, plausible responses, plausible interactions, familiar equipment, and realistic equipment" (Edler, Chen, Honkanen, Hackel & Golianu, 2010, p. 114; Seropian, M., 2003). The cost depends greatly on the mix of target population, purpose of simulation and technology used. It also depends on how educational and clinical organizations succeed in reorganizing their structures of work to incorporate simulation-based learning (Gaba, 2004). The cost assigned to personnel, whether faculty or staff, is also an important factor. Human capital or personnel costs are associated with simulation staff, which may include faculty simulation experts, clinical educators, and instructional technology technicians, simulation technicians in addition to other support staff such as finance officers, secretaries, and custodians (Tuttle, 2014).

The Virtual Environment

Much of the literature regarding the use of HCS for IPE is situated within the context of a physical or face-to-face environment. As discussed previously, due to the nature of healthcare professional education, this is not always feasible. Simulations facilitated in virtual environments provide different affordances than those implemented in a face-to-face format. In virtual learning environments, students from various health professions are provided with opportunities to understand roles and responsibilities of healthcare team members. Experiences from 21 global consortium universities show that information technology can be used to "help break down established stereotypes and promote equal partnership in patient care" (WHO, 2010, p. 10).

Empirical research related to the use of virtual platforms to deliver IPE is scant and typically focused on technical issues and access. The most commonly explored virtual platform for IPE activities found in the studies was SecondLife™. Learners assume online identities known as avatars and interact with other entities in a virtual world known as SecondLife™. Within this world, simulated clinical environments exist such as hospitals, clinics, and patient homes for community health interactions. Kidd, Knisley and Morgan (2012) found that use of Second Life™ provided for safe practice of skills needed for mental health patients by nursing students. Another pilot study demonstrated that Second Life can be an effective option for interprofessional case discussions or communication but the technical issues and learning curve necessary for faculty and students proved to be challenging (Seefeldt, Mort, Brockevelt, Giger, Jordro, Lawler, Nilson & Svien, 2012).

Social Media and Microblogging as Educational Pedagogy

In the past 15 years, web access, the nature of the web and contexts for learning have been transformed. Literature indicates social media is more than an emerging technology platform or cultural trend, but a method of communication that is changing the way individuals transmit and receive information. The first generation of the web, or Web 1.0, was viewed as an educational and communication resource similar to that of conventional classrooms such as books. Most users browsed, read, and obtained information from a common entry or "front page". There was minimal creation of individual knowledge and sharing was accomplished primarily through text-based online forums and listservs (Greenhow, Robelia & Hughes, 2009). The emergence of Web 2.0 in 2004 facilitated participatory, collaborative, and distributed practices within Web 2.0-enabled formal and nonformal spheres (Lankshear & Knobel, 2006). Chong (2010) asserted that while the Web is not a learning technology itself, it enhances the learning culture dramatically. The Web gives access to people and information and provides tools that support users in communicating and collaborating, collecting, exchanging and processing information (Huang & Yang, 2009).

It seems apparent that social media in some form is here to stay. Approximately 80% of Americans and Canadians currently use the internet and approximately 75% of these individuals use some form of social media. Fifty-five percent of today's students check their social media site(s) approximately 13 times per day and 11% post or read an average of 112 times per day. In this increasing internet-dependent society, the field of education has demonstrated some movement away from traditional classroom-based, location-specific instruction to virtual learning environments (Greenhow & Burton, 2011; Zandberg, Lewis & Greene, 2008).

Subsequently, social media offer mechanisms for collaboration, networking and learning not previously available to faculty or students (Schmitt, Sims-Giddens & Booth, 2012).

Research on the role of social media in people's lives is mixed, with some scholars arguing that online interactions diminish face-to-face communication and increase social isolation (Greenhow & Burton, 2011; Kraut, Kiesler, Boneva, Cummings, Helgeson & Crawford, 2002); Nie, 2001). Research by Heiberger (2007) and the Higher Education Research Institute (HERI, 2007) found a positive relationship between social networking use and college student engagement. These variances suggest that not all web application is equivalent and a more productive approach to research and debate is to consider precise forms of web activities and their associated socio-technical opportunities and constraints (Greenhow & Burton, 2011; Steinkuehler & Williams, 2006).

Congruent with the population at large, the number of healthcare providers engaging in social media is also increasing. Integral into the role of healthcare professionals is identification, interpretation, and transmission of knowledge and information. Social media is a platform that can assist faculty in helping students to gain greater understanding and acquisition of professional communication skills. Worthy of note is that research indicates adoption of a pedagogical tool into healthcare professional curriculum is slower than other programs in higher education (Schmitt, Sims-Giddens & Booth, 2012).

Increased use of social media in healthcare professional education is apparent given the emergence of studies implemented within the past five years. Schmitt, Sims-Giddens & Booth (2012) assert that social media is a platform that can assist nursing faculty in helping students develop skills in communication, health policy, patient privacy and writing competencies.

There are multiple social media platforms, which may be considered for formal learning, each with their own affordances and hindrances. Twitter is one example of a media technology using microblogging and is highlighted by Bristol (2010) as an innovative approach to share and distribute knowledge. In a controlled study, Junco, Elavsky & Heiberger found that using Twitter as an educational tool increased college student engagement and increased grades (2012). The functionalities of Twitter make it a versatile tool for nursing education as a framework to organize class discussions. Twitter was evaluated by Mistry (2011) in asynchronous and synchronous class environments in a nursing course. Students watched clinical scenarios and then communicated via tweets regarding the evolving patient condition. Positive correlation was found between the use of Twitter and students' ability to reflect, communicate, interact with classmates, review, make decisions, and reinforce prior learning.

As discussed, there is increased need and call for students to develop skills necessary for collaborative practice, yet there are many barriers to meeting this need. Healthcare simulation has been proven as a safe venue by which students can practice skills without risk to patients. Literature also suggests that social media, specifically microblogging, is a viable option for educators to consider as a pedagogical tool (Gao, Luo & Zhang, 2012). Controlled experimental evidence presented by Junco, Heiberger & Loken (2010) suggests that "using Twitter in educationally relevant ways can increase student engagement and improve grades, and thus, that social media can be used as an educational tool to help students reach desired college outcomes" (p. 130). My study will contribute to this body of knowledge by exploring whether microblogging is an effective vehicle to facilitate healthcare simulation experiences among multiple healthcare professional disciplines.

Situated Learning Theory

Interprofessional Education draws from a number of education, sociology, and psychology theories. Literature also points to interprofessional education as being most effective when principles of adult learning are used, learning methods reflecting real world practice experiences of students, and when interactions occur between students of different disciplines. For the purpose of this study, Situated Learning Theory and concepts of collaborative learning environments provide the framework for inquiry. By using a realistic case scenario and reproducing a context where a nurse and physician typically communicate and collaborate with each other, an opportunity is provided for learners to apply and practice IPE skills. In essence, learning will be situated within a realistic experience for the study although delivered via a different platform (e.g. social media). By using this situated simulation experience to answer the research questions, it will provide an opportunity to determine if this type of simulated experience is a viable option for administrators and educators of healthcare professional students to consider while integrating IPE into curriculum.

Situations shape how we learn and who we are. An educational philosopher, Rousseau (1762), proposed that education shapes who we are and laid the foundation that learning is a route to forming our identity. Lave and Wegner (1991) asserted in the Theory of Situated Learning that learning is embedded within an activity, context, and culture. Rather than looking at learning as the acquisition of certain forms of knowledge, Lave and Wegner (Smith, M.; Lave & Wegner, 1991) place learning in social relationships: situations of co-participation. This participation involves an active process on the part of individuals as they practice within social communities and construct identities in relation to these communities (Wegner, 1999). Learning is not seen as the acquisition of knowledge by individuals as much as the process of this social

participation. Paramount to the theory is the notion that it explores the situated character of human understanding and communication (Lave and Wegner, 1991). The idea that learning involves an increased process of participation in a community of practice has gained significant ground in recent years and the nature of the situation impacts significantly on this process (Smith, 2003).

Situated learning involves more than "learning by doing" or experiential learning. Lave and Wegner's concept of "situatedness" involves individuals being full participants in the world and in generating meaning (Smith, 2003). Learners interact with each other in varied ways of participation resulting in social transformation. As beginners or novices move from the periphery of the learning community to the center, they become more active and engaged within the culture and then eventually assume the role of experts. Situated learning is then exemplified by a process where knowledge is co-created within a context of how that skill or knowledge is applied (Lave & Wenger, 1991).

Social interaction and collaboration are essential components of situated learning. Students become involved in a community of practice that embodies beliefs and behaviors achieved through interaction. Understanding of individual roles, roles of other professions, teamwork and collaboration are achieved through this "community of practice. Opportunities for learning are structured by the requirements of work and apprentices often learn from other apprentices (Lave & Wegner, 1991). The shared practice within a community includes sharing information about ongoing activities and "talking through" activities. For healthcare professional students, this may be accomplished in a clinical setting as a member of an interprofessional team.

Lave and Wegner (1991) suggested that learning in communities of practice is not highly structured and sequenced but rather "unfolds in opportunities for engagement in practice" (p. 93). Teaching methods include scaffolding and fading. Scaffolding refers to the facilitation of the educator to assist learners in achieving tasks while fading refers to gradual elimination of facilitation as the learners achieve expertise (McLellan, 1996). In interprofessional healthcare education, the educators may gradually introduce aspects of a case scenario to a community of learners for the purpose of engagement in clinical practice and decrease the level of involvement as learners begin to collaborate with each other and apply expertise to the case as relevant to their role.

The elements of Situated Learning presented are relevant to IPE as students engaged in IPE activities move first from the periphery of their own profession into a greater understanding of their role within it, and then interact with other professions and ultimately as members of a team (Thistlewaite & Nisbet, 2011). Knowledge exchange and knowledge transfer are key components of such activities (Kaufman & Mann, 2007). A limitation of this model within the healthcare setting is that students are placed, or assigned, to clinical environments which may or may not be interprofessional or those that work in the setting do not emulate desired interprofessional skills (Thistlewaite, 2012) thus hindering the learning experience.

According to Young (1993), there are four critical tasks involved in instructional design for situated learning. These include: (1) selecting the situation or set of situations that will afford the acquisition of knowledge that each learner needs to attain, (2) providing necessary "scaffolding" for novices to operate within the complex realistic context while allowing experts to work within the same situation, with the role of the educator being that of coach, (3) providing supports that enable educators to assess progress, access distributed sources of knowledge,

interact with individual students and/or cooperating groups of students, and (4) defining the role and nature of assessment and what it means to "assess" situated learning.

SocialSim Conceptual Framework

Collaborative virtual environments provide remotely located individuals with the ability to collaborate via real interactions in a shared artificial environment (Brna & Aspin, 1997). Technology can increase the potential for learning within a variety of different contexts including virtual environments. These virtual simulations allow students to explore their physical world identities in a simulated environment. The artificial environment can then function as a link to the physical environment (Adams, Astruc, Garrido & Sweeney, 2011). Figure 2.5 illustrates the relationship between the educator and students during a simulated learning experience using Twitter as a virtual platform and environment for communication and collaboration and serves as the conceptual framework for SocialSim. Healthcare simulation which is facilitated virtually intersects with situated learning it provides a venue for concrete experiences (simulation), peripheral participation (virtual environment) and reflective observation (debriefing). This experience is further situated within the context of interprofessional education with the overarching goal of preparing students for clinical practice (i.e. workforce).

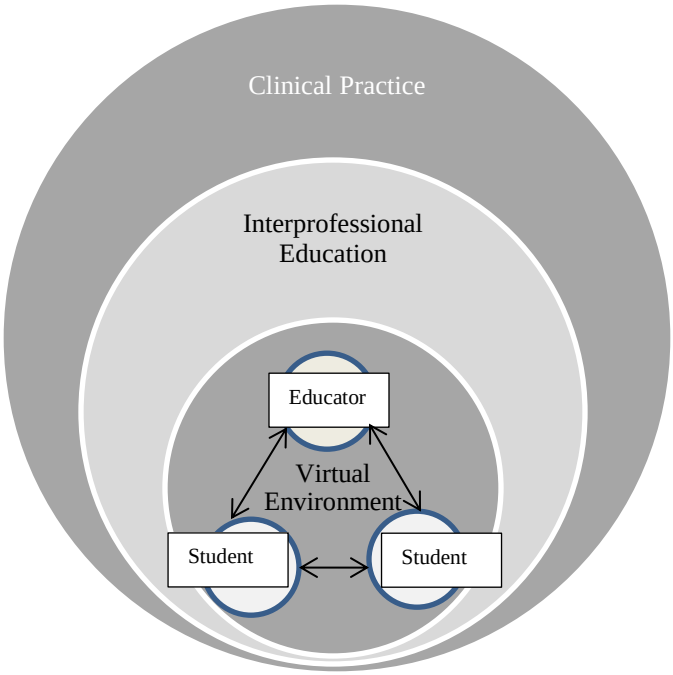

Figure 2.5 SocialSim Conceptual Framework.

Conclusion

Based on the literature, it is clear that IPE is no longer a desired but an expected component of healthcare professional education. There are many frameworks supporting the interface between healthcare professional education and improvement of patient care and safety presented in the review. Simulation methodologies provide viable options in which to accomplish IPE, however most are dependent on students participating in a face-to-face format. It would be prudent for healthcare administrators and educators in higher education institutions to look beyond the physical or face-to-face learning environment where IPE has traditionally been implemented, in order to overcome some of the barriers presented.

Literature is absent with regard to the use of social media to facilitate IPE or healthcare simulation activities. Given the evolution of the emergence of social media and literature suggesting that social media is a viable platform by which formal learning can be situated,

inquiry is warranted as applied to simulation and IPE. The synthesis of IPE, simulation and microblogging (e.g. Twitter) as a social media platform results in a tool which will be referred to as SocialSim which will be tested in this study.

It is imperative that healthcare professional students learn how to function as effective interprofessional team members in the healthcare workforce. It is more important now than ever for the development of innovative and effective options to teach IPE skills in order to improve both education and patient outcomes. The overarching purpose of this study is to determine if SocialSim is a viable option to achieve these goals. It is projected that this study will contribute to the body of knowledge in higher education, specifically as related to the healthcare professions; however, the results may have broader applicability. The study may inform administrators and faculty as to effective, or non-effective, tools to consider when making curricular decisions and integration of appropriate methodologies. Lastly, this study will provide empirically-based evidence that may be considered when implementing simulation-based teaching and learning, thereby contributing to the broader field of simulation education.

CHAPTER 3: METHODOLOGY

The purpose of this descriptive study was to explore how a simulation methodology I developed, SocialSim, might facilitate simulation-based interprofessional education (IPE) activities for medical and nursing students including the ability of SocialSim to facilitate collaboration and communication skills, affordances and challenges of delivery via a social media microblogging platform and associated perceptions regarding benefits and barriers to the use of SocialSim. As a result of my inquiry, I was able to provide a thematic description of findings to best explain the perceptions of participants in my study. The organization of this chapter begins with the research approach followed by the design of the study which includes context, participants, data collection and analysis.

Research Approach

Considering that I set up an experimental condition by using an intervention such as SocialSim, my approach may seem to be quantitative in nature at first glance. Quantitative research is associated with experimental science which begins with a theory or hypothesis about the world and operates under the assumption that by setting up the appropriate intervention, evidence can be collected to support or reject the hypothesis (Creswell, 2009). However, given I incepted and developed SocialSim without prior literature exploring this type of methodology to facilitate healthcare simulation, I felt it was most important to explore the qualitative aspects of SocialSim first. I chose to focus on the students' perceptions for my initial inquiry related to SocialSim as I assert that students are at the core of teaching and learning and therefore, an essential first step prior to testing or using the tool more broadly. In order to consider SocialSim in the future and possibly continue development of this tool to be used in interprofessional education, it is important to know how the students used it, what the affordances and challenges were and how it may or may not have facilitated collaboration and communication between them.

Research design

In an effort to facilitate interprofessional education (IPE) and overcome barriers identified in the literature, I developed a new method of delivery to explore. I named this methodology SocialSim which will subsequently be used as the term to encompass this new method for delivery healthcare simulation. The participants in my study were students in a large non-profit public research university in Michigan with both medical and nursing colleges. Actual implementation of the study was situated within a virtual setting, specifically a social media microblogging platform, Twitter.

Simulation Description

This simulation was designed using a social constructivist lens. Developed by Lev Vygotsky (Vygotsky, 1978) building upon Jean Piaget's theory (Mooney, 2013), social constructivism emphasizes the social context of learning. Cognitive development occurs within cultural and social contexts and the role of the educator is to create an environment for learning rooted in real life situations and in which students can become engaged in interesting activities. The educator may guide students as they approach problems. One of these contexts may involve technology, since technology can be used to connect rather than separate students from one another. Technology serves as an essential tool to support goals of social constructivism. Examples include telecommunications, collaborative writing programs, and realistic simulations (Atherson, 2013).

The social constructivist approach allowed me to create a realistic clinical case-based simulation that was delivered virtually using a social media platform (i.e. Twitter). First, I developed a simulated case scenario representing a realistic clinical situation appropriate for the level of students in the study and their assumed clinical decision-making abilities. The case centered on a middle-

aged female in the primary care setting with chronic diseases presenting with an acute condition (see Appendix B). The case was reviewed by experts in primary care in order to validate the fidelity of the scenario. These experts included two primary care physicians and one doctorate of nursing practice, all of whom are faculty in the medical and nursing colleges that participants were recruited from.

Next, I chose the social media platform I felt most suited to deliver the simulation. There were multiple alternative platforms to consider, however, I chose Twitter due to innate features I believed conducive to delivering an engaging simulation. These included the ability to embed media such as audio and visual clips within tweets, alerts that would be translated when learners received tweets and the ability to easily isolate the case scenario to a pair of students versus a larger group. Twitter is also amenable to an ongoing dialogue than other types of social media such as Facebook because Twitter is a microblogging platform (Ebner, Lienhardt, Rohs & Meyer, 2010).

In order to promote a realistic experience while minimizing technological challenges that might occur, I distributed supporting documents and references on the first day of the simulation to students via email. These included an electronic patient chart with lab reference (see Appendix C) and "Twitter Tips" (see Appendix D).

Lastly, I developed a set of guiding questions included in the case scenario document to be used during the debriefing session (see Appendix B). The intent was to provide a reference for the simulation educator who debriefed the students as a means to facilitate discussions focused on the research questions and objectives of the case.

Participants

The greater student population from which I recruited from included fourth-year nursing students enrolled in a traditional baccalaureate nursing program at a large research university in

the Midwest within a cohort of approximately 80 students. I also recruited third-year medical students from the same institution with an enrollment of 300. I anchored my selection of participants to those with basic ability to use the Twitter, of which I determined to be having an account for six months accessing at least one time per month. The other determining factor was the availability of students during the study implementation period. Twelve student pairs were matched in pairs according to schedule availability and additional students did not participate. All students had previously completed classroom and clinical work in the areas of medicine and surgery. The students in the study consisted of pairs of medical and nursing students (i.e., one of each in pair) and were at comparable points in their curriculum. Therefore, they were considered to have the ability to apply prior acquired knowledge and critical thinking necessary for the designed SocialSim case scenario.

Convenience sampling was used with the intent to ultimately recruit and schedule eleven third-year medical students and eleven fourth-year nursing students who participated in the SocialSim as part of a two-person team. A key feature of qualitative research is that researchers typically work with small samples nested in their context and depth and tend to be purposive versus random (Miles, Huberman & Saldana, 2014). The medical students were physically located throughout the state per academic program protocol. The nursing students were in their fourth year of a traditional program consisting of on-campus face-to-face courses and off-campus clinical experiences in multiple institutions. Although the students' locales varied, the convenience nature of the sampling applied since they were readily available via the benefit of connectedness using technology which transcended the geographical boundaries (Miles, Huberman & Saldana, 2014).

Participation was voluntary and recruitment was accomplished via mass email including basic study information to the medical and nursing students distributed by their respective college faculty (See Appendix E). The response to the mass email was significantly larger than intended for the design of the study with 26 nursing and 42 medical students responding.

Prerequisites for participation in the study were possession of a Twitter account for a minimum of six months in addition to continuous access to Twitter via computer, smartphone or tablet for the duration of their assigned participation period. Students were instructed to contact me indicating their interest in participating in the study after which time an electronic background questionnaire was distributed using MonkeySurvey eliciting demographic and other information, which was subsequently utilized to identify prerequisite baseline experiences related to use of social media and insight regarding prior engagement in interprofessional education experiences (see Appendix F). Informed consent (see Appendix G) was obtained electronically at the time the background questionnaire was distributed. Participants were then sent an electronic scheduling tool, Doodle Poll, indicating availability for 3-day blocks of time in order to accommodate other academic responsibilities and workload and decrease potential for attrition. Students not available to participate based on their scheduling availability were eliminated from the subject pool in addition to some students on days with too many available. Participants were subsequently paired based on their matched availability and professional discipline. The pairings included one medical and one nursing student on dates that both were able to participate in an effort to avoid conflicting responsibilities and risk for attrition. One pair of students served as a pilot group but was not informed as such in order for me to provide the most realistic and unbiased experience for the students as well as an opportunity for me to hone skills needed to implement the study for the larger group. Lastly, participants were scheduled for

post-simulation interviews using an online "sign-up sheet" (i.e. SlyReply). After completion of the simulation, debriefing and interview, participants were compensated with a certificate of IPE participation and an Amazon (i.e. online shopping site) gift card upon completion of all study requirements.

Implementation

The study was implemented in two phases. In Phase I, a background questionnaire (see Appendix F) was distributed to establish demographic information and characteristics of the population related to experiences related to use of social media and previous engagement in interprofessional education activities. In Phase II, participants engaged in a simulation over the course of 3 days in pairs consisting of one medical and one nursing student. The first simulation implemented with randomly assigned pair was used as a pilot. Following the simulation, participants engaged in a debriefing session. Phase II concluded with individual semi-structured phone interviews.

The scenario was scaffolded over the course of three days as I assumed both the role of patient and communicating various pieces of information related to the simulated patient via Twitter tweets. I designed a simulation script as a general guide, however, adapted my interactions based on those observed between students (see Appendix H). I facilitated interactions between students by sending tweets directly to one student with the goal being that it would prompt that student to contact the other. For example, when I noticed a lull between two students, I sent the nursing student a tweet from the patient stating that she had been awake all night due to the pain. In other instances, I asked probing questions via a tweet to both students. An example of this was, "I'm curious as to if you think something else may be going on given information in the chart." The Twitter account settings used for the case scenario were set as

private in order to protect the safety and confidentiality of students and case materials. A common hashtag was used by participants and me to streamline tweets and allowed me to monitor interactions using a social media management platform, Hootsuite.

On the first day of participation, the students were oriented to the SocialSim concept and provided with a Twitter resource guide referred to as "Twitter Tips" (see Appendix D). The participants were introduced virtually to their partner via email and encouraged to share basic information such as program, level, clinical placement, etc. The participants were also introduced to their patient via a condensed case scenario including a lab reference (see Appendix C). Over the subsequent two days, multiple tweets were sent to students as a method to translate information to the participants regarding the assessment and condition of the simulated patient. Video (i.e. YouTube) and audio clips (i.e. SoundCloud) were hyperlinked into tweets in order to promote optimal fidelity of the case scenario.

Following engagement in the case simulation, the students participated in a debriefing session in small groups conducted by a certified healthcare simulation educator (Society for Simulation in Healthcare, 2016) using a video and web conferencing platform (i.e. Zoom). Debriefing has been a cornerstone of simulation in healthcare from its inception and is a crucial component of any simulation experience intended to help participants change the way they think and practice (Littlewood and Szld, 2015). Reflection on one's own practice is a crucial step in the experiential learning process and helps learners develop and integrate insights from direct experience into later action (Rudolph, Simon, Rivard, Dufresne & Raemer, 2007). An advocacy-inquiry approach was used for the debriefing session in order to promote reflection and sharing of the cognitive schemata of participants that led to actions and decisions during the simulation. The debriefing session further enhanced the social context of the study by facilitating

interprofessional communications using technology. Table 3.1 provides an overview of the activities situated within each phase.

Table 3.1

Description of Study Phases

Phase I	Phase II
22 Participants	Pilot-2 participants
Background questionnaire	Simulation implementation
Supplemental document collection	Debriefing
	Interviews

Data Collection

The following section describes the data collection procedures for this study beginning with collection of pre-simulation data and ending with data collected during semi-structured interviews focused on the participants' perceptions regarding the use of SocialSim for interprofessional education. Qualitative researchers strive to capture participants' perspectives with depth and complexity (Geertz, 1973). High-quality qualitative research emphasizes participants' subjective experiences, meanings and social contexts "to understand the world from the subjects' point-of-view" (Kvale, 1996, p. 1). These perceptions shared in the semi-structured interviews allowed me to gain insight from participants as to their perceptions in order to answer the specified research questions (Glesne, 2011).

Qualitative data was collected separately during semi-structured interviews from participants within 1-2 days after each simulation and facilitated either by phone or via Skype, depending on student preference and convenience. The open-ended exploratory nature of the interview questions was most appropriate since I did not know the parameters or dynamics of the participants' experience with SocialSim (Miles, Huberman & Saldana, 2014). Table 3.2 illustrates interview questions correlating with the research questions.

Table 3.2

Interview Questions with Correlated Research Questions.

Research Question	Post-simulation interview question numbers
How does SocialSim facilitate simulation-based interprofessional learning activities for medical and nursing students?	3,4, 5, 6
What are the affordances and challenges to the use of social media microblogging platform (i.e. Twitter) to deliver SocialSim?	1, 2, 3
How does SocialSim facilitate communication and collaboration between medical and nursing students?	3, 5, 6
What are medical and nursing student perceptions regarding benefits and barriers of SocialSim as an IPE learning tool?	7, 8, 9

While I followed the same protocol for each interview (see Appendix I), I remained open to changes that occurred during the interview process allowing me to follow-up with additional questions when I felt I needed more detail or students needed more information in order to appropriately respond to questions (Kvale, 1996). All students opted for phone interviews which were recorded with their verbal consent and conducted privately to ensure confidentiality. I also took notes during the interviews in order to capture significant information conveyed for future reference and reflection on my part (Glesne, 2011). I maintained a data accounting log (i.e. Excel) as a management tool to track scheduling of participants and details related to data collection (Miles, Huberman & Saldana, 2014).

The interviews took place over a two week period of time during the fall of 2015 and ranged in length from 29 to 44 minutes. Interviews were recorded and transcribed using a transcription service.

Data Analysis

After receiving the transcribed text of interviews, I listened to each interview again to verify accuracy and filled in any blanks due to transcriptionist's lack of medical terminology that some students used. All identifying information was removed from the transcribed interviews, and pseudonyms were then assigned. I also added and referred to my reflective notes in a journal. All data was stored initially on a password protected network drive and then transferred to an external device secured in a locked safe.

The data analysis focused on a descriptive approach which involved staying close to the interview data as originally recorded and allowing the data to "speak for itself". This approach helped identify themes and subsequent answers to the research questions (Glesne, 2011). My goal was to understand how students perceived the use of SocialSim as a method to deliver interprofessional education and what the associated benefits and challenges may be. My

approach to this analysis was to: (a) write a review memo and send to each participant for their review; (b) maintain notes in a reflective journal; (c) code each transcript; and (d) develop a list of emergent themes across participants.

Glesne (2011) describes coding as "a progressive process of sorting and defining and defining and sorting those scraps of collected data (i.e. observations notes, interview transcripts, memos documents and notes from relative literature) that are applicable to your research purpose (p 194)." Saldana (2013) divides codes into two major stages: First Cycle and Second Cycle. First Cycle involves the assignment of codes to data chunks. Second Cycle Coding methods generally work with the resulting First Cycle codes themselves. Miles, Huberman and Saldana (2014) posit that "coding *is* analysis" (p. 72).

I used Dedoose software throughout the data analysis for First and Second Cycle coding. For initial coding, I imported interview transcripts into Dedoose. The coding involved a line-by-line analysis and assigned codes whenever I identified meaningful segments of text based on subjects' responses to the interview questions. Segments were deemed meaningful if they were relevant to the research questions or frequently expressed by students. In the Second Cycle, I compared the various codes from the First Cycle and identified emergent themes in order to describe and summarize the findings.

Cost

Costs associated with my study included my time, student compensation and transcription. Total for incurred expenditures was $1451.50. This does not include my time developing the case which cannot be discounted as it would be a consideration for others implementing SocialSim. Time investment on my part designing the case and supporting

documents was eighteen hours and noted that I have extensive experience developing simulation cases.

Trustworthiness

Creswell (2009) has identified several strategies that researchers can employ in order to ensure the credibility and trustworthiness of qualitative data analysis. Those used in my study included peer review, debriefing, and clarification of researcher bias.

Review and debriefing was a continuous process accomplished regularly with my advisor, dissertation committee members and peers. The peer debriefer was asked to review the case and associated debriefing questions after which some minor revisions were made. My dissertation advisor served as an external auditor of study findings. Study participants also had the opportunity to provide feedback to ensure that their perspectives were represented accurately.

I remained cognizant of my experience and expertise in the field of simulation and affinity toward its use in healthcare professional education. While it could have presented bias in my analysis, it also served as an asset as I implemented my study. My position as Director of a healthcare simulation center situated in same institution as the participants could have influenced responses of participants, however, it is noted that I do not directly assess performance or influence grades of the students who participated in the study.

Consideration of Human Subjects

The privacy and confidentiality of participants was essential throughout the course of my study. Upon approval of the Institutional Review Board (IRB), I obtained consent for participation from students at which time they were informed of protocols in place to protect their privacy. They were informed of any potential risks and my planned measures to limit any of those risks. I ensured that all interactions took place in a private location where others were

not able to overhear any part of the interviews. I remained cognizant of participant's level of comfort throughout the interview process. All electronic communications transpired via email program protected by dual authentication protocol.

Data including spreadsheets, study documents, audio files and transcribed interviews were maintained in a secured server accessible only by me using dual authentication. Files uploaded and residing within Dedoose were also double-password protected. During transcription and throughout the analysis stages, participants' names were not used. An alphabetical code coinciding with their discipline (i.e. "N" for nursing and "M" for medicine) was assigned in addition to a numerical code. Data will be stored for three years after which time will be destroyed.

As I share my findings in the next chapter, I protect participants' privacy and confidentiality by masking identifying data and categorizing data in themes. When necessary, I assign student excerpts generically using pseudonyms and de-identify markers (e.g. geographical location, clinical assignments, etc.). Lastly, I have been attentive to ensure any contextual details do not inadvertently reveal identities of the students.

CHAPTER 4: FINDINGS

The primary aim of my study was to explore medical and nursing students' perceptions regarding the use of SocialSim for simulation-based interprofessional education (IPE) activities, particularly collaboration and communication skills, in addition to the affordances and challenges of delivery via a social media microblogging platform (e.g. Twitter). In this chapter, I present and interpret the findings in an integrated manner within each section. I argue that the use of SocialSim presents a viable option to be considered by administrators and faculty when integrating interprofessional education into curriculum. A deeper understanding of how students perceived this methodology underpins my approach and analysis. This chapter uses examples from the students interviewed in this study in order to describe perceived benefits, challenges and application of social media-facilitated simulation, SocialSim, to interprofessional education.

I begin this chapter with an introduction to the terminology used in Chapters 4 and 5 resulting from themes and topics that emerged during analysis in addition to review healthcare simulation definition previously presented. Demographic information is then presented with the intent of providing a schematic representation of the subject population as a whole and insight as to how certain characteristics may have influenced their perceptions. The data revealed from the pre-survey suggests some characteristics of the subjects influenced perceptions and also provided a baseline or reference as to what prior experiences of the subjects were. The remaining sections of this chapter focus on thematic presentation of participants' perceptions in an effort to answer the research questions. The overarching areas to be explored include affordances, challenges and influences of SocialSim on interprofessional education, particularly collaboration and communication.

Definitions

Healthcare Simulation

Healthcare simulation is defined as: "A technique that uses a situation or environment created to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing or to gain understanding of systems or human actions" (Palaganas, Maxworthy, Epps & Mancini, 2015; Society for Simulation in Healthcare Accreditation, 2014).

Healthcare simulation can be manifested in multiple forms such as human patient simulators, standardized patients, partial-task trainers, haptic devices, computer-assisted instruction, gaming and virtual reality.

Fidelity or Realism

Fidelity, also known as realism, refers to "The believability or the degree to which a simulated experience approaches reality. The level of fidelity can involve a variety of dimensions including (a) physical factors such as environment, equipment and related tools; (b) psychological factors such as emotions, beliefs and self-awareness of participants; (c) social factors such as participant and instructor motivation and goals; (d) culture of the group; and degree of openness and trust, as well as particpants' modes of thinking" (Palaganas, et al., 2015; Dieckmann et al., 2007; National League for Nursing Simulation Innovation Resource Center [NLN-SIRC], 2013).

Healthcare Informatics

Healthcare informatics refers to the application of computer and information science in basic and applied biomedical sciences in order to facilitate the acquisition, processing,

interpretation, optimal use, and communication of health related data. The focus is on the patient and the process of care with the goal to enhance the quality and efficiency of care provided (Hebda, Czar & Mascara, 2005). It is also broadly defined in medicine as "the storage, retrieval and application of medical data and knowledge" (Chen, Safdar & Nagy, p. 1).

Interprofessional Education

Interprofessional education (IPE) is "that which occurs when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes" (World Health Organization, 2010). Informal IPE is unplanned and may occur serendipitously. Formal IPE aims to promote collaboration and enhance the quality of care. It is a planned and purposeful effort that brings learners from different professions together to engage in activity (ies) that promote inteprofessional learning. The intention for formal IPE is for curricula to achieve this goal (Palaganas, et al., 2015).

Transfer to Practice

Transfer to practice is relevant in this study as situated within transformative learning. Transformative learning (Mezirow, 1991, 1995, 1996, 1997; Cranton, 1994, 1996) is "the process of effecting change in a frame of reference (p.5)". A frame of reference encompasses cognitive, conative and emotional components (Mezirow, 1997). When considering transfer to practice, learners transfer a change in frame, or way of knowing, to their practice or work. In the case of healthcare education, the medical and nursing students would apply newly learned skills, behaviors and attitudes to the clinical setting to improve patient care.

Subject Demographics

This study explored the perceptions of 10 third-year medical students and 10 fourth-year nursing students regarding the use of social media as a mechanism to deliver a simulated clinical experience to facilitate interprofessional education. All students were at similar stages in their academic trajectory having completed a medical-surgical rotation caring for patients with histories of chronic disease. I am grateful to the students who chose to participate and share their valuable time and perspectives with me multiple times over the course of the study, which equated to a total of approximately 6 hours. In describing the participants, my primary concern is that they remain unidentifiable. Therefore, I will approach the presentation of data and discussion surrounding their perspectives thematically and with the use of pseudonyms as indicated in Table 4.1.

Table 4.1 Student Pseudonyms and Associated Discipline.

Medical Student Pseudonyms	Amber, Darlene, Erik, Maria, Mark, Martha, Maya, Miranda, Tanya, Zach
Nursing Student Pseudonyms	Abby, Alexis, Ann, Audrey, Dawn, Eva, Francine, Lori, Nancy, Paul

The subjects were recruited via email through their respective college faculty and administrators. From the 42 medical students and 26 nursing students who responded, 22 were selected based on scheduling availability. Informed consent was obtained at the same time as the demographic survey. The demographic survey elicited characteristics of the participant population and affirmed diversity of the subjects in an effort to broaden range of perspectives and substantiate a pool somewhat representative of the larger student population.

It was noted there were more female participants which correlates proportionately with nursing enrollment at the respective institution. In contrast, gender distribution of medical students was skewed since enrollment is more equalized with regard to gender (see Figure 4.1). Thelwall, Wilkinson and Uppal (2010) found that social media is an emotion-rich environment where females give and receive more positive comments. They did not find any differences between genders in negative comments. Their findings also suggest that females are more successful social media site users because of their ability to better textually harness positive affect. Thomson (2006) found significant differences between genders in the "new" work or virtual environment. Gender differences were found to be more salient in same-gender electronic discussions versus mixed-gender discussions and that gender affects how we produce and interpret these communications. Whether or not the disproportionate number of females had actually impacted my results is beyond the scope of this study. However, considering the literature, this dynamic may be worthy of consideration and future inquiry.

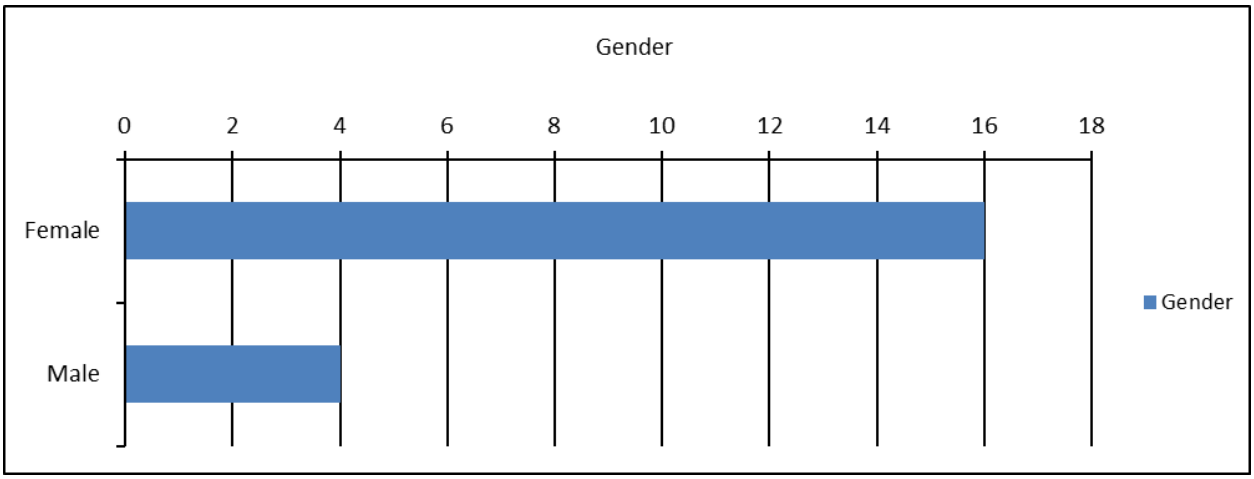

Figure 4.1 Subject gender distribution

The age of students was more homogenous with 75% in the 20-25 range and 25% students aged 26 or older (see Figure 4.2). This would be expected considering nursing students

were recruited from a traditional program meaning they typically pursue their degree immediately following high school graduation and would be approximately 22-23 years old in their fourth year. The older students were noted to be medical students with 5 being traditional and 5 pursuing medical education later than what is typical.

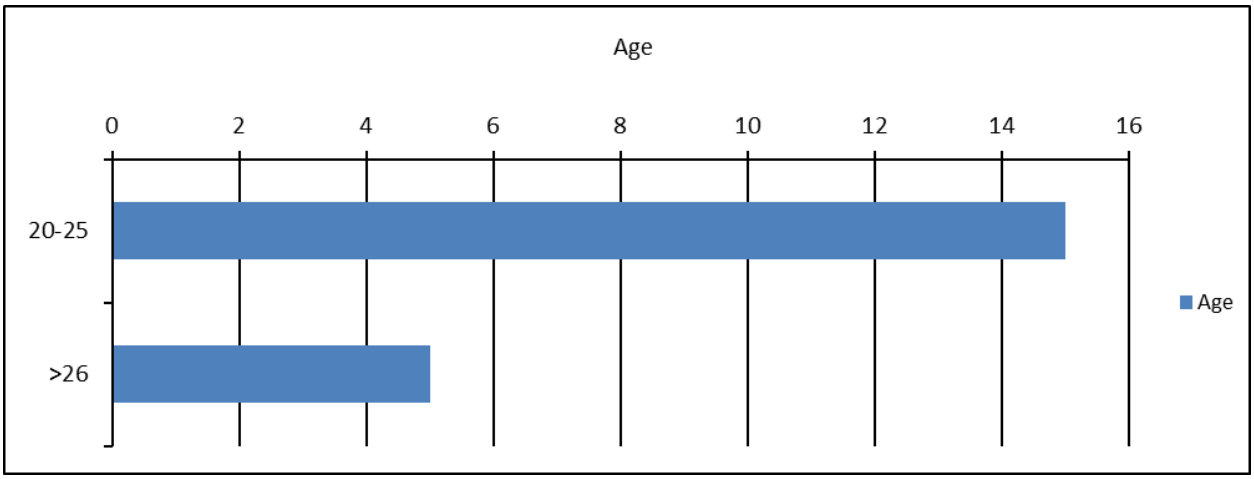

Figure 4.2 Subject age distribution.

A prerequisite for participating in the study was to have had a Twitter account for at least 6 months to ensure basic understanding of Twitter and thereby facilitating the ability to engage in the simulation, particularly given the short span of the study period. As illustrated in Figure 4.3, all students met this criterion.

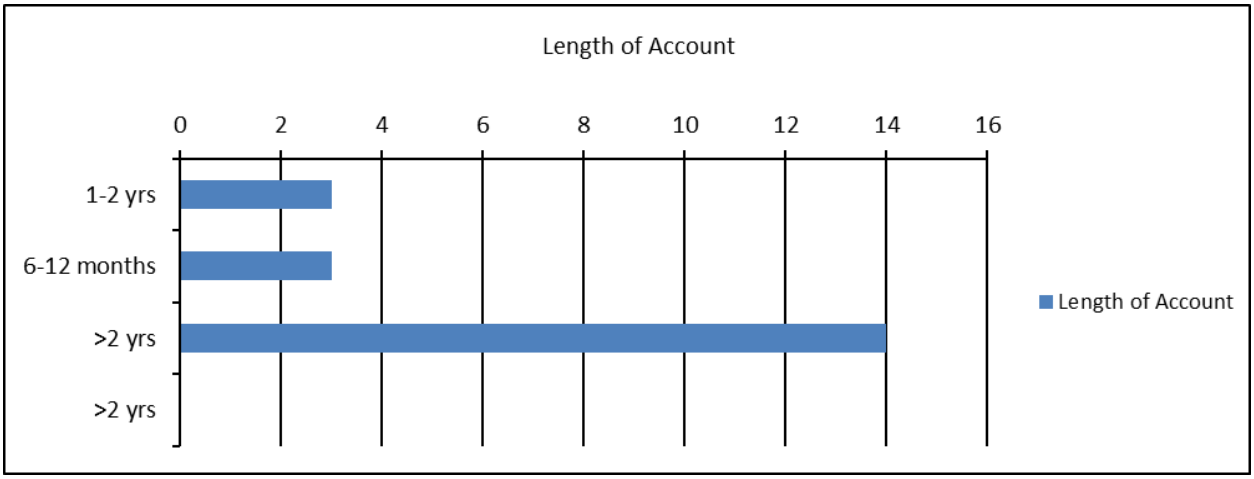

Figure 4.3 Length of time possessing a Twitter account.

I was also interested in frequency of use since the length of time a student had their account as it would serve as an indicator of their experience with Twitter which is illustrated in Figure 4.4. It also helped me gain a sense of how often they might be accessing their Twitter account during the period of the study so that I would know what to expect and could plan accordingly. The number of students that used Twitter less than twice per month was greatest and represented a third of the subject population. Two thirds of the students used Twitter multiple times per day, week or month.

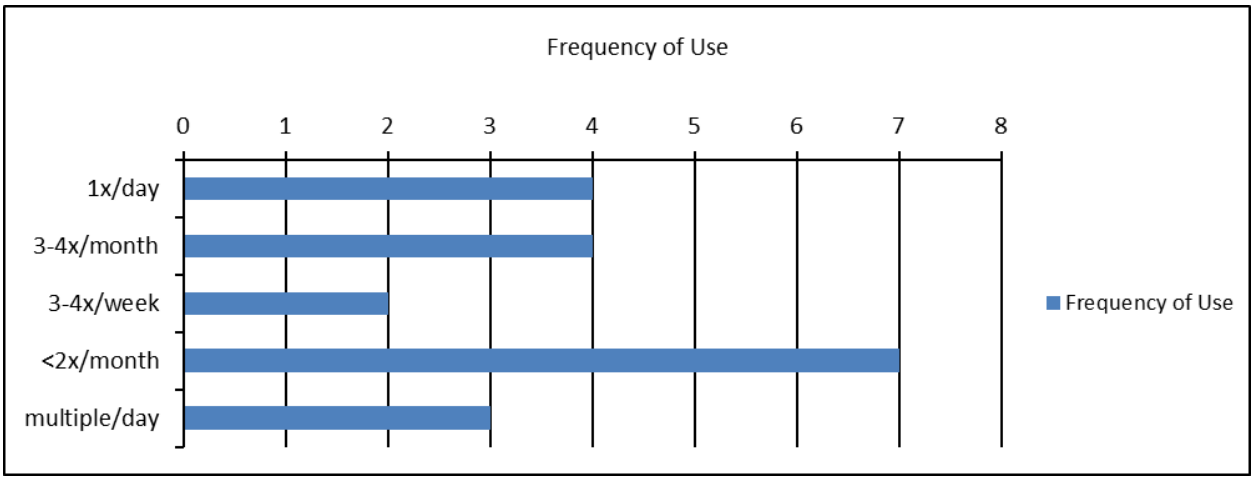

Figure 4.4 Frequency of Twitter Use.

Another characteristic of interest was how the students perceived their Twitter expertise to be. This self-perception could have an impact on self-efficacy of students with regard to using a social media platform for academic purposes. The students' assessment of their Twitter expertise was quite variable as seen in Figure 4.5.

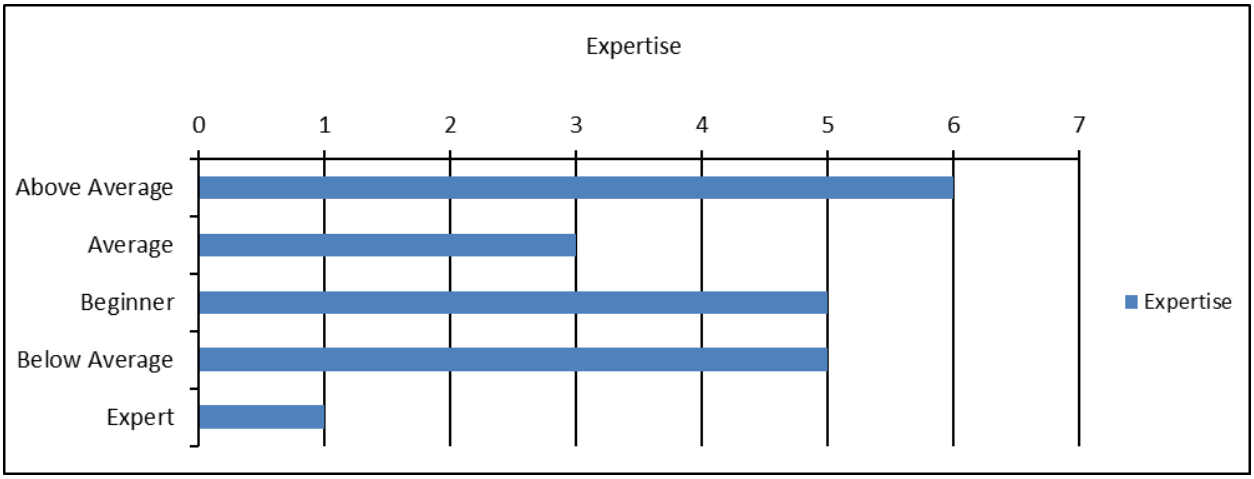

Figure 4.5 Self-described Twitter expertise.

The final areas of interest prior to implementation of the simulation were whether students had prior experience with interprofessional education (IPE) learning activities during the course of their curriculum and if they had opportunity(ies) to communicate or collaborate with students of the opposite discipline (e.g. medicine or nursing). Figure 4.6 indicates almost all students had prior IPE experience. This could be beneficial by providing safety for students within the context of a virtual IPE experience as they might feel more comfortable interacting with each other than not having had prior experience.

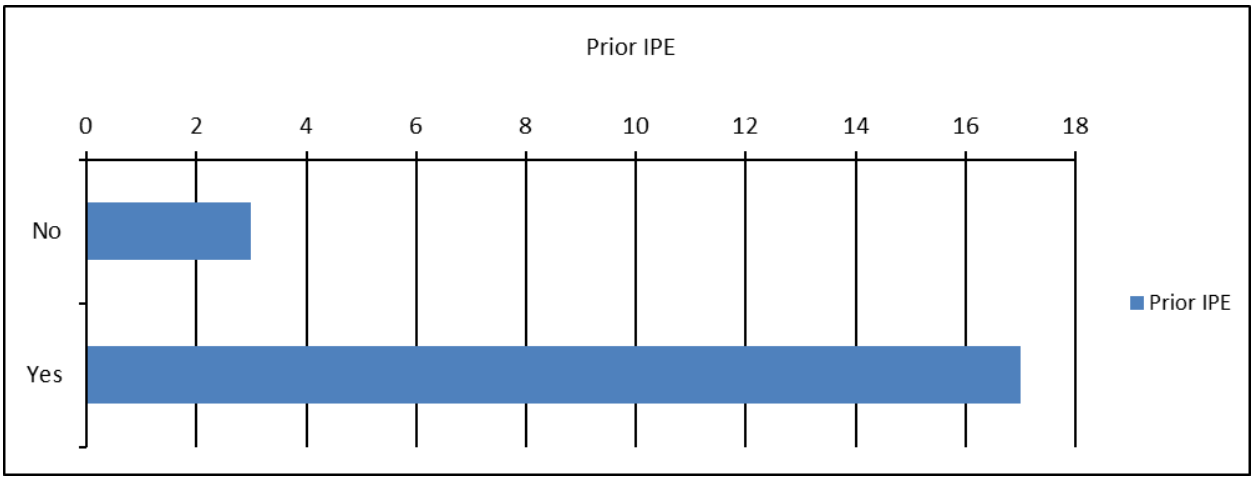

Figure 4.6 Prior experience with IPE.

As would be expected, students reported opportunities to collaborate and communicate with students of another discipline correlated with prior experience with IPE with the exception of one student who reported that they had not had an opportunity to communicate (see Figures 4.7 and 4.8). I assume this discrepancy was in error as it would not be possible for a student to collaborate without communication and I did not probe the student further.

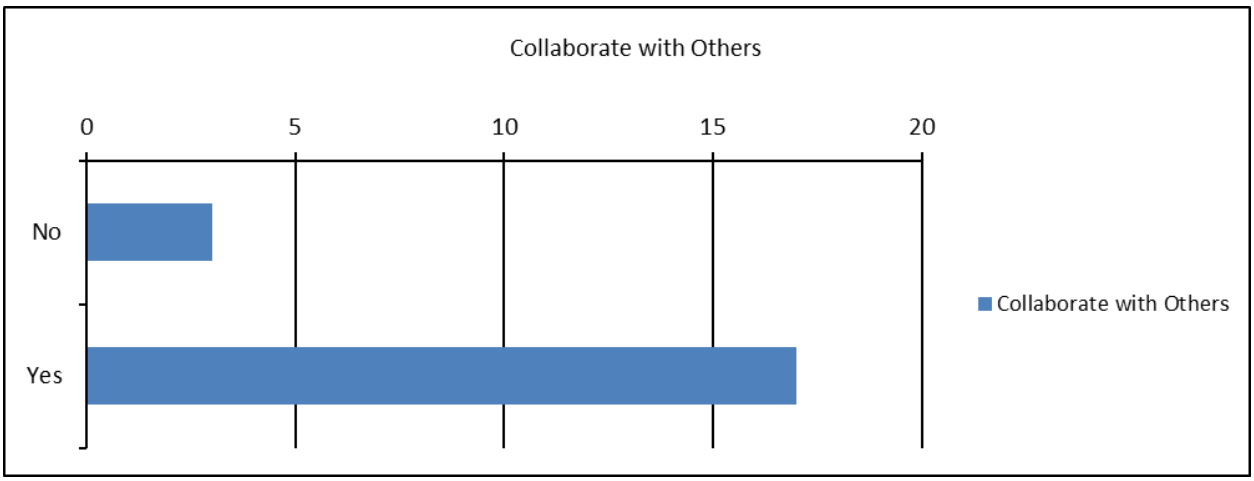

Figure 4.7 Prior collaboration with students of other discipline.

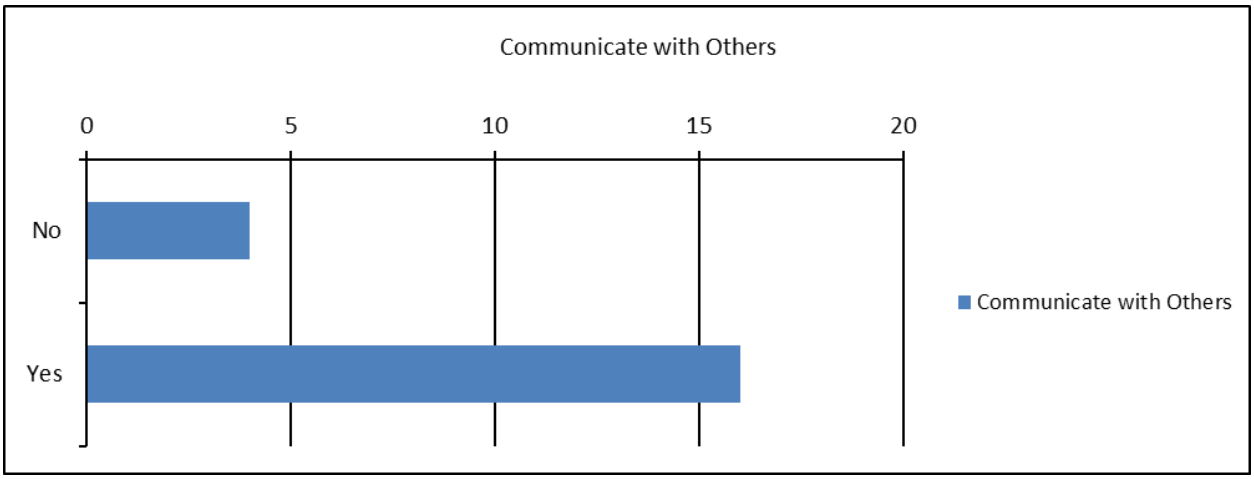

Figure 4.8 Prior communication with students of other discipline.

After collection of information related to demographics, prior IPE experience and Twitter usage, students were paired based on their availability and scheduled for the SocialSim experience and debriefing session. Following the simulation and debriefing session, semi-

structured interviews were scheduled and conducted at which time the students shared their personal perspectives regarding their experience which are presented in the next section.

Thematic Presentation

The primary aim of this study was to elicit student perceptions regarding the use of SocialSim as a method for delivering interprofessional education, specifically as it relates to communication and collaboration. The time spent during the semi-structured interviews proved to be insightful as students shared their individual experiences and thoughts. I continue this chapter by introducing the themes that emerged relative to the research questions. These themes are organized into three sections: (1) Affordances, (2) Challenges and (3) Influence on interprofessional education. The descriptive nature of these findings are intended to inform administrators and faculty as to how SocialSim may facilitate interprofessional education in addition to contributing to the broader field of healthcare simulation.

Affordances

Accessibility

Within the context of this study, accessibility refers to the ability of students to access or connect to the learning activity in addition to others (e.g. partner, patient, faculty, patient) using SocialSim. Given a traditional simulation activity, students are expected to physically locate to wherever it might occur. Typically this means students go to a campus-located simulation center or skills laboratory during specific operational hours. Often, students in healthcare professional programs are not geographically proximate (NLN, 2011). Mark was one of these students who exemplified the geographical challenge of being physically located at a site distant from campus

and other students, particularly those in different programs. Mark was assigned to a hospital two hours from campus for his third and fourth-year clinical rotations.

> You can be anywhere and do it. So, I'm in Tawas, the nursing student was in Detroit…I think you were in East Lansing and we were able to all collaborate and work through the case. I think that's probably the biggest advantage that I see to it [SocialSim].

What Mark did not know was that I was in a different city 90 miles from campus during the period of his simulation. SocialSim allowed the students and educator (i.e. myself) to interact in a manner that we would not have been able to otherwise. Also noted is that Mark's simulation was on a weekend during a time when he did not have competing demands on his time.

Another issue relative to access brought forth numerous times was the ability of SocialSim to accommodate students' schedules. A number of students mentioned the affordance of being able to connect to Twitter any time of the day and subsequently, their partner, patient and myself. Abby, a nursing student, describes the benefit of SocialSim and accessibility as related to time:

> I thought it was cool how Twitter specifically, was at our own schedule. We could tweet at our own schedule and receive tweets whenever we wanted. It wasn't like you had be online at a specific moment to receive the information. The information would come to your phone and you'd get notifications and then you could check it whenever you had time. I thought it was also cool that we had, you know, a partner that we could tweet back and forth and share both of our views on the scenario.

As indicated in the literature, confounding schedules of healthcare professional students presents a significant barrier to integrating IPE (NLN, 2011). Abby's comments reflect the affordance of

SocialSim to provide an accessible means for her to engage with her partner whenever her schedule allowed. One of the medical students, Maria, expressed similar sentiments:

> You know, I was at home and, and it'd be 8 o'clock at night but I could still respond and still communicate with the patient and my partner which was very nice. It was different from other ways of communication, you know, because you're not able to do that while you're doing other things.

While there is much debate in the literature regarding the impact multitasking has on learners, SocialSim is conducive to it. Maria expanded upon her thoughts related to access by addressing efficiency of the access:

> I do use social media to look for information quickly and for emails or whatever it is that's leading up to something. Being on the laptop computer or mobile device or whatever it is, I'm able to use it right away and I'm available right away. The nursing student was great; we talked back and forth through messaging and discussed what we thought was going on and which way to go and what to do and had that open line of communication. It was nice to communicate quickly and efficiently. In terms of the patient, they were able to get feedback in the appropriate time versus waiting and being unsure.

It is noted from the background questionnaire that most of the students in the study would fall in the Millennial generation which includes those born 1977 and 1992 (Noren, 2011).,,. According to the Nielson Report (2014), Millennials expect everything from smartphones to websites to mobile apps, to provide the most usable, self-guided, hiccup-free, efficient user experiences in history.. Maya's comments reflects the millennial attributes as she describes

SocialSim being able to facilitate continuous access, engagement and fun. As she references her peers as being from a "tech savvy generation", one might conclude that a significant number of other students would feel the same way.

> We are a tech savvy generation…most of my peers have Twitter and check it constantly. But I thought it [SocialSim] was very interactive, engaging and fun. I liked anticipating what videos or pictures would be uploaded and then tweeting after with my partner. I thought it was a fun exercise. As far as education is concerned, I found this to be a really great tool for that.

Enhanced Fidelity

According to the literature, students have repeatedly stated that they prefer high levels of fidelity when reporting their level of satisfaction with simulated learning activities (Jeffries & Rizzolo, 2006; Lapkin, Levett-Jones, Bellchambers & Fernandez, 2010). The students participating in my study varied in their views as to whether SocialSim enhanced or lacked realism or fidelity. While fidelity was not specifically addressed in my research questions, it became apparent in the interviews that students valued fidelity as contributing or enhancing the learning experience and therefore considered an affordance. Lack of fidelity as a perceived barrier will be discussed in the respective section.

In primary care, the norm is for patients to have a healthcare record which is accessed by providers in the interest of formulating diagnoses, treatment interventions and promoting optimal health and quality of life for their patients. The SocialSim experience began with dissemination of an abbreviated patient record with the goal of providing students an opportunity to learn about and care for their virtual patient as the simulation evolved. Nancy represents a number of

students who articulated the impact of this type of reality-based "prop" on the simulated experience and how this may replicate a realistic experience.

> My thoughts after looking at her chart and her phone call were immediately about teaching and planning nursing interventions, so it was pretty similar to how I approach things in the real life clinical setting.

Zach states, "I think just not having…even if it's a simulated patient not having that face to face was a lot different doing it by social media. I actually did think it helped to have a picture of her on Twitter. Just to…to make it feel a little bit more personal." He acknowledged that it was different from a face-to-face encounter, but yet appreciates the pictures embedded in tweet links as enhancing the reality of the case. These comments are congruent with the concept of "suspension of reality" in the field of simulation. This exists when learners are innately aware that a case or situation is not real, yet for the duration of the simulation, cognitive engagement and emotional responses occur. The concept of environment includes not only the physical setting but also the equipment, teammates, and other individuals involved in reproducing the desired situation. It also includes elements necessary to the way it is perceived and experienced (eventually even believed) by participants (Dieckmann, Gaba & Rall, 2007). Zach's comments suggest that details embedded in a simulation can overcome the reality that the situation is not real and the experience can ultimately promote an enriching learning experience.

Twitter allowed for embedding links to audio and visual clips into the tweets which had the benefit of not only enhancing fidelity but also appealing to students whose learning preferences emphasize auditory or visual components. Dawn describes her thoughts regarding these embedded links as follows:

> I liked having had her actual voice on there. That made the patient come to life, I guess you could say. I also liked how it seemed very realistic managing her diabetes and providing proper education. So I really like real voice was used which made it life-like. They also used layman's terms for her like a regular person not in the medical field, which I liked.

Hayes (2005) found that some virtual environments are not solely text-based and provide opportunity for learning via a wider range of modalities such as visual and auditory. There is an infinite number of pictures, audio and video available to embed into tweets. Therefore, SocialSim would offer an opportunity or affordance for educators to respond to student preferences.

Lastly, I argue that the perceived fidelity could be advantageous as a way to establish face and content validity of the case. For example, although I had sought input from multiple experts, if the case was designed in such a way that students did not find it plausible, it could be an indicator regarding the validity and subsequently have an impact on engagement and use of SocialSim.

Transfer to Practice

It is imperative for medical and nursing students to transfer learning to the practice environment. It is sometimes difficult to differentiate between the fidelity of a learning experience and transfer to practice as they can be so tightly coupled. For example, if an experience has a high level of fidelity, one might expect that acquired learning would naturally transfer to practice. I assert that they are different and that a learning activity with a high level of fidelity does not necessarily guarantee that students transfer behaviors to the clinical

environment. Therefore, I opted to separate perceptions related to the level of fidelity from those related to skills they thought they would use in the real world.

Paul shares his thoughts regarding the use of the chart as correlating with other realities of his as a student in the clinical setting:

> It really reminded me of when I come on the unit and I'm looking at my chart and I'm prepping for my day. I'm collecting all the information like the investigation portion, or the pre-assessment. I like looking over the labs and understanding the pathogenesis outside of my physical assessment and trying to understand, you know, from all the different resources. Then I can coordinate this with my physical assessment and go from there. I think it [SocialSim] was really similar.

Paul comments reflect the ability of SocialSim to replicate what he would expect in a real patient record. It is interesting considering recent attention focused on the viability for healthcare simulation to replace actual clinical experiences. In a recent study conducted by the National State Board of Nursing, results indicate that up to 50% of clinical experiences for nursing students can be replaced with simulation. The authors describe conditions necessary to exist in this situation including faculty members who are formally trained in simulation pedagogy, an adequate number of faculty members to support the student learners, subject matter experts who conduct theory-based debriefing, and equipment and supplies to create a realistic environment (Hayden, Smiley, Alexander, Kardong-Edgren & Jeffries, 2014). The ability for simulation to transfer directly to clinical practice is compelling and the degree to which it can debatable. Nevertheless, the use of modalities such as SocialSim to accomplish this objective may be more realistic in the future.

Zach describes yet another aspect of how SocialSim might serve as impetus to reflect on prior learning, assess current knowledge and apply to practice:

> So I was thinking while it [SocialSim] was going on that there's quite a bit that I probably could be researching, especially when I got the initial case. Just seeing the amount of problems that Wanda [simulated patient] had going on. It was kind of in my mind that I should look up guidelines and things. I thought it was good that I was able to refresh my memory on some of the things that I hadn't really taken a look in a little while, like the 10-year risk…uh, cardiac risk assessment. I hadn't used that in a few weeks, and there were a couple of other things too that I was checking out, so it was…it was a good incentive to kind of look up guidelines and things like that.

Zach recognized the need to reference prior learning in addition to the need to access additional information regarding what was going on with the simulated patient and SocialSim provided an opportunity to reinforce and contextualize key concepts. Mayer (1983) found that postsecondary students were able to recall conceptual principles and related information at a significantly higher rate when they were presented repeatedly. Thus, SocialSim can provide a venue to repeat and reinforce previously learned concepts in a different way.

Use of Informatics

An interesting and unanticipated affordance of SocialSim that emerged was the potential for SocialSim to facilitate learning related to healthcare informatics. Multiple students felt that it would prepare them for what they believe is the future of healthcare, specifically related to the use of technology to augment care of the patient. While the design and objectives of the simulation were not specifically intended to teach informatics, students repeatedly referenced

this in multiple interviews. As is often the case in healthcare simulation, secondary objectives emerged which warrants discussion.

One of the medical students, Tonya, expressed: "I think it's a different way, a different type of medicine that people might be using. It's like looking into the future." The use of technology to interact with patients, in this case SocialSim, seemed to provide a glimpse into the future and what her work might look like.

Lori generalized the prevalence of social media use and is perplexed that it is not used more often in healthcare:

> Social media is such a big thing nowadays. Everybody's on social media and it's becoming one of the primary ways to keep in contact with people...I think that our generation is becoming such a social media internet generation that I don't see why it isn't used more often in practice.

Given that the majority of students in the study fall within the Millennial generation, it is not surprising that she would respond in this manner. SocialSim provided the opportunity for Lori to conceptualize the use of social media in practice and has difficulty comprehending why it is not in the real world. According to Nelson (2007), the preferred learning environment of Millennials combines personal challenge with teamwork and technology. In Lori's subsequent comments, she exemplified how SocialSim supported teamwork and technology:

> I think it's [SocialSim] definitely something that should be put into practice. It's very helpful for the patient because it lets them know if they should come in or if they should not come in which we see a lot of times in like hospital settings and primary care settings.

> For example, patients don't come in 'cause they don't things are as serious when they should. So if they have the option to just post a picture on social media or tweet to their nurse, physicians and nurses might be able to catch something before it becomes even worse than it already was.

As previously defined, the use of technology to support care of patients falls within the realm of healthcare informatics. I assert that SocialSim provided an opportunity for students in the study to use technology to care for a patient in a virtual environment as evident in the interviews. This suggests that SocialSim can provide a venue for students to practice their informatics skills. It is also interesting to consider that SocialSim prompted students to reflect on what they envision the use of technology for patient care to be in the future.

Challenges

Technical Issues

Despite careful planning and piloting the simulation prior to broad implementation of the study, there were some technical issues that originated both from me and the students. The technical issues did seem to decrease significantly over the course of the study with students participating mid to end of the study having less technical issues than at the beginning.

One of the common issues at the beginning was the need to include the assigned hashtag and designated Twitter handle in every tweet in order for the students, patient and myself to connect to each other. As Eva states, "It was kind of hard just with having to make sure that we had everybody's Twitter handle in the hashtag for SocialSim 8 so that we could follow along with it." Some of the students contacted me via email conveying that they had not heard from me or their partner and upon investigation. I found most issues related to not including handles

and/or hashtags in their tweets. In addition, if students neglected to "follow" anyone else (e.g. their partner, patient or me) they were isolated from the activity. Another issue contributing to technical issues was that the simulated patient's settings were private. Therefore, without the use of assigned hashtag and permission, the students could not access the case.

Given that these functions are considered basic to the use of Twitter and I had distributed "Twitter Tips" on the first day, I was surprised students experienced difficulty particulary considering the Millennial-affinity to technology. Upon review of the background questionnaire results, I noted the disparity in self-described Twitter expertise in the study population and therefore, should not have assumed a higher level of technological ability than what actually was. Schaffhauser (2015) asserts that Millennials are not as tech-savvy as they think they are. Results from his study indicate that while the Millennials "are the first generation to grow up with computers and internet access, but all that time spent glued to a small screen hasn't translated to technology competence. While they spend an average of 35 hours every week on digital media, nearly six out of 10 Millennials can't do basic tasks such as sorting, searching for and emailing data from a spreadsheet." He goes on to suggest that opportunities to learn problem-solving using technology must become the rule rather than the exception and it is time for government, educators and other STEM advocates to ensure that all young people have the opportunity to become tech savvy.

Lack of Privacy

Students referenced privacy as being an issue in two different ways: 1) social media as public platform may violate privacy of the patient and, 2) student privacy was compromised. Zach shared his thoughts regarding his work being visible:

> Just the idea of putting information out there that is going to stay out there and then obviously on Twitter if you do…and if you're not doing a direct message, everybody could potentially see that information, so it made me think a lot more even though it's a simulated patient. It made me think about the type of information that I would…that I would put out there and versus what I would maybe want to send in a direct message or, or make a phone call or see somebody in person. So that…that was an added factor for sure.

It appears Zach contemplated whether he should tweet information related to the patient or not. Regardless of the fact that the patient was not real, he still felt an ethical obligation to protect his patient. Alexis brought specifically referenced the Health Insurance Portability Act (HIPPA) by stating "I had some concerns about HIPAA and privacy. Twitter isn't protected or encrypted and I was afraid everyone was seeing what I was tweeting with my patient. So that was a little bit odd. We usually get patient consent for this sort of thing." One of the nursing students, Audrey, was able to acknowledge the fact that while HIPPA is an issue to consider, when considering the context and fact that this was a simulated educational experience, it was acceptable: "You know HIPAA's huge and it's probably not likely that a real patient would be taken care of on Twitter, uh but as an educational activity, I thought it was cool."

A major goal of HIPPA is to assure that individuals' health information is protected while allowing the flow of health information needed to provide quality care (United States Department of Health and Human Services, 2003). Healthcare students are required to participate in HIPPA training early in their curriculum (American Association of Colleges of Nursing, 2008). It is apparent that students internalized their knowledge related to HIPPA and

subsequent need to protect the privacy of their patient, even though she was not real. Miranda, was concerned about privacy regarding others who might see her tweets:

> It was uncomfortable because I was thinking from my end whenever I tweeted I wondered if my friends could read it or who else could see this even though I, you know tagged Wanda in it. Maybe it's just my naivety and not really…you know my ignorance with the program and how to use it. I also wondered if my other patients are reading this. Those are the things that I was thinking about.

Another medical student, Amber, was concerned about future implications of her tweets and care of the simulated patient: "I was afraid a residency director might see my tweets and what if I was doing something wrong? What if I ordered the wrong thing? They might not want me in their program…" Despite careful planning of the simulated experience and setting the security within Twitter to private in an effort to sequester any and all SocialSim communications, it seemed to still be a concern for students. I am not certain if they remembered or understood the security settings that did, indeed, protect all information and communications related to the case. My primary motivations for private settings were to comply with the Family Educational Rights and Privacy Act (United States Department of Education, 1974) and protect intellectual property. I had not considered future professional ramification for the students or at least, their perception that it would have an impact on their reputation or future.

Lack of Fidelity

Contrary to prior discussion related to enhanced fidelity of SocialSim, there were some students who felt the fidelity of the simulation was not plausible as compared to real clinical situations. Paul shares his thoughts:

> I felt like it was a lot harder to get information. And then the information I needed wasn't available because of a time lapse. It was different from of being with them right now asking questions and getting immediate responses. So that was a little difficult. You can't really read their emotions with messaging, so that was a little difficult, too.

Paul's perception regarding the lack of realism or fidelity of SocialSim reflected the difference in provider-patient interactions using SocialSim than those in real life that elicit immediate responses. Due to the nature of Twitter, unless all parties are accessing at the same moment, the communications will be asynchronous in nature. In addition, the lack of human emotion with SocialSim was perceived by Paul as problematic and not typical of real life. One of the nursing students, Eva, describes her perception that SocialSim was significantly different from real life:

> I think that the audio and the picture really helped but I think that it also was very different than caring for a real patient. You know when you're assessing in real life and looking at the patient you're assessing a lot of the different things at once. With SocialSim you really kind of – you don't really get the full picture.

Eva appreciated the audio and visual clips that were embedded in the tweets, however, still felt the need to have a comprehensive and holistic view of the patient that was not possible in segmented tweets. Considering these Paul and Eva's comments, Maria suggests that the fidelity of SocialSim may be conditional:

> I think that in this case from my experience with the family med docs, they probably would've wanted to see her and wouldn't have wanted to just do something only with the precursory information that we had. But for things that are recurrent, if she had had this

several times before and it's the same kind of thing, then I think that something similar could happen in a primary care office.

Based on Maria's prior experience in a primary care setting, she did not believe that a patient would be cared for in the same manner as with SocialSim. However, given certain circumstances such as a recurrent health issue, it seemed plausible.

There is widespread belief that simulation experiences (and effectiveness) improve proportionately as the precision of the replication of the real world improves. Under this assumption, a perfectly realistic simulation becomes the gold standard. This view has been criticized early and repeatedly in various fields working with simulation. Some studies have failed to show positive effects of higher fidelity on training outcome, and others have shown that relatively low fidelity simulations can be effective (Dieckmann, et al, 2007). Consideration of the students' perception related to the realism or fidelity of SocialSim, its limitations and affordances, are important when identifying the simulation method during the curriculum design phase and weighing these against the desired outcomes. The decrease in fidelity may not be relevant or prohibitive to a positive learning experience. Regardless of the chosen method, artificial or virtual patients cannot entirely replace real-life patient experiences, however may be able to augment.

Lack of Personal Contact

Another theme that resonated among multiple students was their need for more personal or physical contact. Darlene, a medical student, articulated it best by saying, "I'm in an osteopathic school and we're big on touching the patient and making them feel comforted, and

I'll tell you that was lost." In Mark's opinion, the lack of personal contact with the patient also had an effect on the fidelity of the case:

> I've never had patients who have come in with pictures of what something looked like in the past but you also have them there to kinda check up on how it looks now. So just not getting that patient contact is very different because she had a few things that we'd be worried about that it's, it was hard to address everything just through tweeting back and forth about things we're worried about.

Audrey thought the lack of physical presence prohibited the need to physically assess the patient and hindering the quality of care:

> It was definitely hard because you can't physically see them; you can't physically assess them. A lot of what my assessment skills are based on physical findings, so it was sort of hard to just go by the subjective information I was given and not physically assess the patient.

When I probed further and reoriented Audrey to the fact that the context was within the primary care environment, she seemed to change her mind a bit: "Um, yeah, I guess so. I think a lot of times doctors and nurses care for patients over the phone in the office or when they're on call."

Given the nature of practice-oriented healthcare professions and need for physical contact in order to perform important basic skills such as physical assessment, it is not surprising that the students recognized and missed the personal contact that is not possible via a social media platform.

Text Limits

When I asked students to recall some of their challenges, most prevalent was the text or character limitations of Twitter. In fact, during analysis, I was surprised at the magnitude of this complaint as being unanimous. The text limit of Twitter is 140 characters per tweet and includes the handle, body and hashtag(s). This is a unique feature of Twitter and is mentioned in the literature as being a limitation with Twitter. However, there are other functions built within Twitter that support other means of connection allowing more text, such as direct text messaging. Students were provided with this information in the "Tips" document (see Appendix D) on the first day of the study with the goal of minimizing this potential barrier.

There were a number of consequences noted by students resulting from the text limitation. Tonya expresses concerns about missing important information as a result of the limitation:

> I think it was difficult because you have only 140 characters so I didn't know if I could always able to see the full story. I feel like sometimes if you're, you're using some sort of social media device like Twitter where it's limited in terms of your characters, it's kinda nice in the sense that you discuss what's most important but at the same time you might be missing details using social media and communicating.

Tonya does recognize a benefit of the text limitation as prompting prioritization of issues to discuss with their partner and the patient. Maria's response was similar; however she addressed the necessity to embed hashtags and handles within a tweet:

> With the um hashtags and handles and everything, it took a lot of your characters away and so not being able to like explain why I was thinking things or why I would want a certain test was kind of frustrating.

Depending on how long one's Twitter handle is and the hashtag used, it could have a significant impact on how many remaining character spaces are available for the tweet. The ability for students to completely convey thought processes, share information and ask comprehensive questions could be therefore be hindered by the text limitation. Eva exemplified this:

> I think the character limit was…was pretty brutal because putting both Wanda's handle and my partners handle in there and then also the hashtag which took up more than half of the characters and so the character limit was my biggest problem in terms of communication I would say.

The text limitation inhibiting communication could have a direct impact on interprofessional interactions which will be discussed in the next section.

Influence on Interprofessional Education

The last area of interest relative to the third research question is how SocialSim influenced interprofessional education, specifically communication and collaboration between disciplines (e.g. medicine and nursing). Literature suggests that other simulation methods have a direct impact on learning since simulation and is often a shared, social experience, contrary to other instructional media (Dieckmann et al. 2007). I was particularly interested as to whether SocialSim as a simulation method may have a perceived effect on interprofessional education specifically related to collaboration and communication skills that underpin effective interprofessional care of patients. I found during the interviews and analysis that often times

these two skills were interwoven and interdependent. For example, students needed to communicate in order to collaborate and expressed as such in the interviews. Elements of collaborative practice include responsibility, accountability, coordination, communication, cooperation, assertiveness, autonomy and mutual trust and respect (Brown, Lewis, Ellis, Beckhoff, Stewart, Freeman, & Kasperski, 2010). Because it is difficult to segregate collaboration and communication completely, some elements of each will be found in the next two sections.

Collaboration

The attribute of SocialSim that students seemed to appreciate the most was the opportunity to collaborate with one another. It was an interesting and rewarding experience to observe the collaboration that occurred between pairs of students during the simulation experience followed by their perceptions shared during the interviews. The nature of the collaborations varied among the pairs. Typically, the students collaborated with each other regarding the diagnosis, or underlying cause for the patient's complaints followed by their agreed upon plan of care. Mark describes the collaborative nature of interactions with his partner as:

> …based on the first tweet, we were thinking in one direction but then looking at the second video, I asked the nursing student, "This I think and this is what I think we should do, what do you think?" And then she said, "I agree with what you're suggesting and I think we should also do this. We both had our own things and came together. We were both discussing and agreeing on what we should do and so forth.

Some students appreciated SocialSim as promoting a team-based approach with a "two is better than one" ideology. This is exemplified by Erik's comments.

> Two sets of eyes, two brains…if one of us missed something in the labs and the other brought it up as an issue, you start thinking about other things that might be going on with the patient. I thought that was good. I prefer working in teams so…

Considering once again the age group of the participants and the tendency for Millennials to thrive with team-oriented activities, it is not surprising that the students enjoyed working as a team with SocialSim. Zach takes this concept further and elaborates by sharing his thoughts.

> What I liked was that she [partner] had a different perspective than I did. I felt like when I pulled up the case [Twitter] I was quickly thinking about disease states and med changes and diagnoses and she [partner] was thinking more along the lines of education and lifestyle kind of things, I thought that was good because… I guess it's a little lower on my list than it should be, so it was nice to have somebody with a little bit of different perspective on that, so…the idea of directing questions to somebody else to involve them was helpful. I would have liked more of a kind of bouncing ideas back and forth, but it was nice to feel like there was a team there so if I said something that was kind of off the wall, she could at least check it and we could correct each other. Not that this happened but if there was something that…that kind of got put out there, we'd be able to work through it together. It wasn't just me and the patient, there was somebody else to look at…look at things as well to be able to check what I was saying. Just being able to have, a team approach and a patient case because I know that personally I can really hedge myself in to a certain diagnosis or to just any area that I'm focusing in on that I want to work on with the patient.

These examples suggest that SocialSim provided a platform and case scenario conducive to collaboration and problem-solving.

Also frequently shared by students during the interviews was that the opportunities to collaborate with students in other disciplines was lacking and SocialSim provided a means to overcome this deficiency. An example of this is reflected by Alexis:

> I thought it was cool to talk to, like get that chance to like collaborate with nursing students because we don't really get that much in our training at all. Especially like, in my first two years of school we never talked about like what kind of things that we needed to tell nurses or what their education level is or how, what they know and what they, they can teach us. So I thought that was really helpful.

As evidenced by the background questionnaire, most students had previous opportunities to collaborate with students of the opposite discipline. It is interesting to note the number of times students mentioned the lack of opportunity to collaborate with other disciplines during the interviews which I found was not congruent with the background questionnaire. This may be indicative of a lack of consistency or standardization on the part of academic programs to provide collaborative opportunities for students. It may also be that the frequency of opportunity was such that it did not have a significant impact. For example, while they reported on the survey that they had previous opportunity, it may have only one time or not significant.

Communication

Effective communication across multiple healthcare disciplines and professions is critical to ensure the delivery of safe and efficient care (Abu-Rish, Kim, Choe, Varpio, Malik, White, Craddick, Blondon, Robins, Nagasawa, Thigpen, Chen, Rich & Zierler, 2012; Greiner & Knebel,

2003). The study participants shared differing perspectives regarding the ability of SocialSim to promote communication with each other. The majority of students felt that SocialSim was able to support their ability to communicate with each other.

Conversely, a few students felt communications were more parallel than bidirectional as evidenced by Erik's comments:

> I was hoping that there would be more back and forth, more um kind of discussing what we thought was going on and I felt like we were kind of at parallels at times. I was talking to the patient and was thinking through some of these things. She [partner] was also talking to the patient and thinking through these things, but we weren't really discussing them together and, and coming up with a plan of action or maybe even a top…a top three of what in terms of importance what should be tackling in order and then how are we going to move forward, what kind of follow-up do we want with the patient.

Unfortunately, one student, Paul, conveyed his partner had not interacted or responded to him throughout the entire simulation. While I had observed this from the periphery and attempted to prompt his partner to communicate via tweets, she did not respond. What was particularly compelling and interesting was that Paul, despite participating in SocialSim unilaterally, was still able to communicate with the patient and ultimately gain something from the experience. He enjoyed interacting with students of both disciplines during the debriefing and stated, "I learned so much." Simulation literature consistently points to debriefing as being the "heart and soul" of healthcare simulation (Fanning & Gaba, 2007). It is during this period that guided reflection, processing of information and sharing among participants occurs. There is an abundance of literature supporting the value and importance of quality debriefing in simulation, however, very

little related to promotion of quality debriefing for inteprofessional simulation (Littlewood & Szld, 2015). The comments expressed by Paul suggest that the quality of the debriefing may have an effect on the SocialSim experience and consequential learning.

Many of the students appreciated the "just-in-time" nature of SocialSim. According to the Nielson Social Media Report (2014), Millennials have different communication habits, and are way more connected and in-tune with technology and online culture. Growing up with access to information at their fingertips, they have become accustomed to an on-demand lifestyle, expect a seamless shopping experience, and won't hang around for long if they don't find what they need. Martha exemplifies many of the students in the study who had an affinity for SocialSim's "just-in-time" delivery:

> I do use social media more often than I'm sure other people do. I look for information quickly for, for like an email or whatever it is that's leading up to something. Whether on the laptop computer or mobile device or whatever it is, and I'm able to use it right away and I'm available right away. The nursing student was great… we talked back and forth through messaging and we discussed what we thought was going on [with the patient], and which way to go and what to do. We had that open line of communication and it's not to say like everybody's gonna be like that but just – it worked out for us. We were both able to communicate quickly and efficiently. In terms of the patient they were able to get feedback in the appropriate time versus waiting and being unsure.

It is interesting given that some students expressed frustration with the asynchronous nature of SocialSim and lag time as discussed previously but yet others perceived SocialSim as providing immediate access to communication. Dawn stated, "It was nice to be able to do it in the comfort

of my own home but then I would sometimes have to wait a few hours for responses and then have to go someplace but I think the positives outweighed the negatives."

Lastly, many students perceived social media as a futuristic method to communicate with each other in addition to their patients. Dawn shares her prediction:

> I could see in the future this kind of communication coming to the healthcare setting. I thought it was cool. I was like very excited to be a part of it 'cause I think with how healthcare is now and how social media and just everyone is, seems to be connected all the time that this is kind of where healthcare is headed a little bit in terms of communicating with people.

Whether or not Dawn's prediction comes to fruition in the healthcare arena or not, it is certain that social media is here to stay in one form or another. The use of social media as a vehicle to support interprofessional education communication skills appears to have both pros and cons.

Summary

I have presented multiple perspectives of medical and nursing students regarding the affordances and challenges related to the use of SocialSim. I developed SocialSim with the intent to facilitate a simulated interprofessional education experience situated within a virtual environment; in this case, using social media (Twitter). My primary interest given the early stage of SocialSim, was how the students felt about this tool prior to pursuing further development and subsequent inquiry. As evidenced in the interviews, there are many factors to be considered.

It is also important to consider the broader arenas of healthcare delivery and higher education. The current crisis in primary care in the United States presents challenges to

healthcare leaders and policy makers. Unprecedented demand for care coupled with poorly trained healthcare teams creates the "perfect storm" for adverse events (Schuetz, Mann & Everett, 2010). This creates opportunity for administrators and faculty in higher education to better prepare healthcare professional students for contemporary healthcare by developing interprofessional team skills. According to Thistlewaite (2012), "Interprofessional learning must be interactive, whether it takes place in a classroom, clinical setting or online (p. 59)." While interprofessional education to prepare students to deliver quality care is not new, progress has been slow considering the roots of IPE dating to the 1980s (IOM, 2009). Innovative methods such as SocialSim to ignite progress and overcome barriers are desperately needed.

There are two primary contributions of this study. First, it provides an understanding of students' experience and perceptions regarding SocialSim in an effort to inform administrators and faculty as to how this type of methodology it may be integrated into interprofessional education. Second, it contributes to the broader field of healthcare simulation. What began as an idea during an elective course came to fruition as I pursued my inquiry. Many lessons were learned from the students who shared and contributed to my journey. The next chapter will focus on further discussion of the results, implications for practice and suggestions for further research

CHAPTER 5: DISCUSSION AND CONCLUSIONS

This descriptive study examined the potential for SocialSim to facilitate simulation-based interprofessional education from the perspective of medical and nursing students. In light of increased need to integrate interprofessional education (IPE) into curriculum, I sought to answer the following research questions:

1. What is the influence of SocialSim on simulation-based interprofessional learning activities for medical and nursing students?
2. What are the affordances and challenges to the use of social media microblogging platform (i.e. Twitter) to deliver SocialSim?
3. What is the influence of SocialSim on communication and collaboration between medical and nursing students?

The conceptual basis for my study is underpinned by the framework that I developed based on review of literature and my professional experience (Figure 6). The inner circle represents faculty and students engaged in teaching and learning within a virtual environment with bidirectional arrows indicating communication and collaboration among all. The faculty member transforms from teacher to learner and together with the learners, co-creates knowledge (Lave & Wegner, 2008). Using SocialSim, I was able to interact between students and observe them interact between themselves. Components of the simulation activity were scaffolded in such a manner that allowed systematic presentation of information at intervals promoting the ability of learners to process, communicate, collaborate and formulate a plan of care. I was able to systematically send this information in tweets via Twitter, ask questions and encourage students to probe deeper into the case. The middle circle represents interprofessional education

and that the learning activity is situated within the IPE domain. Lastly, the large circle represents the larger arena of clinical practice. The assumption is that the learning activity will prepare students for an interprofessional approach to patient care. Underpinning the conceptual framework are experiential and situated learning theories. In my study this experiential learning activity is SocialSim and it is situated within a virtual environment-social media. SocialSim was designed to facilitate faculty-guided teaching and learning within a virtual environment in order to teach interprofessional skills to prepare learners for contemporary clinical practice.

In this chapter, I will present the discussion in sections correlating with the research questions. I will make connections to the conceptual framework and literature within each section in an effort to promoting deeper meaning and understanding of the major findings. I will then discuss implications for practice specifically as it related to higher education and the field of simulation. Lastly, I will present specific recommendations and limitations learned from this study.

Discussion

Research Question 1

Question 1 sought to answer what students' thoughts were regarding the influence of SocialSim on simulation-based interprofessional learning. The majority of students expressed appreciation regarding the opportunity it provided to interact with students of a different discipline. While most of them had previous IPE experiences prior to the study, it was often described as a one-time activity. The SocialSim activity influenced interprofessional learning by providing a structured and carefully designed opportunity to incorporate interprofesional learning simply by providing a venue for them to interact.

Students detailed their interactions with each other and how they approached the care of their simulated patient. Though they were not in the same physical space, the shared virtual space SocialSim is situated in provided an opportunity to work together centered by a shared case.

The students also referenced application of previously learned skills such as gathering of patient information, diagnosis and discipline-specific interventions. Malcom Knowles' andragogy, or "the art and science of helping adults learn" (as cited in Merriam, 2004) is based on five assumptions. The assumptions most relevant to this discussion are the adult learner is someone who (a) "has an independent self-concept and who can direct his or her own learning", (b) "has accumulated a reservoir of life experiences that is a rich resource for learning", and (c) "is problem-centered and interested in the immediate application of knowledge" (p. 203). Thus, according to the theory of andragogy, the students are self-directed, have prior knowledge to draw upon, enjoy problem-solving and appreciate relevance and immediate application. Inteprofessional education relies upon many different theories to substantiate learning activities. Drawing from andragogy, SocialSim influences interprofessional education since students need a certain degree of self-direction in order to actively participate, immediately apply previously learning knowledge and approach the case in an effort to problem-solve.

According to the literature review conducted by Issenberg, McGaghie, Petrusa, Gordon and Scalese (2005) under the Best Evidence Medical Education (BEME) Collaboration, ten consistent features and uses of simulation were found to be beneficial to the development of every healthcare professional and include:

- Immediate provision of feedback during the learning experience

- Ability for simulations to integrate into the overall curriculum
- Ability to practice increasing levels of difficulty
- Adaptability to multiple learning strategies
- Capacity for clinical variation
- Controlled environment without injurious patient consequences
- Individualization of learning and ability to reproduce standardized experiences
- Clear outcomes
- Realistic, relevant practice

When considering the features of SocialSim, most of the above would apply. It is possible for faculty to provide feedback via tweets at any time in addition to the debriefing. I argue that the potential for SocialSim to be integrated into the curriculum would be comparable to other simulation methods. It is also possible for SocialSim cases to be designed for varying levels of difficulty and variety of clinical scenarios. Standardization would be facilitated as multiple pairs or groups of students could be exposed to the same clinical experience which is impossible in actual healthcare environments. Most importantly, the students can practice interprofessional and clinical decision making skills without the risk of harming real patients. The one use of SocialSim for development of healthcare professionals that would be difficult to determine is clear outcomes. This is term is ambiguous since outcomes can be measured by many different benchmarks.

Students often referenced their belief that the SocialSim activity prepared them for what they foresee as the future of healthcare and their respective role within that arena. The Quality and Safety Education for Nurses (QSEN) project addresses the challenge of preparing future nurses with the knowledge, skills, and attitudes (KSAs) necessary to continuously improve the quality and safety of the healthcare systems within which they work. QSEN articulates that effective simulations being able to engage students in realistic problems that require clinical data

and decision-making, along with the opportunity to reflect on their practice. QSEN further recommends that when designing simulation scenarios, an effort be made to thread elements of patient-centered care, teamwork and collaboration, evidence-based practice, safety, and informatics (Jarzemsky, 2010). SocialSim demonstrated the ability to engage the students centered around a realistic problem that included clinical data and supported decision-making. Again, the debriefing provided an opportunity for reflection.

At the Interprofessional Education and Healthcare Simulation Symposium (2012), known as IPEC, 29 leaders representing 27 key healthcare professional organizations, including those from nursing (i.e. American Academy of Colleges of Nursing and National League for Nursing) and medicine (i.e. Association of American Medical Colleges and The American Association of Colleges of Osteopathic Medicine), presented research findings substantiating healthcare simulation as an effective vehicle for interprofessional education. In summary, there was agreement that simulation in all of its modalities–task training, team training, immersive experiences using standardized patients or manikins, screen-based simulations, virtual reality, serious gaming—is a powerful tool that should be leveraged in IPE.

Lastly, considering historical aspects of both healthcare simulation and interprofessional education, there has been a logical synergy between them. According to Palaganas, Epps & Raemer (2014), healthcare simulation has features which are advantageous over other educational techniques such as:

- Close resemblance to actual clinical practice
- More objective simulator scores (assessment)
- Ability to assess psychomotor skills

- More relevant feedback
- Learner identification of educational needs
- Ability to vary conditions
- Student motivation to practice specific tasks

Students expressed that SocialSim provided a situation similar to what they would encounter in clinical practice. The ability to vary conditions within the simulation and provide relevant feedback is also easy for faculty to accomplish with SocialSim. Not as feasible is the ability to assess psychomotor skills and practice of tasks would be limited to those that could be replicated virtually.

Based on results of my study combined with the current body of research substantiating simulation for interprofessional education, SocialSim influences interprofessional education by providing a platform or venue for students to interact, apply knowledge and skills, problem-solve and engage in reflective practice. I argue that it is a new addition to the menu of healthcare simulation options administrators and faculty may consider. As presented in this section, SocialSim has the ability to influence interprofessional education in many ways.

Research Question 2

In order to answer question 2, the students shared valuable insight regarding the affordances and challenges of the chosen social media platform, Twitter, to deliver SocialSim. Collectively, they provided the perspective I needed to critically examine SocialSim through the eyes of the student. This information is important to consider as choices are made regarding the methodologies best supporting a specific population of students in addition to programmatic objectives. In this section, I will discuss the affordances and barriers identified by students in an

effort to answer the second research question. Some of the themes that emerged were very similar and intertwined and therefore will be combined in the following sections.

Accessibility. The ability of SocialSim to facilitate access to learning was appreciated by most of the students. The concept of accessibility was manifested in my study in a variety of ways: (a) access to the information or case using technology, (b) access to each other in the interest of inteprofessional encounters, and (c) and timeliness or flexibility of the access. Online learning environments provide an unprecedented opportunity for students to access learning in higher education. According to Adams, DeVaney and Sawyer (2009), the design of virtual learning environments for post-secondary instruction is rapidly increasing among public and private universities. The social aspects of teaching, learning and educational practice are changing to accommodate rapidly emerging communication technologies and there is a growing demand from students for delivery of educational activities not tied to a physical place or set time. In recent years, online learning practices have evolved into virtual learning environments. The positive side of this is the ability to create high quality, responsive, and engaging learning environments that foster engagement between faculty and students (Topper, 2007). There are a variety of reasons for the increased demand and use of learning activities in higher education facilitated by educational technologies, which include the need to expand access, offer students greater scheduling flexibility, the freedom to work at their own pace and curb increasing cost (Bell & Federman, 2013).

In contrast to students appreciating the access and flexibility afforded by SocialSim, a few students indicated that they did not like the lag time or having to wait for their partner to respond. Dziuban, Moskal, Brophy and Shea (2007) attribute this attitude as being typical of Millennial students as they have been accustomed to a hyper-rich media environment where "on

demand" access is the norm and will express dissatisfaction with any learning situation that does not involve their preferred modality. The authors suggest that development of instructional technologies in higher education with the "compelling power to captivate in an asynchronous learning environment" (p. 92) is necessary. The root cause regarding why some students felt the asynchronous nature of the microblogging platform, Twitter, to be problematic while others did not was left unanswered and is an area for further exploration.

Fidelity. Fidelity was perceived as both an affordance and a challenge. While some students conveyed that SocialSim was realistic and similar to caring for a patient in real life, other students did not. The underlying issue related to the lack of realism seemed to be the inability to see or touch their patient. When probed, the students typically conceded that it is plausible in primary care for healthcare providers to care for their patients without seeing or touching them. For example, a patient may call a clinic complaining of back pain. A healthcare provider can gather information over the phone and suggest interventions without the patient having to be seen face-to-face in the clinic.

Palaganas and Rock (2015) state that "team engagement depends heavily on the realism portrayed and facilitated through the simulation experience…Realism in healthcare simulation occurs at three levels of fidelity: physical fidelity (how real the environment and people appear), conceptual fidelity (the degree of each person's engagement) and emotional/experiential fidelity (the interactive impetus that creates the emotions and experience)" [pg. 116]. I argue that SocialSim does have the ability to replicate realistic clinical situations, however, is dependent upon the context of the case, engagement of the students in addition to their commitment to interacting in a virtual environment.

Privacy. A significant number of students expressed discomfort with regard to the lack of privacy SocialSim provided for their patient and for themselves as learners. Despite that fact that I had utilized the privacy settings within Twitter, it was nevertheless still an issue for the students. While I would like to attribute some of this to the fidelity of the simulation in that they were so immersed that it was difficult for them to differentiate the "fake" patient from a real one, I cannot dismiss their concerns.

Concerns regarding the student's own privacy and perceived ability for others to see what they were tweeting on social media is problematic on multiple levels. A fundamental characteristic of simulation-based learning is the establishment of psychological safety (Council for the Accreditation of Healthcare Simulation Programs, 2012). For students to fully engage in simulation, their fears and insecurities need to be addressed (Palaganas, 2012). Gaba (2013) and Truog and Meyer (2013) state that anyone who has a role in simulation needs to consider the psychological effects of simulation on leaners and be responsible to themselves and the learners.

Another issue is the potential for giving students mixed messages. HIPPA compliance is emphasized and expected in face-to-face experiences. If sensitive health information related to the simulated patient is shared in the virtual setting, students may experience confusion as the behavior is accepted in one context and not another.

The perceived lack of privacy definitely impacted the psychological safety of the students and was unanticipated on my part. This had an adverse effect for some students as they did not feel comfortable posting tweets, which could have inhibited their desire to fully engage and interact in the simulation. I will never know what they might have posted had they not had these concerns.

Technical issues. There was a general dissatisfaction regarding the character limit (e.g. 140) allowed on the Twitter platform. While a few students acknowledged that it prompted them to be more succinct in their communications, most found this to stifle their ability to express complete thoughts and interact with each other. This challenge could have been circumvented by using the direct-messaging feature available within Twitter, however, only one pair of students recognized and used this feature despite the information provided in the "Twitter Tips" document (see Appendix D).

Twitter users are reliant upon the product as is, barring any periodic updates. Therefore, educators are not able to revise or customize the platform. There were a few technical issues, however, which may be overcome. First, simply the inexperience of the students and myself with SocialSim hindered the ability of SocialSim to facilitate the interprofessonal education activity for those participating at the beginning even after the pilot. This did improve over the course of the study as I became more experienced and was able to assist the students more effectively as time went on. An example of this is when students did not "follow" each other or the patient right away. The "pathway" was not created and thus, communications were stalled until it was corrected. Once I had figured this out, I was able to avert this with subsequent pairs by including it in information provided on Day 1.

Use of Informatics. Students expressed appreciation for SocialSim to provide an opportunity for them to use technologies that they will use in the future. Engelbardt and Nelson (2002) asserted over a decade ago that planning and implementation of educational activities to teach informatics skills to healthcare professionals is necessary. Since then, the accrediting bodies for nursing (American Colleges of Nursing, 2013) and medicine (American Osteopathic Association, 2015; Accreditation Commission on Colleges of Medicine, 2016) articulate an expectation that

informatics knowledge be integrated into baccalaureate nursing and medical education. In addition, the Institute of Medicine (2003) identified the use of informatics as one of five competencies necessary to work in interprofessional teams.

While the initial intent of SocialSim was not designed to facilitate integration of informatics in healthcare curriculum, it is apparent that it may warrant consideration based upon students' feedback, accreditation requirements and public policy initiatives.

Transfer to practice. Arguably, the primary goal of any experience in healthcare education is to prepare students for clinical practice. Maginnis & Croxon (2010) found that there needs to be parity between what is taught and what is experienced to ensure safe practice. While I did find an abundance of literature related to the use of simulation to promote self-efficacy, acquisition of psychomotor skills, and installation of interprofessional team skills in order to promote safe care, literature was scant with regard to how these acquired skills directly translate to practice and even less to the degree that it affects patient outcomes.

Based on findings in my study, SocialSim can provide a platform for students to practice, apply and reflect on learning generated by the case and interactions with their partner. The students were able to make a connection between the simulated case and real clinical care. However, it is unclear to me as to whether they would transfer learning specifically from the use of SocialSim to real clinical practice and would be an area for further inquiry. There are a few theories to consider with regard to the ability of SocialSim to support the transfer of knowledge to practice. First, Kolb's Experiential Learning theory as discussed in the literature review acknowledges the experience followed by reflection and application to practice. Another theory

that may be considered is Transformative Learning. Jack Mezirow described a transformation of perspective as going through ten ordered phases (Cranton, 2006, p. 20):

- Experiencing a disorienting dilemma
- Undergoing self-examination
- Conducting a critical assessment of internalized assumptions and feeling a sense of alienation from traditional social expectations
- Relating discontent to the similar experiences of others recognizing that the problem is shared
- Exploring options for new ways of acting
- Building competence and self confidence in new roles
- Planning a course of action
- Acquiring the knowledge and skills for implementing a new course of action
- Trying out new roles and assessing them
- Reintegrating into society with the other perspectives

As students participated in the SocialSim activity, they shared a problem (i.e. case) which presented an opportunity for them to self-examine how they would approach the problem, conducted critical assessment of how they might have approached interprofessional care in the past, recognized the shared experience, explored new options to approach the care of the patient, planned a course of action and tried out new roles. The ideal would be for students to become more confident as a result of the learning activity (SocialSim), become competent members of an interprofessional team and then integrate this into their future practice.

Lastly, when considering the conceptual framework, SocialSim was effective in providing a platform for faculty and two students to interact bidirectionally during the simulation and then as a group during debriefing. This was situated within the context a realistic primary care case scenario using a virtual environment (Twitter) to facilitate interprofessional communication and collaboration. The desired outcome, while not measured, would be for the students to be able to transfer knowledge gained from the activity to their clinical practice. Given the nature of social networking platforms such as Twitter, SocialSim promotes the social aspects of learners constructing their own knowledge through their experience(s).

The students shared many examples of how they were able to apply previously learned skills to their simulated virtual patient. Multiple studies support simulation as preparing students for clinical practice whether it is psychomotor skills, attitudes or behaviors. One of the most notable and debated studies in recent time is the National Council of State Boards of Nursing (2014). This was a multi-institutional randomized controlled study with 666 nursing students comparing varying percentages of simulation replacing hours in a real clinical environment on clinical competency and nursing knowledge. The researchers found no significant difference in these skills when replacing 25% and 50% of real clinical experiences with simulation. In a systematic review, Zendejas, Brydes, Wang and Cook (2013) concluded that there were moderate patient benefits when simulation was incorporated into medical education. Therefore, SocialSim may provide an opportunity for students to apply didactic knowledge with the hope that it has a positive impact on actual clinical practice. Measuring this would warrant further inquiry outside the scope of my study.

Faculty Affordances

Over the course of implementation of the simulation, I noted some affordances for the faculty. Even though my study was relative to the students' perception, I feel it is worth noting in this section since they may have had an impact on the experience. First, I was able to facilitate the simulation from locations varying within a 120 mile radius at any time of the day. I also appreciated the ability to scaffold the simulation in a customized manner according to what each pair of learners was doing. For example, one pair of students progressed quickly through the simulation arriving at a diagnosis and appropriate interventions quicker than other pairs. I was able to tweet probing questions prompting them to focus on underlying issues with the patient. Finally, I was able to monitor activity using Hootsuite, which is an online social media management program. This enabled me to visualize frequency of interactions between student pairs and when I noticed activity decreasing, I sent tweets "from the patient" with the goal of increasing engagement.

Research Question 3

The third research question was intended to explore how the students perceived the influence of SocialSim on communication and collaboration between them. There are many skills integral to effective interprofessional care; however, these two were identified most frequently in the literature as being fundamental to interprofessional education and therefore were the skills I focused on in my study.

It became apparent that SocialSim did influence the communications and collaboration between the students, both positively and negatively. Overall, the students appreciated the opportunity SocialSim provided for both interprofessional communication and collaboration.

Most of the students liked the "just-in-time" aspect of SocialSim, however, a few found that the asynchronous nature of Twitter prohibited immediate access to their partner that they would have liked. I also found it interesting that as a group, the students liked the affordance of "just-in-time", increased access and flexibility related to their interactions with each other but yet missed the face-to-face contact with the patient.

According to Palaganas (2012), the social process of students working together to find new ways of doing things may be the most important characteristic promoting positive outcomes of inteprofessional simulation. This was exemplified by my study as SocialSim facilitated the collaborative efforts of students to identify what the underlying issues were (i.e. problem-solving) with their patient followed by an interprofessional approach to care. Principles of social constructivism discussed in Chapter 3 are relevant given the manner in which the students collectively constructed their own knowledge rooted in a realistic case, using technology and yet also considered the cultural elements of their own professions.

Microblogging platforms such as Twitter, are hybrids that facilitate both online and offline communication (Gao, Luo & Zhang, 2012; Antenos-Conforti, 2009). Such an environment is particularly suitable for designing social learning experience grounded in social constructivism (Gao, Luo & Zhang, 2012; Vygotsky, 1978), distributed cognitions theory (Gao, Luo & Zhang, 2012; Pea, 1997) and connectivism (Gao, Luo & Zhang, 2012; Siemens, 2005).

Implications for Practice

The overarching impetus for my study was to explore the possibility for SocialSim as an innovative tool to be added to the growing list of options administrators and faculties have to integrate IPE into curriculum. First and foremost, I wanted to explore student perspectives since

they are central to any educational activity. The answers to the research questions provide compelling evidence to consider. While my study focused specifically on education in the fields medical and nursing, I argue that there are many similarities and lessons learned that would be of value to other disciplines and programs.

Significant barriers to interprofessional education, specifically geographical locale of student and competing demands of scheduling are not insurmountable. Leaders in higher education will need to consider nontraditional methods requiring face-to-face participation in order to implement IPE overcome these barriers. At this point in time, the advancement of technologies should be leveraged as a promising option in which to circumvent these particular barriers.

During my study, I noted interesting similarities and differences between SocialSim and face-to-face simulations intended to facilitate interprofessional interactions with students. The primary difference was the lack of physical connection which offers the advantage of immediate exchange of information and conversation. While SocialSim overcomes geographical barriers, it cannot overcome the lack of being in the same physical space. Careful consideration needs to be made as to when face-to-face is more appropriate and when SocialSim would be able to achieve the intended outcomes. I believe novice students would benefit most from face-to-face IPE activities, whereas upper-level students with previous IPE experiences would be able to use SocialSim most effectively. One of the more interesting similarities was student comments during the debriefings. Based on my prior experience with debriefing IPE simulations, I did not notice any differences regarding the nature of the students' interactions nor the affective reactions.

While I have argued that SocialSim has potential to contribute in many ways to IPE, I do not suggest that it is the "end-all". Rather a blended learning approach, whereby teaching utilizes a mixture of online and in-person methods for IPE over the entire curricular trajectory is worth consideration and further study. The Horizon report (2015) examined face-to-face, blended, and fully online models and concluded that "blended approaches were most successful in 'unbundling' the classroom. Students felt the faculty member was more accessible and that there was altogether more persistent communication through the use of virtual learning environments." Modalities such as SocialSim have potential to facilitate a blended approach when integrated with current classroom and clinical practice experiences.

Social media is here to stay in one form or another. Programs such as educational technology, marketing and communications integrate the use of social media throughout the curriculum. There is very little evidence in the literature and practice that healthcare professions use social media as a pedagogical tool and no evidence to suggest it has been used to facilitate simulation. This arena is essentially untapped and ripe for exploration not only to deliver simulation but also to communicate with students, network with experts or share and disseminate scholarship.

There has been some work in healthcare education regarding the use of technology as a means to promote reflective practice. Reflective writing is widely-accepted as a means to integrate theory with experience (Boyd & Fales, 1983). Study findings by Chretien, Goldman and Faselis (2008) suggest that blogging is an effective way to integrate reflective writing into clinical practice. Since Twitter is a form of blogging, specifically microblogging, SocialSim may be a method to facilitate reflective writing as it provides the opportunity for reflective writing via tweets and direct messaging.

Another important consideration for administrators is the cost to deliver educational experiences. Balancing a budget while providing optimal learning for students has become more challenging today than ever before. While a comprehensive cost analysis comparing the multitude of educational methodologies is beyond the scope of my study, a simple cost comparison for implementing IPE between traditional simulation methods and SocialSim is appropriate. Typically, costs for a face-to-face IPE experience include high fidelity simulators at $50,000-250,000, faculty and staff time prior to, during and after the experience, medical supplies relevant to the case which are variable, technologies including audio-visual and computer devices and adequate space to accommodate the number of learners. Cost to implement my study was limited to gift cards for students and transcription which totaled $1451.50. Under normal circumstances, SocialSim would not require incentives for students or transcription. While not to discount the amount of time necessary to develop a robust case, supporting materials and all that is involved with implementation (e.g. tweets, monitoring students, debriefing), it is safe to assume the cost is much less than other methods most often used for IPE, specifically, high fidelity immersive simulation. A cost-benefit analysis of face-to-face experiences as compared to SocialSim would be valuable for administrators as decisions regarding teaching methods are made. I posit that it would make sense to invest more financially in higher impact IPE simulations where students from multiple disciplines (e.g., more than two disciplines) participate and might benefit collectively from the IPE event. These situations would ideally occur earlier in the curriculum.

Another investment to consider is that of faculty as integral to delivery of SocialSim. The role of faculty is not limited to facilitating interactions between students. It is necessary for faculty to develop the case and simulation script prior to implementation. This required

approximately eight hours of my time including the supporting documents and noted that I have extensive experience developing simulation cases. Over time, SocialSim cases could be developed and shared in an effort to minimize time. Scheduling, pairing and organizing student pairs took approximately four hours. Implementation of the SocialSim scenario for twelve pairs consumed a moderate amount of time. It is possible to schedule tweets in advance for multiple pairs, which I would recommend for larger groups. Debriefing also requires time on the part of faculty. I recommend debriefing a group of 6-8 for 30-45 minutes. The group needs to be large enough to facilitate multiple perspectives, however, not too large to manage using technology. Although the development and implementation of SocialSim does require a significant amount of time, I equate it to other forms of simulation based on my experience.

While it is premature to suggest that SocialSim can replace actual clinical experiences, conceptually, administrators and faculty may want to consider virtual options to deliver IPE. As a result of the groundbreaking National Council of State Boards of Nursing (NCSBN) study (Alexander, et al, 2014), outcomes of simulation in prelicensure education have come under scrutiny. Their findings indicate that up to 50% of real clinical experiences may be replaced with simulation. It is important to note that the simulation method used in the study was high-fidelity immersive and those implementing the simulations and study have a high level of expertise. Nevertheless, it is likely that the debate will continue and all modalities will be considered. I believe it is likely that in the future, virtual simulation will be included in the conversations.

As evidence in the literature, there are specific IPE competencies expected of healthcare professionals. I did not specifically explore IPE competency outcomes. However, I propose that these be explored in the future. It would be important for administrators and faculty to know if

SocialSim was an effective method to achieve specific competencies. I would recommend quantitative inquiry to address these questions.

Lastly, I propose that an interprofessional approach of administrators and faculty is warranted. In order to best represent appropriate learning objectives for an interprofessional group of learners, an interprofessional approach to integration is necessary. Support by leaders of multiple disciplines and commitment by faculty charged with incorporating IPE is imperative. In addition, role modeling of faculty for their respective groups of learners is important. Role modeling has been shown to be effective to inculcate professional values, attitudes and behaviors in healthcare professional students (Paice, 2001). How can administrators and faculty fail to model the same communication and collaborative behaviors expected of learners? This will most definitely require openness to change for everyone and a collective commitment to navigating the IPE process. As Henry Ford said, "Coming together is a beginning. Keeping together is progress. Working together is success."

Recommendations

Given that I navigated uncharted waters with regard to the use of social media to deliver an interprofessional education activity, there were many lessons to be learned. Based on my experience with SocialSim and study results, I present some recommendations in this section which may benefit administrators and faculty as they consider methods to incorporate IPE into curriculum.

Briefing and Debriefing

Briefing in healthcare simulation is similar to orientation. It is important for learners to be pre-briefed in order to provide psychological safety and preparation for the case (Smith & Lammers, 2015). More attention to privacy and HIPPA in the orientation or briefing could help students avert their expressed concerns regarding lack of privacy and fear of their actions being visible in a public forum. It would also provide an opportunity for faculty to reinforce the importance of HIPPA compliance and settings in place to ensure privacy of the simulated patient. It is also important to inform students that their privacy is ensured by the settings and reassure them that their simulation interactions are not visible to others. The debriefing would present another opportunity for faculty to review importance of privacy for the patient and students and how these were protected during the simulation.

Technical Solutions

Technical issues influencing students' ability to communicate with each other can be minimized by addressing in the pre-briefing. Additions to the "Tips" document should be made to include how to "follow" each other, how to incorporate links to assist with text limitations and how to more effectively use hashtags would likely improve the experience.

Another technical issue experienced by myself is related to managing multiple pairs of students. In an effort to accommodate students' schedules, I was facilitating pairs of students over the course of a few weeks and often times the pairs overlapped. While I was ultimately able to engage, monitor and interact with all pairs, it was no easy task. Considering cohorts of medical and nursing students often equate to 100 or more, I would recommend orchestration of SocialSim for multiple groups consecutively. In other words, begin on the same day and progress

through the simulation similarly, but yet still customized for all pairs. It may require repeated iterations of the simulation or multiple faculty members sharing the workload.

Development of Fidelity

The fidelity of the simulation could be enhanced with more video or audio-enhanced clips since the students indicated that they liked them and they were fairly easy to develop and embed. Another strategy to address any lack in fidelity could be addressed in the pre-briefing with a "fiction contract". The purpose of a fiction contract is for faculty (facilitators) and students (participants) to mutually agree on the conditions related to the simulation. Each party brings a set of responsibilities to the table to promote a positive learning experience. The agreement can range from implicit to explicit, but when they exist and are adhered to will allow the recognition of value arising from the simulation (Phrampus, 2015). The fidelity or realism can be explained in the fiction contract as exemplified in Appendix J.

Hybrid Model

Considering the literature supporting a blended learning approach in education and some of the students' expressed need for physical contact, SocialSim could be used as an adjunct with other methodologies. In blended learning, traditional methods such as face-to-face are blended with technology-supported methods such as online. In the field of healthcare simulation, this often referred to as a hybrid model. For example, IPE integration could incorporate multiple simulation methods including standardized patient interactions, immersive high-fidelity combined with SocialSim. Garrison and Kanuka (2004) stated, "Leaders of higher education are challenged to position their institutions to meet the connectivity demands of prospective students and meet growing expectations and demands for higher quality learning experiences and

outcomes" (p. 95). Their conclusion was that blended learning is consistent with the values of traditional higher education institutions and has the proven potential to enhance both the effectiveness and efficiency of meaningful learning experiences.

I recommend consideration of simulation-based technologies such as SocialSim to be integrated with traditional methods of IPE instruction in an effort to meet the connectivity demands of learners while providing a quality learning experience.

Limitations

The most significant limitations were related to the study subjects. The subjects in my study represented only medical and nursing students. A more robust interprofessional education activity would include students of other disciplines such as pharmacy, respiratory therapy, social work. SocialSim should have the capacity to accomplish this and in fact, would allow students of different disciplines at other institutions to participate together. The study sample was also small and from one institution, and therefore, not necessarily indicative of the greater population of medical and nursing students. In addition, the subjects volunteered and were self-selected according to their availability. Therefore, they may represent a highly motivated strata within the greater population of students. Lower motivated students could potentially have entirely different experiences and perceptions of SocialSim. Lastly, the subjects were all approximately the same age and generation. Considering characteristics of Millennials, it could have influenced how they utilized SocialSim and what their perceptions were. The perspectives of older students would also be of interest.

SocialSim is limited in its ability to be used for every context of healthcare. For example, it would be extremely difficult to facilitate a simulation situated in an operating room using

SocialSim. It would also be unlikely to simulate the delivery of a baby using SocialSim. Like any other simulation modality, the objectives and context of learning should underly the chosen method.

SocialSim is also reliant on connectivity to be effective. If faculty or students had limited connectivity at any time during the simulation, it could alter the experience. By using hashtags, faculty and students could reconnect later with the case; however, it would not be as interactive or collaborative.

For my study, prior experience with Twitter was a prerequisite for participation. It is conceivable that in a typical medical or nursing cohort that not everyone would have experience with social media. This would result in a significant learning curve from the start which might present a barrier for the student(s) and faculty.

Another limitation of my study is that I used Twitter as the only option for microblogging. There are a number of other social media platforms available to educators, each with their own unique feature, that were not explore in this study.

Lastly, a limitation of my study is that I considered perceptions of all students collectively and globally. I did not compare or contrast perceptions of medical and nursing students. Therefore, I do not have insight as to if perceptions were related to one discipline or the other which could have more specific programmatic implications.

Suggestions for Future Research

While my study results were compelling, I became more interested in the potential for future research as my study commenced. I challenge not only myself, but others in higher

education to respond to the need for further inquiry related to IPE and new methods to facilitate it. I propose suggestions for further inquiry in this section.

Considering the magnitude of the impact of text limitations of Twitter, exploration of other social media platforms to deliver SocialSim is warranted. Facebook, in particular, may provide similar abilities to communicate and collaborate without the constraints of character limits.

A qualitative inquiry exploring faculty perceptions of SocialSim would also contribute to broader understanding. This would be relatively simple from a logistical perspective as the same case and interview protocol would be appropriate. It would be helpful to know how effectively faculty in general can facilitate a SocialSim experience since literature varies regarding technical abilities of healthcare program faculty.

Following expanded qualitative study, I recommend inclusion of quantitative inquiry. Use of analytics provided by programs such as Hootsuite may provide more insight as to variables such as frequency of student interactions, length of time spent communicating and what types of information are exchanged during interactions. Randomized controlled studies comparing groups and disciplines of students regarding use, preferences, feasibility, etc. would also be of interest. Themes identified in my study could serve as a foundation for these inquiries.

Lastly, initial or repeat studies related to types of simulation used for IPE would be beneficial. Previous studies (Palaganas, 2012) have compared the use modalities such as high fidelity, partial task trainers and standardized patients for IPE, however, have not considered virtual environments or social media. Of further interest may be a combination or blend of these modalities in an effort to determine what options might be with regard to blending of

methodolgoies for IPE. Cost analysis of these would further inform administrators and faculty as to what the best options for IPE are to achieve programmatic objectives, accreditation standards, respond to student needs and most importantly, improve the future of healthcare delivery.

Conclusion

The integration of interprofessional education into healthcare curriculum is no longer an option, but a requirement. How to best accomplish this given the numbers of barriers is a challenge for administrators and faculty. While it is certainly possible to accomplish this in clinical care environments, a simulated environment offers opportunity for students to practice and apply interprofessional skills without risk to patients. Most traditional simulation methodologies require face-to-face interactions such as immersive or high fidelity and use of standardized patients. I argue that we must explore beyond traditional methods of interprofessional education and develop new innovative modalities not as a replacement for all other methods, but to augment. In other words, we will have more tools in our toolbox to choose from. This will allow administrators and faculty to align interprofessional learning objectives to appropriate methods based on factors such as geography, students' schedules, space, financial resources and make informed decisions.

My study confirms that SocialSim is a viable consideration for interprofessional education through the students' lens. When I incepted the idea of SocialSim, I was unsure if would be possible to deliver a simulated case similar to what could be replicated from real life using social media. I found that it was, however, knowing students' perceptions was imperative prior to pursuing further inquiry. I found there are some affordances and challenges which need to be taken into account when faculty are choosing the most appropriate tool to use given the

intended outcomes. I also found that it is not a "one size fits all" for students, although I assert that this is the case with any teaching method.

There are many implications for further inquiry regarding the use of social media to facilitate interprofessional education. Until this occurs, my hope is that my study may challenge administrators and educators to think outside the box as external forces mandate the integration of interprofessional education. The barriers are not insurmountable. I also hope that my study contributes to the field of healthcare simulation. This field is in its infancy as compared to others and ripe for individuals to develop and test new methods. According to Smith and Lammers (2015) "Simulation educators have a responsibility to society to study simulation education to determine the methods and techniques to help students understand retain concepts, to identify whether the knowledge, behaviors, skills and attitudes learned and practiced in the simulated environment translate to practice at the bedside (p. 600)." Ultimately, my overarching goal when I designed SocialSim was to prepare healthcare professional students to function in a world in which inteprofessional care is essential for safer, better quality patient care.

APPENDICES

APPENDIX A:
IPEC Core Competencies for Interprofessional Education (Interprofessional Education Collaborative Expert Panel, 2011)

The four domains of interprofessional education competencies are identified below with correlating skills within each section. Highlighted skills are those SocialSim may most effectively support as a teaching method.

Competency Domain 1: Values/Ethics for Interprofessional Practice

- Place the interests of patients and populations at the center of interprofessional health care delivery.
- Respect the dignity and privacy of patients while maintaining confidentiality in the delivery of team-based care.
- Embrace the cultural diversity and individual differences that characterize patients, populations, and the health care team.
- Respect the unique cultures, values, roles/responsibilities, and expertise of other health professions.
- Work in cooperation with those who receive care, those who provide care, and others who contribute to or support the delivery of prevention and health services.
- Develop a trusting relationship with patients, families, and other team members
- Demonstrate high standards of ethical conduct and quality of care in one's contributions to team-based care.
- Manage ethical dilemmas specific to interprofessional patient/ population centered care situations.
- Act with honesty and integrity in relationships with patients, families, and other team members.
- Maintain competence in one's own profession appropriate to scope of practice.

Competency Domain 2: Roles/Responsibilities

- Communicate one's roles and responsibilities clearly to patients, families, and other professionals.
- Recognize one's limitations in skills, knowledge, and abilities.

- Engage diverse healthcare professionals who complement one's own professional expertise, as well as associated resources, to develop strategies to meet specific patient care needs.

- Explain the roles and responsibilities of other care providers and how the team works together to provide care.

- Use the full scope of knowledge, skills, and abilities of available health professionals and healthcare workers to provide care that is safe, timely, efficient, effective, and equitable.

- Communicate with team members to clarify each member's responsibility in executing components of a treatment plan or public health intervention.

- Forge interdependent relationships with other professions to improve care and advance learning.

- Engage in continuous professional and interprofessional development to enhance team performance.

- Use unique and complementary abilities of all members of the team to optimize patient care

Competency Domain 3: Interprofessional Communication

- Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussions and interactions that enhance team function.

- Organize and communicate information with patients, families, and healthcare team members in a form that is understandable, avoiding discipline-specific terminology when possible.

- Express one's knowledge and opinions to team members involved in patient care with confidence, clarity, and respect, working to ensure common understanding of information and treatment and care decisions.

- Listen actively, and encourage ideas and opinions of other team members.

- Give timely, sensitive, instructive feedback to others about their performance on the team, responding respectfully as a team member to feedback from others.

- Use respectful language appropriate for a given difficult situation, crucial conversation, or interprofessional conflict.

- Recognize how one's own uniqueness, including experience level, expertise, culture, power, and hierarchy within the healthcare team, contributes to effective communication, conflict resolution, and positive interprofessional working relationships.

- Communicate consistently the importance of teamwork in patient-centered and community-focused care

Competency Domain 4: Teams and Teamwork

- Describe the process of team development and the roles and practices of effective teams.

- Develop consensus on the ethical principles to guide all aspects of patient care and team work.

- Engage other health professionals—appropriate to the specific care situation—in shared patient-centered problem-solving.

- Integrate the knowledge and experience of other professions—appropriate to the specific care situation—to inform care decisions, while respecting patient and community values and priorities/ preferences for care.

- Apply leadership practices that support collaborative practice and team effectiveness.

- Engage self and others to constructively manage disagreements about values, roles, goals, and actions that arise among healthcare professionals and with patients and families.

- Share accountability with other professions, patients, and

communities for outcomes relevant to prevention and health care.

- Reflect on individual and team performance for individual, as well as team, performance improvement.

- Use process improvement strategies to increase the effectiveness of interprofessional teamwork and team-based care.

- Use available evidence to inform effective teamwork and team-based practices.

- Perform effectively on teams and in different team roles in a variety of settings

APPENDIX B:
SocialSim Faculty Case Scenario and Debriefing Guide

Case Scenario name: Wanda LaFleur
Target Audience: 3rd Year Medical Students and 4th Year Nursing students

Purpose: The purpose of the simulation is to give students an opportunity to apply interprofessional core competencies by collaboratively developing a plan of care for a virtual patient with situated within the primary care setting. Although a patient plan of care may be a outcome, the emphasis is on the learner's interactions and problem solving.

Objectives:
During the simulated encounter, learners will:
1. Develop an interdisciplinary, patient centered plan of care
2. Demonstrate effective communication skills with learner colleagues
3. Evaluate one's own ability to work effectively in a team

Competencies:
1. Utilize the full scope of knowledge, skills and abilities of available health team members to establish
   an interdisciplinary patient plan of care
2. Choose effective communication tools and techniques to facilitate interdisciplinary team discussions
3. Engage team members in shared patient-centered problem solving
4. Apply leadership practices that support collaborative practice and team effectiveness
5. Reflect on individual and team performance

Simulation Set Up:
1. Virtual patient
2. Patient characteristics: [60] year old female
   Healthy appearing; no weight issues
3. Technologies: Email, Social media platform/Twitter (delivery of simulation) and web-based video-conferencing/Zoom/Skype (debriefing and/or interviews)
4. Patient Chart (or EMR)

Learner Preparation:
1. Assembly of teams and introduction to each other
2. Review of Twitter (email "Twitter Basics" document)
3. Welcome and Orientation to the patient (email patient chart)
4. Information: You are a [role] in a busy primary care clinic. You and your team member will be assessing [patient or patients] and planning care for your patient, Wanda LaFleur based on information provided via social media.

Case Information

Demographics, Financial & Insurance Status:

- Wanda LaFleur is a [60] year old, married female
- She is currently employed full time as a bank teller at the credit union she has worked since

graduation from high school
Wanda is insured through Blue Cross Community Blue

- Wanda completed a high school education

Social:
Wanda lives with her husband in a suburban neighborhood in the home they built in 1968. Wanda likes to travel, however, her husband does not. They spend a lot of time at their lake cottage during the summer. Wanda has 3 married sons, 5 grandchildren, and 1 great-grandchild. Besides spending time at the cottage, Wanda enjoys reading and gardening.

Health Habits / Lifestyle:
Wanda has a 40-year history of smoking 1ppd, husband smokes non-filtered cigarettes. She rarely drinks alcohol other than occasional wine or margaritas. She has been physically active until the last year by gardening and walking.

Diet: Wanda prepares all the meals, which typically consist of meat, vegetables, and starches. She goes out to eat with her husband approximately 3 lunches and 4 dinners per week.

ADLs & Exercise:
Wanda used to walk every day; she has not been able to for the past year.

Other:
Wanda denies exposures to communicable diseases and has never travelled internationally.

Spiritual: Wanda attends mass at the Catholic church nearby every week.

Family History:
Father Deceased (age 76); History of HTN, diabetes and colon cancer
Mother Deceased (age 88); History of diabetes, dementia and coronary artery disease

Past Medical History:

- Hypertension (diagnosed 2006)
- Diabetes (diagnosed 2005)
- Coronary Stenting (June, 2012; drug eluting stent placement in right coronary artery); routine pre-op EKG prompted the cardiac catheterization and resulting stent; mild MI noted
- Chronic back pain due to Degenerative Spondylolisthesis in lumbar vertebrae (diagnosed 2010); treatments have included NSAIDS, physical therapy, epidural injections (x8) and spinal fusion

Past Surgical History:

- Hysterectomy (1978)
- Spinal fusion of L4 & L5 (2014)

Allergies:
NKMA

Prescribed Medications:

- Norco 7.5 mg/325 mg; 1 tablet orally every 6 hours prn
- Zestril (Lisinopril) 10 mg 1 tablet orally daily

- Humalog 10 Units tid at mealtimes
- Plavix (clopidogrel) 75 mg 1 tablet orally daily

Over the Counter Medications:

- Aspirin 81 mg orally daily
- Motrin 600 mg orally every 6 hours as needed for pain

Vaccines:

- Influenza (2014)
- Zostavax (January, 2015)

Preventative:

- Colonoscopy at age 52 (negative)
- Mammogram; last 12/2014 (negative)

Vital Signs:
Last visit (10/14/2015); BP 135/76 HR 70 Resp 12; Height 5'7" Weight 186 lbs.

Significant Lab Results (10/14/2015):
A1C 7.1
FBS 188 mg/dL
Na 137 mmol/L
K 4.2 mmol/L
Cl 101 mmol/L
Creat 2.2 mg/dL
Alb 6.9 g/dL
T.bili 1.6 mg/dL
Direct bili 0.6 mg/dl
Uric Acid .56 mmol/L
Total Protein 8g/dl
Calcium 10.3 mg/dL
Hgb 14.2 g/dL
Hct 38%
Platelets 330,000 x103/mL
HgbA1c
WBC 8,000/ml
aPTT 32.0 sec
PT 12.0
INR 1.0
Fibrinogen 1.9 g/L
Triglycerides 101 mg/dL
Total cholesterol 4.0 mmol/L
HDL 121 mg/dL
LDL 167 mg/dL
Amylase 111 u/L
Lipase <95 U/L

Simulation Script

1. Day 1-Email patient chart, normal lab value reference and initial instructions
2. Day 2
   a. Tweet 1 (both students)-What are primary concerns for this patient?
   b. Tweet 2-(nrsg. Student) Send audeo; patient complains of toe pain x2 days
   c. Tweet 3-To nrsg. Student: Increased pain; send picture of toe
   d. Subsequent tweets based on exchange and any requested pt. info
3. Day 3
   a. Tweet 1-(both students)-send audio; pt. called office during night and left message c/o increased pain, drainage from toe, redness up to knee. Office schedule is overbooked for the day.
   b. Tweet 2-(both students)-What are primary concern(s) for this patient? Priorities? What treatment options? Plan of action?
   c. Subsequent tweets based on exchange and any requested pt. info

Debriefing

Overview:

1. Welcome students to the debriefing session and introduce faculty who will be conducting the debrief
2. Outline the debriefing process
3. Identify the simulation objectives
   a. Using social media platform, primary care of patient with chronic disease
   b. Explore interprofessional team interactions, communications & collaboration

Potential Debriefing Questions:

1. How well do you think you worked together as a team?
2. Overall, what went well?
3. If you have a patient like this in real life, what might you do differently ?
4. If you have a similar situation in real life, how might you improve team communication and collaboration?
5. As a team, how did you decide the plan of care? Did one team member take primary responsibility or did you distribute equally? How did that work for you?
6. What priorities did you identify for the patient's care?
7. What did you learn about other team members?
8. What one thing will you integrate into practice?

APPENDIX C:
SocialSim Student Information

I. Day 1: General information and instructions distribited via email

A bit of background: Assume you are both working in a primary care office or clinic. You will note that your patient has chronic conditions which you will be able to identify given the information provided and in discussing with each other. There will be an issue that emerges r/t your patient that will be delivered via Twitter. I have attached a document (patient "chart"; very abbreviated for your convenience) with patient information to provide some background for your patient, Wanda LaFleur. I have also attached a lab results reference to save time as well.

Pertinent Twitter Handles:

Alex: @_____

Dawn: @_____

Mary Kay: @MaryKaySmith2

Wanda: @WandaLaFleur

Please use the hashtag #SocialSim___(insert number associated with pair here)

Guidelines:

1. The goal is to facilitate a patient case oriented interaction via social media to see if this might be a way to incorporate required interprofessional activities in healthcare education. Don't worry about any right or wrong…it is more about the experience and learning from each other.

2. I may tweet one or both of you. Hint: think about that because you may choose to share pertinent information regarding your patient.

3. Feel free to share any resources with each other via Twitter (e.g. articles, web links, etc.). There is no minimum or maximum amount of tweets between the two of you; you decide what is necessary to care for your patient.

4. You may email me with any difficulties you may be having. My interactions will be infrequent as I will observe, tweet, and be your "guide on the side" if needed.

You can expect tweets from Wanda today and tomorrow. Again, please use Twitter with each other as your primary means of interaction. Have fun and "talk" to you soon!

Mary Kay Smith (mksmith@msu.edu)

II. Day 1: Patient Information or "chart" distributed via email

Patient : Wanda LaFleur
Demographics, Financial & Insurance Status: • Wanda LaFleur is a [60] year old, married female • She is currently employed full time as a bank teller at a local credit union and has worked there since graduation from high school Wanda is insured through Blue Cross Community Blue • Wanda completed a high school education • Wanda's husband (Carl) has worked for 45 years as a Security Supervisor at an automotive company
Social: Wanda lives with her husband in a suburban neighborhood in the home they built in 1968. Wanda likes to travel, however, her husband does not and she has not been able to for over 5 years d/t back pain. They spend a lot of time at their lake cottage during the summer. Wanda has 3 married sons, 5 grandchildren, and 1 great-grandchild. Besides spending time at the cottage, Wanda enjoys reading and gardening.
Health Habits / Lifestyle: Wanda has a 40-year history of smoking 1ppd, husband smokes non-filtered cigarettes. She rarely drinks alcohol other than occasional wine or margaritas. She has been physically active until the last year by gardening and walking.
Diet: Wanda prepares all the meals, which typically consist of meat, vegetables, and starches. She goes out to eat with her husband approximately 3 lunches and 4 dinners per week.
ADLs & Exercise: Wanda used to walk every day; she has not been able to for the past year.
Spiritual: Wanda attends mass at the Catholic church nearby every week.
Family History: Father Deceased (age 76); History of HTN, diabetes and colon cancer Mother Deceased (age 88); History of diabetes, dementia and coronary artery disease
Past Medical History: • Hypertension (diagnosed 2006) • Diabetes (diagnosed 2005) • Coronary Stenting (June, 2012; drug eluting stent placement in right coronary artery); routine pre-op EKG prompted the cardiac catheterization and resulting stent; mild MI noted • Chronic back pain due to Degenerative Spondylolisthesis in lumbar vertebrae (diagnosed 2010); treatments have included NSAIDS, physical therapy, epidural injections (x8) and spinal fusion
Past Surgical History: • Hysterectomy (1978)

- Spinal fusion of L4 & L5 (2014)

Other:
Wanda denies exposures to communicable diseases and has never travelled internationally.

Allergies:
NKMA

Prescribed Medications:
- Norco 7.5 mg/325 mg; 1 tablet orally every 6 hours prn
- Zestril (Lisinopril) 10 mg 1 tablet orally daily
- Humalog 10 Units tid at mealtimes
- Plavix (clopidogrel) 75 mg 1 tablet orally daily

Over the Counter Medications:
- Aspirin 81 mg orally daily
- Motrin 600 mg orally every 6 hours as needed for pain

Vaccines:
- Influenza (2014)
- Zostavax (January, 2015)

Preventative:
- Colonoscopy at age 52 (negative)
- Mammogram; last 12/2014 (negative)

Vital Signs:
Last visit (10/14/2015); BP 135/76 HR 70 Resp 12; Height 5'7" Weight 186 lbs.

Significant Lab Results (10/14/2015):
A1C 7.1
FBS 188 mg/dL
Na 137 mmol/L
K 4.2 mmol/L
Cl 101 mmol/L
Creat 2.2 mg/dL
Alb 6.9 g/dL
T.bili 1.6 mg/dL
Direct bili 0.6 mg/dl
Uric Acid .56 mmol/L
Total Protein 8g/dl
Calcium 10.3 mg/dL
Hgb 14.2 g/dL
Hct 38%
Platelets 330,000 x103/mL
HgbA1c
WBC 8,000/ml
aPTT 32.0 sec

PT 12.0
INR 1.0
Fibrinogen 1.9 g/L
Triglycerides 101 mg/dL
Total cholesterol 4.0 mmol/L
HDL 121 mg/dL
LDL 167 mg/dL
Amylase 111 u/L
Lipase <95 U/L

III. Day 1: Lab reference distributed via email

Test	Abbreviation	Normal Ranges
Hematology		
White Blood Cell	WBC	Non-Blacks: 4000 - 10,000/ml (4-10K/mL)
		Blacks 2800 - 10,000/mL (2.8 - 10K/ul)
Hemoglobin	Hgb	M: 13.5-17.5 g/dL
		F: 12.0-16.0 g/dL
Glysolated hemoglobin	HgbA1c	5.6 - 7.5 % of total Hgb
Hematocrit	Hct	M: 41-53%
		F: 36-46%
Red blood cell	RBC	M: 4.5-5.9 x 106 cells/mL
		F: 4.0-5.2 x 106 cells/mL
Mean corpuscular volume	MCV	80-100 fL
Mean corpuscular hemoglobin	MCH	26-34 pg/cell
Mean corpuscular hemoglobin concentration	MCHC	31.5-36.3 gm/dL
Reticulocytes	Retic	33-137 x 103 cells/mL

Platelets	Plt	150-400 x 103/mL
Erythrocyte sedimentation rate	ESR	0-20 mm/hr
Coagulation Parameters		
Prothrombin time	PT	11-14 seconds
Partial thromboplastin time	PTT	25-35 seconds
International normalized ratio	INR	0.8 to 1.2
Chemistry Tests		
Sodium	Na+	136-146 mEq/L
Chloride	C1-	98-106 mEq/L
Potassium	K+	3.5 - 5.0 mEq/L
Bicarbonate	HCO3	23-29 mEq/L
Glucose	Glu	70 - 105 mg/dL
Creatinine	Cr	0.5-1.2 mg/dL
Blood urea nitrogen	BUN	7-18 mg/dL
Calcium	Ca2+	8.5 - 10.5 mg/dL
Inorganic phosphorus (phosphate)	PO4	3.0 - 4.5 mg/dL
Urate (Uric Acid)		M: 3.5 - 7.2 mg/dL
		F: 2.6 - 6.0 mg/dL
Lactate dehydrogenase	LDH	88-230 U/L

Iron	Fe	50 - 175 ug/dL
Total iron binding capacity	TIBC	250-460 ug/dL
Ferritin		20-300 mg/mL
Albumin	Alb	3.5-6.0 g/dL
Total Protein		6-8g/dl
Alkaline phosphatase	Alk phos	40 - 130 U/L
Aspartate aminotransferase	AST (SGOT)	12-37 IU/L
Alanine aminotransferase	ALT (SGPT)	3-25 IU/L
Total bilirubin	T.bili	0.1-1.2 mg/dL
Direct bilirubin		0- 0.2mg/dl
Amylase		0 - 130 U/L
Lipase		<95 U/L
Thyroid stimulating hormone	TSH	0.5 - 4.6 uU/ml
Thyroxine	free FT4	9 - 24 pmol/L
Tri-iodothyronine	Total T3	70 -132 ng/dL
Cholesterol		<200 mg/dL
Fasting triglycerides		<250 mg/dL
High density lipoprotein	HDL	M: 40-50 mg/dL
		F: 50-60 mg/dL
Low density lipoprotein	LDL	<130 mg/dL
Osmolality		270-290 mOsm/kg (L)

Urine Analysis		
Urine electrolytes	Na+, K+, Cl+	variable, wide range
Urine osmolality	Uosm	38-1400 mOsm/L

Appendix D:
"Twitter Tips"

Tweets: A tweet is a message. You have 140 characters, including spaces, to put down your thoughts. Type your message in the What's happening? text box on your homepage, and click the Tweet button to send a tweet. **Link shorteners:** If you have 140 characters, you don't want to use 50 of them by including a long URL. You need to shorten the URL so that you can save yourself some characters. Most URL shorteners shrink the links to anywhere from 16 to 20 characters.

@ Reply: If you see an @ (that isn't part of an email address) on Twitter, it is typically followed by someone's screen name. It is a way to hold a public conversation with that person. Your "patient's" handle is: @wlafleur . I will send your partner's handle one day prior to start of your simulation.

DM: DM stands for direct message. It is a way to hold a private conversation with another Twitter user, but you can only DM people who are already following you. To send a direct message, type the letter D followed by the username of the twitterer you want to reach, and then enter your message in the What's Happening? text box. You also have the ability to send direct messages directly to the individual through your Messages Inbox on your profile. Feel free to DM your partner as you deem necessary in order to care for your "patient".

RT: RT stands for retweet. If you like what someone says on twitter, You can retweet it to spread the message to your followers as well. Note: Please do not retweet interactions r/t your "patient"

Hashtag (#): If you see the pound symbol (#) before a word or phrase, it is essentially a keyword tag for the tweet so that others can find it more easily. On Twitter, this is called a hashtag, and they can be serious, to help people search for your tweet (like #advice or #blogging) or funny (like #ImSoDarnTired). Not every tweet needs hashtags. Basically, it's a way to follow the stream of everyone talking about a specific subject. We will use the hashtag #SocialSim

Twitter Chat: A Twitter chat happens when several people get on Twitter at once to share ideas with one another. They do this by using a specific hashtag. For example, every Sunday, bloggers participate in #blogchat.

Etiquette:

- Remember that you are on a public forum. Don't share something about another tweeter that they might want to keep private and don't make people uncomfortable with TMI tweets.
- If you use an affiliate link on Twitter, tweet something sponsored, or link to an ad, make sure you note that in the tweet.
- Credit/cite sources.

APPENDIX E:
Recruitment Flier

SOS…Can you help?

I (Mary Kay Smith) am recruiting third year medical students and fourth year nursing students to participate in my study as a component of my doctoral study in the College of Education.

Problem: Medical and Nursing accrediting bodies require interprofessional education to be included in all programs. There are many barriers, specifically scheduling students to be in the same place at the same time for simulation.

My study: I am exploring whether social media can be used as a vehicle to deliver a simulated "patient" experience for which medical and nursing students can virtually care for.

What would be involved for you:

- Participants will be grouped in pairs of one medical and one nursing student
- I will send a short pre-questionnaire (10 questions) gathering basic information (program, age, gender, how long you have used social media, etc.)
- I will send a very short/basic "patient" chart
- I will tweet to you and your partner over the course of two days
- You will participate in a debrief session using Zoom
- I will follow up with a post-interview to gather your thoughts regarding your experience
- You will receive a **$25.00** Amazon gift card and certificate of participation as a THANK YOU!

PLEASE CONTACT Mary Kay Smith via email (mksmith@msu.edu) or phone (517-353-5162) if interested.

APPENDIX F:
Background Questionnaire

1. What program are you in?
    a. Medicine b. Nursing
2. What is your age?
    a. 20-25
    b. 26-30
    c. 31-35
    d. 36 or older
3. Are you:
    a. Male
    b. Female
4. How long have you had a Twitter account?
    a. 6-12 months
    b. 1-2 years
    c. Over 2 years
5. How would you rate your Twitter expertise?
    a. Expert user (Aware and use multiple functions within Twitter; provide support, tips, etc. to others)
    b. Above Average user (Aware and use multiple functions within Twitter)
    c. Average
    d. Below Average (Have an account, however, do not regularly tweet)
    e. Beginner (Have an account)

6. How often do you check your Twitter feed?
    a. Multiple times per day
    b. Once per day
    c. 3-4 times per week
    d. 3-4 times per month
7. For what purposes do you use Twitter?
    a. Social connections with others
    b. Source of news or current events
    c. Networking with experts in your chosen field
    d. Access and/or sharing of scholarly articles
    e. Access to evidence-based information for patient care
8. Have you participated in an interprofessional activity (not social; focused on care of patients) with students of another discipline while in your current program (examples: simulation, case studies, clinical rotations, etc.)?
    a. Yes
    b. No
9. Have you had an opportunity to **communicate** with students of another discipline regarding the care of a patient during the period of your program?
    a. Yes
    b. No
10. Have you had an opportunity to **collaborate** with students of another discipline in order to plan care of a patient (real or simulated) during the period of your program?
    a. Yes
    b. No

APPENDIX G:
Research Participant Information and Consent Form

1. EXPLANATION OF THE RESEARCH and WHAT YOU WILL DO:

- You are being asked to participate in a research study regarding the use of social media to deliver an interprofessional simulation. Your input regarding the usefulness of this method is extremely valuable as it will contribute to healthcare professional education and the field of healthcare simulation.
- You will complete a survey collecting basic information related to demographics, previous participation in interprofessional education and use of social media. A small group of participants (twelve pairs of one medical and one nursing student) will be selected to participate in the simulation and follow-up interview based on this information.
- If you are selected for the simulation phase, you will schedule a time to participate in a virtual simulation delivered via Twitter intermittently over the course of two days. Total time commitment is expected to be approximately two hours. The primary investigator will interview you after the simulation for approximately 30 minutes.
- You must be at least 18 years old to participate in this research.

2. YOUR RIGHTS TO PARTICIPATE, SAY NO, OR WITHDRAW:

- Participation in this research project is voluntary. You have the right to say no. You may change your mind at any time and withdraw. You may choose not to answer specific questions or to stop participating at any time.

3. COSTS AND COMPENSATION FOR BEING IN THE STUDY:

- There are no costs associated with participating in the study.
    - You will be compensated for your time with a $25.00 Amazon gift card, which will be emailed directly to you after the interview has been completed.

4. CONTACT INFORMATION FOR QUESTIONS AND CONCERNS:

If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact the researcher:

Mary Kay Smith, PhDc, MSN, RN, CHSE
HALE Doctoral Candidate
965 Fee Rd., A601 E. Fee Hall
mksmith@msu.edu
517-353-5162

Or
Dr. John M. Dirkx, Ph.D.
Professor, Higher, Adult and Lifelong Education
Michigan State University
517-353-8927

If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at Olds Hall, 408 West Circle Dr Rm 207, East Lansing, MI 48824.

APPENDIX H:
Faculty SocialSim Script

I. Day 1: Introduction to SocialSim and the patient

A. Patient chart sent electronically to students with orientation materials

1. Patient case scenario situated in primary care

2. Include lab value reference

II. Day 2

A. Video of patient tweeted to both students in the morning introducing the patient and for the purpose of enhancing fidelity of the case

B. Late morning, the nursing student will be tweeted by the patient indicating a change in condition. Expected action: Nursing student communicates with patient for assessment and may/may not contact medical student.

C. Early afternoon, patient contact nursing student again (via tweet) reporting no improvement. Expected action: Nursing student will consult with medical student via tweet. Medical student will respond to nursing student via tweet and both will communicate and collaborate as to plan of care.

D. Late afternoon, patient may report slight improvement via tweet to nursing student (dependent upon student actions) or will continue to deteriorate if no or inappropriate student actions taken. Expected action: Nursing student apprises medical student of patient condition.

E. Faculty (researcher) may tweets relevant evidence-based article or other resources as warranted.

III. Day 3

A. Audio of patient phone call is tweeted to nursing student: Patient describes visit to Emergency Room at 3:00 a.m. due to change in condition. They were sent home and referred to physician's office. Expected action: Nursing student communicates with patient via tweet. Nursing student then tweets medical student regarding change. Medical student responds via tweet and students collaborate as to plan of care. Patient may be requested to come to office. If not, continued tweets will be sent to nursing student with reports of escalating symptoms until student(s) instruct patient to come for office visit. Patient (researcher) may need to assert this in order to prompt student actions.

B. Audio from patient tweeted to student which includes verbal assessment of patient condition. Expected actions: Medical and nursing student communicate and collaborate regarding plan of care. Researcher may tweet resources depending on student progress toward patient care outcomes.

C. Afternoon/Early evening-Patient will have improved symptoms. Expected action: Nursing student contacts patient regarding condition or patient (researcher) will call office.

D. If students progress quickly through scenario, reference may be made to patient chart and prompted to review for any other conditions of concern.

IV. Debriefing Session

A. Debriefing-Students debriefed via Zoom by Certified Healthcare Simulation Educator (CHSE)

APPENDIX I:
Interview Protocol

1. Can you describe your experience with SocialSim?
    a. What did you do?
    b. What was it like?
2. Can you share your thoughts regarding the simulated patient you cared for?
    a. In what ways was it like caring for a real patient?
    b. In what ways was it different?
3. What was it like taking care of a patient using social media (Twitter)?
    a. How did using social media influence your care of the patient?
    b. What did you do differently?
    c. What did you do that was similar?
4. Please describe your interactions with your partner (e.g. medical or nursing student).
    a. What was the nature of these interactions? Can you describe what happened?
    b. What did you like most about these interactions?
    c. What concerned you about your interactions with your partner?
5. How did SocialSim affect communication(s) with your partner?
    a. What were some of the positive effects on communication with your partner?
    b. What were some of the negative effects of SocialSim on communication with your partner?
    c. How did you feel about these effects?
6. How did SocialSim affect collaboration with your partner?

7. What benefits did you find to using SocialSim?
8. What challenges or barriers did you find to using SocialSim?
    a. What makes them challenges or barriers?
9. Do you have any recommendations with regard to using SocialSim to foster interprofessional education?
    a. What do you think would make it better or more effective?

Thank you for your participation!

APPENDIX J:
Simulation Fiction Contract

The purpose of simulation-based healthcare training is intended for you to develop skills, including judgment and reasoning, for the care of real patients. Using patient simulators and/or other simulation teaching techniques, faculty will recreate realistic patient care situations. The realism of each simulation may vary depending upon the learning goals for the session. The simulated environment and patient(s) have certain limitations in their ability to exactly replicate real life.

When participating in the simulations, your role is to assume all aspects of a practicing healthcare provider's professional behavior. Additionally, when a gap occurs between simulated reality and actual reality, it is expected that you try to understand the goals of the learning session and behave accordingly. All patient information is to be kept confidential and reproduction and/or sharing with others is not permitted.

Faculty Responsibilities:

- Create goal-oriented, practical simulations based upon measurable learning objectives.
- Add enough realism to each simulation so that the learner receives enough clues to identify and solve a problem.
- Set and maintain an engaging learning environment.
- Provoke interesting and engaging discussions and fosters reflective practice.
- Identify performance gaps and helps close the gaps.

Learner Responsibilities:

- Suspend judgment of realism for any given simulation in exchange for the promise of learning new knowledge and skills.
- Maintain a genuine desire to learn even when the suspension of disbelief becomes difficult.
- Treat the simulated patient with the same care and respect due an actual patient.

_____ _____

Learner Signature Faculty Signature

Date_____ Date_____

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