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Graduate Nurse Perceptions Of Effectiveness Of Prelicensure Education On Medication Administration

Renee M. Mielke
University of New England

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By

Renee M. Mielke

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MSN Michigan State University 2009

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Renee Mielke
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GRADUATE NURSE PERCEPTIONS OF EFFECTIVENESS OF PRELICENSURE EDUCATION ON MEDICATION ADMINISTRATION

Abstract

This cross-sectional descriptive survey examined nurse graduates' perceptions of the efficacy of their educational experiences in preparing them to administer medications safely. Situated cognition provided organization for the study design and analysis. Data were obtained from a cohort of nursing graduates from a community college in south central Michigan using a two-step online and paper survey method. Respondents included 24 nurse graduates from the college of study. Data analysis from the researcher-designed survey revealed learning environments, activities and tools considered to be realistic to nursing practice are considered more effective for learning safe medication practices. Graduate respondents may feel effectively prepared to administer medications safely, however, they do not feel as effectively prepared to anticipate or respond to adverse medication reactions or recognize that a medication error occurred. Needing more practice administering medications was clearly indicated, as was the need to socialize to realistic expectations of nursing practice. Opportunities for nursing educational leaders to improve the effectiveness of graduate preparedness for safe medication administration practices is demonstrated. Situated cognition theory was shown to be an effective tool in evaluating teaching practices. Combined with graduate perceptions, situated cognition can provide a means of developing more effective teaching strategies. Implementing more realistic activities and tools into the learning environments may improve graduate perceptions of

preparedness for practice. Graduates whom are better prepared for safe medication administration practices may decrease medication errors and increase patient safety.

Keywords: medication administration, nursing pedagogy, nursing pre-licensure

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This dissertation was presented
by

Renee M. Mielke

It was presented on
August 21, 2018
and approved by:

Dr. Carey Clark, Ph.D.
Lead Advisor
University of New England

Dr. Peter Fifield, Ed.D.
Secondary Advisor,
University of New England

Dr. Elaine Van Doren, Ph.D.
Affiliate Committee Member,
Grand Valley State University

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CHAPTER 1

INTRODUCTION

A primary goal of nursing programs is to provide prelicensure nursing students with the essential knowledge, skills, and attitudes for safe practice (Amer, 2013; Andrew & Mansour, 2014; Cooper, 2014; Kavanagh & Szweda, 2017). Preparing graduates for safe practice in today's complex healthcare environment requires educational opportunities aimed at developing psychomotor skill competencies, higher-order thinking and reasoning skills (Bennett, Grimsley, Grimsley & Rodd; 2017Billings & Halstead, 2016; NCSBN, 2012; Kavanagh & Szweda, 2017). Graduation and subsequent licensure of graduate nurses are supposed to indicate to employers and the public that the new nurse meets minimum standards of practice and competency and is qualified to enter the workforce (NCSBN, 2011). Employers and consumers expect this and trust that graduate nurses have the skills and knowledge to manage complex patient situations. This is not always so (Meechan, Jones & Valler-Jones, 2011b; Numminen, Laine, Isoaho, Hupli, Leino-Kilpi & Meretoja, 2014).

In the past few years graduate nurse competency and work readiness have been the focus of much global debate (Bennett et al., 2017; Goodare, 2015; El Haddad, Moxham & Broadbent, 2017; Hickerson, Taylor, & Terhaar, 2016; Numminen et al., 2014; Theisen & Sandau, 2013; Wood & Ezebuihe, 2016). Nurse leaders, educators and researchers cite discrepancies between the knowledge and skills that are needed to successfully navigate in today's practice settings and the knowledge and skills that the new graduates actually have (Ajani & Moez, 2011; Candela & Bowles, 2008; Hussein & Osuji, 2017; Kavanagh & Szweda, 2017; Meechan et al., 2011b; Numminen et al, 2014; Theisen & Sandau, 2013; Wood & Ezebuihe, 2016). Research on

academic leader and healthcare administrator perceptions of graduate work readiness vary significantly. Healthcare managers and administrators perceive that nurse graduates are not 'work ready' upon graduation, whereas educators feel that graduates are (Missen, McKenna & Beauchamp, 2015; Numminen et al., 2014; Walker & Campbell, 2013). Despite healthcare administrator concerns, educators continue to use traditional teaching methods (Bennett et al., 2017; Slaikeu, 2011; Wise, 2013).

The lack of graduate work readiness illuminates a gap between prelicensure educational preparation and practice requirements (Benner, Sutphen, Leonard & Day, 2010; Bennett et al., 2017; Candela & Bowles, 2008; Goodare, 2015; Numminen et al., 2014). This preparation/practice gap has become common knowledge and has been widely discussed in the literature (Bennett et al., 2017; El Haddad et al., 2017; Hickerson et al., 2016; Zimmerman & House, 2016). Research describes several possible causes of the preparedness-practice gap, suggesting the need to evaluate nursing program teaching strategies (Vaismoradi, Jordan, Turunen & Bondas, 2014). The literature cites that nursing has moved from an apprenticeship-training model to an educational model (Bendall, 2006; Monaghan, 2015; Onda, 2012; Watt & Pascoe, 2013). In the educational model, knowledge, skills and 'know how' as taught in the classroom are not always reflective of the real world (Bendall, 2006; Bennett et al., 2017; Vaismoradi et al., 2014). Teaching that is not reflective of the real world is problematic, as practice has become increasingly complex and there are growing numbers of medications being introduced and administered (Hewitt, Tower & Latimer, 2015). Graduate nurses struggle to apply what is taught in nursing school in the real world (Kavanagh & Szweda, 2017; Unver, Tastan & Akbayrak, 2012). This lack of opportunity to apply new learning contributes to the

preparedness for practice gap in nursing, which suggests that the way prelicensure educational educators teach students to think and behave in the educational setting is very different from the work of practicing registered nurses (RN) (Bennett et al., 2017; Numminen et al., 2014; Onda, 2012; Saintsing, Gibson, Pennington, 2011; Unver et al., 2012; Vaismoradi et al., 2014).

Research suggests that nursing schools and healthcare administrators must collaborate to prepare students for the realities of practices, not the ideals (Beauvais et al., 2017; Goodare, 2015; Numminen et al., 2014). Nursing literature reiterates that curriculums and teaching methods are outdated or cannot keep up with the fast pace of healthcare change (Bennett et al., 2017; Slaikeu, 2011). Challenging clinical environments compound the problem by not supporting effective learning (O'Mara, McDonald, Gillespie, Brown & Miles, 2014). Nursing education focuses on preparing students to pass the NCLEX, instead of preparing them for practice (Kavanagh & Szweda, 2017; Numminen et al., 2014; Onda, 2012). These reasons are exacerbated by nursing academe faculty shortages, lack of qualified clinical instructors, rapidly advancing technology, lack of clinical sites, inconsistent clinical and educational experiences, lack of socialization to the role of the practicing nurse, and less than optimal clinical environments (Freeling, Parker, & Breaden, 2017; NCSBN, 2005; O'Mara et al., 2014; Onda, 2012; Watt & Pascoe, 2013).

There is growing concern that if nursing does not take action to improve the preparation of the graduate nurse, there will be increasingly compromised patient safety and quality of care (Kavanagh & Szweda, 2017; Leufer & Cleary-Holdforth, 2013; Tanner, 2010). Replacing retiring experienced nurses in the next decade will require 1.1 million new nurse graduates (American Nurses Association, 2014). As these graduates enter the workforce, they will need to

assume more responsibility with less experience to guide them (Bennett et al., 2017; Saintsing et al., 2011). The transition from student to practicing graduate nurse is already considered challenging (Kavanagh & Szweda, 2017; Missen et al., 2015), therefore, the lack of experienced guidance is concerning. Without the appropriate knowledge, skills, and experience, there is an increased chance that these new nurses will commit errors or fail to recognize unstable patient situations (Unver et al., 2012; Vaismoradi et al., 2014). Statistics provided by one large metropolitan hospital that hires more than 1000 graduate nurses yearly reveals that only 23% of novice nurses have acceptable critical thinking skills; 54% cannot manage patient problems, and 23% cannot recognize when a patient is in trouble (Kavanagh & Szweda, 2017). There is fear that this lack of critical thinking and clinical reasoning skills will compromise patient safety. Patient safety concerns include injuries caused by medication errors (Zimmerman & House, 2016).

This chapter includes a discussion of the preparation/practice gap, preparation /practice gap as it relates to medication administration, what is known about graduate nurse perceptions of their educational experiences in preparing them for practice/safe medication administration and identification of gaps in knowledge. The theory of situated cognition is the conceptual framework for this study. This chapter presents the study purpose, research assumptions, limitations, and study significance.

Preparation/practice Gap and Medication Administration

Medication errors harm patients across the world (Jember, Hailu, Messele, Demeke & Hassen, 2018; Leufer & Cleary-Holdforth, 2013; Reid-Searl, Moxham, Walker & Happell, 2010). Each medication error costs an average of $2000 to $8750 per occurrence and can prolong

a patient's hospital stay (Anderson & Townsend, 2015; Jember et al., 2018). The Institute of Medicine (IOM) reports that in the United States, medication errors cause up to 7000 deaths annually and injure another 1.5 million people per year (IOM, 2007). Countries such as the Canada, Australia, United Kingdom, Denmark, and Sweden post similar statistics (Bourbonnais & Caswell, 2014; Hewitt et al., 2015; Orbæk, Gaard, Fabricius, Lefevre & Moller, 2015) demonstrating that medication errors and resulting patient harm is a global problem.

Medication administration is considered one of the most important and frequently performed skills prelicensure nursing students learn (Bourbonnais & Caswell, 2014; Leufer & Cleary-Holdforth, 2013; Lock, 2011; Reid-Searle & Happell, 2012; Simones et al., 2014), yet nurse graduates are failing to execute this skill safely (Unver et al., 2012). Sources estimate that approximately 55%-88% of nurse graduates make medication errors in the first year of practice (Saintsing et al., 2011; Sykes, 2017; Treiber & Jones, 2018; Unver et al., 2012). The occurrence of graduate medication errors is not surprising as literature on nursing students' perceptions of medication management reveal that education is not always compatible with practice and nursing students anticipate that their education will not prepare them to practice (Vaismoradi et al., 2014). If students do not feel their education is adequately preparing them to administer medications safely, it is not feasible to expect new graduates to administer medications safely.

There is an abundance of literature addressing the reasons for graduate medication errors. Reasons include the complexity of the medication administration process (Bourbonnais & Caswell, 2014), distraction, lack of mathematical skill, and lack of adequate knowledge of pharmacology (Unver et al., 2012). Medication errors can be related to inadequate skill application involving medication administration pumps, intravenous IV lines and other

equipment, knowledge deficit, inexperience, and poor staffing (Gregory, Guse, Davidson, Davis, & Russell, 2009; Leufer & Cleary-Holdforth, 2013). System and individual factors include not completing the five rights safety checks, high patient-to-nurse ratios, administration of large numbers of medications during peak times, insufficient training, nurse incompetence, and graduate status (Jones & Treiber, 2010, p. 243). In addition, system failures and changing medication administration processes negatively affect the number of medication errors. Nurse educators are called to evaluate how teaching strategies may address both individual and system failures (Hewitt et al., 2015; Vaismoradi et al., 2014).

Nurses are responsible for medication administration safety. Nurses must understand and maneuver multi-faceted healthcare environments, comprehend complex administration processes, and work as members of multidisciplinary teams (Hewitt et al., 2015; Leufer & Clearly-Holdforth, 2013). Knowledge of medication administration and performing medication administration processes within the contexts of the healthcare environment are essential for medication safety and competence (Leufer & Clearly-Holdforth, 2013; Lim & Honey, 2014; Unver et al., 2012).

There is a significant amount of opinion in the literature suggesting ways to improve graduate nurse medication safety. Many of the recommendations are broad and non-prescriptive (Cleary-Holdforth & Leufer, 2013; Crookes, 2015; Gunningberg, Poder, Donaldson, & Swenne, 2014; Lim & Honey, 2014; Vaismoradi, Griffiths, Turunen & Jordan, 2016). Many educators have taken up the challenge to develop teaching strategies to improve medication safety and better prepare graduates for the realities of practice (Aggar & Dawson, 2014; Harris, Pittiglio, Newton & Moore, 2014; Hayes, Power, Davidson, Daly & Jackson, 2015; Hewitt et al., 2015;

Hurley, 2017; Valdez, de Guzman & Escolar-Chua, 2013; Zimmerman & House, 2016). Prelicensure student nurses and educator evaluations of developed teaching strategies provide an idea of their usefulness in teaching medication administration. Although nursing student perspectives are helpful and needed (Vaismoradi et al., 2014), the graduate evaluations of medication administration teaching strategies are missing (Candela & Bowles, 2008). Graduate nurses have experienced both prelicensure training and the demands of real life practice firsthand. To create teaching strategies that bridge the preparation/practice gap, nursing educators need to research graduate nurse perceptions of how effective teaching strategies are in preparing them for safe medication processes (Candela & Bowles, 2008; Sykes, 2017). Educators must understand what strategies are effective in merging theoretical knowledge with clinical practice (Hussein & Osuji, 2017).

The role of nursing education is critical to preparing graduates for safe medication administration (Wood & Ezebuihe, 2016). The rapidly changing healthcare environment creates challenges for nursing educators in developing teaching practices that enable students to attain competency in safe medication administration skills (Clearly-Holdforth & Leufer, 2013; Hewitt et al., 2015; Zimmerman & House, 2016). Students often feel torn between what they are told are correct processes for medication administration and what is demonstrated in practice (Bendall, 2006). Students report that knowledge received in the classroom does not always reflect real-world practice, and, therefore, does not transfer to the real-world environment. Facilitating student transition to nursing practice requires educators to develop educational strategies that replicate real-world complexity (Crookes, 2015). The need to evaluate and promote real-world

teaching strategies is especially important of teaching medication administration (Brady, Malone, & Fleming, 2009).

Statement of the Problem

National Level

Observation of graduate nurse skills demonstrates that teaching strategies are not preparing students adequately to assume their new roles as safe graduate nurses (Zimmerman & House, 2016). There is a lack of knowledge about the effectiveness of educational practices in limiting or perpetuating the preparedness-practice gap. The American Nurses Association (ANA) predicts the need for 1.1 million new nurses by 2022 to fill nursing positions (2014). Nursing experts warn that it is unreasonable to expect to replace half of all nurses in the next 10 to 15 years without improving prelicensure nursing education using evidence-based teaching strategies (Orsolini-Hain & Malone, 2007). Other literature warns that medication errors will continue to occur and may even increase because of the increasing complexity of our healthcare environment and growing demands for higher levels of graduate performance (Zimmerman & House, 2016).

Nursing program instructors do not fully understand which medication administration teaching practices are adequately preparing graduates to administer medications safely. Learning activities conducted in the contexts of the classroom, clinical, skills, and simulation laboratories are most commonly used to assist students in acquiring medication administration knowledge and skills (Krautscheid, Orton, Chorpenning, & Ryerson, 2011; Lim & Honey, 2014; Onda, 2012; Paige & Daley, 2009; Zimmerman & House, 2016). Educators have proposed but not fully explored questions regarding the efficacy of the quantity, quality, and types of teaching strategies used in nursing schools to teach medication administration (Vaismoradi et al., 2014). There are

few answers as to how to better prepare students for practice, as there is little research that centers on graduate nurse perceptions of the efficacy of their nursing education (Anderson & Edberg, 2010; Candela and Bowles, 2008). There is even less research on graduates' perceptions of the effectiveness of their nursing education and preparation for safe medication administration (Sykes, 2017; Treiber & Jones, 2018).

Local Level

A community college in south-central Michigan trains nursing students in safe medication administration. Didactic instruction provides students with knowledge of medication administration safety processes, pharmacology, and dosage calculation throughout the two-year associate degree program (personal communication, November 2017). Students learn medication administration through a process of scaffolding. Students first learn medication administration theory, pharmacology, and dosage calculation in the classroom. Students then engage in replicated patient experiences in a series of active learning strategies in the skills laboratory and simulation laboratory. Students are socialized to authentic medication administration processes in clinical practice communities. Nursing instructors mentor and coach students in each environment through apprenticeships.

There have been many undocumented and unsubstantiated complaints from students, healthcare facility registered nurses (RNs), and college clinical instructors regarding the number and types of medication administration opportunities presented to students. Complaints include inadequate opportunities to practice and gain competence, inability to adequately socialize to medication administration processes in a clinical setting, lack of quality learning experiences,

and outdated teaching methodologies that don't utilize 'real world' tools or replicate the way things are done in authentic communities of practice.

This associate degree program is the only known program in the south-central Michigan area that limits nursing students to administering medications with clinical instructors only. Students do not engage in medication administration processes with facility staff RNs and do not participate in one-on-one preceptor experiences. There is a concern that this clinical learning model limits student opportunities to practice medication administration and be socialized to the role of the nurse. Some students report having received many opportunities to administer medications in clinical, while others report having had only one or two experiences in their entire two years as a student. Students complain that they feel less prepared to administer medications safely under this model.

Students and faculty also report varying opportunities to practice medication administration processes in both the classroom, skills and simulation laboratories. Variance in practice opportunities in these environments further limits skill and knowledge development. In addition, students also indicate that what they experience in the classroom, the skills and simulation laboratory is not always reflective of what they do in practice. Students echo faculty concerns that teaching methodologies are not keeping pace with the technology and procedural changes in healthcare, leading to difficulty in applying what they have learned in school to real-life environments. Graduate nurses' perspectives on the effectiveness of teaching strategies are needed to substantiate these claims.

The aims of this study are twofold. The first aim is to understand graduate nurses' perceptions of the effectiveness of their nursing program experiences in preparing them for safe

medication administration as nurse graduates. The second aim is to understand if nurse graduates feel suggested teaching strategies are potentially effective in preparing the next generation of graduates for safe medication administration. The goal is to use graduate nurse perspectives to assist nursing program leaders in the evaluation of current teaching strategies and development of others. The goal is to improve the graduates' preparation for practice.

Purpose of the Study

The purpose of this study is to investigate the efficacy of prelicensure teaching strategies in preparing graduate nurses for safe medication administration in practice.

Research Questions

The following research questions examine the problems identified in this study:

1. What are nurse graduates' perceptions of the effectiveness of their prelicensure educational experiences in preparing them to be safe administrators of medication as new nurses?
2. What educational experiences do nurse graduates feel have the potential to be effective in preparing them with the knowledge and skills needed to manage medication administration safely?

Conceptual Framework

Situated cognition learning theory is the framework for this research project. Situated cognition provides a guide for developing and evaluating learning activities and teaching methods (Melincavage, 2011; Molloy, 2017; NCSBN, 2005; Onda, 2012; Sykes, 2017; Wyrostok, Hoffart, Kelly & Ryba, 2014). This theory postulates that knowledge does not occur in isolation. Instead, activity, context, and culture co-produce knowledge (Brown, Collins &

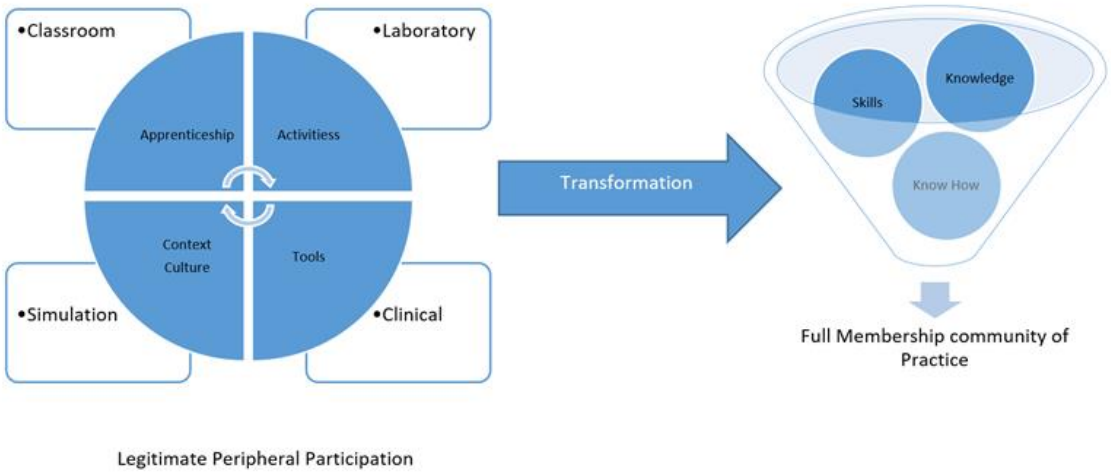
Dugid, 1989). In essence, the theory implies that context and culture of a learning situation is as integral to the creation of knowledge as the learning activity itself. Situated activities provide the learner with meaningful and usable knowledge (Brown et al., 1989) applicable in real-life context. The classroom, skills and simulation laboratories, and clinical setting are the learning environments utilized by nursing education. These environments are situated within both academic and healthcare communities. Each has their own cultural and social structures and contexts (Brown et al., 1989). For this study, realistic communities of practice are considered to be any healthcare environment in which students participate in clinical work and practicing nurses are present. According to situated cognition, an authentic activity is reflective of or realistic to the contexts, social and cultural ways of being, and behaving in a real community of practice.

Lave and Wenger (1991) view situated activities as a distinctive element in what they call legitimate peripheral participation (LPP). Learners or students are considered 'newcomers' learning the practices of nurses (old timers), through various levels of engagement. The concept of LPP assists in explaining the complex relationships that exist between nursing students, practicing nurses, cognitive apprenticeship, activities, tools, and the communities of academe and real-world practice (Lave & Wenger, 1991). The process of LPP employs cognitive apprenticeship to assist students in understanding the characteristics of nursing practice, the realistic use of authentic tools, development of skill competency, and complex thinking processes (Collins, Brown & Newman, 1989). Situated cognitive theory suggests the use of the combination of cognitive apprenticeship and situated activities through legitimate peripheral

participation is integral to moving the learner from the position of peripheral participant to full membership in a community of practice (Collins et al., 1989; Lave & Wenger, 1991)

This theory provides a framework for research in many practice-oriented professions (Brown et al., 1989; Collins et al., 1989; Lave & Wenger, 1991; Onda, 2012; Paige & Daley, 2009; Sykes, 2017; Woolley & Jarvis, 2007). Theoretical concepts and applications of this theory are reflective of how teaching and learning processes occur in the nursing profession (Brown et al., 1989; Lave & Wenger, 1991; McLellan, 1996). Concepts central to situated cognition are community (environment), activities, tools, context, culture, cognitive apprenticeship, and LPP. The process of transforming a novice student with no knowledge of medication administration processes to a full member of nursing practice who is adequately prepared to safely administer medications closely aligns with the principles of situated cognition (Onda, 2012; Paige & Daley, 2009). This alignment provides a means of evaluating the effectiveness of nursing education strategies (see Figure 1).

Figure 1: Situated Cognitive Theory and Nursing Education



Descriptions of the separation between knowledge and practice, as in academe and real-world, is characterized within the theory of situated cognition as a separation between ‘know what' and ‘know how' (Brown et al., 1989). The researcher proposes that this separation of learning and use cited in the theory of situated cognition are reflective of the preparedness-practice gap described in the nursing literature, and is the result of deficient educational practices (Hussein & Osuji, 2017). Situated cognition provides an appropriate context in which to analyze graduate perceptions of educational processes. Chapter Two examines this theory in greater depth.

Assumptions, Limitations, and Scope

Previous nursing literature warns of a future nursing shortage of both numbers and expertise (Orsolini-Hain & Malone, 2007). Orsolini-Hain and Malone (2007) state that the "perfect storm" in nursing is brewing. The projected exit of experienced nurses from patient care and the rush to replace these nurses with newly graduated, and less experienced, nurses is causing this concern. The perfect storm is the prediction that "…fewer overall numbers of nurses, with less experience and few clinical mentors, will be expected to care for sicker patients with multiple conditions and higher-level care needs in an atmosphere of greatly increased technological complexity and economic pressures" (Orsolini-Hain & Malone, 2007, p. 158). Educators and healthcare administrators discuss faculty shortages and growing concerns about patient safety failures in light of these predictions (Hill, 2010; Zimmerman & House, 2016).

Much of the research that has been done on teaching strategies and medication administration involves the prelicensure student who has yet to engage in actual practice as a licensed registered nurse (Harris, et al., 2014; Mariani, Ross, Paparella & Allen, 2017;

Vaismoradi et al., 2014). Nursing students provide valuable insight into the gaps in educational practices and medication administration, however; they do not fully understand the complexities of medication administration in authentic nursing practice. Although student perceptions are helpful, they cannot always judge whether prelicensure teaching strategies are sufficient to prepare them for practice. Determining which educational strategies are most effective in preparing graduates for safe medication administration is challenging educators' current thinking. There is not enough evidence to support the effectiveness of specific prelicensure teaching strategies (Hussein & Osuji, 2017; Patterson, Boyd & Mnatzaganian, 2017). There is a distinct lack of research on graduate perspectives of the effectiveness of instruction in teaching medication administration skills and preparing them for the realities of practice (Sykes, 2017).

Definition of Terms

Apprenticeship- a method of learning in which a student 'apprentice' and an expert 'master' develop a relationship in which the learner is encultured to a practice or a trade through activities and social interaction. (Brown et al., 1989; Lave & Wenger, 1991)

Community- pertains to socially constructed groups whose behaviors and ways of thinking are formed by their history, relationships, social, and cultural patterns. Nurses are members of communities called "communities of practice" (Brown et al., 1989; Lave & Wenger, 1991)

Conceptual knowledge- "The interrelationships among the basic elements within a larger structure that enable them to function together" (Krathwohl, 2002, p.214)

Context- "the interrelated conditions in which something exists or occurs (environment, setting)" (Merriam-Webster, n.d., para 1).

Culture- "beliefs, social forms, and traits…set of shared attitudes, values, goals, and practices…" that characterize an organization or shared by people in a place or time (Merriam-Webster, n.d., para 1).

Education process- "a systematic, sequential, logical, scientifically based, planned course of action consisting of two major independent operations: teaching and learning" (Bastable & Alt, 2014, p. 13).

Effective- "producing a decided, decisive, or desired effect" (Merriam-Webster, n.d., para 1).

Factual knowledge- *"*is knowledge that is basic to specific disciplines. This dimension refers to essential facts, terminology, details or elements students must know or be familiar with in order to understand a discipline or solve a problem in it." (Krathwohl, 2002, p. 214)

Lecture- "highly structured method by which the educator verbally transmits information directly to a group of learners for the purpose of instruction" (Fitzgerald & Keyes, 2014, p. 471).

Clinical Instruction- "Hands-on learning situations are those where students directly care for patients within the relevant setting" (NCSBN, 2005).

Clinical Instructor- Faculty and staff members responsible for an assigned cohort of students in the traditional clinical and simulated environment (Hayden, Smiley, Alexander, Kardong-Edgren, Jeffries, 2014, p. S42).

Clinical Preceptor- "A registered nurse (RN) supervising a student in the clinical setting. The preceptor provides oversight of the student's patients and gives feedback to the student and the clinical instructor" (Hayden et al., 2014, p. S42).

Graduate nurse- a newly licensed individual employed in nursing for the first time after graduation: (Polifroni, McNulty, & Allchin, 2003, p. 455).

High-fidelity simulation: ‘‘Experiences using full-scale computerized patient simulators, virtual reality or standardized patients that are extremely realistic and provide a high level of interactivity and realism for the learner" (NLN-SIRC, as cited in Meakim et al., 2013).

*Medication Error- ‘‘*Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer. Such events may be related to professional practice, healthcare products, procedures, and systems, including prescribing, order communication, product labeling, packaging, nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use″ (National Coordinating Council for Medication Error Reporting and Prevention, 2018, para 1).

*Performance Deficit- ‘‘*requisite skills and knowledge are available to safely perform medication administration, but there is a failure to complete the task successfully" (Wolfe, Hicks & Serembus, 2006, p. 48).

Procedural knowledge- “refers to information or knowledge that helps students to do something specific to a discipline, subject, or area of study. It also refers to methods of inquiry, very specific or finite skills, algorithms, techniques, and particular methodologies” (Krathwohl, 2002, p. 214).

Simulation- “activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision-making, and critical thinking through techniques such as role-playing and the use of devices such as interactive videos or mannequins” (NCSBN, 2005, p. 2).

Sufficient clinical instruction- "…adequate time spent directly with patients under the supervision of a qualified faculty member, so that program outcomes are met" (NCSBN, 2005, p. 2).

Tool- physical: "something (such as an instrument or apparatus) used in performing an operation or necessary in the practice of a vocation or a profession" (Merriam-Webster, n. d., para 1). Both conceptual (knowledge) and physical artifacts are tools (Brown et al., 1989).

Significance

There is great concern nationally and internationally about patient safety, medication errors, and patient harm. The study of how nurse educators facilitate competency in medication administration in prelicensure nursing education is timely and necessary. Research suggests that the cure for the prepared-practice gap could be a matter of gaining knowledge and experience over time and postgraduate interventions (Numminen et al., 2014). Nursing educators cannot refute this claim bearing the existence of the preparation-practice gap and the reported frequencies of graduate nurse medication errors (Jones & Treiber, 2018; Sykes, 2017; Unver et al., 2012). It is essential that nurse educators provide student nurses with evidence-based experiences to attain the knowledge, skills, and attitudes needed for safe medication administration as graduates (Beauvais et al., 2017; Numminen et al., 2014). As the nursing shortage looms on the horizon, it is crucial that nurse graduates administer medications safely upon licensure. Without adequately researching nurse graduates' perceptions of their education, the faculty does not fully understand which educational strategies are adequately preparing students. Educators do not fully understand what teaching strategies need to be changed or

developed. Nursing educators need to respond to the needs of the nursing practice and recognize the experience of graduates as they transition into practice (Candela & Bowles, 2008).

The lack of evidence-based teaching pedagogies is an opportunity for nursing leadership to define educational standards for teaching medication administration (Sulosaari, Suhonen & Leino-Kilpi, 2011). Developing and monitoring the education of student nurses is the responsibility of nursing educators. Literature suggests that nursing educators need to evaluate its practices of teaching medication administration safety from a systems perspective (Gregory et al., 2009). A systems perspective would review how nurse educators teach, guide, and evaluate students in medication administration safety both didactically and in the clinical environment. It is crucial that leaders in the nursing profession provide stakeholders and accreditors with a solid rationale for teaching practices (Zimmerman & House, 2016). This research assists in assessing and developing evidence-based experiential pedagogies that will bridge the prepared-practice gap. This research is a beginning step to evaluate the practices of nursing education.

Conclusion

Nursing and healthcare leaders cite a troubling gap between the education that is provided by nursing programs and the education that is needed by nurses to practice in the real-world safely (Candela & Bowles, 2008; Meechan et al., 2011b). This divide is known as the ‘preparation-practice gap" (Hickerson et al., 2016). Observation of nurse graduate skills demonstrates that perhaps teaching strategies are not preparing students adequately enough for safe assumption of their new roles as graduate nurses (Bennett et al., 2017). While much literature describes nursing students’ perceptions of the effectiveness of teaching strategies in learning the skill of safe medication administration, there is little known about graduate nurses’

perceptions of their efficacy in preparing them for medication administration as a new nurse. Questions regarding the effectiveness of teaching strategies used in nursing schools to teach skills, and specific medication administration, have been proposed but not fully explored. This study aims to understand graduate nurses' perceptions of the effectiveness of their nursing program experiences in preparing them for practice safe medication administration as graduate nurses. This study evaluates their perceptions of the learning experiences encountered in their nursing education.

This study, as introduced in this chapter, explains the problem and the significance of researching this problem. Chapter 2 will further explore the literature or lack of literature related to graduate nurses, educational practices, and medication administration.

CHAPTER 2

LITERATURE REVIEW

The purpose of this study is to investigate the efficacy of prelicensure teaching strategies in preparing graduate nurses for safe medication administration in practice. The objective of this literature review is to explore the literature and identify current knowledge related to medication administration and the education of nurses in this skill. Understanding what is already known and where knowledge gaps exist is the goal. A literature review of medication errors, medication administration teaching strategies, preparation-practice gap, graduate perceptions, and situated cognitive theory shows the importance of studying and addressing this topic.

Search Methods

Literature for this study is provided in CINAHL and ProQuest databases, as well as the process of snowballing. Search terms included ‘medication administration’, ‘medication errors’, ‘graduate nurse or novice nurse’, ‘nursing student’, ‘clinical’, ‘simulation’, ‘situated cognition’, ‘perceptions-attitudes-opinions’, ‘preparedness practice gap’, and ‘nursing education.’ The review considered articles between 2008 and 2018 with a few exceptions. The literature review includes multiple books, dissertations, and nursing research from over 35 journals. The books chosen for review are widely known within nursing education and frequently referenced in many articles. The review included national nursing standard publications and books on situated cognition.

Articles utilized in the review assisted in developing the following concepts: (1) theory-practice gap, (2) medication administration processes, (3) teaching medication administration, (4) medication errors, (5) graduate perceptions, and (6) situated cognition. There are few

research articles generated that explicitly researched medication administration and nurse graduates' perceptions of the efficacy of educational strategies essential to promoting competency in this skill. As such, many literature sources are used to build an understanding of concepts central to the purpose of this study.

Conceptual Framework

Situated cognition (situated learning theory) is a complex theory on the nature of learning (Brown et al., 1989; Collins et al., 1989; Lave & Wenger, 1991). This theory expands on theoretical concepts of social cognition (Bandura, 1989), experiential learning theory (Kolb, 1984), John Dewey's philosophy of education and experience (Sikander, 2015) and Vygotsky's theory of sociocultural learning (Vygotsky, 1978). Dewey believes that there is a clear link between experience and learning, learning by doing and situated activities (Sikander, 2015). Dewey maintains that an experience involves a binary process of changing and being changed by the environment (Sikander, 2015). Meaningful knowledge is thought to be experiential and related directly to the lived experience of individuals (Dewey, 2004). Kolb's theory of experiential learning supposes that ideas are "formed and reformed through experience" (Kolb, 1984, p. 26). A person's knowledge and thought processes are continually evolving through experiences. Evolution of thought occurs through a four-stage process: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984). The process is holistic and continuous. Succeeding situations utilize knowledge gained from previous experiences. Kolb (1984) elicits that the cycle of performance-learning-development provides for a continual process of adaptation to the environment (p. 34). Bandura's theory (1989) supposes that learning is a social process in which observation or engagement in social interactions

develops behavior. Social cognitive (learning) theory (SCT) perceives that learning occurs through three methods: observation, imitation, and modeling (Bandura, 1989).

Vygotsky's theory of sociocultural learning suggests that cognitive development results from social interactions between a person and their environment (Vygotsky, 1978). Vygotsky developed the concept of 'zone of proximal development' (Lave & Wenger, 1991; Vygotsky, 1978). The zone of proximal development can be thought to mean several things (Lave & Wenger, 1991). First, it can be thought to mean the difference between the ability of an individual to problem-solve alone versus an individual's ability to problem-solve when guided by more experienced people (Lave & Wenger, 1991). Second, it can be thought to mean the difference between scientific knowledge as would be obtained through schooling and common everyday knowledge as obtained through interaction with a given culture (Lave & Wenger, 1991). The zone of proximal development supports the process of 'scaffolding,' cognitive apprenticeship and legitimate peripheral participation in which the social interactions with experts assist the learner in developing knowledge and complex skills. The zone of proximal development is thought to change as the learner changes. When the learner masters one concept or skill, they can move on to the next complex skill or concept (Vygotsky, 1978).

Situated Cognition Concepts

Situated cognitive theory expounds on these theories. Knowledge is thought to be situated in activities of everyday life and bound by the social, cultural and physical contexts of the environment in which the learning occurs. The major concepts included in situated cognition are context, community, culture, tools, activity, cognitive apprenticeship (Brown et al., 1989), and legitimate peripheral participation (Lave & Wenger, 1991). The relationship between the

concepts is complex and varies in application between authors (Brown et al., 1989; Lave & Wenger, 1991; McLellan, 1996). Brown et al. (1989) use the theory the in context of learning, whereas Collins et al. (1989), strives to merge formal schooling with apprenticeship processes. Lave and Wenger (1991) focus more on the social and cultural process of learning especially in communities of practice. Lave and Wenger (1991), as well as Brown et al. (1989) and Collins et al. (1989), discuss the importance of cognitive apprenticeship as it relates to learning a skill in a trade or practice profession.

Community, culture, and enculturation. Community refers to socially constructed groups whose behaviors and ways of thinking are formed by their history, relationships, and cultural patterns (Brown et al., 1989; Wyrostok et al., 2014). The classroom, skills, and simulation laboratories, and clinical are learning environments utilized by nursing education and situated within both academic and healthcare communities. Academe and healthcare communities each have their own cultural and social structures and contexts (Brown et al., 1989). Each distinct community culture affects the behavior and actions of its members and provides a socially constructed context in which learning takes place through situated activities. Culture dictates member behaviors, activities, and ways of thinking (Brown et al., 1989). When engaging in activities in a specific community, an individual begins to learn and integrate the behaviors and beliefs of community members, thus starting the process of enculturation (Brown et al., 1989). Nurses, physicians, carpenters, and scientists are members of ‘communities of practice’ (Brown et al., 1989).

Brown et al. (1989) posit that learning is a process of enculturation in which the learner engages in the process of learning what knowledge, skills, and behaviors are acceptable to the

culture of a particular community. Authentic activities, therefore, produce 'meaningful learning' through social constructed activities within the context of a community. Nursing students learn the behaviors and expectations of the nursing community of practice through clinical emersion. Through interactions with clinical instructors, nurses and other healthcare professionals, students learn socially accepted norms, behaviors, and ways of communicating. Students discover here whether academic knowledge and learned rules of conduct are applicable in real nursing practice. Being able to utilize knowledge attained in academe within the context of the nursing community allows students to authenticate what is learned in school providing a deeper level of learning (Brown et al., 1989).

Tools. A tool can be both physical and conceptual (Brown et al., 1989). Physical tools, 'artifacts,' are devices or instruments used to perform a task (Merriam-Webster, n.d.) Learning how to use tools requires an understanding of the tool itself, conditions for use, and the context within which communities use the tools. A community and culture that uses tools determine what tools are needed and how they are fittingly utilized (Brown et al., 1989). Both cognitive and physical tools can "only be fully understood through use, and using them entails both changing the user's view of the world and adopting the belief system of the culture in which they are used" (Brown et al., 1989, p. 33).

Conceptual tools. Any situated activity can generate knowledge. The relevance of use in specific circumstances determines whether knowledge is considered 'useful' (Lave & Wenger, 1991). Activities in the classroom, skills laboratory, simulation laboratory and clinical all provide opportunities for the learner to attain knowledge. Knowledge is socially constructed and takes on different meanings. The learner builds on and assimilates the social and cultural

contexts in which knowledge is learned (Lave & Wenger, 1991). In the classroom, information is organized and transmitted through teaching methods that produce knowledge that is often textbook-bound requiring memorization and no real understanding of how to apply the knowledge in practice (Collins et al., 1989). One may think that there is no value in classroom knowledge. Usefulness of classroom knowledge, however, builds its meaning upon the social and cultural contexts of classroom use of learning. Learning in the classroom is meant to scaffold students' knowledge by first introducing theory relative to practice. The learner uses the theoretical knowledge to complete other more complex learning tasks. This is important to learning medication administration psychomotor skills and safety practices. Scaffolding is an acceptable approach; however, the information presented through classroom activities is often abstract and decontextualized to the situations in which the knowledge would be best-used (Lave & Wenger, 1991). Knowledge, if not contextualized to real-world use, may not be useful. If a student can "renegotiate" the meaning of knowledge by evaluating it using experiences and possible future applications their knowledge may evolve into something meaningful (Lave & Wenger, 1991). If a student can relate general knowledge, as can be obtained in classroom activities to real life, as through stories, what may be considered abstract may become more meaningful and relevant (Lave & Wenger, 1991).

Brown et al. (1989) suggest algorithms and routines are forms of cognitive knowledge. Without contextualizing algorithms within the environmental context in which they will be used the learner may 'learn' them, but not 'know-how' to use them. In nursing, algorithms and routines can be likened to the process of medication administration and the use of the five rights for safety. A student could be taught the five rights of medication safety in a classroom setting

but may not understand the full implications of how to apply them (Campbell, 2013). Brown et al. (1989) agree that students can obtain knowledge of algorithms, demonstrate understanding of the algorithm concepts, but have no idea how to use the algorithm if called upon to do so in a real situation. The five rights of medication administration are an example of a conceptual tool whose use is significantly influenced by culture and context (Brown et al., 1989). The more the individual uses the tool in context or in an activity that realistically replicates context, the more developed and useful their conceptual tools become (Campbell, 2010).

Physical tools. Physical tools are devices, used for a specific function. Brown et al. (1989) describes the use of a pocketknife for removing stones from the hooves of a horse. A particular purpose understood within the community, of those that care for horses. Outside of the horse community, an individual may know what the tool is but would not know how to use it if called upon to do so. In this manner, the community determines the use of the tool and how its culture views the tool concerning the world around it. Physical tools within nursing include computer systems, medication scanners, intravenous infusion pumps, medication distribution machines such as 'Pyxis,' syringes and other such devices used by nurses for the specific task of distribution of medications.

Activity. Activities are actions or tasks of learning that occur within a specific community and are, therefore, 'situated' (Brown et al., 1989). Situated cognition as an instructional approach suggests that purposeful knowledge can be gained through participating in situated activities of everyday life where learning is relative to the environment (Brown et al., 1989). 'Authentic' activities are said to be "ordinary practices" of a culture and are learned by engaging in actions or tasks that are socially constructed through interactions with members of a

community (Brown et al., 1989). Lave and Wenger (1991) call learning through situated activities 'learning in-situ' (p. 31). By engaging in activities, 'in situ' learners begin the process of enculturation, learning the behaviors, languages, and norms of the community (Brown et al., 1989).

Legitimate peripheral participation. Students learn through social interaction, the sharing of wisdom and collective community knowledge in a process called 'legitimate peripheral participation' (Lave and Wenger, 1991). Student involvement in activities of peripheral participation can be varied ranging from being very engaged in an activity or not engaged at all. The student who is not directly taking part in an activity or 'not engaged' can learn from watching or standing on their "…legitimate position on the periphery" (Lave & Wenger, 1991). As periphery suggests, student learners are not full members of the community; however, they are still present in the community and subject to the influence of the community's social and cultural contexts (Lave & Wenger, 1991). Being present, even on the periphery, is essential for those that wish to enter a culture of practice. Legitimate peripheral participation gives the student insight into what behaviors and language accepted and expected by members of a community of practice (Brown et al., 1989). LPP provides the learner with a comprehensive understanding "about the world; on activity in and with the world; and on the view that agent, activity, and world mutually constitute each other" (p. 32). LPP is a transformative process in which the end goal is for the student learner to become a full member of a practice community (Lave & Wenger, 1991).

Cognitive apprenticeship. Cognitive apprenticeship in situated learning is the practice of enculturating a student into a vocation or trade through activities and social interaction

(Brown et al., 1989). Enculturation is accomplished using legitimate peripheral participation and apprenticeship relationships with ordinary people "experts" in a community of practice. In apprenticeship, coaches or practice experts enculturate students through context-situated activities by process of "…modeling, coaching and fading" (Brown et al., 1989). Coaches model expected behaviors then provide guided practice until the student can perform independently (Brown et al., 1989).

Apprenticeship provides a method for learning how to problem-solve unexpected and ill-defined difficulties encountered within a practice environment through watching and working (Lave & Wenger, 1991). Students learn to work through and solve unexpected problems in ways that cannot be taught in a classroom or measured on a test. This approach to teaching and learning fosters renegotiation of classroom knowledge and application of such knowledge in real context. It encourages scaffolding of knowledge application in unfamiliar tasks or new problem situations (Brown et al., 1989). Students learn the language of the culture, how to apply knowledge, use tools, and collaborate with community members in a culturally accepted manner (Brown et al., 1989). Apprenticeship fosters an understanding of the many roles that the practice community member must engage in to effectively carry out a task, assists in confronting misconceptions of use of tools or application of principles in real world context, and provides the opportunity to learn how to collaborate with the many members of a community in order to work effectively (Brown et al., 1989).

Medication Errors

The National Coordinating Council for Medication Error Reporting and Prevention (2018) defines a medication error as:

> Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in control of the healthcare professional, patient or consumer. Such events may be related to professional practice, healthcare products, procedures, and systems, including prescribing, order communication, product labeling, packaging, nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use. (para, 1)

Medication errors can occur in any part of the administration process (Unver et al., 2012). Research on medication errors reveals that 37% of medication errors occur during administration and 1% during the post-administration monitoring phase (Sulosaari et al., 2011). Nurses are intimately involved in the administering and monitoring aspect of medication management and make the bulk of these medication errors (Treiber & Jones, 2010). According to several studies, 78% of nurses' report having made a medication error at least once during their career as nurses (Jones & Treiber, 2010). The frequency of which medication errors occur has become a national and global concern (Hewitt et al., 2015; IOM, 2007; Leufer & Cleary-Holdforth, 2013).

The numbers of errors that are occurring with prelicensure nursing students is also a national concern (Dolansky, Druschel, Helba & Courtney, 2013; Gregory et al., 2009). In a study of 154 prelicensure students, improper medication administration accounted for 56% of all documented errors made (Gregory et al., 2009). An additional 30% of potential errors or 'near misses' were intercepted by clinical instructors (CI) and preceptors before the error reached the

patient (Gregory et al., 2009). Without interception by the CI or preceptor, the error rate could be significantly higher. Studies of nursing student perceptions convey that educational deficiencies such as a lack of practical and contextualized pharmacology knowledge precipitates errors (Vaismoradi et al., 2014). Students remark that they are taught abstract pharmacology concepts but do not understand how to apply them in real practice. Students cite a lack of confidence in medication administration due to difficulty aligning theory with practice and limited clinical medication administration practice (Vaismoradi et al., 2014).

Studies on graduate nurses demonstrate error rates similar to those of nurses and nursing students (Jones & Treiber, 2018; Sykes, 2017; Unver et al., 2012). In an integrative review, statistics demonstrate that up to 75% to 88% of novice nurses make medication errors (Saintsing et al., 2011). In three subsequent descriptive studies, 55%- 62.1% of practicing nurses reported making a medication error as a graduate nurse (Sykes, 2017; Treiber & Jones, 2018; Unver et al., 2012). To add to this concern only 24%- 45.35% of new nurses report their medication errors (Sykes, 2017; Treiber & Jones, 2018; Unver et al., 2012). If all errors are not reported, the actual number of errors could be significantly higher.

One study of nurse graduates shows that 92.7% of graduates understand what incorporates a medication error, 83.6% indicate they know when to report an error; however, 26% state they might not report an error if they were fearful (Sykes, 2017). In addition, a study by Treiber and Jones (2018) reveals that perhaps five percent of new graduates are not even sure if they have made an error (Treiber & Jones, 2018). These numbers are concerning and demonstrate that graduate nurses are entering practice without the knowledge, skills, and confidence needed to practice medication administration safely.

Studies of causes of graduate nurse errors and contributing factors include both system and individual factors. Factors such as inexperience or being new, fatigue, miscommunication with physicians, feeling overwhelmed, rushing, not following safety procedures such as the five rights, not double checking medications, intimidation, fear, time pressures, distractions, and not using an infusion device correctly are common mentions (Treiber & Jones, 2018). A study of graduates in North Carolina demonstrates similar results (Sykes, 2017). Other factors found to contribute to errors include problems with technology such as medication scanners and dispensing systems (Jones & Treiber, 2018). These are similar to factors identified by students (Bourbonnais & Caswell, 2014). In all studies, the most common reasons for medication errors were exhaustion or feeling tired, distraction, failing to complete patient safety checks, and double identification (Sykes, 2017; Treiber & Jones, 2018). Missing in these studies is the effect of environmental culture and context on medication errors.

Research studies show that the complexity of the real world practice environment and limitations associated with current teaching models leads to both student and graduate errors. Authors cite a need to evaluate how students are taught medication administration (Bourbonnais & Caswell, 2014; Gregory et al., 2009, Meechan et al., 2011a; Sulosaari, Kajander, Hupli, Huupponen, & Leino-Kilpi 2012). Current literature also suggests that what is taught and how it is taught is not adequate in preparing students and graduates for safe medication administration processes (Bourbonnais & Caswell, 2014; Forber, DiGiacomo, Davidson, Carter & Jackson, 2015; Sulosaari et al., 2012).

Medication Administration Process

Medication administration includes a five-step process of 1) ordering or prescribing, 2) transcribing, writing or computer entry, 3) dispensing, 4) administering, and 5) evaluation (Gallagher-Gordon, 2014). The process involves many disciplines including physicians, mid-level providers, pharmacists, and nurses (Adhikari, Tocher, Smith, Corcoran, & McArthur, 2014; Hewitt et al., 2015; Bourbonnais & Caswell, 2014; Gallagher-Gordon, 2014; Orbæk et al., 2015). Nurses play a crucial role in the medication administration process, particularly on the administration and evaluation processes (Adhikari et al., 2014; Bourbonnais & Caswell, 2014; Hall, 2013; Lim & Honey, 2014). Medication administration for nursing is defined as the act of "preparing, giving and evaluating the effectiveness of prescription and non-prescription drugs" (Bulechek, Butcher, Dochterman & Wagner, 2013, p. 255). Nurses may administer medications multiple times in a single day making it a high-volume, high-risk task (Cooper, 2014; Gunningberg et al., 2014). Responses to a survey study of medication processes utilizing the experiences of nurses in Pennsylvania (n=92) demonstrates that nurses may administer up to 70 medications in a shift (Gallagher-Gordon, 2014). In all aspects, medication administration is a complicated process that creates the potential for unsafe practices and errors (Adhikari et al., 2014; Jember et al., 2018; Leufer & Cleary-Holdforth, 2013; Zimmerman & House, 2017).

The literature on nursing and medication reflects that medication competence is considered one of the most fundamental and necessary skills for nurses and graduate nurses alike (Sulosaari et al., 2011). An integrative review of 21 studies of nurse medication competence identifies 11 broad and three major categories of general medication competence for nurses (Sulosaari et al., 2011). The three most significant competence categories include 1) decision-

making competence, 2) theoretical competence, and 3) practical competence. Decision-making competence is described as having "well-grounded knowledge (theoretical competence) and the ability to apply that knowledge (practical competence), during often complex medication processes" (Sulosaari et al., 2011, p. 475). This definition correlates with recent study findings reiterating that medication competence requires nurses to attain the appropriate knowledge of pharmacology, medication administration processes, and critical thinking and decision-making skills (Bourbonnais & Caswell, 2014; Hewitt et al., 2015). The definition of decision-making processes is also found to support findings that nurses must be able to apply knowledge, while at the same time weighing the importance of patient contextual data (Campbell, 2013). Sulosaari et al.'s (2011) review of the literature finds that decision-making requires that nurses understand laws, regulations, and national guidelines of medication care, collaborate with interdisciplinary teams, and have a sound foundation of knowledge of pharmacology, medication calculation, and medication administration processes. Successive literature reiterates safe medication administration decisions are based on sound foundation of knowledge (Bourbonnais & Caswell, 2014; Dolansky et al., 2013; Hall, 2013; Hewitt et al., 2014). Communicating effectively with providers, pharmacists, patients, and their families is also mentioned (Blevins, 2016; Bourbonnais & Caswell, 2014; Theisen & Sandau, 2013).

Ensuring patient safety through competence in safe medication administration practices is of paramount importance to nursing practice (Cleary-Holdforth & Leufer, 2013; Sulosaari et al., 2011). Literature shows that nurse graduates are involved in medication errors and are not always considered competent in medication administration skills (Saintsing et al., 2011; Sulosaari et al., 2011; Zimmerman & House, 2016). For the nurse graduate, becoming competent

in the skill of medication administration is key to preventing medication errors and providing safe patient care as a new nurse (Choo, Hutchinson, & Bucknall, 2010; Sulosaari et al., 2011). Studies on graduate nurse medication competence demonstrate that they are not sufficiently prepared in medication administration. Insufficient preparation increases the risk of medication errors and decreases patient safely (Sulosaari et al., 2011; Zimmerman & House, 2017). Scholars of nursing education deem that educating graduate nurses to be competent practitioners in medication administration is complex (Adhikari et al., 2014; Leufer & Cleary-Holdforth, 2013; Sulosaari et al., 2011; Vaismoradi et al., 2014; Zimmerman & House, 2017).

Teaching Medication Administration

Teaching medication administration skills and providing adequate knowledge for practice is a complex process (Bourbonnais & Caswell, 2014). Medication administration is considered one of the most essential skills that prelicensure nursing students must learn in order to practice safely as an entry-level graduate nurse (Bourbonnais & Caswell, 2014; Choo et al., 2010; Lock, 2011; Reid-Searle & Happell, 2012; Simones et al., 2014, Sulosaari, et al., 2011). In 2014 the National Council of State Board of Nursing (NCSBN) conducted the RN Nursing Knowledge Survey of newly licensed nurses, registered nurse (RN) educators, and RN supervisors in an effort to identify what knowledge is felt to be the most important and least important for the new nurse graduate to possess (NCSBN, 2015). Medication error prevention knowledge and medication safety knowledge is rated in the top three of importance by all participants (p. 23).

The concepts of situated cognition provide a framework (Onda, 2012; Paige & Daley, 2009), and are used to organize and explain the strategies used to teach medication administration. The nursing program of the college of study situates activities in the academe and

the healthcare communities. These communities include the classroom, laboratory, simulation, and clinical environments. Both cognitive and physical tools used in medication administration are presented to students within the context of each environment. Knowledge as a cognitive tool includes an understanding of medication processes, pharmacology knowledge, and dosage calculation. Physical tools or artifacts include such things as medication cups, syringes, and technical equipment: intravenous (IV) pumps, electronic healthcare records (EHR). Nursing faculty, clinical instructors and practice professionals (RNs, doctors, and others) engage students in an apprenticeship form of teaching-learning through coaching, mentoring and role modeling.

Nursing textbooks and literature do not prescribe a specific method for nursing schools to teach medication administration. What the literature does describe are some common elements that are used to teach medication administration (Bourbonnais & Caswell, 2014). Sykes (2017) conducted a descriptive study on medication errors, nursing education, and workplace orientation relative to medication safety (Sykes, 2017). Thirty-five (42.7%) of nursing schools responded to the survey. The most common methods utilized by the respondent schools in teaching medication processes included lab courses 97.1% (n=34) and lecture 94.3% (n=33). Eighty percent (n=28) used both clinical and 80% simulated clinical to reinforce the application of knowledge. Other reported teaching strategies included use of computer/web-based assignments 48.6% (n=17), staff RN preceptorships 28.6% (n=10), laboratory instruction 42.9% (n=15) and problem-based learning 28.6% (n=10) (Sykes, 2017). In a similar size study, over 200 American Association of College of Nursing (AACN) schools of nursing shares that 60% of schools utilize stand-alone pharmacology courses to teach and assess medication process and pharmacology knowledge while 38% utilize nursing courses that integrated pharmacology content. Another 29.3% utilize

computer-assisted safe medication modules and exams, and 96.2% administer dosage calculation exams (Gonzales, 2012, p. 46).

Tools: Medication process knowledge. Knowledge is essential to the development of graduate nurse medication competence (Sulosaari et al., 2011). In a study of general medication competence for nurses, four categories of knowledge are identified as essential to safe medication practice. These include knowledge of anatomy and physiology, pharmacology, mathematical and medication calculation, and medication administration principles (Sulosaari et al., 2011).

***Pharmacology knowledge*.** Nursing students are gradually introduced to pharmacology, and safe medication management throughout their nursing programs (Adhikari et al., 2014; Bourbonnais & Caswell, 2014). Literature reflects that pharmacology knowledge is one of the most important factors for consideration in medication safety (Adhikari et al., 2014; Bourbonnais & Caswell, 2014; Meechan et al., 2011b; Mettiainen, Luojus, Salminen, & Koivula, 2014). Pharmacology knowledge is essential to medication and patient assessments, and in anticipating and monitoring medication effects (Sulosaari et al., 2011). According to the Agency for Healthcare Research Quality (AHRQ, 2017), there are more than 10,000 prescription drugs on the market, and an estimated one-third of all adults in the United States take five or more prescription drugs (para 1). Gonzales (2012) identified that 60% of AACN schools provide pharmacology knowledge through stand-alone pharmacology courses and 36.8% integrate pharmacology knowledge into their nursing courses. Although the study summarizes that there is no standardized format for assessing students' medication knowledge of pharmacology or safe medication administration processes, it does provide further data as to the methods used to teach

medication administration knowledge (Gonzales, 2012). Other studies show that schools use skills laboratories and simulated learning experiences to assist students in applying theoretical pharmacology, and dosage calculation knowledge in simulated clinical activities (Gonzales, 2012; Meechan et al., 2011b).

At the college of study, medication administration process and pharmacology knowledge is taught in the classroom similarly through face-to-face and flipped lectures, lectures with medication 'clicker' questions, evolving case studies, and laboratory instruction. Examinations on medication processes, pharmacology, and dosage calculation are utilized to assess knowledge. Activities in both the laboratory and simulation are being used to reinforce the application of knowledge.

Physical tools. Basic medication administration tools are first introduced in the classroom and laboratory settings. Clinical instruction provide exposure to these basic tools in the context of real practice (Adhikari et al., 2014). In the 2017 study of nursing programs in North Carolina, all of the 35 responding schools used basic equipment such as medicine cups, syringes, and medication supply carts, as well as partial task trainers (injection pad, IV arms) (Sykes, 2017). Other tools and equipment used by schools include computer-based programs (dosage calculation, clinical scenarios) (71.4%), electronic health records (EHR) (60%), full-body simple manikins (57.1%), smart infusion devices (IV pump with drug database) 54.3%, full-body-medium-fidelity manikins (some basic electronics) (54.3%), full-body high-fidelity manikin (life-like computerized manikin) (42.9%), bar-code scanner (40%), peer patients (37.1%), computer-based task trainers (28.6%), standardized patients (8.6%), virtual reality systems (2.9%) and other equipment, such as posters and dispensing from multidose containers (2.9%).

The college of study uses similar tools except for bar-code scanners, standardized patients, virtual reality systems, and posters. The nursing program is not consistent in its use of an electronic health record (EHR) when teaching medication administration. The lack of an EHR necessitates the use of a paper electronic health record or no record at all.

Authentic situated activities. Situated activities are actions or tasks of learning that occur within a specific community social and cultural context (Brown et al., 1989). Activities are considered 'authentic' when they are reflective of or realistic to the contexts and social and cultural ways of being and behaving in a practice community (Brown et al., 1989). The two most common authentic situated teaching activities supported by the NCSBN in teaching nursing skills are clinical instruction and simulations (Hayden et al., 2014; NCSBN Practice, Regulation, and Education Committee (PR&E), August 2005). Clinical instruction provides students with opportunities to merge theoretical knowledge with knowledge of actual nursing practice (Amer, 2013; Berkow, Virkstis, Stewart, & Conway, 2009). Simulation provides authentic situated activities by mimicking real-life medication administrating situations in a safe learning environment (NCSBN PR&E, August, 2005). Simulations are designed to promote psychomotor skill attainment and develop critical thinking and clinical judgment skills without the threat of harming a patient (Campbell, 2010). Clinical experiences are designed to provide students with real-life experiences, socialization to them to the nursing role while developing critical thinking and skill attainment which is presumed to assist in bridging the prepared/practice gap (Patterson et al., 2017).

Simulation. Simulations are "activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision-making, and critical thinking through

techniques, such as role-playing and the use of devices such as interactive videos or mannequins" (NCSBN, 2005, p. 2). An initial search of simulation in nursing education between the years 2010 and 2018 elicits over 480 research-based studies. Simulated experiences allow the student to engage in critical thinking and practice of skills in a safe, controlled environment. Simulated medication administration is utilized in many nursing programs to offset the lack of clinical sites and clinical opportunities to engage in this skill (Harris, et al., 2014; Hayden et al., 2014). Simulated experiences can be utilized to replicate the clinical environment and provide exposure to these types of experiences that are aspects of 'real life' medication administration (Meechan et al., 2011b; Zimmerman & House, 2016). Instructors use simulation in both the skills laboratory and high fidelity simulation labs, however 'program timing' of simulations differs significantly in nursing programs and is "often fragmented" (Bailey& Mixer, 2018, p. 69). The college of study utilizes simulation in all environments: classroom, skills laboratory, and simulation laboratory. Simulations start in the first course of fundamentals and continue throughout the nursing program, ending in the last course of leadership.

The literature supports the efficacy of simulations as a teaching strategy for medication administration in nursing education (Harris et al., 2014; Hayden et al., 2014; NCSBN, 2005; Onda, 2012; Wyrostok et al., 2014; Zimmerman & House, 2016). The NCSBN study of simulation (Hayden et al., 2014) demonstrates that there is "…no statistically significant differences in clinical competency as assessed by clinical preceptors and instructors between groups..." of students who engage in traditional clinical experiences ($\leq$ 10% simulation experiences), students who engage in 25% of clinical hours replaced by simulated experiences, and students who have 50% of their clinical replaced by simulated experiences (p. S3).

Limitations of simulations are that they do not provide for all of the situated possibilities that can occur in practice such as short staffing, limited resources, social aspects of a practice setting, and unexpected situations (Benner et al., 2010, p. 7-8). Direct care provides opportunities to understand the complexities of real life medication administration, whereas simulation does not (Saintsing et al., 2011). Studies of nurse graduates show that the realism and complexity of simulations directly affect graduate perceptions of simulated activity efficacy (Bailey & Mixer, 2018).

Clinical. Clinical instruction is the traditional method of engaging students in thoughtful practice in an "authentic environment" (NCSBN, 2005, p. 5). Clinical instruction allows the student to participate in real-life patient situations in which they can apply what they have learned in theory, engage in problem-solving, and gain experience in managing patients and their medication needs (Patterson et al., 2017). Clinical immersion is essential in the development of clinical reasoning, skills, and professional socialization (Patterson et al., 2017). Clinical makes up no less than 50% of a student's experiential learning in their nursing program (Patterson, et al., 2017; NCSBN, 2005). As students do not have previous medication administration experiences before entering school, clinical instruction provides them with opportunities to learn the process of administering medications from experienced nurses in an authentic environment (Benner, 2001; Meechan et al., 2011b). Experiences in clinical settings develop competence to manage medication administration (Meechan et al., 2011b).

There are several models for clinical instruction (Billings & Halstead, 2016). The traditional model of instruction assigns one clinical instructor (CI) to eight students whom they provide direct supervision. The role of the CI is to model and coach students in critical thinking,

observe student performance, assist students in applying theory to practice, and evaluation (Mills, Hickman & Warren, 2014). This model is purported to assure that students are learning and applying the theoretical knowledge that teaches safe practices. In the traditional model, students do not administer medications with staff RNs. A second model of clinical instruction is the preceptor model. In this model, the healthcare staff registered nurses (RN) and the CI work with students. Both the staff RNs and CI coach and mentor students as they care for patients, complete skills, and administer medications (Bell-Scriber & Morton, 2009). Staff RNs promote student socialization to the role of a practicing nurse, provide clinical expertise, and supervise the student during medication administration (Bell-Scribner & Morton, 2009). Both of these models offer enculturation to the complexity of medication administration practices in an authentic environment.

Challenges in clinical instruction. The college of study utilizes the traditional model. Both the traditional and preceptor clinical models for instruction may limit student opportunities to administer medications. In the traditional model, CI often have eight to ten students each day. With this many students, CI do not always have enough time to devote to administering medications with each student (Gaberson & Oermann, 2010). In preceptor clinical models Staff RNs or clinical preceptors (CP) also have competing demands for their time which may limit their ability to administer medications with students (DeMeester, Hendricks, Stephenson & Welch, 2017). Nurse graduate and student perceptions of their clinical experiences validate that high student to faculty ratios and preceptor competing demands can limit individual attention and learning opportunities (DeMeester et al., 2017; Hickey, 2010). The lack of opportunities to engage in the experience of administering medications in clinical is felt to impede student

attainment of clinical competence in this skill (Scully, 2011; Sulosaari et al., 2012). CI not employed in a clinical facility in which they have students may also face difficulties as they are not often familiar with the social and cultural constructs of the clinical environments nor are they always oriented and trained on varying equipment and medication administration processes inherent in a clinical site (Hickey, 2010).

Challenges in obtaining quality sites for clinical instruction is a long-standing problem (Hayden et al., 2014; Patterson et al., 2017). Nursing schools are fighting for limited clinical sites, lacking qualified teaching faculty, and at times struggling to place students in clinical sites due to limitations on the number of students allowed on a patient care unit (Hayden et al., 2014). This limits student opportunities to engage in medication administration in an authentic learning environment that provides real-life contextual situations and socialization to the nursing role. Nurse educators are implementing alternative teaching models. However, there is little data on the efficacy of some of the new models (Patterson et al., 2017) or how they affect medication administration skills.

Clinical instruction directly affects the quality of nursing education (Hayden et al., 2014; Hickey, 2010; Nazari & Mohammad, 2015; O'Mara et al., 2014). Researchers question the quality of the learning that occurs in clinical settings (Patterson et al., 2017; Stayt & Merriman, 2013). The lack of adequate training of clinical instructors (Bell-Scribner & Morton, 2009; Dahlke, Baumbusch, Affleck, & Kwon., 2012; Davidson & Rourke, 2012; Seurynck, Buch, Ferrari, & Murphy, 2014), assumptions of clinical competency in those that guide students in medication administration (Hickey, 2010; Tilley, 2008), inadequate supervision of students (Reid-Searl et al., 2010), and challenging clinical environments are aspects of the clinical

experience that are problematic (Patterson et al., 2017). A national survey conducted by The National League of Nursing identifies several barriers to quality educational experiences (Ironside & McNelis, 2010). Barriers include a lack of quality clinical sites, lack of qualified faculty, size of clinical groups (ratio of faculty to students), restrictions on the numbers of students permitted on a unit, restrictions on the number of experiences students are allowed to engage in, and the time-consuming nature of students having to learn multiple technology systems.

Context and community. The concepts of community and context are intimately connected to teaching and learning (Brown et al., 1989). Context is "the interrelated conditions in which something exists or occurs (environment, setting)" Merriam-Webster, n.d., para 1). Community refers to socially constructed groups whose behaviors and ways of thinking are formed by their history, relationships, and cultural patterns (Brown et al., 1989; Wyrostok et al., 2014). Integrating activities that are contextual to community practices operationalizes medication administration knowledge and skills in a way that is meaningful and usable (Onda, 2012).

Both the academic and the healthcare environment are considered communities. Nursing students move back and forth between these communities to learn the expected ways of behaving, communicating, and practicing nursing according to the social norms of real-world practice. In moving between both communities, students learn to merge their knowledge and skills as attained in formal schooling with real-life practices (Melincavage, 2011; Onda, 2012). Engaging in activities that occur within real-life communities, such as in clinical instruction, allows the student to interact with nurses learning the actions of 'ordinary people' and beginning

the process of enculturation to the complexities of practice (Brown et al., 1989). Clinical experiences are vital to socialization to the role of nursing, integration of knowledge into practice context, socialization, and the development of clinical reasoning and problem solving (Harker, 2017).

Role modeling is a specific way in which enculturation and learning occur (Coram, 2016). The literature provides several definitions of role modeling which indicates that it is a process in which a student or learner can observe another's behaviors or attitudes which provides them with knowledge of accepted or expected ways of acting and doing (Baldwin, Mills, Birks & Budden, 2014, p. e18). The purpose of learning through role modeling is that the learner can then pattern their behavior to conform to the observed norms of behavior and thinking (Felstead & Springett, 2016).

The literature supports the importance of clinical immersion; however, students share that the social and cultural contexts of clinical sites are not always supportive and can affect the ability to learn (Melincavage, 2011). Learners situated in activities within clinical practice communities participate in LPP as 'newcomers' and as such students can experience such feelings of anxiety, powerlessness (Lave & Wenger, 1991; Melincavage, 2011). They can experience a lack of support from clinical faculty, feel demeaned, and ignored (Melincavage, 2011). Students may feel that they are outsiders or peripherally located and that 'old-timers' (facility RNs and staff) do not want them to become part of their community (Melincavage, 2011). All of these feelings can have negative implications for successful learning.

Preparation Practice Gap

The literature discusses the lack of graduate nurses' preparedness for practice (Patterson et al., 2017). Some researchers describe this phenomenon as the lack of knowledge for practice, the lack of critical thinking skills, the lack of experience or any combination of the three (Berkow, Virkstis, Stewart, & Conway, 2009; Candela & Bowles, 2008; Higgins, Spencer & Kane, 2010; McCalla-Graham & De Gagne, 2015; Orbaek et al., 2015; Saintsing et al., 2011). Other researchers describe it using the label of either theory-practice gap (Ajani & Moez, 2011; Bendall, 2006; Patterson et al., 2017) or prepared-practice gap (Hickerson et al., 2016; Slaikeu, 2011; Zimmerman & House, 2016).

Theory-practice gap and preparedness-practice gap are metaphorical terms utilized to understand similarities and differences between two things (Gallagher, 2004). Knowledge is "facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject" (Oxford Living Dictionary, 2017). The concept of gap indicates that there is a separation of two parts. This separation can be reduced if conditions are right (Gallagher, 2004). The term 'practice' is not well defined. Ousey & Gallagher's (2007) define 'practice' as the "everyday work of the nurse in contact with the patient" (p. 200). In simplistic terms of putting all of the pieces together, the definition of *theory-practice gap* reflects a lack of knowledge, skills, judgment, or practical understanding of everyday work of the nurse caring for a patient. In more definable terms it has been described by Patterson et al. (2017) as the "developmental lag between achieving competency as an undergraduate student nurse and competency as a novice graduate nurse" (p. 101).

Other authors do not explicitly define the second term *preparation-practice gap* when describing preparedness of graduates for practice (Hickerson et al., 2016; Slaikeu, 2011; Zimmerman & House, 2016). Discussions in these papers reference insufficient knowledge for practice, lack of proficiency in assessment and psychomotor skills, and lack of readiness of student nurses to transition to practice. These are similar characteristics of the theory-practice gap. The researcher utilized the term *preparation-practice gap* to encompass both concepts.

Historically nurses in the U.S. were trained in hospital-based programs using an apprenticeship approach (Harker, 2017; Rebeiro, Edward, Chapman & Evans, 2015). Beginning in the 1960's through the 1980's nursing education transitioned from the hospital-based apprenticeship style model of teaching to theory-based teaching models located within the classroom (Monaghan, 2015; Watt & Pascoe, 2013). In the early 1950's the associate degree-nursing program (ADN) was introduced in which teaching and curriculum development was accomplished using college employed faculty (Harker, 2017). Before the creation of the ADN programs, hospitals and physician created 85% of nursing curriculums (Harker, 2017).

Nursing literature on educational practices and nurse preparation discusses whether there is a connection between the shift from hospital to college based training and the preparedness-practice gap (Bendall, 2006; Benner et al., 2010; Bennett et al., 2017; Harker, 2017; McCalla-Graham & De Gagne, 2015; Monaghan, 2017; Ribeiro et al., 2015; Watt & Pascoe, 2013). Nursing literature traces this concern over the preparedness-practice gap in nursing to the 1970's. In 1976 Bendall (2006) conducted a study of 321 students and 'pupils,' working in 19 hospitals across England. Bendall (2006) discovered that there was little correlation between how the subjects answered a written question and their clinical performance in 80% of observed cases.

Subjects identified appropriate nursing care but often failed to perform the actions. In this study some 14 years before Brown et al.'s publication in 1989, Bendall discovered a discrepancy between "know what" and "know how." Subjects within this nursing study identified, much like today, that "what is taught in school is not what is practiced in the ward's and vice versa" (Bendall, 2006, p. 16). In 1976 Bendall (2006) predicted that if the reality of nursing practice bears little resemblance to nursing training that the gap between 'theory' and 'practice' will continue to expand. She cites that unless nursing educators and administrators change how they train nurses, new nurses will be "…increasingly proficient on paper and decreasingly proficient in practice" (Bendall, 2006, p. 17). Bendall in her study in 1976 cites that more training is occurring in the classroom and less and less in the clinical facilities applying knowledge and practicing the art of nursing.

Current literature and explorations of graduate perceptions of readiness for practice reiterate Bendall's (2006) concern that the transition away from apprenticeship type learning to classroom theoretical learning may have an effect on graduate nurse's preparedness for practice (Benner et al., 2010; Bennett et al., 2017; McCalla-Graham & De Gagne, 2015; Monaghan, 2015; Watt & Pascoe, 2013). Literature demonstrates that graduates, healthcare administrators, and educators alike are disturbed by the stressful transitions, anxiety, and feelings of unpreparedness that graduate encounter when transitioning from the academic environment into an authentic work environment (McCalla-Graham & De Gagne, 2015; Phillips, Kenny, Esterman, & Smith, 2014; Watt & Pascoe, 2013). The theory of "situated cognitions" speculates that the breach between "know what" and "know how" (theory and practice) is the result of educational system practices and beliefs (Brown et al., 1989). Nursing research reiterates the

need to consider, develop and evaluate learning activities that integrate abstract knowledge with practice-based 'real-life' learning opportunities reflective of actual nursing practice (Harker, 2017; Rebeiro et al., 2015).

The literature explores the work readiness or preparedness for practice from the perspective of the registered nurses working with graduates. In several studies, graduates are not able to meet expectations for 36 established competencies, are not able to meet entry levels of critical thinking and clinical judgment, are involved in varying but substantial percentages of medication errors, failing to recognize critical patient problems (Hickerson et al., 2016; Ironside & McNelis, 2010; Slaikeu, 2011; Zimmerman & House, 2016). Transition, in nursing, is "a period of time where new graduates undergo a process of learning and adjustment, and socialization to a new culture, the workplace" (Phillips et al., 2014). Studies indicate that feelings of unpreparedness lead to stress during the transition to practice, which is one of the leading reasons new graduates leave their jobs (Duffield, Roche, Blay & Stasa, 2011).

Graduate Perceptions

Studying nurse graduates during the first 12 months of practice supplies significant and relevant information about teaching practices and transition from academia to practice (McCalla-Graham & De Gagne, 2015). To understand graduate perceptions of teaching practices and preparedness of practice a literature search was completed using the terms 'graduate nurse and novice nurse', 'perceptions-attitudes-opinions.' The literature on graduate nurse perceptions of preparedness for practice and nursing education explores a variety of topics. In the literature there are studies of graduate perceptions of preparedness practice gap (Watt & Pascoe, 2013), clinical experiences and preparation for practice (Hickey, 2010; Patterson et al., 2017);

simulation (Bailey & Mixer, 2018; Kaddoura, 2010; Meyer, Marzen-Groller, Myers, Busenhart, Waugh & Stegenga, 2014); technical skills and medical devices (Ewertsson, Gustafsson, Blomberg, Holmstrom & Allvin, 2015); transition to practice (Bjerknes & Bjork, 2012; Chandler, 2012; Dyess & Sherman, 2009; Higgins et al., 2010; McCalla-Graham & De Gagne, 2015; Parker, Giles, Lantry & McMillan, 2012; Phillips et al., 2014), socialization and collaborative practice (Ebert, Hoffman, Levett-Jones & Gilligan, 2014; Goodare, 2015), professional confidence (Ortiz, 2016), how new nurses learn (Bisholt, 2012), and educational preparation (Callaghan, Watts, McCullough, Moreau, Little, Gamroth & Dornford, 2009; Candela & Bowles, 2008; Williams et al., 2012). There are a few studies focusing on graduate perceptions related specifically to pharmacology knowledge and medication administration and medication errors (Jones & Treiber, 2018; Lim & Honey, 2014; Lim & Honey, 2017; Sykes, 2017; Treiber & Jones, 2018; Unver et al., 2012) and one study on workplace supports and safe medication practice (Sahay, Hutchinson & East, 2015). The literature examined provided only two bodies of research on graduate nurses' perception of their educational preparation for safe medication administration, and specific teaching strategies (Sykes, 2017; Treiber & Jones, 2018).

Perceptions of tools: Knowledge. Several studies exploring graduate nurses' experiences relative to knowledge deficit (McCalla-Graham & De Gagne, 2015; Adhikari et al., 2014). McCalla-Graham & DeGagne's (2015) phenomenological study of 10 graduates indicates that nursing school provides essential knowledge upon which graduates can develop their practice as a novice nurse but that knowledge does not prepare them for the actualities of caring for patients with complex, unexpected problems (McCalla-Graham & De Gagne, 2015). To function effectively in the role of the nurse, graduates relay that they need more knowledge

relating to the complexities of actual patient care and more "worst case scenarios" in clinical to develop their critical thinking skills. (McCalla-Graham & De Gagne, 2014). Studies including both prelicensure students and graduates reveal that what is taught in school does not mirror real-world practice and vice versa. What is taught in school does not prepare graduates to function effectively in their beginning nurse roles (Bendall, 2006; McCalla-Graham & Gagne, 2014).

A study of graduate and final year nursing students' finds that new graduates feel they lack confidence because they have insufficient understanding of pharmacology (Adhikari et al., 2014). Without this knowledge, graduates and students do not feel adequately prepared to monitor and react to patient adverse drug reactions (Adhikari et al., 2014). In this observational study, graduate nurses suggest that prelicensure education should include more pharmacology instruction to include poly-pharmacy, drug side effects, contraindications, additional opportunities to administer medications in prelicensure clinical, and continuing education classes after graduation (Adhikari et al., 2014).

Lim and Honey (2014, 2017) conducted two exploratory surveys to examine graduate nurse perceptions of pharmacology knowledge and medication management. Both studies report weaknesses and strengths in graduate perceptions of pharmacology knowledge and usage. The studies indicate that >50% of new graduates always or often consider pharmacology principles when administering medications, > 70% feel they are strong in applying principles of pharmacology, using resources and understanding why drugs are given and correct dosages, and monitoring for side effects. Areas that graduates perceive less confidence include patient teaching on medications, understanding mechanisms of action for medications and drug clearance (Lim & Honey, 2014, 2017). Qualitative findings in both studies cite that a lack of

time, heavy workload, a lack of pharmacology knowledge, resources, and a lack of experience impair their ability to manage medications effectively. In both studies, participants cite ways to improve medication management and safety by suggesting that undergraduate programs increase pharmacology learning opportunities, provide supervised experiences involving medications, and provide more education on medication policies and procedures (Lim & Honey, 2014, 2017). The discussion of the results suggests that "learning pharmacology outside of context is not conducive to the consolidation and integration of knowledge with clinical practice" (Lim & Honey, 2017, p. 280). Lim and Honey (2017) also suggest that learning pharmacology within the context of clinical improves knowledge acquisition and skill development (p. 280). These results are similar to an earlier study by Candela and Bowles (2008) in which 51% of graduates felt that they did not receive adequate pharmacology instruction in their educational programs. Candela and Bowles (2008) recommend that educators should consider using teaching methods that integrate active learning strategies that foster the transfer of pharmacology knowledge to clinical practice.

Perception of context and community. In the study conducted by McCalla-Graham and DeGagne (2015), environmental context was one of three central themes investigated. In this study, nurse graduates identify that environmental factors such as lack of staff, fast work pace, and increased work requirements, leave them feeling less confident in their abilities. Although this study did not discuss educational strategies to help bridge the transition from school to the first job, it does mention that effective socialization into the workplace, support, and professional development is essential during their first 12 months of work (McCalla-graham & DeGagne (2015).

The literature provides several studies on nurse graduates and their workplace experiences during the transition to practice (Parker et al., 2012; Sahay et al., 2015). Parker et al. (2012) evaluated graduate experiences during the transition to practice. Two hundred and eighty-two Australian graduates report difficulty adapting to workplace cultures especially those that are negative, do not provide graduate support, and allow a culture of horizontal violence to exist. Recommendations based on this study include providing education to students on how to handle difficult nursing cultures and manage social interactions in their first year of practice (Parker et al., 2012). The second study of nurse graduates and the environment in Australia focused on four themes related to graduate nurse medication errors, safe medication practices, and workplace supports relationships (Sahay et al., 2015). The study demonstrates that the lack of supportive relationships is directly related to a decrease in medication safety practices, an increase in medication errors, and a decrease in medication error reporting (Sahay et al., 2015). Although this study does not specifically address any aspect of nurse graduate education, it does demonstrate that new nurse graduates do not develop adequate collaboration and communication skills to successfully navigate a negative work culture.

Perceptions of medication administration. Sykes (2017) was one of the few researchers to focus specifically on graduate nurse perceptions of their educational preparation in acquiring safe medication management skills. In this study, 84.5% to 91.3% of graduate nurses perceive that clinical courses are effective in preparing them for safe medication management. Approximately 65% of graduates feel that classroom courses are effective, while 68% regard pharmacology courses as effective in preparing them for safe medication management. Just over 92% of graduate nurses perceive that having a staff preceptor in a one-on-one relationship is

effective, and almost 93% conclude that working with a clinical faculty in a one-on-one relationship is effective. Only 80.9 % feel that the laboratory is effective and only 76.3 % feel that simulation experiences are effective in teaching medication administration safety. Jones and Treiber's (2018) exploration of graduates' experiences with medication safety and efficacy of education reveals that 71% (n=170) feel their training prepared them well or very well for medication administration (Jones & Treiber, 2018). Only 50% of these same graduates feel that nursing school prepared them well or very well to advocate for themselves (Jones & Treiber, 2018). Advocating for oneself includes skills such as problem-solving, communication, influence, and collaboration (Jones & Treiber, 2018).

Similar to other studies (Lim & Honey, 2014, 2017) Sykes explores graduate nurse perceptions of ways to improve preparation for safe medication management. Qualitative analysis reveals five themes perceptions of graduate nurses: more practice opportunities in lab, clinical and simulation, more opportunities to work equipment that is similar to real practice environments, enhancement of instruction, time/stress management, improve medication safety teaching (what is a medication error, causes of errors, error prevention), and more intensive pharmacology courses (Sykes, 2017, p. 142).

Perceptions of clinical activities. Very few studies evaluate graduate perceptions of the clinical environment encountered during their education. One study done by Sykes (2017) demonstrates that 84.5% of nurse graduates feel their first clinical course was effective in teaching medication administration. Ninety-one point three percent think that subsequent clinical courses are effective in preparing them for same medication administration practices. Both one-on-one preceptorships (92.1%) and clinical experiences with some one-on-one time with the

clinical instructor (92.7%) are found to be effective teaching strategies. Other evidence contradicts these findings and questions the effectiveness of clinical teaching practices of safe medication administration (Patterson et al., 2017). Two studies demonstrate that there is a distinct feeling among some graduates that clinical experiences do not prepare them adequately to safely administer medications upon graduation (Candela & Bowles, 2008). A survey of 352 graduate nurses in Nevada reveals that only 61% feel that their nursing education provides them with enough time to practice medication administration in clinical (Candela & Bowles, 2008). What type of clinical model was used in the clinical setting is not known.

Perceptions of simulation. Very few studies report on the graduate perception of the efficacy of simulation in teaching medication administrations. The first noted study of nurse graduate perceptions of simulations is a descriptive exploratory study of ten newly graduated nurses (Bailey & Mixer, 2018). In the study, researchers found that although simulations varied widely among five regional nursing programs; 90% of graduates feel that simulated learning is helpful in preparing them for practice (Bailey & Mixer, 2018). Graduates share that simulations are more effective when they are realistic, complex, include skills practice, and require critically thinking during the scenario (Bailey & Mixer, 2018). Graduates feel that simulation experiences increase their confidence and are helpful in successfully transitioning to practice (Bailey & Mixer, 2018). In another study however, nurse graduates rate simulations as less effective (76.3%) than lab courses (80.9%), tutorials (laboratory instruction with one teacher and one or two students) (85.3%) and clinical activities (>92%) (Sykes, 2017) in teaching medication administration. The perception that simulations are less effective than lab courses is an unexpected finding as most research supports the efficacy of simulation, indicating they are

highly effective second only to clinical experiences. Sykes does not discuss if there were inconsistent uses of simulation or if the use of simulation specifically in medication administration was ineffective (2017).

Meyer et al. (2014) explored the perceptions of 19 new graduates of the effectiveness of simulation in preparing them for practice. Graduates share that role assignments, faculty expectations of students, and simulation processes can vary. Depending on the purpose of the simulation, they may feel anxious about performing in front of others, and often do not feel they or their peers are prepared to 'perform' although they share that they value the opportunity to participate in simulated experiences and did improve their ability to critically think (Meyer et al., 2014). Kaddoura (2010) conducted a study of new graduates using simulation in critical care training. Graduates in this study identify that the more realistic the patient situation and scenario is the more effective it is for learning and critical thinking development. Role-playing in which instructors act as other interdisciplinary players assists the graduates in learning why different actions are taken in the care of an ill client and helps to develop an understanding of the different roles various healthcare workers play. The simulations promote teamwork and confidence.

Situated Cognition and Nursing

The application of this theory in nursing is gaining in popularity as its underlying assumptions have significant implications for teaching and learning (Allen, 2013; Holland, Landry, Mountain, Middlebrooks, Heim, & Missildine, 2013; Wyrostok et al., 2014). Nursing educators recognize the complexities of present-day nursing practice and strive to supply graduates with practical knowledge and skills (Holland et al., 2013; Wyrostok et al., 2014). Educators look at creating 'authentic' activities that provide learning experiences that occur in or

mimic the complexities of a real practice environment (Wyrostok et al., 2014). McLellan (1996) suggests that teaching/learning strategies such as storytelling, reflection, cognitive apprenticeship, collaboration, coaching, multiple practice, articulation of learning skills, and technology are useful to foster the acquisition of meaningful knowledge and skills, promote problem-solving, enculturation, and self-directed learning. More recent nursing educators are utilizing the theory of situation cognition to develop teaching-learning strategies such as high fidelity simulations (Holland et al., 2013; Onda, 2012; Wyrostok et al., 2014), technology integration (Allen, 2013; Woolley & Jarvis, 2007), simulated clinical learning experiences, virtual communities, and standardized patient experiences (Holland et al., 2013).

Research Study

This research concentrates on several goals. The first goal is to evaluate the effectiveness of medication administration teaching strategies in a community college associate degree prelicensure nursing program in south-central Michigan. Utilizing situated cognition as the guiding framework, tools, learning activities, communities, and contexts of learning are explored. The second goal is to understand which pedagogical strategies nurse graduates feel would be more effective or could improve the preparation of graduates for safe medication administration skills for graduates starting practice. Those that live the experience provide the best understanding of what works and does not work in preparing them for the realities of nursing practice (Candela & Bowles, 2008).

Conclusion

What is Known?

Today's healthcare environment has evolved into a progressively complex, fast-paced, technologically advanced system (Adhikari, Tocher, Smith, Corcoran & MacArthur, 2014; Bennett et al., 2017; Holland et al., 2013; Jones & Treiber, 2010). In response, nursing practice is in a state of perpetual transformation in which nurses adapt to meet the shifting demands of today's healthcare market. Medication administration is a high-volume, high-risk task that requires new nurses to perform safely in complex, fast-paced environments (Jones & Treiber, 2010). Despite advances in technology and concentrated efforts to improve medication safety practices, medication errors are still occurring (Jones & Treiber, 2010).

The need for continual evolution in practice creates challenges for nurse educators to adequately prepare students to practice safely and competently as new nurse graduates (Benner et al., 2010; Bennett et al., 2017; Cleary-Holdforth & Leufer, 2013). New graduate nurses are expected to be 'practice ready' upon graduation and licensure (Bennett et al., 2017; El Haddad et al., 2017). They are expected to be able to manage patient care accurately and competently providing safe care (Benner et al., 2010; El Haddad et al., 2017). Studies demonstrate that new nurse graduates are not adequately prepared to practice upon entering the workforce (Benner et al., 2010; Bennett et al., 2017; Cheng, Tsai, Chang & Liou, 2014; Goodare, 2015; Theisen & Sandau, 2013). Research on nursing practice and graduate nurse competency validates that the challenge of adequately preparing new graduates for practice is significant (Benner et al., 2010; Bennett et al., 2017; Meechan, Jones & Valler-Jones, 2011a).

Currently, there are no standard practices for ensuring graduate nurses are adequately prepared for the transition to practice as safe medication administrators (NCSBN, 2005; Sykes, 2017). There is no standard or evidence-based educational practice that is common among states or schools that could dictate the appropriate experiential teaching model for teaching prelicensure student nurse's medication administration (Meechan et al., 2011a).

New graduates must be able to transition into practice with the appropriate knowledge, skills, and attitudes essential to safe patient care (Amer, 2013; Beauvais et al., 2017). The literature demonstrates that this is not happening and that being a novice nurse is a critical factor in the occurrence of medication errors (Jones & Treiber, 2010). There is a well-documented practice gap resulting in unsafe medication administrative practice and medication errors by graduate nurses (Unver et al., 2012; Zimmerman & House, 2016).

What is Unknown?

There is insufficient research on the efficacy of medication administration teaching strategies as perceived by nurse graduates. Literature details graduate nurse deficiencies in practice (Patterson et al., 2017). What is missing from the research and the pedagogical developmental process is the voice of the graduate nurse (Candela & Bowles, 2008). Without understanding the effectiveness of current educational strategies from the graduates' perspective, nurse educators do not know what teaching strategies currently in use are effective and what is not.

As medication errors can cause significant patient harm, it is critical to understand from the graduates' perspective which educational strategies are effective in preparing them for safe medication administration. The skills that students attain in school should be adequate to prepare

them for the realities of practice. The researcher questioned whether current teaching strategies are indeed effective in providing students with the tools they need to administer medications safely upon graduation and subsequent licensure. The hypothesis is that if nursing educators understood from graduates which learning experiences best prepared or least prepared them for practice, strategies could be adopted to prepare them better and close the prepared/practice gap. Graduates would attain useful knowledge and skills and be able to safely administer medications in an authentic practice setting with less error and less patient harm.

CHAPTER 3

METHODOLOGY

Nursing researchers debate how to best prepare graduate nurses for practice (Bennett et al., 2017; Hussein & Osuji, 2017; Wood & Ezebuihe, 2016). Stakeholders seek to solve the graduate lack of preparedness by creating post-graduate interventions such as residencies, externships, and continuing education (Crimlisk, 2017; Garrison, 2017). Although stakeholder interventions are one way to address the preparedness-practice gap, researchers cite a need for nursing educators to evaluate how to prepare graduates better. Educators are asked to assess the effectiveness of teaching practices to understand how best to prepare graduates with the knowledge and skills needed in real-world practice (Hussein & Osuji, 2017).

Educational research has often focused on student perceptions of the effectiveness of medication administration teaching strategies (Betts, 2016; Harris et al., 2014; Hewitt et al., 2015 Mariani et al., 2017). Even though student nurse input validates the effectiveness of many teaching strategies, graduate nurses are still not ready for practice. Graduate nurse input is needed to provide an evaluation of teaching and learning from the perspective of those that have lived the transition from academia to real-world practice. Graduates can provide insight into which educational methods provide them with the essential knowledge that is replicable and usable in real-world practice. Currently, there is little information regarding the graduate nurse perceptions of the effectiveness of medication administration teaching practices (Hussein & Osuji, 2017; Sykes, 2017). This study aims to bridge this gap in knowledge.

This research study addressed the following research questions:

1. What are nurse graduates' perceptions of the effectiveness of their prelicensure educational experiences in preparing them to be safe administrators of medication as new nurses?
2. What educational experiences do nurse graduates feel have the potential to be effective in preparing them with the knowledge and skills needed to manage medication administration safely?

Methods

This study utilizes a cross-sectional, descriptive survey design to explore graduate nurse perceptions of the effectiveness of their prelicensure educational experiences in preparing them for safe medication administration in their first year of practice. The study utilizes the theory of situated cognition to explore the various tools, activities, and contexts in which students learn medication administration. Tools, activities, and context are elements of teaching strategies utilized to provide graduates with the knowledge, skills, and attitudes needed to administer medications safely. This study examines the effectiveness of specific teaching strategies used at this community college to prepare graduates to complete specific medication administration skills and practices related to safe medication administration in authentic practice. The study further explores graduate perceptions of various teaching strategies that are suggested by research to be useful in preparing graduates for safe medication administration. One open-ended question is utilized to gain a broader awareness of graduate ideas for enhancing the student experience in preparation for safely administering medications.

Framework

Situated cognition learning theory provides the framework for this study. This theory suggests that if learning is meaningful, the learner acquires knowledge and skills that are usable and transferable in a community of practice (Brown et al., 1989). Acquisition of usable and transferable knowledge is a product of the situated activities and the social context of the environments in which learning occurs (Brown et al., 1989). Learning activities in nursing education occur in several environments: classroom, skills laboratory, simulation laboratory, and authentic clinical environments.

Social interactions facilitate learning among the students. Teachers, clinical instructors, and expert RNs acting as role models, mentors, and coaches assist the learner in becoming a full member of the practice community Situated activities sensitive to practice contexts promote teaching/learning that is reflective of the ways that ordinary people work. Tools relevant to real-world practice, both cognitive and physical, introduced and used in nursing school promote skills in tool use upon entering authentic working communities. Where and how learning occurs affects the type of knowledge that is acquired. Understanding the graduate perceptions of the effectiveness of specific activities and tools in the various environments can assist educators in determining which of these is producing meaningful learning that is transferable from academia to authentic practice.

Situated cognition provides guidance in developing activities that promote learning (Paige & Daley, 2009; Wyrostok et al., 2014). Few researchers, however, use this theory to evaluate learning activities. This research endeavors to evaluate the effectiveness of mediation administration teaching strategies utilizing the assumptions of situated cognition. This research

uses situated cognition as a framework to understand from the graduate perspective whether the learning that takes place within the different contexts and activities of nursing school is effective in teaching them usable and transferable skills for safe medication administration.

Setting

The study took place at a community college in south-central Michigan. The prelicensure nursing student may earn an associate degree in nursing after two years of nursing coursework and completion of general education requirements. Once a student completes all nursing courses and college requirements, they are eligible to take a nationally recognized licensure exam called the NCLEX registered nurse licensure exam. A licensed nurse graduate can seek employment in a variety of healthcare environments. Nursing students who graduated from this associate degree program in May of 2017, received their initial nursing license as of December 31, 2017, and are employed as a registered nurse at the time of the survey, were included in this study.

The researcher is a full-time nursing faculty at the college of study and is interested in bridging the preparation/practice gap involving medication administration training. The evaluation and creation of evidence-based pedagogical strategies that improve graduate performance and patient safety are essential to nursing program success. This research is specific to the college of study and provides one evaluation of end of program student learning outcomes and development of pedagogical strategies that best facilitate student acquisition of safe medication administration practices.

In collaboration with the community college institutional research department, graduates in the May 2017 cohort were sent an invitation to participate in this study. The invitation included a letter introducing them to the research, an explanation of the risks and benefits, their

rights, confidentiality, and the URL to a web-linked survey. Potential participants received two follow-up letters, one at two weeks and one at four weeks after the initial invitation. Follow-up letters are shown to increase response rates by 30% to 50% with each letter sent (Burns & Kho, 2015).

The institutional research department assisted in the creation of the survey using the institution's Survey Monkey platform. The institutional research department further assisted the researcher in mailing the invitation and follow-up letters to participants to ensure participant confidentiality. A small response rate after the initial and follow-up letter mailings required the researcher to send another invitation to participate in the study. This second request included an invitation letter, a paper survey and a self-addressed stamped envelope for return. In both survey formats participation in the survey implied consent. Data was collected and transferred to the researcher in a manner in which each response was anonymous and confidential.

Participants/Sample

Associate degree programs offer students the ability to enter nursing practice after two years of education versus four years at the bachelor's degree level. Community colleges, junior colleges, and technical schools offer students the opportunity to obtain an associate degree in nursing (ADN). This study is a survey of graduates from an associate degree-nursing program at a south-central Michigan community college. A cohort of ADN nurses were appropriate for this study as ADN nurses represent almost 50% of new nurses obtaining licensure in 2017 in both the United States and Michigan (NCSBN, June, 2018). Even though this study utilized one sample of ADN nurses and was not expected to represent the perceptions of all ADN nurses in Michigan

or the United States, the findings inform understanding the efficacy of teaching strategies in preparing ADN graduates for safe medication administration.

There were 129 graduates in the May 2017 cohort. One hundred and thirty-one student nurses finished all of the nursing courses by May 2017. Two, however, were not included, as they did not officially graduate in May. Two of the graduates elected not to take their NCLEX licensure exam and six of them were not successful on their NCLEX exam after one or two attempts by December 31, 2017 (Pearson, 2018).

This cohort of graduates represents a census approach in which all graduates were invited to participate in the study. Several reasons informed the selection of this cohort of graduates. The first reason was to maximize recall of nursing school educational experiences by minimizing the amount of time between graduation and this study. The second reason was to capture the graduate nurses' perceptions of the effectiveness of their nursing school learning experiences as they transitioned into their first roles as registered nurses. Capturing graduate perceptions assists program leaders in evaluating the effectiveness of the tools, activities, and contexts of nursing school learning and the ability of these strategies to produce usable and transferable knowledge and skills. In congruence with the college vision and mission, it is paramount that all graduates have an equal opportunity to share their perceptions through participation in the study. Each graduate would have encountered teaching experiences in a variety of contexts unique to them, and therefore would be able to provide valuable input.

The requirements for participation were that the nurse graduated from this specific college in May of 2017, obtained licensure by the time of the survey by December 31, 2017, and obtained employment as a registered nurse before completing the survey. Graduate

demographics, including gender and age, are shown below (Table 1). This data was used to evaluate the survey respondents for representation of the total population. A representative sample is necessary for survey research when generalizing data to a target population. This is especially true if the response rate is low (Creswell, 2015).

Table 1

Demographic Characteristics of May 2017 Cohort

		n (%)
Gender	Male	18 (14)
	Female	111 (86)
Age in years	20-25	43 (33.3)
	26-30	30 (23.3)
	31-35	23 (17.8)
	36-40	17 (13.2)
	>40	16 (12.4)
NCLEX Pass Rate	yes	121 (93.8)
	no	8 (6.2)

n=129

The demographic profile of the May 2017 cohort consists of 86% female, and 14% male. These demographics are slightly different from the 2014 RN Nursing Knowledge Survey conducted by the NCSBN (response rate of 16.3%) in which 93.6% of survey participants are female and 6.4% are male (NCSBN, 2015). A subsequent survey study on nursing workforce in 2015 reports that males make up 12.7% of newly licensed RN's. The study indicates that those males licensed between 2013 and 2015 represent 14.1% of the nursing workforce (NCSBN, 2016). The percentage of male nurse graduates in this national study indicates that the percentage of May 2017 male graduates is close to the national average. Age distribution of the May 2017 cohort demonstrates 56.6% of graduates are <30 years of age which is higher than the national

workforce statistic of 9.5%. The statistic for May 2017 graduates older than age 40 is 12.4%. This statistic is less than the national workforce report of 20.9% for ages 40-49 years, and the report of 50% for ages ≥ 50 years (NCSBN, 2016). May 2017 cohort demographics represent a younger population and an increased male representation of nurses entering the workforce from this college.

Sample Size

As there is little research similar to this study, it was difficult to predict a survey response rate. A like study of over 6000 graduates in the state of North Carolina posts an initial 7.1% (428/6032) response rate. After applying an inclusion criterion, the response rate dropped to 3.2% (197/6032) (Sykes, 2017). A literature review of survey design studies of graduate nurses' reveals response rates from as low as 12% to a high of 65.1% with an average of 32% (Callagan et al., 2009; Candela & Bowles, 2008; Ewertsson et al., 2015; Hickey, 2010; Lim & Honey, 2014, 2017; Parker et al., 2012; Patterson et al., 2017; Sahay et al., 2015;). In a combined study of both experienced and novice nurses on medication errors, researchers obtained a response rate of 8.2% (n=176) using a mailed survey in which the participants could complete the survey on paper or on-line (Jones & Treiber, 2010).

The researcher's college engages in a graduate survey every year. The last four years of nursing program survey data includes between 104 and 143 graduates with a response rate between 28.7% and 35.6% (Study Site College, 2017). These percentages represent a total number of 36 to 41 students. The participant sample size for this study was expected to range between 36.7 and 45.5 respondents based on current numbers and past response rate history. A

response rate of 36 would have provided a 95% confidence level with a 14% margin of error. A response rate of 54 would have represented a 95% confidence level with a 10% margin of error.

As this is an exploratory, descriptive study, the desire was to attain the highest number of responses as possible. High numbers of responses assist in minimizing error and non-response bias. Reports of acceptable response rates in the literature range from 50% (Creswell, 2015) to 50-70% (Burns & Kho, 2015) and 70% or higher (Roberts, 2010). Other research suggests that no minimum response rate requirement can establish whether survey results are valid (Burns & Kho, 2015). These authors propose that the ability to establish the validity of the responses depends on whether or not the respondents are representative of the total population.

The researcher desired a response rate of a ≥50% for this study. However, it may not have been realistic based on literature and previous college surveys. Therefore, response rate analysis also includes evaluation of the robustness of the respondent sample examining how representative they are of the total population of May 2017 graduates. When respondent samples are low and do not adequately represent the target population, the data may be in error (Dykema, Jones, Piche & Stevenson, 2013). Determining that the responses are representative of the total population adds to the quality and validity of the study data.

Data

Cross-sectional survey designs are utilized by nursing researchers to assess graduate nurse perceptions of medication errors (Unver et al., 2012), use of technical skills and medication devices (Ewertsson, et al., 2015), application of pharmacology knowledge (Lim & Honey, 2014), work readiness (Patterson et al., 2017), and graduate nurse perceptions of medication errors and education and workplace experiences (Sykes, 2017). In this study,

graduates' perceptions of their educational experiences in preparing them for safe administration of medications as new nurses was assessed utilizing a similar exploratory cross-sectional survey design. There is little research available on graduates' perceptions of the effectiveness of their nursing school experiences in preparing them to administer medications safely. Graduates' perceptions in this study therefore, fill an information gap. Perceptions provide insight into participant attitudes, beliefs, and opinions of nursing school educational experiences. An exploratory, descriptive survey design best meets the purpose of this study (Creswell, 2015). The survey design in this study is appropriate, as an entire cohort can be examined in a short time-frame (Creswell, 2015).

Instrumentation

The survey instrumentation for this study was designed using a systematic approach, ensuring that fundamental components involved in the research study are included and accurate to the study questions (Burns & Kho, 2015). The researcher created the survey instrument utilizing evidence found in the literature and consultation with full-time faculty. An existing survey instrument that would assess graduate nurse perceptions of the effectiveness of nursing school teaching practices was not found in either Cinahl and ProQuest. A search of literature published between 2010 and 2017 using keywords 'medication administration'; 'graduate nurse'; 'nursing education'; and 'graduate perception' provided no one study or dissertation with a valid or reliable survey tool to fit the needs of this study. Instead, there appeared to be several tools that contained a few applicable questions.

Five sections of questions examine the central concepts of the study (see Table 2). Breaking the survey into sections assists in survey completion and a decrease of survey question

non-response (Baatard, 2012). The first section of the survey includes three inclusion questions. If the respondent met the inclusion criteria, they were allowed access to the survey. The second section of the survey includes questions on demographics: age, gender, graduate employment location, and length of employment as an RN. One question is asked to determine if the graduate routinely administers medication in their practice. The NCSBN (2015a) "2014 Practice Analysis: Linking the NCLEX to Practice" study and the NCSBN (2015b) "Report of Findings from the 2014 RN Nursing Knowledge Survey" was utilized to guide employment demographics, as well as some instrumentation questions regarding relevant knowledge and skills of safe medication administration among nurses.

The third section assesses nurse graduates' perceptions of how effective their nursing education was in preparing them to complete medication administration associated tasks as a new graduate. This section assisted in answering research question number one. Graduates were asked to evaluate the effectiveness of their educational programs in preparing them with the knowledge and skills needed to complete specific tasks related to safe medication administration. A literature review was conducted to determine the knowledge and skills thought to be most important or most significant to safe medication administration as a practicing nurse. A review provides literature regarding 1) information on the knowledge and skills that are thought to be essential for safe medication practices; and 2) descriptions of common medication administration practices completed by nurses (NCSBN, 2015a; NCSBN, 2015b). Textbook (Potter, Perry, Stockert & Hall, 2013) and pharmacology resources (Lehne, 2013) provide information on medication administration knowledge and skill requirements common to nursing. A combination of the retrieved information created the question options for this section.

Table 2

Survey Instrumentation and Research Questions

Section	Research Question	Type of Information	Question
1		Inclusion	Graduation date, NCLEX and Employment
2		Demographics	Age, Gender, Length and type of employment, Medications as part of a job
3	1	Perceptions (Quantitative)	Perception of the effectiveness of nursing education in preparing graduate with knowledge and skills for medication administration associated tasks as a new nurse
4	1	Perceptions (Quantitative)	Effectiveness of environments
	1	Perceptions (Quantitative)	Effectiveness of activities
	1	Perceptions (Quantitative)	Effectiveness of tools
5	1	Perceptions (Quantitative)	Prepared for practice in medication administration
	2	Perceptions (Quantitative)	Potential effectiveness of introduced tools
			Potential effectiveness of simulation
			Potential effectiveness of clinical activities
	2	Perceptions (Qualitative)	Suggestions for enhancing education for safe medication administration

The fourth section of the survey also addressed the first research question. A survey of nine full-time faculties was completed. The data from the faculty survey assisted in the development of study survey instrument. Each of the faculty shared information on those activities, tools, and contexts used within their courses to teach medication administration

knowledge and skills. This faculty is involved in creating and evaluating teaching and learning practices within their courses which span the entire two years of the program. Teaching medication administration includes situated activities in the contexts of the classroom, laboratory, simulation, and clinical. Medication administration cognitive and physical tools are integrated into the contexts of the learning activities within each of the environments. The survey questions were then created correlating each of the defined teaching strategies to the theoretical framework of situated cognition. This section contained three quantitative questions.

The fifth section of the survey instrument answered research question number two. What educational experiences do nurse graduates feel have the potential to be effective in preparing them with the knowledge and skills needed to manage medication administration safely? A literature review informed the development of this section. More than 25 research-based articles, published between the years 2013 and 2017, describe a variety of teaching strategies utilizing different contexts, activities and tools to improve student nurse medication knowledge and skills. All of the articles evaluate the innovative educational strategies through evaluating student skill performance or knowledge acquisition. All of the teaching strategies included in this section of the survey improve some aspect of student learning of safe medication administration.

The goal of this section of the questionnaire was to evaluate the potential efficacy of these teaching strategies as perceived by the graduate. The researcher believes that graduate nurse perceptions of the potential effectiveness of these educational strategies is essential to the evaluation process. Even though nursing education may assess the efficacy of a teaching strategy through the eyes of a student, it is still not known whether the teaching strategy will develop

meaningful and useful knowledge that is transferable to practice. The graduate nurse can give an extended view and experiential insight into the efficacy of potential teaching strategies.

Each of the survey sections included closed-ended questions that provide quantitative data. Each of the questions in sections three through five utilized a five to six point Likert scale evaluating effectiveness. The five-point scale utilizes the following description with the numbered scale. Five represents 'very effective,' four represents 'effective,' three represents 'neither effective nor ineffective,' two represents 'ineffective,' and one represents 'very ineffective.' In section three the first question utilized this same five-point scale as the other survey sections, with the addition of a zero. Zero represents 'I'm not required to do this task.' This extra point in the Likert scale allows the graduate to indicate whether the specific task is a part of their everyday work of administering medications.

An open-ended question in section five provides qualitative data pertaining to research question two. Open-ended questions allowed graduates to elaborate on any beliefs or ideas that are not presented by the researcher. Open-ended questions allowed the participant to provide information based on their own experiences (Creswell, 2015). As the researcher has not lived the same experiences as the prelicensure student and graduate nurse, the researcher does not fully understand the graduate nurses' perspectives on what educational strategies are effective or could be effective in preparing them for today's practice environment.

The survey instrument was created and reviewed by two nursing research experts and the full-time faculty that provided information for the survey creation. The nine full-time faculty represent each of the courses taught in the nursing program. Each of the nine full-time faculty completed the survey instrument in the same web-based format as a group of pilot study

graduates. The faculty evaluated the survey for clarity, length, content validity and ease of use. Faculty responses were reviewed and utilized to revise the survey. Faculty feedback determined that the survey content was reflective of the teaching strategies utilized in the nursing program and pertinent to the research questions posed.

This study included incentives to complete the survey. Respondents could enter into a drawing for five twenty-dollar gift certificates. Respondents could submit email information at the completion of the survey for both the web-based and paper survey. The email information provided for the incentive drawing was not associated with the survey data. This was to protect respondent anonymity. The use of incentives was to encourage potential participants to participate in the study and complete the survey (Creswell, 2015; Dykema et al., 2013).

Distribution

In the first phase of the study, respondents participated in a SurveyMonkey, web-based platform. One hundred and twenty-one potential study participants received an invitation letter. This invitation explained the study and contained a URL to direct the graduates to the web-based survey. The college does not have access to graduates' personal emails, therefore mail format was needed for this study. Evidence suggests that pre-notification of a study is most effective when the method of data collection (web-based) is different from the method of invitation to participate in a study (Dykema et al., 2013). Mailing an invitational letter can increase response rates in web-based surveys (Dykema et al., 2013). In addition, each mailed invitation had a first class stamp on the envelope in an attempt to increase response rates. An integrative literature review of surveys involving nurses determined that the use of first class stamps can increase survey success (VanGeest & Johnson, 2011).

Web-based survey methods have many advantages to mailed survey methods (Creswell, 2015; Dykema et al., 2013). Web-based surveys are easier to complete, easier to design, less expensive, offer improved response rates and time of return (Dykema et al., 2013). Web-based designs also allow the researcher to limit access to the survey to those that meet the inclusion criterion, decreases skipping of questions and reduce inaccuracy of responses (Dykema et al., 2013). The web-based survey is a better option when the questionnaire includes a long series of response choices (Dykema et al., 2013). In addition, a web-based survey makes it very easy to conduct a pilot study within a short period. It improves ease of use and response rates. The web-based design also allows for smoother more accurate recording and transfer of data (Dykema et al., 2013).

The initial invitation letter and two post-card reminders garnered a response rate of 13.2% (16/121). A paper survey followed the invitation and post-cards to increase participant numbers. Web-based surveys increase response rates by five percentage points over paper surveys (McMaster, LeardMann, Speigle, Dillman, 2017). The ability to complete a web-based survey can, however, be less effective if participants have no access to the internet or lack web-based technical skills (McMaster et al., 2017). A recent study of the effectiveness of both web-based and paper surveys indicates that initiation of a paper survey in the late stages of a web-based survey approach can increase both web-based and mailed in paper responses and increase sample representation (McMaster et al., 2017).

The beginning of the survey questionnaire included demographics, inclusion and exclusion criteria questions. If the participant did not meet the survey inclusion criteria, they were not allowed access to the survey questionnaire. If the potential participants met inclusion

criteria, they were allowed access to the rest of the survey questionnaire. Completion of the questionnaire implied consent. The beginning of the survey included a statement, in which the respondent acknowledged that they were 18 years of age or older at the time of the survey. Respondent indication of age greater to or equal to 18 met the expectations of the IRB of the college of study. Potential participants received two reminder postcards at two and four weeks after the initial survey request. There were no reminder letters sent after the second paper survey request.

Analysis

Analysis of survey results utilized two separate analysis methods. The first method evaluated the closed-ended quantitative data. Data accumulated from SurveyMonkey and the paper survey were collected and downloaded to Statistical Packages for Social Sciences (SPSS) version 23 (International Business Machines Corp (IBM), 2015) for descriptive analysis. As an exploratory, descriptive research study the goal was to describe participant perceptions on the study topic, therefore descriptive analysis was used to provide aggregate data.

Survey Response and Sample Representation

Descriptive statistics are appropriate for survey design to determine the response rate, evaluation of potential bias in responses, and reporting aggregate responses on each question (Creswell, 2015). Frequency distribution tables describe the total population demographics and numbers, response percentages, and respondent demographic characteristics. Measures of central tendency (mean, variance and standard deviation) assist in determining the representation of the respondent characteristics to the total population (Weaver, Morales, Dunn, Godde & Weaver, 2018). The mean assists in understanding and explaining variation within responses.

Demographic and categorical data such as types of employment are coded so that data can be assigned scores and variables can be reviewed and related to data (Creswell, 2015).

A table of response rates is not included with a review for response bias, as the sample was too small and non-representative of the total population. Non-response bias of early and late responders can be assessed using a wave analysis. A wave analysis compares the survey response rates of the responses received after the initial invitation, the two reminders, and the paper survey invitation for a total of three 'waves' of time. For this study, the participants received four invitations to participate in the study: an initial invitation with the survey link and two follow-up invitations (via postcard) and a paper survey with a self-addressed-stamped-envelope (SASE) for easier return, however the sample size n=24 is not large enough to facilitate an accurate wave analysis. The analysis evaluates the questionnaire data received with each influx of responses to evaluate whether or not the answers to the questions change (Creswell, 2015). The responses collected at the end of the survey time should be similar to the answers at the beginning of the survey process (Creswell, 2015). If responses are similar the potential for bias is less likely. Survey participants are said to be more representative of the total population (Creswell, 2015). A wave analysis technique is useful as it is a commonly used research method, economical to use, and is not labor or time intensive (Atif, Richards, & Bilgin, 2012). Using this process along with a descriptive analysis of data assists in understanding data patterns and variations (Creswell, 2015).

Quantitative Data Analysis

Each ordinal variable of the Likert scale is assigned a numeric value between one and five or zero and five. Descriptive statistics (frequency distributions, mean, and percentages)

provides an analysis of aggregate responses to each questionnaire item. Tables display aggregate data for each question allowing easy visualization of numbers and percentages. The discussion provides an interpretation of the findings.

Qualitative Data Analysis

Qualitative data is helpful in promoting a better understanding of the participants' perceptions (Creswell, 2015). Qualitative data facilitates understanding when the researcher may not know all the variables that may affect a central phenomenon or which there is a need to explore further into a participant's perceptions and beliefs (Creswell, 2015). Qualitative data in this study is collected utilizing one open-ended question. Open-ended questions allow the participant to voice their suggestions as to how to enhance the student experience in promoting readiness for safe medication administration in practice. The researcher anticipated gaining a deeper understanding of the graduate nurses' perceptions not explored through quantitative questions.

A five-step analysis approach is used to evaluate qualitative data (Creswell, 2015). Participant responses were gathered from SurveyMonkey and the paper survey and placed into a Word document. The process of reading and rereading responses provided a broad understanding of participant suggestion. After gaining a broad understanding of the data general themes and keywords were determined. The themes and keywords were reviewed and coded. These were then compared to the original data to ensure understanding of respondent statements. Credibility and validity of findings were established through a process of triangulation by a graduate from the pilot study and two faculty members (Creswell, 2015). Once data coding was completed, it was analyzed utilizing the theory of situated cognition and compared to previous research when

applicable. Participant responses were interpreted and assessed as to how the graduate perceptions compare to the assumptions of this learning theory. Tables and a narrative discussion are utilized to display the findings.

Participant Rights

The Institutional Review Boards of the University of New England and the Site Study College reviewed and approved the study to ensure the protection of study participants. Each potential participant received information relevant to the study. Completion of the survey implied consent to participate in the study. Both IRBs approved all survey instruments, information forms, and recruitment materials before use (see Appendix A). The college of study facilitated mailing of the invitation letters follow up postcards, and paper survey provided by the researcher.

Graduates that responded to the study accessed the web-based survey or completed the paper survey. Graduate respondents did not provide any information in the survey that allowed the researcher or the college to identify them. The respondent data were collected anonymously through SurveyMonkey and paper surveys and transferred to the researcher using an encoded format or with email information removed. Surveys obtained from participants were stored in an encrypted format in a double-locked location to protect the participant responses. Individual data responses were kept confidential and only shared within the framework of the aggregate data collection to preserve anonymity. When the study was completed, data was destroyed.

Limitations

There were several potential limitations to this study. The researcher is a full-time faculty at the college of study. Responding to a faculty survey may have created a bias for the

participants that attended the researcher's college. A second limitation was the accuracy of the mailing addresses and the ability to obtain survey responses. A third limitation may have been the lack of willingness of graduates to participate in the study due to a variety of factors. Creswell (2015) points out those technological difficulties, security issues and the potential for the web-based survey to go directly to junk mail could limit the success of web-based surveys. Technical difficulties may limit the response rate and create a bias toward those participants that utilize computer-based technology (Creswell, 2015).

A non-response bias may result from a low response rate (Creswell, 2015, Atif et al., 2012). Low response rates may result in a sample that is not representative of the total population thus creating bias (Atif et al., 2012). "Bias is the difference between a survey estimate and the actual population value (between the respondents and non-respondents) (Atif et al., 2012, p. 3). The validity and reliability of collected data is threatened if there is a response bias (Atif et al., 2012). Low- and non-response rates for a survey instrument can be related to many reasons including psychological and mechanical reasons, and the method used to administer it (web or mail or both) (Atif et al., 2012). Psychological reasons include forgetting to take the survey, too busy to fill out the survey, or feeling that the survey is too long or too personal (Atif et al., 2012). Mechanical reasons include internet access and skill, technical problems and concerns of data security and confidentiality (Atif et al., 2012). Although some resources recommend analysis of low response rates (Creswell, 2015), others recommend analysis of both high or low response rates (Atif et al., 2012). Non-response bias can be eliminated if the sample of participants can be shown to be representative of the total population (Atif et al., 2012).

The methods utilized to conduct the study presented a limitation. The college institutional research department does not have graduate personal email addresses, only their mailing addresses. For this reason, each May 2017 graduate received an invitation letter via the postal service. If students moved, this invitation letter may not have reached them. There is a cost to mailing an invitation letter with the URL to the survey website, and two follow-up postcards. Costs of utilizing a web-based process to recruit and administer a survey are said to be one half to one-third the cost of a mailing process (Dykema et al., 2013). As the method of distribution of this survey utilized both a mailing and web process, the researcher was not sure how to estimate a time of return for surveys or the response rate. A comparison of web-based and mailed surveys response times reveals that web-based surveys are often completed in much less time and have higher response rates (Dykema et al., 2013). Web-based surveys are easier to complete; however, the participant must have computer access and be computer literate (Dykema et al., 2013). Although there are many advantages of the web-based process, there are also disadvantages that may present limitations such as technical barriers and potential for nonresponse bias (Dykema et al., 2013).

Pilot Study

A pilot study assists in determining whether a survey is well constructed, usable, and can be completed as intended (Creswell, 2015). A pilot study of 18 nursing graduates was completed to test the survey. A total of 18 graduates from 2015 and 2016 cohorts were asked to complete the pilot survey and respond to eight evaluative questions. These 18 nurses were all graduates from the college of study and chosen for convenience of access. Two of the respondents were male, 16 were female, three lived outside the state of Michigan, all were employed as RNs, and

all administered medications as a routine part of their jobs. 15 of the 18 graduates completed the web-based survey. All 15 answered the following questions:

- Did you feel that the questions were clearly written?
- Were any of the questions poorly worded or worded in a way that you did not understand what it was asking?
- Were you uncomfortable with what was being asked?
- How much time did it take you to complete the survey?
- Was the survey too long?
- Did it ask questions that were pertinent to the research questions?
- Did it ask questions that were reflective of our program?
- Is there an option that is not listed that you wanted?

The researcher estimated that the survey would take eight to ten minutes to complete and that an 85% response rate would be obtained. The average time utilized to take the survey was 12 minutes and 16 seconds during the pilot study, and no respondents reported that the survey felt too long. Graduate nurses reported which questions were wordy, not clear or redundant. Comments and answers to the evaluation questions were reviewed and compared to faculty feedback. This information was utilized to revise the survey.

CHAPTER 4

RESULTS

The purpose of this study was to investigate the efficacy of prelicensure teaching strategies in preparing graduate nurses for safe medication administration in practice. This chapter presents the results of this cross-sectional descriptive survey. Discussion of research methodology and findings includes descriptions of both population and sample demographics. The first section of this chapter presents the methodology for analyzing data and includes an explanation of the organization of survey data related to research questions and analysis. The second section reviews the respondent characteristics and sample data, statistical analysis and coding processes. The third section provides tables and narrative quantitative and qualitative data findings. The conceptual framework is used to analyze, describe, and present research questions findings. The end of the chapter provides a summary of findings.

Methodology

This study used a cross-sectional descriptive survey design to examine nurse graduates' perceptions of the effectiveness of their education in preparing them to administer medications as new nurses safely. Data were collected utilizing a two-phase process and included a web-based method with SurveyMonkey and a paper survey. The web-based survey in the first phase of study yielded an adjusted response rate of 14.1% (n=16) necessitating the second phase of data collection. The mailed paper survey yielded an additional eight responses for a total adjusted response rate of 21.2% (n=24) (see Table 4). Chapter 3 describes the survey used in this study in detail. The survey instruments are included in Appendix C. The survey included nine survey questions collecting data related to three aspects of educational preparation involving medication

administration (see Table 3). Each survey question had between two and 18 multiple response options depending on the topic of the question. Eight of the survey questions (SQ) collected quantitative data, and one of the survey questions collected qualitative data.

One survey presented in two formats provided data for this study. Formats included both a web-based survey on SurveyMonkey and a paper survey sent by mail with a self-addressed-stamped-envelope (SASE). Efficacy rating among the variables within each question was assessed using either a five or six option Likert scale. The five-scale Likert of "5" meaning "very effective," and "1" meaning "very ineffective" was utilized for all questions except for questions one and nine. SQ1 utilized the five-scale Likert and adds a "0" for "I'm not required to do this task." The term *effective* was reported if a question or variable is ranked as "very effective" or "effective." The term *ineffective* was reported if a question or variable was ranked "very ineffective" or "ineffective." SQ9 utilized a 5-point Likert scale however for this question "5" measured "very prepared," and "1" measured "very unprepared." The researcher downloaded data into Statistical Package for the Social Sciences (SPSS) version 23 (IBM, 2015) for analysis. Descriptive statistics (frequencies, percentages) and means were calculated using the Likert scale data. The higher the mean value for responses the more effective respondents perceived their educational preparation.

SPSS analyzed the combined data from both the web-based and paper surveys. A visual inspection of responses revealed four random pieces of missing data (non-response) noted among the eight research questions and 67 multiple response variables. Respondents may have overlooked this missing random data or may have not known how to answer the question. There were no missing demographic or inclusion criteria in the web-based or paper survey data. Table 5

presents respondent numbers, and demographic characteristics including place of employment, length of employment, and whether the respondent administered medications as a regular part of their job. Table 4 presents the inclusion criteria, sample size, and calculation of the adjusted response rate in a narrative format.

Table 3 presents a breakdown of the survey questions as they related to research questions one (RQ1) and two (RQ2), the type of information gleaned from the question and how the data is analyzed.

Table 3

Survey Questions Relationship to Data Collection and Analysis

Section	RQ Number	SQ Number	Type of Information	Question Analysis
1		1-3	Inclusion	Narrative discussion
2		1-5	Demographics	Frequency, cross tabulation tables, Fisher's exact test
3	1	1	Perceptions (Quantitative)	Frequency tables with percentages, and means
4	1	2-4	Perceptions (Quantitative)	Frequency tables with percentages, and means
5	2	5-7	Perceptions (Quantitative)	Frequency and cross tabulation tables with percentages, and means
5	1	9		
5	2	8	Perceptions (Qualitative)	Table of responses and narrative

Qualitative data was interpreted using a five-step analysis approach (Creswell, 2015). Respondent data downloaded into a Word document contained both the web-based survey and the paper survey data. Reading and rereading respondent suggestions provided a broad understanding of respondent suggestions. After gaining a broad understanding of the data,

general themes and keywords were obtained. These themes and keywords were reviewed, coded, and then compared to the original data to ensure understanding of participant responses. Credibility and validity of the findings was established through a process of triangulation by a graduate from the pilot study and two faculty members (Creswell, 2015). Coded data was analyzed utilizing the theory of situated cognition and compared to previous research when applicable. Participant responses were interpreted and assessed as to how the graduate respondent perceptions compared to the assumptions of this learning theory. A list of responses and a narrative discussion were utilized to present the findings.

Cohort and Sample Characteristics

The study sample was drawn from one cohort of nurse graduates from an associate degree program in south-central lower Michigan (see Table 1 in Chapter 3). In order to participate in the study participants had to meet three inclusion criteria. Inclusion criteria in section one of the survey utilized three questions to validate respondent ability to meet requirements. Inclusion criteria was reviewed upon receipt of the survey. All of the respondents (n=24) were eligible to participate in the study. The response rate was determined based on the number of graduates eligible to participate in the study and on the ability to deliver the surveys via the postal service. The population size contained 113 graduates yielding an adjusted response rate was 21.2% (see Table 4). This response rate provided a 95% confidence interval with an 18% margin of error.

Table 4

Adjusted Return Rate

Sample Population	Did not meet inclusion criteria	Incorrect Addresses	Surveys Delivered	Responses	Analyzable Responses	Adjusted Response Rate
129 graduates	8	8	113	24	24	21.2%

Sample Demographics

Table 5 presents sample demographics of age, gender, place of employment, and length of employment. The majority of respondents were female. There was representation in each age group; however, ages varied widely. The majority of respondents indicated employment in acute care medication surgical units (oncology, orthopedics, neurology, and cardiology) and critical care units (emergency department, Intensive Care Unit (ICU), Coronary Care Unit (CCU), Pediatrics/neonatal intensive care, Post Anesthesia Care Unit (PACU). No respondents indicated employment in pediatrics or rehabilitation areas. Length of employment among respondents' ranged between six and 12 months at the time of the survey. Of note is that two (8.3%) did not administer medications as a part of their daily RN routine. The two respondents that did not administer medications as a part of their daily RN routine indicated employment in a community healthcare environment and a physician's office.

Table 5

Sample Demographics

		n (%)
Gender	Male	2 (8.3)
	Female	22 (91.7)
Age in years	20-25	4 (16.7)
	26-30	6 (25)
	31-35	7 (29.2)
	36-40	5 (20.8)
	>40	2 (8.3)
Employment	Critical Care	4 (16.7)
	OR	0 (0.0)
	Med Surg	13 (54.2)
	OB	1 (4.2)
	Pediatrics	0 (0.0)
	Psych	2 (8.3)
	Long-Term Care	1 (4.2)
	Rehab	0 (0.0)
	Physician Office	1 (4.2)
	Community	1 (4.2)
	Other	1 (4.2)
Length Emp.	0-3 months	0 (0.0)
	3-6 months	0 (0.0)
	6-9 months	2 (8.3)
	9-12 months	22 (91.7)
Admin meds	yes	22 (91.7)
	no	2 (8.3)

n=24

Note: Detailed descriptions of employment is included in Appendix C on the survey instrument.

Table 6 presents a cross tabulation of respondent areas of employment and length of employment. All of those employed in critical care indicated length of employment between nine and twelve months. Only one of the respondents employed in medical-surgical units indicated a length of employment between six and nine months. The other respondent indicating employment between six and nine months was employed in long-term care.

Table 6

Employment Length-Employment Area Cross Tabulation

		Length Employment		
		6-9 months	9-12 months	Total
Employment	Critical Care	0	4	4
	Med Surg	1	12	13
	OB	0	1	1
	Psych	0	2	2
	Long-Term Care	1	0	1
	Physician Office	0	1	1
	Community	0	1	1
	Other	0	1	1
Total		2	22	24

Sample and Cohort Comparison

Table 7 presents the age and gender demographics of both the sample and cohort.

Table 7

Cohort and Sample Comparisons

		Count	*n* %
Cohort Gender	Male	18	14.0%
	Female	111	86.0%
Sample Gender	Male	2	8.3%
	Female	22	91.7%
Cohort Age in years	20-25	43	33.3%
	26-30	30	23.3%
	31-35	23	17.8%
	36-40	17	13.2%
	>40	16	12.4%
Sample Age in years	20-25	4	16.7%
	26-30	6	25.0%
	31-35	7	29.2%
	36-40	5	20.8%
	>40	2	8.3%

Cohort n=129; Sample n=24

The only demographic data that could be compared between groups were age and gender. More females than males were present in the sample than in the original cohort population. Both the cohort population and sample included representation of all age groups. The sample and cohort age groupings demonstrated differences in the percentages of each age group. Only one age group (26-30) had comparative percentages.

Research Questions and Data Results

Research Question 1 (RQ1)

RQ1 asked: "What are nurse graduates' perceptions of the effectiveness of their prelicensure educational experiences in preparing them to be safe administrators of medication as new nurses?" Data from SQs 1-4 in sections three and four of the survey provided answers for this question. The analysis included an examination of frequencies, mean, and percentages.

SQ1 Section 3 "Preparing You for Practice" asked graduates: "What is your perception of the effectiveness of your nursing school education in preparing you with the knowledge and skills needed to complete the following medication administration associated tasks as a new graduate nurse?"

Respondents rated the effectiveness of their educational experiences in preparing them for 18 everyday medication administration tasks. Respondents rated perceived effectiveness using a 6 point Likert scale ranging from "0" indicating that they were not required to do this task to "5" indicating "very effective." For this question only, data for the response "I'm not required to do this task" was treated as missing data for the eighteen items included in this question. The researcher decided that only data from the respondents that complete the specific everyday tasks be used to determine efficacy. Treating "0" as missing data altered the statistical analysis. Table 8 presents the ranked responses of the efficacy of education in preparing graduates for medication tasks from lowest to highest (see Table 8).

Table 8

	Very Effective	Effective	Neither Effective nor Ineffective	Ineffective	Very Ineffective		
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n*	Mean
IV Incompatible	2 (10.0)	7 (35)	8 (40)	2 (10)	1 (5)	20	3.35
Communicate	7 (30.4)	9 (39.1)	2 (8.7)	4 (17.4)	1 (4.2)	23	3.74
Use Med-Equip	8 (36.4)	7 (31.8)	2 (9.1)	4 (18.2)	1 (4.5)	22	3.77
Adm. other med	8 (36.4)	8 (36.4)	1 (4.5)	4 (18.2)	1 (4.5)	22	3.82
Pt teaching	4 (17.4)	14 (60.9)	3 (13)	2 (8.7)	0 (0.0)	23	3.87
Adv. Reactions	5 (21.7)	12 (52.2)	4 (17.4)	2 (8.7)	0 (0.0)	23	3.87
Rec Order Error	8 (34.8)	10 (43.5)	2 (8.7)	3 (13)	0 (0.0)	23	4.00
Rec Med Error	5 (21.7)	14 (60.9)	3 (13)	1 (4.3)	0 (0.0)	23	4.00
Report Error	6 (26.1)	14 (60.9)	2 (8.7)	1 (4.3)	0 (0.0)	23	4.09
Dosage Calc	6 (26.1)	15 (65.2)	1 (4.3)	1 (4.3)	0 (0.0)	23	4.13
Elect Resource	11 (50)	7 (31.8)	2 (9.1)	1 (4.5)	1 (4.5)	22	4.18
Adm. IV meds	10 (45.5)	9 (40.9)	1 (4.5)	2 (9.1)	0 (0.0)	22	4.23
Med Disp Equip	10 (45.5)	8 (36.4)	3 (13.6)	1 (4.5)	0 (0.0)	22	4.23
3 to 4 pts	10 (47.6)	8 (38.1)	2 (9.5)	0 (0.0)	1 (4.8)	21	4.24
EHR EMR	11 (47.8)	10 (43.5)	1 (4.3)	1 (4.3)	0 (0.0)	23	4.35
Use Med tools	11 (47.8)	10 (43.5)	1 (4.3)	1 (4.3)	0 (0.0)	23	4.35
1 to 2 pts	13 (56.5)	9 (39.1)	0 (0.0)	1 (4.3)	0 (0.0)	23	4.48
Adm. Oral Meds	16 (69.6)	6 (26.1)	1 (4.3)	0 (0.0)	0 (0.0)	23	4.65

Ranked Educational Effectiveness Preparation for Medication Tasks

One of the two respondents that did not administer medications as part of their daily routine indicated “I’m not required to so this task” for all questions. The other respondents that indicated they did not administer medications as part of their work routine only indicated that they did not administer medications to three or four patients. Various other respondents indicated

they did not complete certain tasks, which is reflected in the 'n' value and percentages. Recognition of IV incompatibilities had the most indications by respondents that they were not required to do the task (*n*=4). For all other tasks, between 21 and 23 respondents indicated that they completed the tasks.

The four medication tasks graduates felt most effectively prepared for included "safely administration of oral medications to patients", "administering medications safely to one to two patients", "utilization of medication tools (med cups, carpujects, syringes, needles, etc.)", and "utilize electronic healthcare and medication record (EMR) to safely administer medications". Dosage calculation was also rated as effective by the majority of respondents; however, fewer of the respondents felt it was 'very effective' in comparison to the higher scoring tasks causing it to have a lower mean value and be ranked lower overall.

The four medication tasks graduates felt least effectively prepared for include "recognizing intravenous (IV) drug incompatibilities," "communication with health care professionals about medications (obtaining orders, clarifying orders, reporting medication errors)," "programming and use of medication administration equipment (IV pumps, patient-controlled analgesia pumps)," and "safely administering medications by other routes (eye, ear, nasal, rectal, vaginal, transdermal)." Only half of the respondents felt that education was effective in preparing graduates to recognize IV drug incompatibilities and the other half felt that education was either ineffective or neither 'effective nor ineffective.'

More respondents indicated that their educational experiences were effective in preparing them to administer medications to one to two patients than in preparing them to administer medications safely to three to four patients. Of all the medication tasks, communication with

healthcare providers, utilization of mediation equipment, and administration of medications by other routes had the highest numbers of graduates that perceived education as being ineffective in preparing them to do these tasks. Lastly, respondents suggested that education was more effective in preparing them to report a medication error than it was in preparing them to recognize a medication error, recognize an incorrect medication order, and anticipate and respond to an adverse drug reaction.

SQ2 section four evaluated educational environments and asked graduates: "What is your perception of the effectiveness of the following teaching environments (classroom, laboratory, simulation, and clinical experiences) in preparing you for safe medication administration practices as a new graduate?" The question evaluated the different contexts of the four specific environments in which teaching medication administration occurs. Frequencies, percentages and mean were calculated and ranked from lowest to highest (see Table 9).

Table 9

	Very Effective	Effective	Neither Effective nor Ineffective	Ineffective	Very Ineffective	
	n (%)	*n (%)*	*n (%)*	*n (%)*	*n (%)*	Mean
Skills Lab	3 (12.5)	14 (58.3)	4 (16.7)	1 (4.2)	2 (8.3)	3.62
Classroom	2 (8.3)	12 (50)	9 (37.5)	1 (4.2)	0 (0.0)	3.63
Simulation	8 (33.3)	11 (45.8)	2 (8.3)	1 (4.2)	2 (8.3)	3.92
Clinical	11 (45.8)	10 (41.7)	1 (4.2)	2 (8.3)	0 (0.0)	4.25

Ranked Efficacy of Environments

The respondents reported that the clinical environment was the most effective environment, followed by the simulation laboratory, skills laboratory and the classroom. More respondents felt that the simulation laboratory was an ineffective environment for learning as

compared to clinical experiences. A little over half of the respondents felt that the classroom environment was effective. The classroom had the highest number of respondents that felt this environment was neither effective nor ineffective in preparing them for safe medication administration.

SQ3 section 4 asked graduates: "What is your perception of the effectiveness of the following educational activities in preparing you for safe medication administration practices as a new graduate?"

Table 10

Ranked Effectiveness of Activities

	Very Effective *n* (%)	Effective *n* (%)	Neither Effective or Ineffective *n* (%)	Ineffective *n* (%)	Very Ineffective *n* (%)	Mean
Case studies	2 (8.3)	13 (54.2)	6 (25)	2 (8.3)	1 (4.2)	3.54
Lecture	3 (12.5)	13 (54.2)	7 (29.2)	0 (0.0)	1 (4.2)	3.71
Class exams	2 (8.7)	15 (65.2)	4 (17.4)	2 (8.7)	0 (0.0)	3.74
Lab med sims	7 (29.2)	10 (41.7)	5 (20.8)	1 (4.2)	1 (4.2)	3.88
Med admin no.	13 (54.2)	5 (20.8)	1 (4.2)	1 (4.2)	4 (16.7)	3.92
Lab practice peers	9 (37.5)	9 (37.5)	2 (8.3)	3 (12.5)	1 (4.2)	3.92
Flipped	6 (25.0)	13 (54.2)	3 (12.5)	2 (8.3)	0 (0.0)	3.96
Pharm calc. exam	4 (16.7)	17 (70.8)	2 (8.3)	0 (0.0)	1 (4.2)	3.96
Med clickers	6 (25.0)	12 (50)	6 (25)	0 (0.0)	0 (0.0)	4.00
Lab skills checks	8 (33.3)	12 (50)	2 (8.3)	2 (8.3)	0 (0.0)	4.08
Formal sims	7 (30.4)	12 (52.2)	3 (13)	1 (4.3)	0 (0.0)	4.09
Lab teach	11 (47.8)	8 (34.8)	3 (13)	1 (4.3)	0 (0.0)	4.26
Clinic admin	16 (66.7)	7 (29.2)	0 (0.0)	0 (0.0)	1 (4.2)	4.54
Clinic observe RN	14 (58.3)	9 (37.5)	1 (4.2)	0 (0.0)	0 (0.0)	4.54

This question asked respondents to report their perception of 14 everyday activities utilized during their nursing program to teach safe medication administration. Table 10 presents the activities listed from lowest to highest perceived effectiveness utilizing frequencies, percentages, and means.

Respondents identified that the least effective activities were "classroom evolving case studies to solve practice problems related to medication administration," "classroom lecture," and "classroom examinations." Very few respondents felt those three activities were 'very effective.' Lecture and case studies had similar percentages of respondents who felt that the activity was neither effective nor ineffective. The majority of respondents felt that the activity "classroom lecture with medication clicker questions" was effective, however, a quarter of respondents found this activity to be neither effective nor ineffective.

The highest scoring activities included "clinical: observing facility RN administer medications," "clinical: medication administration with clinical instructor," "laboratory: clinical instructor teaching medication administration," "formal simulation in simulation lab," and "laboratory: medication skills checkoffs." Over half of the respondents felt administering medications in clinical was very effective which had the most 'very effective' ratings received by any activity listed in this question including observing the RN. "Clinical: number of experiences administering medications" had the highest number of respondents rate it as "very ineffective."

More respondents felt that formal simulations in the simulation lab were effective than laboratory medication simulations (peer to peer or manikins). Laboratory medication skills check-offs were felt to be effective by more graduates than the laboratory practice of medication administration with peers. Even though formal simulation activities and the clinical instructor

teaching medication administration in the laboratory had high numbers of respondents that felt they were effective teaching strategies, more graduates felt that having the clinical instructor teaching medication administration in the laboratory was "very effective" compared to formal simulations.

SQ3 section four evaluated educational tools and asked graduates: "What is your perception of the effectiveness of the following tools (as used in nursing education in preparing you for safe medication administration practices as a new graduate?" This question evaluated 13 tools utilized in the college of study to teach medication administration. The multiple responses were analyzed and presented from the lowest and highest perceived efficacy (see Table 11).

Table 11

Ranked Efficacy of Tools

	Very Effective *n* (%)	Effective *n* (%)	Neither Effective nor Ineffective *n* (%)	Ineffective *n* (%)	Very Ineffective *n* (%)	Mean
Low fid. manikin	3 (12.5)	8 (33.3)	8 (33.3)	5 (20.8)	0 (0.0)	3.37
SLS	3 (12.5)	9 (37.5)	9 (37.5)	1 (4.2)	2 (8.3)	3.42
Paper MAR/HR	4 (16.7)	7 (29.2)	11 (45.8)	1 (4.2)	1 (4.2)	3.50
Part Task trainer	5 (20.8)	10 (41.7)	5 (20.8)	4 (16.7)	0 (0.0)	3.67
Peer pts. in lab	5 (20.8)	12 (50)	4 (16.7)	3 (12.5)	0 (0.0)	3.79
Peer pts. in class	5 (20.8)	13 (54.2)	3 (12.5)	3 (12.5)	0 (0.0)	3.83
Med disp. cart	4 (16.7)	14 (58.3)	5 (20.8)	1 (4.2)	0 (0.0)	3.88
EHR EMR	8 (33.3)	10 (41.7)	5 (20.8)	0 (0.0)	1 (4.2)	4.00
IV Smart Pumps	8 (33.3)	13 (54.2)	2 (8.3)	1 (4.2)	0 (0.0)	4.17
IV Equip	8 (33.3)	14 (58.3)	0 (0.0)	2 (8.3)	0 (0.0)	4.17
Med fid. manikin	6 (25)	16 (66.7)	2 (8.3)	0 (0.0)	0 (0.0)	4.17
High fid. manikin	9 (37.5)	15 (62.5)	0 (0.0)	0 (0.0)	0 (0.0)	4.38
Basic Equipment	12 (50)	11 (45.8)	1 (4.2)	0 (0.0)	0 (0.0)	4.46

The tools respondents felt to be the least effective included: “low fidelity simulators (no electronics, arm injection sites),” “computer simulated learning systems (SLS):” “used in laboratory medication skills lab,” and “paper health record (HR), medication record (MAR) (as found in patient chart: paper form).” All three tools had the most substantial percentages of respondents who felt they were neither effective nor ineffective and ineffective as compared to all other tools. SLS had the most ratings of very ineffective, which was the highest number of very ineffective ratings given to any tool.

The tools respondents felt were the next most effective include “Partial task trainer (IV arms, injection pads),” “Peer patients (other students in lab),” “Peer patients (other students in class),” “medication dispensing cart (labeled drawers),” and “Electronic health record (provided on computers).” Three tools; partial task trainer, electronic healthcare record, and the med dispensing cart, all had about one-quarter of the respondents reporting these tools as being neither effective nor ineffective. The partial task trainer and the low fidelity manikin had the most ‘ineffective’ ratings.

The following tools had the highest number of effective ratings: “basic equipment (pill cutter, medication cups, syringes, needles, etc.),” followed by “high fidelity manikins (HFM) (as in formal simulation lab),” then “Mid-fidelity manikins (MFM) (BP, HR, lung sounds and bowel sounds),” and finally “IV equipment (IV tubing, IVPB tubing).” Although basic equipment had a higher mean than the HFM, the HFM was felt to be effective by all of the respondents.

In rankings of manikins, respondents felt the high-fidelity manikin was more effective than medium-fidelity manikins and low-fidelity manikins. Almost twice as many respondents

felt that the electronic healthcare record and medication records were effective as compared to the paper health and medication records.

SQ9 Section 5 asked graduates: "Upon graduation and entry into your first registered nurse job, how prepared did you feel to safely administer medications?" This last question answered RQ1. A 5-point Likert scale was again utilized to analyze the effectiveness of preparation. This scale was defined differently having a "5" defined as "very prepared," 4 as "prepared," "3" as "somewhat prepared," "2" as "not prepared," and "1" as "very unprepared." Table 12 describes a cross-tabulation of data (see Table 12).

Table 12

Graduate Preparedness for Practice

	Very Prepared	Prepared	Somewhat prepared	Unprepared	Very Unprepared	
	n (%)	*n*(%)	*n* (%)	*n* (%)	*n* (%)	Mean
Prepared for practice	6 (25)	7 (29.2)	11 (45.8)	0 (0.0)	0 (0.0)	3.79
Critical Care (CC)	2(50)		2 (50)	0		4.00
Medical Surgical	1 (7.7)	5 (38.5)	7 (53.8)	0		3.53
Emp. 6-9 mo.		1 (50)	1 (50)	0		3.50
Emp. 9-12 mo.	6 (25)	6 (27.3)	10 (45.5)	0		3.81

Of the 24 respondents, over half reported feeling prepared to administer medications at their first job. Just under half of the graduates felt somewhat prepared. None of the respondents' reported feeling unprepared. The two areas of employment most identified (critical care and medical-surgical) were analyzed to determine perceptions of preparedness. The critical care respondents all identified themselves as having lengths of employment from '9-12 months' (see Table 6). Half of these critical care respondents felt very prepared for practice, and half felt

somewhat prepared for practice. All but one respondent employed in acute care: medical-surgical units indicated a length of employment between '9-12 months'. Of the medical-surgical nurses, almost half felt somewhat prepared versus only 25% feeling either prepared or very prepared. One medical-surgical unit nurse employed between '6 to 9 months' identified feeling somewhat prepared. The other respondent employed between six to nine months in long-term care felt prepared for practice. None of the respondents employed between six to nine months felt 'very prepared' for practice (see Table 13).

Table 13

Length Employment and Preparedness for practice

		Preparedness for practice			
		Somewhat prepared	Prepared	Very Prepared	Total
		n	*n*	*n*	*n*
Lengthemp.	6-9 months	1	1	0	2
	9-12 months	10	6	6	22
Total		11	7	6	24

Research Questions 2 (RQ2)

RQ2 sought data relevant to: "What educational experiences do nurse graduates feel have the potential to be effective in preparing them with the knowledge and skills needed to manage medication administration safely?" Respondents answered three quantitative questions with multiple variables and one qualitative question. Section five included all questions used to answer RQ2. This section discusses the quantitative questions. A separate section of this chapter describes responses to the qualitative question.

SQ5 Section 5 asked graduates**:** "What is your perception of the potential effectiveness of introducing the following tools into the classroom, laboratory, or simulation laboratory in preparing a new graduate to safely administer medications?" This question presented six tools that either 1) research has shown are useful in preparing students for safe medication administration, or 2) are real-world practice tools that the nursing program at the college of study does not use. The tools were ranked as lowest to highest utilizing frequencies, percentages, and means (see Table 14).

Table 14

Ranked Potential Efficacy of Tools

	Very Effective *n* (%)	Effective *n* (%)	Neither Effective nor Ineffective *n* (%)	Ineffective *n* (%)	Very Ineffective *n* (%)	Mean
Comp. Online learning	11 (45.8)	8 (33.3)	3 (12.5)	2 (8.3)	0 (0.0)	4.17
Barcode Scanners	13 (56.5)	9 (39.1)	1 (4.3)	0 (0.0)	0 (0.0)	4.52
Pyxis	18 (75)	5 (20.8)	1 (4.2)	0 (0.0)	0 (0.0)	4.71
EHR MAR	18 (75)	5 (20.8)	1 (4.2)	0 (0.0)	0 (0.0)	4.71
EHR Med Resources	18 (75)	5 (20.8)	1 (4.2)	0 (0.0)	0 (0.0)	4.71
Smart pumps All	17 (70.8)	7 (29.2)	0 (0.0)	0 (0.0)	0 (0.0)	4.71

The respondents reported all six of the tools as being potentially effective. "Computer-based online learning modules" were perceived by respondents as being the lowest potentially effective tool in preparing graduates for safe medication practice. Although computer online learning modules were considered effective by the majority of respondents, it also had the highest number of respondents that felt it would be 'neither effective nor ineffective' and 'ineffective.' One hundred percent of nurse graduates rate "smart pumps all" as being potentially

effective. Almost all of the respondents felt that the tools "barcode scanner," "EHR-MAR," and "EHR Med resources" were potentially effective.

SQ 6 Section 5 asked graduates**:** "What is your perception of the potential effectiveness of the following simulation activities in preparing a new graduate to safely administer medications?" This question was utilized to answer RQ2 by asking nurse graduates to rate the potential effectiveness of nine simulation activities for preparing graduates for safe medication administration practices. The simulated activities were ranked as lowest to highest utilizing frequencies, percentages, and means (see Table 15).

Table 15

Ranked Potential Efficacy of Simulation Activities

	Very Effective *n*(%)	Effective *n*(%)	Neither Effective nor Ineffective *n*(%)	Ineffective *n*(%)	Very Ineffective *n*(%)	Mean
Pre Sim Med lecture	10 (41.7)	12 (50)	2 (8.3)	0 (0.0)	0 (0.0)	4.33
Distraction (1)	12 (50)	11 (45.8)	0 (0.0)	1 (4.2)	0 (0.0)	4.42
Teaching	15 (62.5)	7 (29.2)	1 (4.2)	1 (4.2)	0 (0.0)	4.50
Distractions (2)	14 (58.3)	9 (37.5)	0 (0.0)	1 (4.2)	0 (0.0)	4.50
Errors	13 (54.2)	11 (45.8)	0 (0.0)	0 (0.0)	0 (0.0)	4.54
Interprofessional	15 (62.5)	8 (33.3)	0 (0.0)	1 (4.2)	0 (0.0)	4.54
Multi meds	16 (66.7)	7 (29.2)	0 (0.0)	1 (4.2)	0 (0.0)	4.58
Multi patients	16 (66.7)	8 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	4.67
Side effects	17 (70.8)	7 (29.2)	0 (0.0)	0 (0.0)	0 (0.0)	4.71

In this question, there was a duplicate variable in the survey. "Medication administration with distractions" is listed twice in the survey, however, produces two slightly different statistical answers. For both, almost all of the respondents felt that a simulation including

medication administration and distractions was potentially effective, with only one graduate thinking it may be ineffective. The variation is due to 50% thinking the simulation may be very effective when answering the first question regarding simulations with distractions, and over 58.3% thinking it may be very effective when answering the duplicate question.

The highest rated simulations were "medication administration simulation with post-administration side effects or adverse reactions," "medication administration simulation with multiple medications administrations with 2 or more patients," and "medication administration simulation errors (error recognition and prevention)." For these three simulations, 100% (n=24) of respondents thought they would be potentially effective in teaching safe medication administration practices. A slightly higher percentage of respondents (70.8%, n=17) thought the "medication administration simulation errors (error recognition and prevention)" may be very effective as compared to the "medication simulation with multiple medications with one patient" and "medication administration simulation with multiple medications administrations with 2 or more patients" (66.7%, n=16). The next highest simulations rated as potentially effective were "medication administration simulation with multiple medications to one patient" and "interprofessional simulations (with pharmacy and medical students, Physician Assistants (PA) and nurse practitioners (NP)."

Q7 section 5 asked graduates: "What is your perception of the potential effectiveness of the following clinical activities in preparing a new graduate to safely administer medications?" This question was the last of the quantitative questions utilized to answer RQ2. This question, as with the previous simulation questions, asked graduates to rate activities in the context of an

environment, clinical. Activities were ranked from lowest to highest using frequencies, percentages, and mean (see Table 16).

Table 16

Ranked Potential Efficacy of Clinical Activities

	Very Effective n(%)	Effective n(%)	Neither Effective nor Ineffective n(%)	Ineffective n(%)	Very Ineffective n(%)	Mean
Preceptorship	19 (79.2)	2 (8.3)	1 (4.2)	1 (4.2)	1 (4.2)	4.54
Med admin with RN	16 (66.7)	7 (29.2)	0 (0.0)	0 (0.0)	1 (4.2)	4.54

This section included only two clinical activities not currently used at the college of study. Both activities "administering medications with an RN employed by the clinical facility (preceptor)" and "preceptorship: 1 on 1 preceptorship in the last semester (student assigned to a facility RN, follows RNs schedule, and administers medications with RN)" were rated as potentially effective by the majority of graduates. Several respondents felt that a preceptorship is potentially ineffective, while only one felt that administering medications with an RN may be very ineffective.

Qualitative Data Results

SQ 8 section 5 presented graduates with the opportunity to give their perceptions of how the nursing program might promote better medication administration preparedness and asks: "Do you have any suggestions for enhancing the student experience in prelicensure nursing education to promote preparedness for safely administering medications upon licensure and entry into the

workforce? (Please be specific)". Nine of the 24 respondents answered this question. These data were downloaded to a Word document and evaluated for common themes.

Qualitative Responses

1. We need to focus more on the actual LEARNING of drugs, not memorization for pharm exams. Patient teaching needs to be emphasized more. Teaching for how to correctly administer eye drops, nasal sprays, inhalers, nebulizers, etc.
2. Students need to do practice talking with doctors in the sim lab way more often. They need to practice on being prepared to talk to doctors...getting vitals, looking at doctor's notes before and asking your PCA needed questions before calling the doctor. Students need to recognize questionable meds giving such as a BP med to a patient with a low BP, or insulin to patient a who isn't eating. Students need way more sim labs with the distractions and how to prioritize them as they come. Students need to recognize when they are overwhelmed and how to ask for help. In my opinion students need more sim time and less clinical because the instructors do not have the time to explain things with students like sims can provide.
3. The college did a great job preparing me but very few clinical instructors take their job seriously. Many of them just allowed me to pass meds on 1 or 2 patients and I needed to be ready to pass meds on 5 or 6 patients. The simulations were helpful but when you mention having a NP or pharmacist those SIMS usually did not make a difference because the instructor was running between speaking (running the simulation) and being the doctor or whatever was needed. I also think that pairing up with a specific nurse that has been trained to have a student for more medication administration would be helpful.

4. Med pass to 6 pts because that's real life on a med surg unit
5. Preceptors - we didn't evolve much from 1st semester to last in terms of clinical experiences
6. I believe having Pyxis/scanner simulations would be helpful due to limited opportunities to pass medications during clinical time. During my schooling, I only hung one IVPB medication during clinical, when I entered the workforce, this task was intimidating and I felt very nervous. It took repetition to feel comfortable. In general, I learned more about being a CNA on the floor during clinical than I did about administering medications. In practice, delegating these tasks to support personnel during medication passes is a vital component to patient safety, oftentimes nurses are bombarded with tasks such as fetching ice, blankets and ADLs during med passes, performing these tasks while administering medications can be a huge distraction, it's important to be comfortable delegating.
7. I think a preceptorship would be wonderful. I did one through work and it made the transition to nursing amazing!
8. More clinical time. - More hands on learning. - More accurate resources we used when we get our license or job (Lexi-comp). - More pharm classes instead of just one and then briefly hitting certain meds.
9. More time with passing medications. - I would have loved to pass meds with preceptor, but preceptors sometimes have bad habits; therefore, more time with my instructor would be preferred. - More practice with IV meds. - I agree with all of the suggestions in this study. Common themes and phrases were categorized utilizing the conceptual framework of situated cognition.

Tools

Common themes identified from the suggestions given for enhancement of education included the need for the development of cognitive tools such as pharmacology knowledge and integration of realistic medication tools. Three of the respondents identified the need for more pharmacology knowledge that provides practical knowledge, not just memorization. Respondents wanted knowledge that allowed them to recognize when medication administration is inappropriate. One respondent suggested nursing school provide more pharmacology classes, not just one. Respondents also identified the need to be exposed to authentic physical tools of practice such as Pyxis, scanners, and Lexi-comp. Respondents suggested utilizing simulation as a way of developing valuable knowledge and integrating authentic physical tools of real-life practice.

Situated Activities

The need for more medication administration practice was the second most common theme identified. Suggestions included having more time practicing medication administration in clinical and in simulation both with clinical faculty and preceptors. Medication-related skills (tasks) such as communicating about medications, prioritizing for medication administration, dealing with distractions, delegating, patient teaching and administering alternative formats of medications (IV, IVPB, eye drops, nasal sprays, inhalers, nebulizers, etc.), and learning how to administer medications to five or six patients was also suggested.

Environment

Respondents identified that more practice should occur in the clinical and simulation environments. Two respondents suggested there is a need for more simulation and less clinical

time. Others suggested more ‘hands on’ learning. Those that suggested more ‘hands on’ learning did not specify the environment. Other respondents suggested the need for more clinical time. Others discussed the need for more medication administration in clinical settings with preceptors and clinical instructors. There were no suggestions to increase activities in the skills laboratory or the classroom.

Apprenticeship in clinical settings. Respondents mentioned clinical instructors and RN preceptors as both facilitators and barriers for learning medication administration. One respondent identified the need to work more with clinical instructors, citing that preceptors can have “bad habits.” Two others felt that more work with a trained preceptor RN could facilitate evolution of skills, the transition to practice and provide more opportunities to administer more medications during clinical. These respondents felt clinical instructors do not take their role seriously or do not have time to teach medication administration adequately.

Summary of Findings

Descriptive statistics and qualitative responses provided a means to understand the nurse graduate respondents’ perceptions of the efficacy of their education in preparing them for safe medication administration practices. Survey questions one, two, three, four, and nine answered research question one. These survey questions asked graduates for their perceptions of the efficacy of prelicensure educational experiences in preparing them for practice. Survey questions five, six, seven, and eight answered research question two. Question nine assessed graduates’ perceptions of their overall feeling of preparedness when entering practice as a new nurse. Question eight is a qualitative question that provided a deeper understanding of how to enhance medication administration education.

Communities of Learning: Environments

Respondents consistently rated the clinical environment and clinically situated activities as being the most effective for learning medication administration. Of the 24 respondents, 21 rate clinical as an effective environment and almost half rate it as being very effective. These ratings exceeded all other environments including the simulation laboratory and the skills laboratory environments. The least effective environment was the classroom. Respondents shared the following comments:

> "more clinical time-more hands on learning"
>
> "In my opinion students need more sim time and less clinical because the instructors do not have the time to explain things with students like sims can provide"
>
> "…simulations would be helpful due to limited opportunities to pass medications during clinical time"

Situated Activities

The respondent perceptions of the efficacy of situated activities mirrored respondent ratings of the effectiveness of the specific environments. Respondents perceived clinical activities as more effective than simulated activities, simulated activities as more effective than laboratory activities, and laboratory activities as more effective than classroom activities with few exceptions. Clinical activities "administering medication with clinical instructor" and "observing facility RN administer medications" were found to be the highest rated in efficacy and have the most ratings of 'very effective' among all activities. These perceptions are in contrast to respondents' perceptions of the effectiveness of classroom activities such as the use of lecture and case studies in which the least number of respondents perceive these as being

effective. Over one-quarter of the respondents feel that these classroom activities are 'neither effective nor ineffective' in preparing them for safe medication administration. The "classroom lecture with medication clicker questions" is felt to be somewhat more effective than other classroom activities, ranking just under formal simulations and laboratory skills check-offs. One-quarter of the respondents, however, still rate this classroom activity as 'neither effective nor ineffective,' which is consistent with the lower ranked classroom activities. The pre-class 'flipped' classroom lectures (audio lectures) is believed to be effective by the majority of ranking similarly to classroom lecture with medication clicker questions and much higher than a classroom lecture.

Of note in the findings is that "clinical: number of experiences administering medications" demonstrates more polarized responses by respondents. Although the majority of respondents perceive that the number of clinical medication administration experiences is effective, some also perceive it to be 'very ineffective.' Of all the activities listed, this activity has the most 'very ineffective' ratings of any activity. Comments shared in the qualitative survey question discuss the need for more opportunity to administer medications:

"more time passing medication…more time with my instructor would be preferred. More practice with IV meds"

"…simulations would be helpful due to limited opportunities to pass medications during clinical time During my schooling, I only hung one IVPB medication during clinical, when I entered the workforce, this task was intimidating and I felt very nervous. It took repetition to feel comfortable"

"…pairing up with a specific nurse that has been trained to have a student for more medication administration would be helpful."

"More practice with IV meds"

The simulation and skills laboratory environments were found to be less effective than the clinical environment, but more than the classroom. Although the activity of "formal simulation in the simulation lab" had the same perception of efficacy among graduates as "laboratory: clinical instructor teaching medication administration;" more respondents felt that working with the clinical instructor in the lab was 'very effective' compared to completing a formal simulation in the simulation lab. These beliefs are not consistent with the respondent perceptions of the efficacy of the skills laboratory environment and simulation laboratory environments.

Fewer respondents felt that activities in the laboratory "laboratory practice with peers" and "laboratory medication simulations with patient scenarios (peer to peer or with manikin)" were effective as compared to laboratory skills check offs and laboratory teaching with clinical instructors. Fewer respondents rated laboratory medication simulations as effective than formal simulations conducted in the simulation laboratory.

Tools

Respondents provided their perceptions of the efficacy of 13 tools used in the nursing program. Respondents had varied responses to electronic and computer-based tools compared to tools that did not have electronics. Basic equipment (pill cutter, medication cups, syringes, needles, etc.) was perceived by almost half of the respondents to be "very effective," even above high-fidelity manikins that were considered effective by all of the graduates. IV equipment such

as IVPB tubing was perceived by slightly more respondents to be effective than Smart infusion IV pumps (pumps with drug database). These IV tools were then scored higher than medication dispensing card (file box with labeled drawers), which does not utilize any computer or electronic components. Twice as many respondents perceived the EHR and MAR to be effective as compared to the Paper HR/MAR. The 'computer simulated learning systems' (SLS) used in laboratory medication skills lab was the lowest scored computer- or electronic-based tool with 37.5% feeling it was neither effective nor ineffective.

Respondents sequentially rated high fidelity simulators (manikins that have high levels of electronics) as more effective than the mid-fidelity simulators (manikins that have BP, HR, lung sounds and bowel sounds) and more than low-fidelity simulators (manikins with no electronics). Respondents consistently rated the high- and mid-fidelity simulators over the use of peer interactions (with other students in lab and class) that act in place of a simulator during a simulated experience. Only two respondents rated the high- and mid-fidelity simulators as being neither effective nor ineffective, whereas over a quarter of respondents felt the use of peers as patients in the lab and class was 'neither effective nor ineffective'. Over a third of the respondents felt the same about low-fidelity manikins.

Educational Effectiveness Preparation for Medication Tasks

Survey question one asked graduates to rate the efficacy of their education in preparing them to complete 18 specific everyday medication administration tasks. This question gave insight into the overall effectiveness of the entire nursing educational experience in preparing graduates with the knowledge and skills to complete medication administration tasks required of nursing practice. More of the respondents indicated that their education is effective in preparing

them to administer medication to ‘1 to 2’ patients than ‘3 to 4’ patients. Relative to these two medication tasks respondents commented: “… [Clinical instructors] allowed me to pass meds on 1 or 2 patients and I needed to be ready to pass meds on 5 or 6 patients.” and “Med pass to 6 pts. because that’s real life on a med. surg unit.”

More of the graduates indicated that their education was effective in preparing them to safely administer oral medications than IV medications and medications by other routes. Recognizing IV drug incompatibilities was the lowest ranked medication administration tasks. Very few of the respondents felt they were effectively prepared by their nursing program to complete this task even though the majority of these same respondents felt effectively trained in how to safely administer intravenous medications (IV, IVPB, and IV infusion).

An analysis of four medication administration safety tasks: “anticipating and responding to adverse drug reactions,” “recognizing incorrect medication orders (dosage, routes, etc.),” “recognizing that a medication error has occurred,” and “reporting that a medication error has occurred” provided data on medication safety processes. Data showed that nursing education was more effective in teaching the respondents how to report an error, than recognize, anticipate or respond to medication errors or adverse reactions. Respondents provided suggestions for enhancing medication safety knowledge and skills:

> “We need to focus more on actual LEARNING of drugs, not memorization for pharm exams”
>
> “Students need to recognize questionable meds giving such as a BP med to a patient with a low BP, or insulin to patient who isn’t eating…”
>
> “More pharm classes instead of just one and then briefly hitting certain meds.”

Respondents rated their education as being less effective when the task involved communication practices. Only 69% felt effectively prepared to communicate with other healthcare professionals about medications, and 78% felt effectively prepared to provide medication education to patients and families. A little over a quarter of respondents felt their education was ineffective in teaching them how to communicate with other healthcare professionals. One respondent shared the following about communication tasks:

> "Patient teaching needs to be emphasized more…Students need to do practice talking with doctors in the sims lab way more often. They need to be prepared to talk to doctors…looking at doctors' notes before asking your PCA needed questions before calling the doctor."
>
> "The simulations were helpful but when you mention having a NP or pharmacist those SIMS usually did not make a difference because the instructor was running between speaking (running the simulation) and being the doctor and whatever was needed."

Respondents rated their overall education preparation for the use of some tools in practice similarly, to how they rated the efficacy of the tools used in nursing schools. For example, almost all of the respondents thought basic medication tools were effective in helping them learn about medication administration. Similarly, respondents perceived their overall education as effective in preparing them to utilize basic medication equipment in their first jobs. This same trend occurred for the following tools: electronic health and medication record, and medication dispensing equipment. A similar trend was noted between the efficacy of one activity as conducted in education and the efficacy of education on using that same activity in practice. The majority of respondents rated pharmacology calculation exams as being effective, which is

consistent with the number of respondents that perceived their education effectively prepared them to calculate drug dosages in practice accurately. No other educational activities used in the nursing program translated to a specific medication administration task.

Preparedness for Practice

Survey question nine was the last question utilized to answer research question one. This question provided an overall picture of how effective the graduate nurses felt their education was in preparing them to be safe administrators of medications as new nurses. Respondents were able to reflect and share how prepared they felt for practice when their prelicensure educational experiences were completed. Over half of the respondents felt prepared for practice while the other half felt somewhat prepared. None of the respondents indicated feeling unprepared.

Research Question Two

Research question two was linked to survey questions five, six, seven, and eight. These survey questions gave insight into the potential effectiveness of tools, simulation, and clinical activities.

Tools

All of the tools were perceived to be potentially effective by >90% of respondents except for one. Computer-based online learning modules (pharmacology, dosage calculations, virtual hospital) were only thought to be potentially effective by three-quarters of the respondents. This perception is consistent with respondent ratings of computer-based SLS learning systems that are currently in use in the nursing program. Although there were no comments regarding computer-learning systems, a comment was made related to the introduction of suggested tools into simulation experiences:

"I believe having Pyxis/scanner simulations would be helpful due to limited opportunities to pass medications during clinical time."

Simulation and clinical activities. Respondents ranked all 11 simulated and clinical activities as being potentially effective. These rankings are consistent with respondent perceptions of current clinical and simulation activities. Even the lowest rated activity "conducting a medication lecture prior to medication simulations" was felt to be effective by the majority of the respondents. The highest rated simulations were consistent with respondent suggestions for improvement of preparation. Medication simulation with post-administration side effects or adverse reaction was rated the highest, followed by medication simulation with multiple patients.

In evaluating clinical activities, the majority of the respondents thought that a preceptorship in the last semester would be very effective in preparing them for practice. Although the respondents indicated in the quantitative data that they felt this activity may be potentially effective, there were mixed comments in the qualitative data. Comments include:

"preceptors [may enhance learning]: we didn't evolve much from 1st semester to last in terms of clinical experiences."

"I think a preceptorship would be wonderful. I did one through work and it made the transition to nursing amazing!"

"I would love to pass meds with a preceptor, but preceptors sometimes have bad habits, therefore, more time with an instructor would be preferred."

Respondent recommendations for simulation and clinical settings also varied, presenting different viewpoints on simulation and clinical experiences:

"…In my opinion students need more sim time and less clinical because the instructors do not have the time to explain things with students like sims can provide."

"…very few clinical instructors take their jobs seriously…I think that pairing up with a specific nurse that has been trained to have a student for more medication administration would be helpful."

"More clinical time-more hands on learning"

"More time with my instructor would be preferred."

"…In general, I learned more about being a CNA on the floor during clinical than I did about administering medications…"

Conclusion

This chapter presented findings of this study investigating the efficacy of prelicensure teaching strategies in preparing nurse graduates for safe medication administration practices. Each survey question was linked to the research questions and findings were presented in table format. This chapter provided a summary of findings for each question in narrative format. Survey questions prompting both quantitative and qualitative responses were framed using the theory of situated cognition. Reviews of both cohort and sample characteristics were also presented in tables and further discussed in narrative format. Chapter five discusses the findings from this chapter in further detail.

CHAPTER 5

CONCLUSION

This chapter presents a brief overview of the study, interpretation of findings, discussion of study limitations, implications for nursing education and future research, and recommendations for action. The theory of situated cognition frames the discussion of findings and implications for nursing education and research.

Overview of Study

Medication administration is considered one of the most important and frequently performed skills that nursing students must learn in order to practice safely as an entry-level graduate nurse (Bourbonnais & Caswell, 2014; Leufer & Cleary-Holdforth, 2013; Lock, 2011; Reid-Searle & Happell, 2012; Simones et al., 2014). A key goal of nursing programs is to provide students with the requisite knowledge and skills needed to safely administer medications upon graduation (Vaismoradi et al., 2014). Nurse graduates, however, are not always ready for practice, lacking the skills and knowledge needed to administer medications safely, causing them to make medication errors (Unver et al., 2012).

The literature cites many individual and system reasons for medication errors. Healthcare service providers continue to search for ways to improve medication safety. Educators search for ways to improve how medication safety is taught (Vaismoradi et al., 2014). Many studies evaluate teaching strategies from the viewpoint of the student but very few from the graduate perspective. Some researchers believe that the graduate nurse perceptions of the effectiveness of their education in preparing them for practice may be the missing link in solving nursing education deficiencies (McCalla-Graham & DeGagne, 2015). Currently, there is very little research on graduate perspectives about the effectiveness of their nursing education and

medication administration (Sykes, 2017). Information provided by nurse graduates may contribute to making the changes in curriculum and development of educational strategies that will improve the efficacy of nursing education and minimize nurse graduate skill and knowledge deficiencies. Preparing nurses to administer medications safely is an essential step in decreasing medication errors and improving patient safety. As medication administration skills are important to practicing nurses and patient safety, learning how to administer medications safely before entering practice is essential (Lim & Honey, 2014; Sykes, 2017).

This descriptive study is one of many steps needed to understand where educational deficiencies lie in teaching medication administration processes. The results of this study assist in laying the groundwork for the development of evidence-based educational processes and contribute to the substantial body of knowledge about the preparation-practice gap from the perspective of the graduate nurse. The purpose of this study is to investigate and describe graduate perceptions of the efficacy of prelicensure teaching strategies in preparing graduate nurses for safe medication administration in practice. A secondary purpose is to evaluate educational environments, activities, and tools from the perspective of situated cognitive learning theory.

Nurse graduates were asked to share their perceptions of the efficacy of teaching strategies both individually and in general. The study assessed graduate perceptions of educational efficacy in preparing them to complete medication administration tasks of real-life practice. Also, this study asked the graduates to share their overall perceptions of their preparation for safe medication administration upon licensure and entry into their first job.

Graduate perceptions of educational efficacy were examined using the following research questions:

1. What are nurse graduates' perceptions of the effectiveness of their prelicensure educational experiences in preparing them to be safe administrators of medication as new nurses?
2. What educational experiences do nurse graduates feel have the potential to be effective in preparing them with the knowledge and skills needed to manage medication administration safely?

Interpretation of Findings

Sample and Cohort Comparison

The respondents comprised a small number of nurse graduates from a community college in south-central Michigan. The respondents' gender demonstrated an overrepresentation of females as compared to the cohort (see Table 7). It is not known why male graduates did not respond to the survey however, the male response rate was similar (6.9%) to the NCSBN study of RN Nursing Knowledge (2015b), the 2015 Survey of Nurses (Michigan Center for Nursing, 2016) (93.2% female, 6.8% males), and the NCSBN 2015 Workforce Study of RN's (92% female, 8% male) (NCSBN, 2016).

The sample and cohort age groupings demonstrated differences in the percentages of each age group. The sample (26-30) age group was the only group that had similar percentages. The sample under-represented the age group of 20 to 25 and >40 years of age. The sample over-represented the age group 31-35 and 36-40. Sample ages did not correlate with ages noted in other studies such as the NCSBN 2015 National Workforce Survey (2016), the NCSBN Study of

RN Nursing Knowledge (2015b) or the 2015 Survey of Nurses [in Michigan] (2015) having higher numbers of nurse graduates in the 20 to 25 age group and lesser numbers in the 40 and over age groups. A Fisher's exact test of gender demonstrated that gender is not significantly different between groups (p=0.7415), however a Fisher's exact test did demonstrate that age was significantly different between groups (p=0.0429). Findings cannot be generalized to the total cohort population based on differing distributions of ages between groups. Inability to generalize findings presented a limitation to this study.

Sample Characteristics

Table 12 represented other characteristics of the respondents in the study sample. The majority of respondents indicated employment in acute care medical-surgical units, including oncology, orthopedics, neurology, cardiology and critical care (16.7%, n=4). Employment characteristics were similar to other studies in which the majority of new graduates are employed in medical-surgical units, followed by critical care (NCSBN, 2015a; Parker et al., 2012; Sykes, 2017). The length of employment ranged from six months to twelve months with all but two in the '9 to 12-months' time range. Length of employment findings were consistent with the timing of respondent graduation date and survey completion between April and June of 2018.

Two respondents stated they did not administer medications as a part of their daily work. One respondent reported employment in the community and the other in a physician's office. It would not be expected for them to routinely administer medications. Employment opportunities in both the community and physician office practices are diverse. The two graduates' (NG1 and NG2) survey responses were reviewed to determine answer variance. NG1 and NG2 differed in their responses to RQ1 in section three regarding educational preparation for medication tasks in

practice. NG1 indicated they did not complete any tasks as listed in the question, however, NG2 indicated they completed all tasks except for administering medications safely to three to four patients. Possible explanations for these responses are: NG2 may have had a previous employer, in which they administered medications as a part of their employment. Also, they may currently complete all medication tasks other than the one they indicated they did not complete. Both NG1 and NG2 completed the rest of the survey, with variable efficacy ratings ranging from one to five. Although NG1 indicated that they did not complete any medication task as a routine part of their employment, they still felt "very prepared" to administer medications as a new graduate whereas NG2 felt "prepared." NG1 may have perceived that if they had needed to administer medications in their job their education would have adequately prepared them to safely administer medications as a new graduate or NG1 may have had previous employment for which they were required to administer medications. NG2 previously indicated they completed all but one of the medication tasks in question one, therefore, it would be anticipated that NG2 had enough experience to rate how prepared they felt.

Conceptual Framework

Situated cognition is the framework for this study. This theory suggests that knowledge does not occur in isolation but is intimately connected to activity, context, and culture (Brown et al., 1989). How an activity is situated is as integral to the creation of knowledge as the activity itself. Situated activities provide the learner with meaningful and usable knowledge applicable in real life contexts (Brown et al., 1989). The use of the combination of cognitive apprenticeship and situated activities through legitimate peripheral participation (LPP) is integral to moving the

learner from the position of a peripheral participant to full membership in a community of practice (Collins et al., 1989; Lave & Wenger, 1991)

The theory of situated cognition is useful in evaluating teaching-learning processes in practice professions (Collins et al., 1989; NCSBN, 2005). Nursing is a practice profession (NCSBN, 2005). Students seeking to enter the nursing profession attend nursing schools in order to attain the knowledge and skills needed to become a full member of the community of practice. Learning to become a nurse is a transformative process. Apprenticeship and legitimate peripheral participation (LPP) promote the transformation of the learner to a full member of the community by merging theoretical knowledge with common everyday practice (Lave & Wenger, 1991). To accomplish these transformations, nursing students participate in a variety of activities situated in both academic and real-life practice environments. These situated activities promote knowledge and skill attainment pertinent to medication administration processes.

Data Interpretation

Graduate respondent perceptions provided for both general and specific understanding of the efficacy of educational practices. Evaluation of quantitative and qualitative data elicited several interpretations. Data suggested that:

- Environments, situated activities, and tools are more effective if they are reflective of or immersed in realistic communities of practice;
- Respondents perceive that they were more effectively prepared to complete those medication administration tasks that were integrated early in their nursing program;

- Environments, situated activities, and tools used in education do not always provide for adequate practice and socialization to realistic expectations of the nurse administering medications in practice;
- More time and opportunities are needed to practice medication administration;
- Teaching is ineffective in preparing respondents to communicate with healthcare professionals and complete patient teaching;
- Situated activities in which a clinical instructor is present are the most effective; however, clinical instructors and preceptor behaviors can also present barriers to learning safe medication administration practices;
- Nursing education is more effective in preparing a graduate to administer medications (oral and IV) than in recognizing IV incompatibilities, anticipating and responding to adverse drug reactions, and recognizing medication order errors and medication errors;
- Education is useful in preparing respondents to calculate drug dosages, however, more effective pharmacology instruction is needed;
- Administering medications with staff RN's, preceptorships and medication simulations are potentially useful strategies to promote preparedness for safe medication administration.

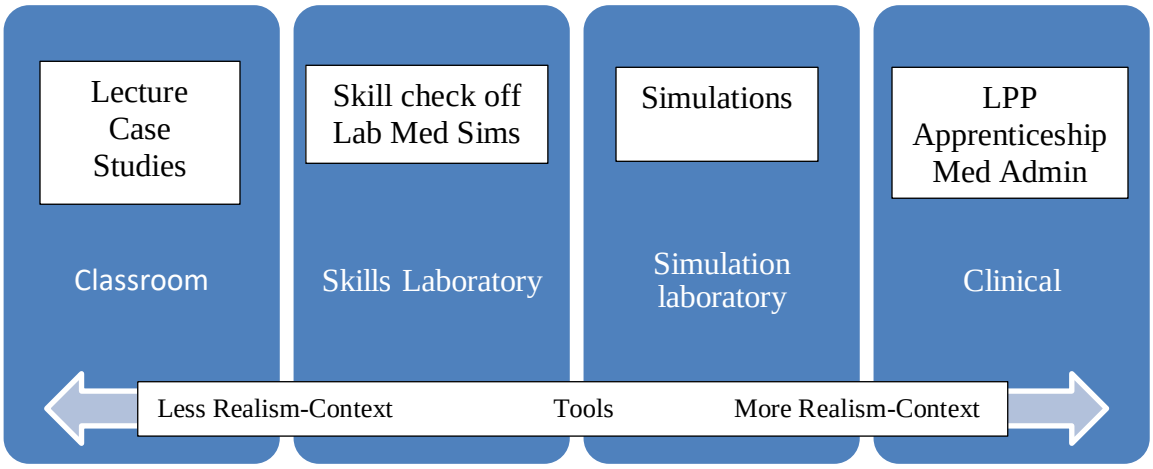
Realistic Environments, Activities, and Tools

The situated cognitive theory posits the acquisition of knowledge, skills and cognitive processes required of a community of practice can best be learned in a learning environment that is realistic to the contextual and cultural realities of that practice community (Brown et al., 1989; Collins et al., 1989; Potgieter, 2012). In accordance to this theory, data in this study

demonstrated that the closer the environment, situated activities, and tools are to the realities of practice communities, the more graduates feel they are prepared for safe medication administration processes (see Figure 2).

Figure 2

Efficacy of Environments, Activities, and Tools



Perceived Efficacy of Environment

Nurses complete medication administration tasks in the context of real healthcare environments. The clinical environment would be expected to be considered a more effective environment for learning medication administration tasks. More respondents indicate that the clinical environment and its associated activities is more effective than any other learning environment. Environments include simulation laboratory, skills laboratory, and the classroom. These findings are not surprising, as those that study nursing education suggest that the shift of education away from healthcare environments to classrooms results in a disconnect between

"know what" and "know how" or 'learning and use' (Brown et al., 1989; Forber et al., 2015;). Bringing the student back to the healthcare environment would help to bridge this disconnect.

Most research relative to environments evaluates "courses," specific situated activities, or student experiences (Hickey, 2010; Sykes, 2017). Respondent perceptions of the effectiveness of 'clinical' or 'simulation' or 'skills laboratory' or 'classroom' may reflect more than just social, cultural, and physical environmental factors. Respondents may alter their perceptions based on the usefulness of the learning that occurs in the environment. In reviewing previous research and this data, it is apparent that there is an intimate connectedness between the environment, its activities, and perceived effectiveness. Perceived effectiveness may be reflective of situated cognitive theory. Situated cognitive theory suggests that all activity is situated. Learning that occurs in situated activities is reflective of the social, cultural and context of the environment (Lave and Wenger, 1991). Therefore, when respondents think of the 'environment' they may be including the contexts of the environment including the social and cultural contexts and the activities that occurred in them. Respondents may even consider whether meaningful learning occurred in situated activities within an environment or if the tools used within it were realistic to real-world practice. Examples of situated activities in the classroom include lecture, flipped classroom, examinations, and case studies. Situated activities in the skills laboratory include skills practice with clinical instructors, simulated medication administration with peers or low fidelity simulator, and skills check offs. The simulation laboratory focuses on the conduction of simulations with a high-fidelity simulation. Clinical activities include administering medications with a clinical instructor or observing staff RNs administering medications.

Clinical environment. The clinical environment was rated effective by the most number of graduates. The highest rated activities for learning medication administration in this study were also clinically-based activities. Clinical experience represents an authentic practicing community in which students engage in activities with expert practitioners who, through legitimate peripheral participation and cognitive apprenticeship, socialize them to the role of the nurse (Lave & Wenger, 1991). Literature supports the efficacy of clinical practice in socializing the student to the role of the nurse and the complexities of life through situated clinical experiences (Holland et al., 2013; Sykes 2017). It is therefore not surprising that respondents perceive the clinical environment as being more effective in preparing them for safe medication practices than the other environments.

Simulation environment. The simulation environment presents situated learning opportunities that are more realistic than classroom or laboratory opportunities. Literature supports the efficacy of simulation (Bailey & Mixer, 2018; Paige & Daley, 2009; Wyrostok et al., 2014). Simulation is designed to mimic the reality of patient situations incurred in a clinical environment. Simulation is often used in place of clinical placements to augment student learning and address the lack of skill opportunities provided by clinical experience (Holland et al., 2013). Situated cognitive theory suggests that simulation is a community reproduction of activities that occur in active practice (Lave & Wenger (1991). Community reproductions reflect the identities and histories of practice in these environments (Lave & Wenger, 1991). Simulations are thought to improve medication administration competency through exposing students to realistic patient situations in which they must act followed by a debriefing in which trained expert clinicians coach and mentor them (Jarvill, Jenkins, Akman, Astroth, Pohl &

Jacobs, 2018). Studies of simulations that promote medication administration competency suggest they are useful in improving student confidence prior to working in the clinical environment, decreasing student medication errors in clinical, improving medication administration examination score, providing students with opportunities to practice more advanced medication administration skills, and improving student medication administration safety (Ferguson, Delaney & Hardy, 2014; Harris et al., 2014; Mariani et al., 2017; Sears, Goldsworthy & Goodman, 2010). The supposition is that all of these benefits would augment graduate preparation for safe medication administration. It is therefore not surprising that respondents perceived simulation as being more effective than classroom or laboratory but not as effective as clinical.

Despite high ratings, almost a quarter of respondents considered the simulation laboratory as an ineffective teaching environment. Why respondents felt this way is not explicitly known. Research of students and their perceptions of the simulation environment demonstrates that students can experience anxiety when in the simulation laboratory which can negatively affect the quality of their learning (Cato, 2013). Cameras, the possibility of making a mistake, performing in front of peers and instructors, and distinguishing what is real and what is simulated, are all noted to be environmental factors producing student anxiety (Cato, 2013). Given this researcher's knowledge of student responses to the simulation environment, this can often be true.

Respondent attitudes may affect the perceptions of the simulation environment. Comments from graduates in other studies vary from not liking simulations:

"I did not like it [simulation]…we should have spent more time with real people, with patients versus a mannequin that can't talk to you" and

"…doing it on a real person and doing it on a fake person is completely different..."

Other comments suggest a liking of simulations…

"it [simulation] gave you much more perspective about what to expect [in practice]"

Lave and Wenger (1991) share that a problem with community of practice reproductions is that they lack the social and cultural constructs inherent in an authentic community. Community reproductions do not provide for social interactions, apprenticeship experiences, or the rich diversity of complexity that occurs in an authentic environment (Lave & Wenger, 1991). As such, simulation does not provide the social and cultural contexts to promote optimal learning of medication administration and therefore cannot replace clinical (Doody & Condon, 2013). Respondents may have perceived this as a reason for thinking that the simulation environment is insufficient for learning. Simulation can augment clinical learning and as a process of scaffolding promote the learning of complex skills such as medication administration.

Skills laboratory environment. Just over 70% of respondents felt that the skills laboratory was an effective place to learn safe medication administration and processes. These findings are congruent with situated cognition. The skills lab is in the academic community outside of and separate from practice communities. It provides an environment in which students can practice skills and gain confidence before working with a real patient in clinical (Krautscheid et al., 2011; Staykova, Von Stewart & Staykov, 2017). Situated activities in the skills laboratory do not always reflect the realities of the practice environment. In the college of study, there is a

lack of electronic medication dispensing equipment, electronic healthcare, and medication records with which to practice.

Similarly, situated activities in skills laboratories do not always teach psychomotor skills in a manner that replicate practical uses within the context of a clinical environment (Staykova et al., 2017). Although the classroom and laboratory environments provide for technical mastery of skills and knowledge of medication processes; understanding how to apply knowledge realistically and execute skills is a complex contextually bound process (Collins et al., 1989). Bourbonnais and Caswell (2014) agree that skills taught in laboratory settings are essential to practicing how to apply cognitive knowledge such as the five rights of medication administration and practicing psychomotor skills. Skills laboratories, however, lack context and cannot reflect the complexities of preparing and administering medications in authentic communities (Bourbonnais & Caswell, 2014). Lack of realism and complexity may contribute to the respondent perceptions of the efficacy of the skills laboratory.

Classroom environment. Respondents perceived the classroom environment to be the least effective of all. Nursing literature and situated cognition principles of learning support this finding. The consensus in the literature is that it is difficult for new graduates to transfer theoretical knowledge gained in the classroom to real-world practice (Saintsing et al., 2011). In the classroom, information is organized and transmitted through teaching methods that produce knowledge that is often textbook-bound, requiring memorization. Students develop no real understanding of how to apply the knowledge in practice (Collins et al., 1989). Knowledge, as obtained in academe, is essential in preparing students to participate in practice activities; however, information attained is often abstract, not relative to real life use or decontextualized

(Brown et al., 1989; Lave & Wenger, 1991). Situated cognitive theory suggests that knowledge is a cognitive tool. Members negotiate its meaning within the culture and context of the community of practice. If the meaning of knowledge is not relative to real use, it is meaningless (Brown et al., 1989). Unless the student can merge theoretical knowledge with experiences or mimicked clinical situated learning opportunities in the classroom, the knowledge can remain unused and useless (Ajani & Moez, 2011; Lave & Wenger, 1991).

Perceived Efficacy of Situated Activities

C**linical activities.** Respondents perceived that both the clinical activity of observing the facility RN and administering medications with the clinical instructor is highly effective. Cognitive apprenticeship involves a relationship between a learner and a 'master' or expert. Learners acquire a combination of cognitive and psychomotor skills through a combination of observation, modeling, coaching, and fading (Collins et al., 1989). Through observation, the student can watch the expert nurse (role model) executing behaviors and activities (Collins et al., 1989), which provides the students with a means of internalizing knowledge and learning authentic ways of doing (Lave & Wenger, 1991; Melincavage, 2011). Observing the expert RN allows the students a way to access resources in order to bridge "understood knowledge, as provided by instruction, and active knowledge, as owned by the individual" (Lave & Wenger, 1991, p. 48). Sykes (2017) presents similar findings of >90% of graduates rating one-on-one preceptorships and working with clinical faculty with some one-on-one as effective teaching strategies for medication administration.

Simulation laboratory activities. For some activities such as simulations, complexity and realism play a significant role. Respondents felt that the formal simulations with high-fidelity simulators and complex patient scenarios were more effective than simulations in the skills laboratory with low-fidelity, mid-fidelity simulator, or peer patients. Studies on the use of low-fidelity manikins in medication simulations, as occur in the skills laboratory, have been shown to be a useful learning activity for teaching medication administration (Helyar, Griffiths, & Norman, 2014). They are, however, not perceived by the respondents in this study to be as effective as the more realistic formal simulations. Students similarly perceive that activities situated in realism are more effective (Krautscheid et al., 2011). Situated activities that occur in authentic practice communities or in simulated environments that replicate realistic clinical scenarios provide contextual learning, therefore, producing knowledge that is meaningful and useable (Brown et al., 1989).

Skills laboratory activities. Some of the activities in the laboratory were thought to be as effective as formal simulations, despite the lower efficacy scoring of the skills laboratory environment. Respondents tended to rate skills laboratory activities higher when a clinical instructor was involved in skills training or evaluation processes. These findings correlate with student perceptions of working with clinical instructors in the clinical setting. Findings suggest that students value learning skills from expert practitioners. Respondents gave more ‘very effective’ ratings to ‘clinical instructor teaching medications in the laboratory’ and ‘completing skills check-offs’ in the laboratory with a clinical instructor than completing a formal simulation in the simulation laboratory. Graduates in Sykes (2017) study also share similar perceptions. The increased perception of the effectiveness of lab activities with a clinical instructor may align with

cognitive apprenticeship processes. Cognitive apprenticeship incorporates modeling, coaching, and fading (Lave & Wenger, 1991). Modeling involves student observation of expert nurses as they execute skills and provide insight into their thinking processes (Collins et al., 1989; Lave & Wenger, 1991). Coaching involves the student performing the task of medication administration while the expert RN guides them and provides support (Collins et al., 1989). Expert nurses role model desired behaviors while providing essential practical insights and support as they coach students (Lave & Wenger, 1991). Findings in one qualitative study suggest that students believe that role models are essential to learning best practices in medication administration and medication technology (Orbaek et al., 2015).

Classroom activities. In keeping with the noted trends, respondents were less likely to perceive the classroom learning activities such as lecture and classroom exams as effective. This perception is not surprising as lecture activities are considered a passive form of learning in which the student learns information that is often abstract and removed from the realities of practice (Lave & Wenger, 1991; Scully, 2011). Teaching abstract content that is independent of authentic use ignores the importance of the situated use of knowledge and the development of practical understanding (Lave & Wenger, 1991).

It is vital to teach medication administration theory, so that knowledge prepares students for more complex thinking and skill performance. Integration of active learning strategies such as ‘flipped’ classroom, which are pre-class lectures, evolving case studies, and lectures with medication clicker questions, are shown to engage learners and increase higher level thinking (Allen, 2013; Patterson, Kilpatrick & Woebkenberg, 2010). The idea with active learning such as the ‘flipped’ classroom is that instead of focusing on textbook content while in the classroom,

students listen to the ‘lecture’ before class so that the instructor can guide the learner in applying the information in more contextualized ways (Hanson, 2016). Giving information before class allows the learner to use this knowledge in classroom activities. Applying information in classroom activities promotes renegotiation of the meaning of textbook knowledge, therefore contextualizing it and making it more meaningful (Lave & Wenger, 1991). It is not surprising that more respondents rated both the ‘flipped’ classroom and ‘lecture with medication clickers’ higher than a lecture. Similar findings are found in literature in which students perceive active learning strategies as a positive addition to the classroom (Hoover, Dinndorf-Hogenson, Peterson, Tollefson, Berndt & Laudenbach, 2018; Patterson et al., 2010).

The unfolding case study activity, however, was not felt be effective for many of the graduates. An unfolding case study is an active learning strategy. Active learning strategies are generally felt to help facilitate learning; therefore, this is an unexpected finding. A review of the literature demonstrates mixed effectiveness of unfolding case studies. Some research indicates that the unfolding case study is effective if it is used correctly (Day, 2011). Some literature demonstrates that case studies have many benefits. Case studies facilitate increased critical thinking and understanding of complex problems; however, they are not felt to be effective in teaching concrete facts, can be time-consuming, and they require proper questioning techniques (Popil, 2011). Other research demonstrates mixed perceptions of the effectiveness of case studies (Carter & Welch, 2016). Findings suggest that students who are less prepared or who like more traditional methods of teaching do not prefer this method of teaching (Popil, 2011). Why fewer respondents considered the case studies as effective despite consideration of literature findings is

not fully known. These findings are, however, consistent with personal comments made by students to the researcher. Further evaluation is needed.

Perceived Efficacy of Tools

The evaluation of data on tool efficacy garnered several findings. The more realistic a tool is to the practice environment the more the respondent perceived it as being an effective tool. Situated cognition suggests that to become a full member of a community, a learner must learn how to use the tools of everyday practice, including technology (Lave & Wenger, 1991). Tools like activities are situated. To learn how to use a tool is to understand its use in the context of the community in which it is used (Brown et al., 1989). The more realistic a tool is to the environment, the more useful it becomes to the user. For example, the college of study's skills laboratory and simulation laboratory use paper healthcare and medication records to teach medication administration processes. Most, if not all, local healthcare environments do not use paper healthcare and medication records, whereas they do use electronic healthcare and medication records. Respondents perceived electronic records to be more effective than paper records. On the other hand, basic equipment and IV equipment (IVPB and IV tubing) are utilized by local healthcare agencies and clinical sites and in the skills and simulations laboratories. Students learn medication administration practices using the same tools they use in practice. These tools were perceived to be effective. Perceived efficacy of these tools is because this equipment is realistic to the contexts of nursing practice in local facilities.

Studies reveal that students share similar perceptions of the use of tools in academe. In a study of educational effectiveness, students shared that old tools that are not realistic to technology, as used in authentic healthcare environments, require them to learn entirely new

tools in clinical (Krautscheid et al., 2011). Learning with outdated tools leads to frustration, the need to learn new skills very quickly, and decreased confidence (Krautscheid et al., 2011). Clinical tools may require very different medication administration processes than the older tools leading to increased risk of medication errors (Krautscheid et al., 2011). Instead of learning medication safety practices that are practical to real life while in the lab and simulation, students learn outdated practices and then must relearn safety practices while in clinical during medication administration times.

Simulated learning system (SLS) is one tool that did not receive high ratings of efficacy from respondents. The SLS is used to teach medication administration in the laboratory. Graduates in Sykes' (2017) study have similar perceptions of the efficacy of computer-based learning and web assignments. Literature suggests computer-based learning tools in nursing can be effective in knowledge and skill acquisition. Computer-based tools are less effective as a learning strategy if the user lacks confidence in using a computer or computer-based program, if there is less than adequate validity and reliability associated with the program, or if the quality of the learning system is low (Kala, Isaramalai & Pohthong, 2010). There is not a full understanding of why the respondents did not perceive SLS as being more effective. The lack of knowledge of the SLS program may contribute to perceptions. Students must access many computer resources during nursing school. The number and variable computer resources they must access can leave them feeling overwhelmed. There is also inconsistency in the use of the SLS system within courses and between instructors. Inconsistency in use contributes to a lack of student understanding and support. It is the researcher's experience that this is often the case.

Socialization in Clinical

A general theme gleaned from respondent data demonstrated that clinical experience does not always provide adequate practice and socialization to realistic expectations of medication administering processes. Qualitative comments suggested that respondents did not evolve much from the first to the last semesters. A respondent stated they learned more about being a non-licensed assistant than they did administering medications. They also shared that they needed more experiences in the clinical administering medications. Studies of other graduates post similar findings stating there is too much emphasis on non-nursing tasks in clinical settings and not enough opportunities to participate in real nursing activities (Hickey, 2010).

Students need adequate numbers of structured clinical activities to engage in RN medication administration activities. The clinical model of one instructor and eight students can limit individual attention and practice opportunities for students. Exposure to realistic expectations of nursing practice is further limited when students are not allowed to administer medications with facility RNs, as in the college of study. Engaging in socially situated activities in a practice environment is vital in assimilating the practices and knowledge of culture (Brown et al., 1989; Lave & Wenger, 1991; McLellan, 1996). Lave and Wenger (1991) refer to this as legitimate peripheral participation (LPP). In LPP, learners participate in learning activities with expert practitioners. As the student learns from the expert, they begin to master culturally and contextually relevant knowledge and skills. This process socializes the learner to the realistic expectations of a practicing nurse (Lave & Wenger, 1991, p. 29).

If respondents (graduates) are not evolving or gaining the skills and knowledge required of nursing practice, then two problems may exist. Either social, cultural, and contextual factors in

the environment are limiting their learning and socialization to the role of the nurse, or they are not engaging in adequate or effective situated activities in clinical practice. Literature supports the occurrence of both of these phenomena (DeMeester, et al., 2017; O'Mara et al., 2014; Ironside & McNelis, 2010; NCSBN, 2005). Respondent comments indicated that the two clinical problems exist.

Studies of other graduates show similar beliefs citing that when instructors have up to eight to ten students, there is not enough individual attention available for each student (Hickey, 2010). In cognitive apprenticeship, learners need to have the opportunities to observe the modeling of behavior as well as receive coaching (Collins et al., 1989). Respondents suggested that to be prepared to practice on a real medical-surgical unit they need to practice administering medication to five or six patients. Literature supports the fact that nurse graduates do not have clinical experiences that prepare them for realistic patient loads (Parker et al., 2012). In a study of novice nurses in their first year of practice, graduate nurses shared that patient loads on a medical-surgical unit can at times require them to care for up to nine to eleven patients (Parker et al., 2012). An integrative review of literature of novice nurse errors supports the stated need to practice managing medication administration to a higher patient load as nurse graduates make more errors when assigned an average load of 5.6 patients or greater (Saintsing et al., 2011). Administering medications to three to four patients is not introduced to students in the college of study until their last semester of nursing school, sometimes just weeks before graduation. Graduate comments substantiate the need for more opportunities to practice administering medications and the desire to administer medications to a realistic patient load of five to six patients. Clinical variations can play a part in the availability of opportunities to administer

medications to a higher number of patients. Many students are not ready to advance to this level of patient care during nursing school.

More Practice Administering Medications

Some respondents felt that there was not enough medication administration practice in both clinical experiences and in the nursing program overall. Only 25% of respondents indicated that they felt the number of experiences administering medications in clinical settings was ineffective; however, almost all of them responded with qualitative comments on the need for more practice. Statements made by graduates in other studies are very similar to the respondents in this study (Hickey, 2010; McCalla-Graham & DeGagne, 2015; Treiber & Jones, 2018). Graduates in the Treiber and Jones study (2018) reiterated the need for 'more clinical hours and more hands-on practice with all medication types', especially high-risk drugs. They suggest grounding medication administration education in 'real-world' contexts in which students can administer medications to multiple patients, navigate distractions and train them in how to react to making a medication error (Treiber & Jones, 2018).

There could be multiple reasons why respondents felt they did not have an adequate number of experiences administering medications in clinical. As respondents have experienced a variety of clinical placements during their education, the number of opportunities to administer medications in clinical would have been varied. At times the number of opportunities can be either adequate and inadequate (Onda, 2012). Competition for clinical sites may require the placement of students in sites that are not optimal for practicing medication administration skills (Hayden et al., 2014). Patient census and acuity vary among clinical sites affecting the numbers of opportunities to administer medication (Bailey & Mixer, 2018). Some facilities restrict what

students can do and limit opportunities to administer medications (Hayden et al., 2014) especially IV and high-alert medications. Students at the college of study do not administer medications with RNs employed by the clinical facilities, only clinical instructors employed by the college. The clinical instructor has up to eight students each day. The ratio of students to the instructor can limit individual attention the number of opportunities students can have to administer medications (DeMeester, et al., 2017; Hickey, 2010). As one respondent shared, "…I only hung one IVPB medication during clinical, when I entered the workforce, this task was intimidating…" Other respondents shared that they felt that "…instructors do not have time to explain things with students…" These types of experiences alter students' perceptions of the effectiveness of their clinical experiences.

Integration of Skills

Medication administration skills integrated into nursing courses early in the nursing program were the skills graduates felt most effectively prepared to enact. Administration of oral medications, administration of medications to one to two patients, and utilization of basic equipment are all introduced to students in the first year of the study college nursing program. Respondents felt more effectively prepared to complete these skills than those introduced later in the program. Skill introduced later in the program include how to safely administer IV medications, administration of medications to three to four patients, and programming and use of medication administration equipment (IV pumps, patient-controlled analgesia pumps). The exception to this finding involved administering medications by other routes. The qualitative comments relay that respondents did not get enough practice administering medications by alternative routes.

Respondents commented that they did not get enough opportunities to practice the skills introduced later in the program. One specific respondent indicated they only administered one intravenous piggyback (IVPB) medication during their nursing program. One opportunity to complete this task is not enough to give the respondent confidence in this skill. IV skills are not introduced until the second year of nursing school leaving only two semesters to practice these skills. With only two semesters of skills practice, respondents may not have the opportunity to feel as confident in these skills. These findings may be related to a lack of clinical opportunities to administer medications, lack of practice in the skills lab or simulation. Clinical instructors with eight students do not always have the time to provide all students with the number of opportunities to administer IV medications. In addition, opportunities to program and use more complex medication administration equipment such as IV pumps and patient-controlled analgesia pumps may have been limited or non-existent.

Medication Safety Skills

A concerning study finding showed that respondents felt adequately prepared to administer medications (oral and IV) safely; however, did not feel as effectively prepared to recognize IV incompatibilities, anticipate, and respond to adverse drug reactions, recognize medication order errors and medication errors. Respondents reported that education is slightly more effective in teaching them how to report an error than how to recognize that a medication administration or medication order error has occurred or recognize and respond to an adverse drug reaction. Qualitative comments reiterate that students need more practice in complex decision-making involving medications. Recognizing IV incompatibilities and anticipating adverse drug reactions are vital to medication safety. A better understanding of why respondents

would feel safe to administer both IV and oral medications without feeling as effectively prepared to recognize and respond to an adverse reaction is needed. Perhaps respondents were not exposed to many adverse drug reactions in nursing school activities. If respondents had limited opportunities to administer IV medications, they would not be well versed in recognizing IV incompatibilities. In looking at the literature, nurses state they are more likely to learn about the effects of drugs when working with them in their jobs (Lim & Honey, 2014). The idea of "learning on the job" suggests that situating medication administration activities in the context of real practice may increase the effectiveness of learning. Additional studies suggest that gaps in pharmacology knowledge and lack of clinical experience leads to medication errors (Lim & Honey, 2014). Based on respondent feedback, these may very well be the reasons they do not feel as effectively prepared to recognize medication errors and adverse reactions.

Ineffective Preparation for Communication

Respondents indicated they felt inadequately prepared to communicate effectively with other healthcare professionals and patients. Respondents cited areas of ineffective preparation including communication with healthcare professionals about medication orders, patient teaching, and delegation to non-licensed personnel. These perceptions are consistent with the nursing literature (Jones & Treiber, 2018). Relationships and communication, the ability to report findings to a healthcare provider, and delegating to non-licensed personnel are all identified an important to successful graduate nurse transition to practice (Blevins, 2016). Communication is fundamental to safe practice in complex, fast-paced health environments (Jones & Treiber, 2018). Nurse leaders and employers agree that communication with

physicians, healthcare team members, patients and their families, are all areas in which graduates are deficient (Theisen & Sandau, 2013).

Nurses learn to communicate occurs through socialization processes. Participating in situated activities in authentic communities of practice socializes the learner to the social and cultural contexts and everyday language of practitioners. Brown et al. (1989) state that some may not think that the socializing is vital to learning, however, learning how to speak and communicate with others in a community is essential to understanding and behaving according to cultural norms. Nursing literature suggests that the best time to teach communication skills is during clinical rotations when students can observe expert RNs modeling these behaviors (Jones & Treiber, 2018). Confidence in communication skills fosters safe medication practice (Sahay et al., 2015). Learning communication processes are not a focus of medication administration at the college of study. Respondents have limited exposure to patient teaching and delegation skills, limiting their socialization to these communication processes. Simulations involve some physician-nurse communication. Students have shared that communication observed in the simulated environment is not realistic to physician-nurse communication observed in practice.

Dosage Calculation and Pharmacology

It is encouraging to find that almost all of the graduates indicated that their education effectively prepared them for dosage calculation. Nursing literature suggests the exact opposite is true of new graduates (Dilles, Vander Stichele, Bortel & Elseviers, 2011). Literature findings demonstrate that graduating nursing students do not have sufficient drug dosage skills and are not prepared to deliver safe medication dosages (Dilles et al., 2011). Medication errors can result from insufficient drug dosage skills (Cleary-Holdforth & Leufer, 2013). If the respondents in this

study felt adequately prepared to perform dosage calculation safely, then teaching methods can be considered effective and need to be examined and shared.

Respondents indicated that more pharmacology instruction is needed. Respondents indicated that they desired more instruction with less focus on memorization and more on learning. Situated cognition suggests that the disconnect between practice and formal education is that much of the information taught is out of context and abstract (Brown et al., 1989). The fact that the respondents acknowledge that they want to 'learn' the information not just memorize it reiterates the importance of the learning in context. Respondents' perceptions of the need for more pharmacological education is not a new phenomenon. Earlier studies of nurse graduates demonstrate similar findings in which graduates indicate they did not receive enough pharmacological preparation in nursing school and perhaps more preparation would improve readiness for practice (Candela and Bowles, 2008; Lim & Honey, 2014; Treiber & Jones, 2018). Graduate medication errors, especially those involving IV medications, are linked to a lack of pharmacology knowledge (Cleary-Holdforth, 2013; Lim & Honey, 2014). Respondents had their pharmacology course in their first semester of nursing school when they had the least amount of exposure to the clinical environment. Having the course early in a nursing program, when students do not have much clinical experience to build on, may contribute to the memorization of information without feeling able to contextualize the information.

Preparedness for Practice

A little over half of the respondents felt prepared to administer medications safely in their first jobs and the other half felt somewhat prepared. These findings are slightly lower than some research (Treiber & Jones, 2018) and similar to others (McCalla-Graham & DeGagne, 2015;

Saintsing et al., 2011). A literature review of graduate confidence suggests that most new graduates feel unready for practice and lack confidence during the first six months of practice, however, most nurses feel ready after six months (Monaghan, 2015). Graduates share that they became more confident as time passed (Monaghan, 2015). These perceptions are similar to the respondents in this study in which those employed longer than nine months tended to have more feelings of being 'very prepared.' Hospital orientation or residency processes can also affect how the respondents view their preparedness. Whether either of these factors affects respondents' views in this study is unknown. Respondent perceptions of preparedness could be the result of a lack of information as some studies suggest or a lack of practice and pharmacology knowledge (Lim & Honey, 2017; McCalla-Graham & DeGagne, 2015).

In describing reasons for feeling less than ready, a descriptive phenomenological study suggests that graduates perceived nursing education as providing basic information; however, the information learned was not enough to prepare them adequately for their roles and responsibilities. Graduates state they cannot function effectively in their first year of practice (McCalla-Graham & DeGagne, 2015). Self-ratings in this study are similar to a study of preceptor satisfaction with new graduate competency, in which only 41% of preceptors are satisfied with nurse graduates' medication skills (Berkow et al., 2009). This information suggests that almost half of the respondents could be better prepared to administer medications when entering the workforce right out of school. The reasons the respondents do or do not feel prepared for practice is not fully understood.

Other reasons for respondent perceptions may include a lack of adequate role models, a lack of clinical practice opportunities, inadequate or ineffective teaching strategies, situated

activities that are not realistic to real-world expectations, and theory that does not reflect practice (Hickerson et al., 2016; Higgins et al., 2010; Monaghan, 2015; Slaikeu, 2011). Respondents also indicated a need for more clinical time, and more medication administration practice. Graduates in other studies reiterate the same perceptions, stating that clinical days should be longer, they should have more realistic patient assignments, and provide engagement in more 'worst case' situations from which to learn better problem solving (McCalla-Graham & DeGagne, 2015).

Recommended Strategies

Potentially effective tools. The majority of respondents perceived suggested tools were potentially effective with one exception. Computer-based online learning modules (pharmacology, dosage calculations, and virtual hospital) were not felt to be as potentially effective. These perceptions are consistent with the ratings of the computer-based SLS learning system. The respondents' perceptions of the SLS system may have influenced how they felt about computer-based online learning modules.

Respondents identified that it might help to expose learners to authentic physical tools of practice such as Pyxis, scanners, and Lexi-comp. Qualitative comments suggested that simulated experiences using authentic physical tools may enhance the development of useful knowledge. Findings in another study of graduate perceptions of medication errors suggest that medication errors can result from problems with technologies such as computers, IV pumps, scanners and automated dispensing systems (Treiber & Jones, 2018). Learning how to navigate these tools assists in preventing errors in patient care (Helmons, Wargel & Daniels, 2009; Keane, 2014). Similar studies of graduates and use of tools show that most new nurses feel that they are "very

good" at using medical devices; however, half of them feel their education inadequately prepared them to use medical devices (Ewertsson, et al., 2015).

The suggested tools in this study are realistic to local healthcare environments. The researcher expected the respondents to find the introduction of the tools potentially useful in enhancing medication administration instruction. Perceptions of efficacy increase when a tool is more realistic. These perceptions are consistent with the previously discussed findings.

Potentially effective clinical activities. The majority of the respondents indicated administering medications with facility RNs and participating in a preceptorship in their last semester of nursing school would be potentially effective. Qualitative comments also indicated a desire to participate in a preceptorship. A preceptorship is perceived to help a student to evolve through clinical experiences, and assist in the transition to nursing practice. Studies of graduate perceptions of clinical instruction indicate that preceptorships are effective as they provide the most "realistic view of the true practice of nursing" (Hickey, 2010, p. 39). Graduates state that preceptorships allow them to see what it means to care for a full patient load, prioritize their time and RN responsibilities (Hickey, 2010). Preceptors (expert 'masters' of nursing practice) provide more individualized modeling and coaching of behaviors and ways of thinking (Hickey, 2010). Modeling and coaching are essential to apprenticeships in which the expert nurse empowers the students to work independently over time (Bisholt, 2012). Sykes (2017) notes that a preceptor experience in clinical settings are "as close to independent practice as a student could experience" (p. 187). Literature indicates that students also feel that working with expert role models helps with professional development and successful attainment of learning outcomes (Baldwin et al., 2014).

Respondents may have perceived that working with facility RNs would increase the number of opportunities to administer medications. They may have felt that facility RNs are more competent or can help to socialize them to the role of the nurse and medication administration better than clinical instructor personnel (Saintsing et al., 2011). Respondents mentioned clinical instructors and RN preceptors as being both facilitators and barriers for learning medication administration. As a student and now a new graduate, respondents were aware that not all nurses use safe practices when administering medications.

Respondents shared that the behaviors and attitudes of clinical instructors and facility RNs can affect learning. An integrative review of the relationships between nurses and students suggest that facility RN attitudes and behaviors can significantly influence a student's learning (Melincavage, 2011; Rebeiro et al., 2015). Nursing students may see clinical instructors and facility nurses (practitioners) as facilitators from whom they can learn both the language and skills reflective of the cultural, social, and physical contexts of the 'real' world healthcare community (Brown et al., 1989). Students appreciate that facility RNs and clinical faculty facilitate learning by allowing them to participate in activities and observing them in their work (Happell, 2009).

Nursing literature indicates that the attitude of practicing RNs and clinical instructors can significantly influence students' ability to learn in clinical (Melincavage, 2011; O'Mara et al., 2014; Rebeiro et al., 2015). When the relationship between clinical instructors, facility RNs and students is not valued, learning suffers. Lave and Wenger (1991) suggest that failing to learn or become a full member of a community is related to the power and social relationships between the learner and the practice community. Negative relationships can wholly or partially alter the

learning process making it very difficult for the learner to develop into a full member of a practice community (Lave & Wenger, 1991). In a study of clinical experiences, students report being demeaned, humiliated, abandoned, and embarrassed by both facility RNs and clinical instructors (Melincavage, 2011). Students feel that they were not a part of the community of practice (Melincavage, 2011). These behaviors inhibit learning opportunities and acquisition of confidence. Respondents' qualitative comments speak little of the social and cultural structures of clinical experiences. Whether the respondents encountered negative relationships with clinical staff and instructors is not known, but must be considered.

Potentially effective simulation activities. Respondents found all of the simulated and clinical activities to be potentially effective. The highest rated simulations were consistent with graduate ratings of other questions as well as graduate suggestions for improvement of preparation. Medication simulation with post-administration side effects or adverse reactions was rated the highest followed by medication simulation with multiple patients. These responses are not surprising based on the respondent perceptions of the effectiveness of their education in preparing them for medication safety tasks such as the anticipation and recognition of medication errors and adverse drug reactions. Limited clinical opportunities to administer medications or inadequate skill development are well-documented reasons for conducting simulations and alternative learning opportunities (Campbell, 2013; Jarvill et al., 2018). Respondents indicated the need for more practice administering medications, especially in the simulation laboratory. Simulations have proven to be helpful in preparing students for safe medication administration processes (Campbell, 2013; Jarvill et al., 2018). Distraction simulations are also thought to be potentially effective. Studies demonstrate that distractions are one of the most common causes of

medication errors (Unver et al., 2012). Studies of distraction simulations are proving helpful in providing students with opportunities to manage interruptions, develop skills necessary to minimize errors, and understand the impact distractions can make before entering practice (Hayes et al., 2015; Thomas, McIntosh & Allen, 2014).

Miscellaneous Findings

Feeling overwhelmed. One respondent shared the need to be better prepared to the handle the stress of nursing practice. "Students need to recognize when they are overwhelmed and how to ask for help." Other respondents stated they were not prepared for assignments of five to six patients, communicating with providers and delegation processes. Similar studies note that many nurse graduates have high rates of stress related to role expectations, managing routines, workloads, and anxiety related to medication administration (Parker et al., 2012). Other nursing literature relates a lack of required skills practice and insufficient socialization to the clinical environment can cause stress and anxiety (McCalla-Graham & DeGagne, 2015; Scully, 2011). It is not surprising then, that responded would indicate a feeling of being overwhelmed when entering practice. Situated cognition theory suggests that not being fully acclimated to nursing practice contributes to feeling overwhelmed. Respondent learning experiences provided through legitimate peripheral participation did not move them from an outsider to a full member of the community of practice (Lave & Wenger, 1991).

Limitations

Sample Size

The small sample size (n=24, response rate=21.2%) is a limitation of this study. The initial mailing of invitations and two subsequent postcard reminders for web-based surveys

elicited only 16 respondents. A second mailing of a paper survey elicited eight more responses. The use of a financial incentive and first-class postage stamps did not appear to increase response rates. Similar studies of nurse graduates demonstrate low response rates (Lim & Honey, 2017; NCSBN, 2015a; Michigan Center for Nurses, 2016; Parker et al., 2012). Many of these studies, however, started with a larger population yielding a larger sample size (Lim & Honey, 2017; Michigan Center for Nurses, 2016; NCSBN, 2015a). Sampling from a larger population increases the chances that the sample will be representative of the total population (Creswell, 2015). Other researchers have smaller response rates and sample sizes, such as Lim and Honey (2017) with a response rate of 19.53% (n=25), and some had moderate sample sizes Candela and Bowles (2008) 12% (n=352). The Lim and Honey (2017) study used a descriptive design with a similar survey methodology.

There are not many studies of nurse survey participation in the literature; however, there is some data on non-responders. A non-responder telephone survey conducted by the NCSBN (2015) determined that RNs did not participate in the knowledge survey of 2014 because they did not get the survey invitation, they were too busy, or they had 'other reasons.' Reasons for non-response of May 2017 graduates in this study is not known. Survey delivery methods may have contributed. Eight participants could not be reached by mail; therefore, other participants may not have received the mailings. The college of study does not have an updated email file for nurse graduates thus limiting the ability to send survey invitations by email to potential participants. The small sample size and response rate of this study may raise questions regarding statistical relevance and may decrease the ability to integrate this knowledge into evidence-based recommendations (VanGeest and Johnson, 2011).

Generalization of Findings

The low response rate in this survey increases the likelihood of non-response bias and decreases the ability to generalize findings (VanGeest and Johnson, 2011). Fisher's exact tests demonstrated that the sample was statistically different from the population limiting the generalization of findings. The study focused on graduates from a community college in south-central Michigan. A different geographical area or level of nursing education may have produced different results.

Instrumentation

The literature did not provide an instrument suitable to measure the multiple variables in this study. The researcher created the study survey instrument using faculty input and a review of the literature. A pilot study with faculty and graduate input was used to establish validity. The final survey instrument contained a duplicate question despite alterations and a review of the instrument. The survey included one qualitative data question. There were limited responses to this question, some being a few words and some being several sentences. Qualitative questions such as these do not always provide the detail of response obtained in a focus group or individual interviews (Creswell, 2015)

Perceptions

Data in this study consisted of nurse graduate (respondent) perceptions. Perceptions are considered a reflection of beliefs and views, not facts (Creswell, 2015; Bloomberg & Volpe, 2016). As these are the views of this sample population generalization to other population can be considered limited; however, data can be utilized to identify perceptions or trends across population groups and across time. Interpretation of respondent perception may be subject to

researcher assumptions and bias (Bloomberg & Volpe, 2016). Members of the faculty, an objective nursing expert, and a pilot study graduate were consulted during the data interpretation process to minimize the influence of researcher bias.

Implications

Understanding the nature of learning is essential in devising methods for more effective teaching-learning processes (Collins et al., 1989). The theory of situated cognition is shown to be a useful framework for evaluating and developing teaching and learning strategies to better improve preparedness for practice. Concepts of situated cognition can be used to understand graduate perceptions of their educational experiences better. Situated cognition should be used to evaluate teaching environments, situated activities, and tools used to teach medication administration should occur. Faculty must strive to bring clinical to the classroom and the laboratory to increase the contextualization of theory and realism of practice. Simulated activities in all academic environments should be as realistic as is possible, utilizing updated tools and realistic communication processes as used in practice. Up-to-date practice tools must replace antiquated tools used in skills and simulation laboratories. Up-to-date tools include computer EHR/MAR and medication dispensing equipment. Situating students in authentic practice environments is vital to socialization to safe medication administration practices.

This study has shown that not all graduates feel adequately prepared to administer medications upon licensure safely. Data interpretation provided insight into graduate perceptions of the effectiveness of teaching practices. As graduates have lived the transition from student to new nurse, their perceptions are crucial to understanding where preparation-practice gaps lie, and where educators can begin to work on better preparing them for safe medication administration.

A review of the causative factors of medication administration errors and graduate feedback can guide the development of simulations. It is of significant concern that respondents felt their education was less effective in teaching them to recognize adverse medication reactions than reporting them. As graduates agree that simulated activities integrating medication administration, medication errors, and adverse drug reactions may be potentially effective, perhaps these deficiencies will be less evident in the future.

The implications for nursing education is that the opportunity exists to evaluate and improve current teaching practices. There are teaching strategies that respondents have identified as being effective and as being less effective. Where graduates cite discrepancies, educators must respond by evaluating teaching practices and integrating new ideas by building partnerships with service providers. The literature highlights many innovative approaches such as adapting clinical reasoning to teaching in the laboratory (Gonzol & Newby, 2013) and development of interprofessional education simulations (Anderson, Hughes, Patterson & Costa, 2017) are available.

Healthcare service providers, especially acute care facilities, employ our nurse graduates; as such, they have a vested stake in the adequate preparation of new nurses. Literature demonstrates that there are opportunities for academic-clinical site partnerships to provide better clinical opportunities (Schecter, Gallagher & Ryan, 2017) to improve graduate competency and socialization to the role of the practicing nurse. Healthcare service partners have a vested interest in patient safety. The findings in this study are similar to the literature showing that the majority of new graduates tend to work in acute care medical-surgical units and specialty critical care units (NCSBN, 2015a; Parker et al., 2012; Saintsing et al., 2011; Sykes, 2017). These two

areas of practice employ the largest population of nurse graduates, who as a whole are at increased risk of making medication errors. Studies of nurse graduates confirm that novice nurses feel working in an acute care ICU or specialty area requires a more developed skill set (Phillips, Kenny, Esterman, & Smith, 2014). Findings suggest that specialty units often have more resources and educators to support new graduates than other working environments such as medical-surgical units (Parker et al., 2012). The learning curve for new graduates in specialty units is steep and greater support is needed (Phillips et al., 2014). Allocation of resources to new graduates in specialty units is important; however, graduates in acute medical-surgical units need support as well. Some research findings suggest that healthcare administrators should hire nurse graduates into less complex units and not directly into specialty units such as critical care (Phillips et al., 2014). Phillips et al. (2014) suggest that graduates should work in acute care units that do not require complex decision making during their first year and patient assignments should match their beginning skill sets.

Healthcare is continually in the process of change (Kavanaugh & Szweda, 2017). Change presents challenges to nursing education, as it is clear that change occurs faster than educators can keep pace. Now is the time to transform nursing practice (Benner et al., 2010). The prepared-practice gap is a call to action. Educators are called to evaluate how current theoretically-based teaching methodologies can be combined with practice-based teaching to create a better-prepared nurse. Knowledge of graduate nurse perceptions of the efficacy of their education can provide the catalyst for the development of evidence-based teaching strategies. Nursing educators are at the forefront to negotiate that change.

Recommendations for Action

Increasing the effectiveness of graduate nurse preparation for safe medication administration practices requires action. Nursing and healthcare leaders must be made aware of the results of this and similar studies. Discussion of findings must ensue to begin evaluating current processes and development of future teaching practices. This small study is a starting point for further research and beginning dialogue to improve educational practices in nursing education.

Future Research

Research in this descriptive design survey focused more on describing trends in graduate perceptions of educational effectiveness rather than explaining cause and effect and predicting outcomes (Creswell, 2015). A low response rate and sample size are limitations of this study. Therefore, repeating this study using future cohorts or larger graduate nurse populations is warranted to improve sample size. It will be important to consider the methodology, survey design, and delivery components when replicating this study in future research. Components in the questionnaire can be altered to incorporate changing nursing medication administration tasks, or social-cultural aspects of medication administration processes. To improve validity and reliability of findings of future research a qualitative component such as with a mixed-methods design would be appropriate to improve the quality of a study even in the case of a low survey response rate (Creswell, 2015).

Education and service partnerships research. Further research with healthcare service partners is warranted to improve understanding of the preparedness-practice gap. Employers may wish to collaborate with educators to evaluate graduate nurse performance in their first jobs. In

light of safe medication administration expectations, this study may shed light on the relationship between perception and practice. Currently, there is no assessment process for evaluating medication administration skill competency of the graduate from the college of study. There is currently no assessment of the occurrence of graduate nurses' medication errors. With knowledge of practice deficits and practice strengths, nursing education and service partners can begin to develop a partnership to address gaps and improve patient safety.

The preparedness-practice gap is multi-factorial of which education is but one piece. Healthcare is changing at such a pace that it is very challenging for nursing programs to keep pace (Hewitt et al., 2015). It is essential that nursing programs and healthcare service providers collaborate to help to bridge this gap. Sharing of equipment and clinical resources, development of designated educational units, and creating new clinical models may be but a few ideas that may assist in the improved preparation of graduates. Perhaps bringing the classroom to the service environment may improve learning and application of theory to practice.

Revisions in Teaching Practices

Graduate and student feedback is essential for the evaluation of teaching-learning practices of nursing students. Graduate respondent perceptions should be shared with the nursing curriculum committees so that evaluation of findings can occur and future change recommendations. Graduate respondents recommended more complex medication simulations and clinical preceptorships. The nursing program should evaluate the introduction of these activities into various courses. Preceptorships may promote more effective socialization to medication administration practices and promote skill acquisition in patient teaching and interdisciplinary communication. Simulations specific to IV medications, IV incompatibilities,

adverse medication reactions, and medication errors may address the identified gap. Evaluation of situated activities in the classroom and laboratory should include a review of active learning strategies that bring clinical into the classroom to contextualize learning. An examination of medication administration tools should assess for relevancy to real-world practice environments.

Clinical models and apprenticeship. Clinical is the most effective environment in teaching medication administration, however, clinical is not without its problems. Respondent comments indicate current clinical models may not be providing students with enough opportunities to practice medication administration and adequately adapt to the needs of real-life practice. There are often not enough clinical sites, or they are ill prepared to meet the learning needs of the students. Better opportunities may exist for our students. There is a need to reevaluate clinical models and consider preceptorships.

Nursing has moved from an apprenticeship-training model to an educational model (Bendall, 2006; Monaghan, 2015; Onda, 2012; Watt & Pascoe, 2013). Graduates are telling nurse educators that they feel apprenticeship-training is an effective strategy for preparing them for practice; however, current academe-clinical partnerships are not adequately meeting the needs of our students. Apprenticeship is vital to students' development and transformation to the role of the practicing nurse; therefore, academic faculty should coach clinical faculty and preceptor nurses on teaching and learning processes. Faculty needs to evaluate clinical instructor orientation and support processes. Clinical faculty must be better integrated into the skills and simulation laboratories to assist in bridging the theory-practice gap and socialize students to medication practices of real-world environments even as they prepare to enter clinical.

Conclusion

Medication errors are one of the most common and costly errors that graduates make (Saintsing et al., 2011). Sources estimate that approximately 55%-88% of new nurse graduates report making medication errors in the first year of practice (Saintsing et al., 2011; Sykes, 2017; Treiber & Jones, 2018; Unver et al., 2012). Preparing for the demands of practice requires significant investments of time and effort in academic pursuits (Saintsing et al., 2011). Respondents in this study indicated preparatory educational efforts are not always effective in preparing them for safe medication administration practices. It is crucial that educators understand how to prepare nurse graduates to administer medications safely. Continued research on the efficacy of education in preparing graduates for specific medication tasks using the theory of situated cognition, will assist in illuminating preparedness-practice breakdowns.

The reality is that the healthcare environment is complex with ingrained social and cultural components requiring a complex set of skills in medication administration processes. Respondent perceptions demonstrate that teaching strategies must be situated in realism and context-laden environments to be most effective. The effective socialization of nurse graduates to the role of the nurse improves communication knowledge and skill, understanding of advancing technology and computerized systems, and the ability to perform complex problem solving all within a social and culturally bound healthcare system. Socialization is therefore vital to medication safety. Study data demonstrates that teaching medication administration is more than just presenting students with content and technical skill knowledge: it is in providing students with learning experiences intimately connected to the tools, activities, and social constructs of real-life practice environments.

Opportunities exist for educational leaders to improve graduate preparedness through partnerships with healthcare service providers. Collaboration with service providers will improve understanding of the gaps in preparation and execution of medication administration skills. It has not been realistic to expect academe to keep up with the rapid pace of healthcare change and the increasingly complex demands for graduate performance given the historical gap between academe and practice. It is also not a legitimate expectation to place the burden of finalizing graduate preparation for practice on the already burdened healthcare system. Everyone owns the success or failure of nurse graduates.

This study is a starting point in evaluating the effectiveness of nursing education in preparing graduates for safe medication administration. This study adds to the growing body of knowledge fueled by graduates' insight into educational strengths and weaknesses. As novice nurses have lived the transition from academe to practice, their perceptions are more reflective of the efficacy of education than student perceptions. Continued research on the efficacy of education in preparing graduates for specific medication tasks using the theory of situated cognition, will assist in illuminating where the preparedness-practice breakdown is most affecting nursing practice. Using this knowledge, we can then begin to design better educational processes and coordinate with service providers to improve safe medication administration practices of new nurses. Improvement in safe medication administration practices is crucial to patient safety and improved graduate transition to practice.

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APPENDIX A

IRB Approval Letters

UNIVERSITY OF NEW ENGLAND

Institutional Review Board
Olgun Guvench, Chair

Biddeford Campus
11 Hills Beach Road
Biddeford, ME 04005
(207)602-2244 T
(207)602-5905 F

Portland Campus
716 Stevens Avenue
Portland, ME 04103

To: Renee Mielke

Cc: Carey S. Clark, Ph.D., R.N.

From: Lliam Harrison, M.A. J.D.

Date: March 23, 2018

Project # & Title: 20180323-019 Study Title: Graduate Nurse Perceptions of Effectiveness of Prelicensure Education on Medication Administration

The Institutional Review Board (IRB) for the Protection of Human Subjects has reviewed the above captioned project and has determined that the proposed work is exempt from IRB review and oversight as defined by 45 CFR 46.101(b)(2).

Additional IRB review and approval is not required for this protocol as submitted. If you wish to change your protocol at any time, you must first submit the changes for review.

Please contact Lliam Harrison at (207) 602-2244 or wharrison@une.edu with any questions.

Sincerely,

William R. Harrison, M.A., J.D.
Director of Research Integrity

IRB#: 20180323-019
Submission Date: 03/23/18
Status: Exempt, 45 CFR 46.101(b)(2)
Status Date: 3/23/18

UNIVERSITY OF NEW ENGLAND
Institutional Review Board
Olgun Guvench, Chair

Biddeford Campus
11 Hills Beach Road
Biddeford, ME 04005
(207)602-2244 T
(207)602-5905 F

Portland Campus
716 Stevens Avenue
Portland, ME 04103

To: Renee Mielke

Cc: Carey S. Clark, Ph.D., R.N.

From: Lliam Harrison, M.A. J.D.

Date: June 1 2018

Project # & Title: 20180323-019 Study Title: Graduate Nurse Perceptions of Effectiveness of Prelicensure Education on Medication Administration – PRAF 1

The Institutional Review Board (IRB) for the Protection of Human Subjects has reviewed the materials submitted in connection to a requested amendment to the above captioned project and has determined that the proposed work remains exempt from IRB review and oversight as defined by 45 CFR 46.101(b)(2).

Additional IRB review and approval is not required for this protocol as submitted. If you wish to change your protocol at any time, you must first submit the changes for review.

Please contact Lliam Harrison at (207) 602-2244 or wharrison@une.edu with any questions.

Sincerely,

William R. Harrison, M.A., J.D.
Director of Research Integrity

IRB#: 20180323-019
PRAF #1 Submission Date: 05/29/18
Status: Remains Exempt, 45 CFR 46.101(b)(2)
Status Date: 06/01/18

APPENDIX B

Invitation Letter to Participants

Dear May 2017 Nurse Graduate,

I am asking you to be a part of my research study. The purpose of this research is to understand the effectiveness of prelicensure education in preparing graduate nurses to safely administer medications. The goal is to evaluate the effectiveness of teaching strategies used in nursing school from the perspective of you, the graduate nurse. As an educator I wish to evaluate and improve the education provided to nursing students at our college and in nursing as a whole. As a graduate nurse, your first-hand experience can provide valuable insight.

If you should agree to participate in this study you will be asked to complete an anonymous survey via survey monkey (see link enclosed in this letter). Completion of the survey will take approximately 10 to 15 minutes. As an anonymous survey, you will not be asked for any identifying information, nor should you include any information anywhere on the survey that may individually identify you or anyone else. No identifying information will be available to the researcher or reported in any document. Survey data cannot be linked to your email address. Survey results will be accessed by this researcher and kept confidential

This letter and subsequent reminder post cards will be mailed to you by KCC so I will not have any knowledge of your participation. The Institutional Review Boards (IRB) of both University of New England and south-central Community College have reviewed this research for your safety. Once this research study is completed all survey data will be destroyed. The results of the study will be shared in the principal researcher's dissertation presentation and may

be published, however; no identifying information will be included. Please note that both IRBs may review the research records.

There are no direct benefits from participation in this study. There is no cost to participate in the research. You may skip or refuse to answer any question for any reason. Completion of the survey implies consent to participate in the research study and that you are 18 years of age or older. At the end of the survey you will have the opportunity to provide an email address if you wish to participate in a drawing for five $20 gift certificates to Amazon. All email addresses will be collected by the south-central Community College Center for Institutional Effectiveness. No personally identified information will be returned to the researcher. The researcher cannot associate your email address with your survey responses in order to keep your responses confidential. Winners of the gift certificate will be notified by email by June 29th, 2018.

If you have questions or concerns about your rights as a research subject, you may call Olgun Guvench, M.D. Ph.D., Chair of the UNE Institutional Review Board at (207) 221-4171 or irb@une.edu. Faculty Mentor: Elaine VanDoren PhD., RN. vandoree@gvsu.edu, 616-331-5728. Please contact me using the email rmielke@une.edu if you wish to have a copy of the study results.

Thank you for participating in this research study,

Renee Mielke, University of New England Doctoral candidate
rmielke@une.edu

Survey monkey URL

APPENDIX C

Nurse Graduate Research Study Survey: Web Format

Perception of Effectiveness of Prelicensure Education

The purpose of this research is to understand the effectiveness of prelicensure education in preparing graduate nurses to safely administer medications. The goal is to evaluate the effectiveness of teaching strategies used in nursing school from the perspective of you, the graduate nurse.

Completion of the survey implies that you have received and read the invitation letter to participate in this study. You understand the description of the research study and the risks and benefits associated with your participation as a research subject. You understand that by proceeding with this survey you agree to take part in this research and do so voluntarily. You understand that your participation is voluntary and that you are free to withdraw at any time, without giving a reason and without cost. Completion of the survey will take approximately 10-15 minutes. By completing the survey, you confirm that you are 18 years of age or older.

Question 1:
____ I am 18 years of age or older and I agree to participate in this survey.
____ I am under the age of 18

If the participant selects "I am under the age of 18" they will be taken to a disqualification page that states, the following:
I appreciate your interest in participating in this research study but you must be 18 years of age or older to participate.

Section 1

Thank you for consenting to participate in this study. Please answer the following 3 questions:

1. Did you graduate from south-central community College in May of 2017?
    1) Yes _____
    2) No _____

2. Did you pass the National State Board of Nursing licensing exam for a registered nurse (NCLEX-RN)?
    1) Yes _____
    2) No _____
3. Are you employed as a registered nurse (RN)?
    1) Yes _____
    2) No _____

If you answered **yes** to all three questions, please proceed to the following survey questions.

If you answered **No** to any one of the three questions, please stop and do not proceed. You do not qualify for this study. Thank you for your time.

Section 2

1. Gender
   1) Male _____
   2) Female _____

2. Age
   1) 20-25 _____
   2) 26-30 _____
   3) 31-35 _____
   4) 36-40 _____
   5) 41-45 _____
   6) ≥ 46 _____

3. Where are you employed?
   1) Acute care hospital:
      a. Critical Care (Emergency room, ICU, CCU, Pediatrics/neonatal intensive care, emergency department, PACU) _____
      b. Operating room (including outpatient surgery and surgicenters) _____
      c. Medical surgical unit (including oncology, orthopedics, neurology) _____
      d. Obstetrics/Post-partum, Labor and Delivery_____
      e. Pediatrics _____
      f. Psychiatry and any subspecialties (detox)_____
      g. Cardiology_____
      h. Other please specify_____
   2) Nursing home (skilled or intermediate) _____
   3) Long term residential care
   4) Rehabilitation _____
   5) Physician office/clinic _____
   6) Community nursing (home health, public health, visiting nurse) _____
   7) Other please specify_____

4. How long have you been practicing as a registered nurse?
   1) 0-3 months _____
   2) 3-6 months _____
   3) 6-9 months _____
   4) 9-12 months _____

5. Do you administer medications as a routine part of your employment as an RN?
   1) Yes _____

2) No _____

Section 3: Preparing you for Practice

The following questions are related to the effectiveness of your registered nurse (RN) education in preparing for your role as a new graduate.

Please answer the following questions using the following 5-point Likert scale:
5= Very Effective, 4= Effective 3= neither effective or ineffective, 2= Ineffective, 1= Very ineffective,

1. What is your perception of the effectiveness of your nursing school education in preparing you with the knowledge and skills needed to complete the following medication administration associated tasks as a new graduate nurse?

	5 Very Effective	4 Effective	3 Neither effective or ineffective	2 Ineffective	1 Very ineffective	0 I'm not required to do this task
A. Administer medications safely to 1 to 2 patients						
B. Administer medications safely to 3 to 4 patients						
C. Safely administer oral medications to patients						
D. Safely administer Intravenous medications (IV, IVPB, IV infusion)						
E. Safely administer medications by other routes (eye, ear, nasal, rectal, vaginal, transdermal)						
F. Recognize incorrect medication order						

(dosages, routes etc.)						
G. Accurately calculate drug dosages						
H. Recognizing IV drug incompatibilities						
I. Anticipate and respond to adverse drug reactions						
J. Recognize that a medication error has occurred						
K. Report that a medication error has occurred						
L. Provide medication education to patients and families						
M. Utilize electronic healthcare and medication records to safely administer medications						
N. Utilize electronic medication resources (Lexi comp, etc.)						
O. Communicate with health care professionals about medications (obtaining orders, clarifying orders, reporting medication errors)						

P. Program and use medication administration equipment (IV pumps, patient controlled analgesia pumps)						
Q. Utilize medication administration tools (med cups, carpujects, syringes, needles etc.)						
R. Utilize automatic medication dispensing equipment (Pyxis)						

Section 4: Effectiveness of Learning Environments, activities and tools.

2. What is your perception of the effectiveness of the following teaching **environments** (classroom, laboratory, simulation and clinical experiences) in preparing you for safe medication administration practices as a new graduate?

	5 Very Effective	4 Effective	3 Neither effective or ineffective	2 Ineffective	1 Very ineffective
A. Classroom					
B. Laboratory					
C. Simulation Lab					
D. Clinical					

3. What is your perception of the effectiveness of the following educational **activities** in preparing you for safe medication administration practices as a new graduate?

	5 Very Effective	4 Effective	3 Neither effective	2 Ineffective	1 Very Ineffective

			or ineffective		
A. Classroom lecture					
B. Classroom Lecture with medication clicker questions					
C. Pre class "flipped classroom" lectures (audio lectures)					
D. Pharmacology: Dosage calculation examination					
E. Classroom: Evolving case studies to solve practice problems related to medication administration.					
F. Classroom examinations					
G. Laboratory: clinical instructor teaching medication administration					
H. Laboratory: practice medication administration with peers					
I. Laboratory: medication skills check offs					
J. Laboratory: medication simulations with patient scenarios (peer to peer or with manikins)					

K. Formal Simulations in simulation lab					
L. Clinical: administering medication with clinical instructor					
M. Clinical: observing facility RN administer medications					
N. Clinical: number of experiences administering medications					

4. What is your perception of the effectiveness of the following **tools** (as used in nursing education in preparing you for safe medication administration practices as a new graduate?

Tool	5 Very Effective	4 Effective	3 Neither effective or ineffective	4 ineffective	5 Very Ineffective
A. Basic Equipment (pill cutter, medication cups, syringes, needles etc.)					
B. Medication dispenser cart (labeled drawers)					
C. Computer simulated learning systems: used in laboratory medication skills lab					
D. Electronic health record (provided on computer)					
E. Paper health record, medication record (as found in patient chart: paper form)					

F. Partial task trainers (IV arms, injection pads)					
G. Smart infusion IV pumps (with drug database)					
H. IV equipment: (IV tubing, IVPB tubing)					
I. Peer patients (other students in class)					
J. Peer patients (other students in lab)					
K. Low fidelity simulators (no electronics, arm injection sites)					
L. Mid fidelity simulators (BP, HR, lung sounds, and bowel sounds)					
M. High fidelity simulators (as in the formal simulation lab)					

Section 5: Potential Effectiveness of activities and tools.

5. The following list of activities and tools are not currently utilized in the classroom, laboratory, clinical or in the simulation laboratory but could be developed and used to teach medication administration.

   What is your perception of the ***potential effectiveness*** of the introducing the following tools into the classroom, laboratory, or simulation laboratory in preparing a new graduate to safely administer medications?

	5 Very Effective	4 Effective	3 Neither effective or ineffective	2 Ineffective	1 Very ineffective
A. Bar code scanners					
B. Pyxis for medication distribution					

C. Electronic health record with medication administration record (eMAR)					
D. Electronic health care record with medication resources (drug information and IV compatibility charts)					
E. Smart pumps (Patient controlled Analgesia PCA and IV Pumps)					
F. Computer-based on line learning modules: pharmacology, dosage calculations, virtual hospital					

6. What is your perception of the ***potential effectiveness*** of the following **simulation activities** in preparing a new graduate to safely administer medications?

	5 Very Effective	4 Effective	3 Neither effective or ineffective	2 Ineffective	1 Very ineffective
A. Conducting a medication lecture prior to medication simulations.					
B. Medication administration simulation with distractions					
C. Medication administration simulation with multiple medication administration: 2 or more patients					
D. Medication administration simulation with multiple					

medications to one patient					
E. Medication simulation of discharge teaching to a patient and family					
F. Medication administration simulation with errors (error recognition and prevention)					
G. Medication administration simulation with post-administration side effects or adverse reaction					
H. Interprofessional simulations (With pharmacy and med students, PA and NP)					
I. Medication administration simulation with distractions					

7. What is your perception of the ***potential effectiveness*** of the following **clinical activities** in preparing a new graduate to safely administer medications?

	5 Very Effective	4 Effective	3 Neither effective or ineffective	2 Ineffective	1 Very ineffective
A. Administer medications with an RN employed by the clinical facility (preceptor)					
B. Preceptorship: 1 on 1 preceptorship in last semester (student assigned to a facility RN, follows the RNs					

schedule, administers medications with RN)					

8. Do you have any suggestions for enhancing the student experience in prelicensure nursing education to promote preparedness for safely administering medications upon licensure and entry into the workforce? (please be specific)

9. Upon graduation and entry into your first registered nurse job, how prepared did you feel to safely administer medications?
   1) Very prepared _____
   2) Prepared_____
   3) Somewhat prepared _____
   4) Not prepared_____
   5) Very unprepared_____

After Completion of the survey:

Please indicate whether you would like to be entered in a random drawing for one of five $20 Amazon gift cards by selecting the appropriate statement(s) and entering your e-mail address below.

All email addresses will be collected by the south-central Community College Center for Institutional Effectiveness. No personally identified information will be returned to the researcher. The researcher cannot associate your email address with your survey responses.

Please enter me in the random drawing.
A valid e-mail address must be entered here to be eligible for the random drawing:
_____

Thank you for your time and willingness to share your perceptions of your experiences.

APPENDIX D

Nurse Graduate Research Study Survey: Paper Format

Nurse Graduate Research Study Survey

Perception of Effectiveness of Prelicensure Education
Completion of the survey implies that you have received and read the invitation letter to participate in this study. You understand the description of the research study and the risks and benefits associated with your participation as a research subject. You understand that by proceeding with this survey you agree to take part in this research and do so voluntarily. You understand that your participation is voluntary and that you are free to withdraw at any time, without giving a reason and without cost. Completion of the survey will take approximately 10-12 minutes. By completing the survey, you confirm that you are 18 years of age or older.

☐ I am 18 years of age or older and I agree to participate in this survey.

☐ I am under the age of 18

Section 1

Thank you for consenting to participate in this study. Please answer the following 3 questions:

1. Did you graduate from Kellogg community College in May of 2017?
   ☐ Yes ☐ No

2. Did you pass the National State Board of Nursing licensing exam for a registered nurse (NCLEX-RN)?
   ☐ Yes ☐ No

3. Are you employed as a registered nurse (RN)?
   ☐ Yes ☐ No

If you answered yes to all three questions, please proceed to the following survey questions.

If you answered No to any one of the three questions, please stop and do not proceed. You do not qualify for this study. I appreciate your interest in participating in this research study thank you for your consideration and time.

Section 2

1. Gender
   ☐ Male ☐ Female

2. Age
   ☐ 20-25 ☐ 26-30 ☐ 31-35
   ☐ 36-40 ☐ >41

3. Where are you employed?
   ☐ Acute care hospital
      ☐ Critical Care (Emergency room, ICU, CCU, Pediatrics/neonatal intensive care, emergency department, PACU)
      ☐ Operating room (including outpatient surgery and surgicenters)
      ☐ Medical surgical unit (including oncology, orthopedics, neurology)
      ☐ Obstetrics/Post-partum, Labor and Delivery
      ☐ Pediatrics
      ☐ Psychiatry and any subspecialties (detox)
      ☐ Cardiology
      ☐ Other please specify
   ☐ Nursing home (skilled or intermediate)
   ☐ Long term residential care
   ☐ Rehabilitation
   ☐ Physician office/clinic
   ☐ Community nursing (home health, public health, visiting nurse)
   ☐ Other please specify

4. How long have you been practicing as a registered nurse?
   ☐ 0-3 months ☐ 3-6 months ☐ 6-9 months
   ☐ 9-12 months

5. Do you administer medications as a routine part of your employment as an RN?
   ☐ Yes ☐ No

Section 3: Preparing you for Practice

The following questions are related to the effectiveness of your registered nurse (RN) education in preparing for your role as a new graduate.

1. What is your perception of the effectiveness of your nursing school education in preparing you with the knowledge and skills needed to complete the following medication administration associated tasks as a new graduate nurse?

   Please answer the following questions using the following 5-point Likert scale:

   5= Very Effective
   4= Effective
   3= Neither Effective or Ineffective
   2= Ineffective
   1= Very Ineffective
   0= I'm not required to do this task

	5	4	3	2	1	0
A. Administer medications safely to 1 to 2 patients.	☐	☐	☐	☐	☐	☐
B. Administer medications safely to 3 to 4 patients.	☐	☐	☐	☐	☐	☐
C. Safely administer oral medications to patients.	☐	☐	☐	☐	☐	☐
D. Safely administer Intravenous medications (IV, IVPB, IV infusion.)	☐	☐	☐	☐	☐	☐
E. Safely administer medications by other routes (eye, ear, nasal, rectal, vaginal, transdermal.)	☐	☐	☐	☐	☐	☐
F. Recognize incorrect medication order (dosages, routes etc.)	☐	☐	☐	☐	☐	☐
G. Accurately calculate drug dosages.	☐	☐	☐	☐	☐	☐
H. Recognizing IV drug incompatibilities.	☐	☐	☐	☐	☐	☐
I. Anticipate and respond to adverse drug reactions.	☐	☐	☐	☐	☐	☐
J. Recognize that a medication error has occurred.	☐	☐	☐	☐	☐	☐
K. Report that a medication error has occurred.	☐	☐	☐	☐	☐	☐
L. Provide medication education to patients and families.	☐	☐	☐	☐	☐	☐
M. Utilize electronic healthcare and medication records to safely administer medications.	☐	☐	☐	☐	☐	☐
N. Utilize electronic medication resources (Lexi comp, etc.)	☐	☐	☐	☐	☐	☐

	5	4	3	2	1	0
O. Communicate with health care professionals about medications (obtaining orders, clarifying orders, reporting medication errors.)	☐	☐	☐	☐	☐	☐
P. Program and use medication administration equipment (IV pumps, patient controlled analgesia pumps.)	☐	☐	☐	☐	☐	☐
Q. Utilize medication administration tools (med cups, carpujects, syringes, needles etc.)	☐	☐	☐	☐	☐	☐
R. Utilize automatic medication dispensing equipment (Pyxis.)	☐	☐	☐	☐	☐	☐

Section 4: Effectiveness of Learning Environments, activities and tools.

2. What is your perception of the effectiveness of the following teaching ***environments*** (classroom, laboratory, simulation and clinical experiences) in preparing you for safe medication administration practices as a new graduate?

   5= Very Effective
   4= Effective
   3= Neither Effective or Ineffective
   2= Ineffective
   1= Very Ineffective

	5	4	3	2	1
A. Classroom	☐	☐	☐	☐	☐
B. Laboratory	☐	☐	☐	☐	☐
C. Simulation Lab	☐	☐	☐	☐	☐
D. Clinical	☐	☐	☐	☐	☐

3. What is your perception of the effectiveness of the following educational ***activities*** in preparing you for safe medication administration practices as a new graduate?

	5	4	3	2	1
A. Classroom lecture	☐	☐	☐	☐	☐
B. Classroom Lecture with medication clicker questions.	☐	☐	☐	☐	☐
C. Pre class "flipped classroom" lectures (audio lectures.)	☐	☐	☐	☐	☐
D. Pharmacology: Dosage calculation examination.	☐	☐	☐	☐	☐
E. Classroom: Evolving case studies to solve practice problems related to medication administration.	☐	☐	☐	☐	☐
F. Classroom examinations.	☐	☐	☐	☐	☐
G. Laboratory: clinical instructor teaching medication administration.	☐	☐	☐	☐	☐
H. Laboratory: practice medication administration with peers.	☐	☐	☐	☐	☐

	5	4	3	2	1
I. Laboratory: medication skills check offs.	☐	☐	☐	☐	☐
J. Laboratory: medication simulations with patient scenarios (peer to peer or with manikins.)	☐	☐	☐	☐	☐
K. Formal Simulations in simulation lab.	☐	☐	☐	☐	☐
L. Clinical: administering medication with clinical instructor.	☐	☐	☐	☐	☐
M. Clinical: observing facility RN administer medications.	☐	☐	☐	☐	☐
N. Clinical: number of experiences administering medications.	☐	☐	☐	☐	☐

4. What is your perception of the effectiveness of the following ***tools*** (as used in nursing education in preparing you for safe medication administration practices as a new graduate?

5= Very Effective
4= Effective
3= Neither Effective or Ineffective
2= Ineffective
1= Very Ineffective

	5	4	3	2	1
A. Basic Equipment (pill cutter, medication cups, syringes, needles etc.)	☐	☐	☐	☐	☐
B. Medication dispenser cart (labeled drawers.)	☐	☐	☐	☐	☐
C. Computer simulated learning systems: used in laboratory medication skills lab.	☐	☐	☐	☐	☐
D. Electronic health record (provided on computer.)	☐	☐	☐	☐	☐
E. Paper health record, medication record (as found in patient chart: paper form.)	☐	☐	☐	☐	☐
F. Partial task trainers (IV arms, injection pads.)	☐	☐	☐	☐	☐
G. Smart infusion IV pumps (with drug database.)	☐	☐	☐	☐	☐
H. IV equipment: (IV tubing, IVPB tubing.)	☐	☐	☐	☐	☐
I. Peer patients (other students in class.)	☐	☐	☐	☐	☐
J. Peer patients (other students in lab.)	☐	☐	☐	☐	☐
K. Low fidelity simulators (no electronics, arm injection sites.)	☐	☐	☐	☐	☐
L. Mid fidelity simulators (BP, HR, lung sounds, and bowel sounds.)	☐	☐	☐	☐	☐
M. High fidelity simulators (as in the formal simulation lab.)	☐	☐	☐	☐	☐

Section 5: Potential Effectiveness of activities and tools.

5. The following list of activities and tools are not currently utilized in the classroom, laboratory, clinical or in the simulation laboratory but could be developed and used to teach medication administration.
What is your perception of the ***potential effectiveness*** of the introducing the following tools into the classroom, laboratory or simulation laboratory in preparing a new graduate to safely administer medications?

5= Very Effective
4= Effective
3= Neither Effective or Ineffective
2= Ineffective
1= Very Ineffective

	5	4	3	2	1
A. Bar code scanners.	☐	☐	☐	☐	☐
B. Pyxis for medication distribution.	☐	☐	☐	☐	☐
C. Electronic health record with medication administration record (eMAR.)	☐	☐	☐	☐	☐
D. Electronic health care record with medication resources (drug information and IV compatibility charts.)	☐	☐	☐	☐	☐
E. Smart pumps (Patient controlled Analgesia PCA and IV Pumps.)	☐	☐	☐	☐	☐
F. Computer based on line learning modules: pharmacology, dosage calculations, virtual hospital.	☐	☐	☐	☐	☐

6. What is your perception of the ***potential effectiveness*** of the following simulation activities in preparing a new graduate to safely administer medications?

5= Very Effective
4= Effective
3= neither effective or ineffective
2= Ineffective
1= Very ineffective

	5	4	3	2	1
A. Conducting a medication lecture prior to medication simulations.	☐	☐	☐	☐	☐
B. Medication administration simulation with distractions.	☐	☐	☐	☐	☐
C. Medication administration simulation with multiple medication administration: 2 or more patients.	☐	☐	☐	☐	☐
D. Medication administration simulation with multiple medications to one patient	☐	☐	☐	☐	☐
E. Medication simulation of discharge teaching to a patient and family.	☐	☐	☐	☐	☐

5 4 3 2 1

F. Medication administration simulation with errors (error recognition and prevention) ☐ ☐ ☐ ☐ ☐

G. Medication administration simulation with post administration side effects or adverse reaction. ☐ ☐ ☐ ☐ ☐

H. Interprofessional simulations (With pharmacy and med students, PA and NP.) ☐ ☐ ☐ ☐ ☐

I. Medication administration simulation with distractions. ☐ ☐ ☐ ☐ ☐

7. What is your perception of the ***potential effectiveness*** of the following clinical activities in preparing a new graduate to safely administer medications?

5= Very Effective
4= Effective
3= Neither Effective or Ineffective
2= Ineffective,
1= Very ineffective

5 4 3 2 1

A. Administer medications with an RN employed by the clinical facility (preceptor.) ☐ ☐ ☐ ☐ ☐

B. Preceptorship: 1 on 1 preceptorship in last semester (student assigned to a facility RN, follows the RNs schedule, administers medications with RN.) ☐ ☐ ☐ ☐ ☐

8. Do you have any suggestions for enhancing the student experience in prelicensure nursing education to promote preparedness for safely administering medications upon licensure and entry into the workforce? (please be specific)

9. Upon graduation and entry into your first registered nurse job, how prepared did you feel to safely administer medications?

- ☐ Very prepared
- ☐ Prepared
- ☐ Somewhat prepared
- ☐ Not prepared
- ☐ Very unprepared

After submission of Survey:

Please indicate whether you would like to be entered in a random drawing for one of five $20 Amazon gift cards by selecting the appropriate statement(s) and entering your e-mail address below.

All email addresses will be collected by the Kellogg Community College Center for Institutional Effectiveness. No personally identified information will be returned to the researcher. The researcher cannot associate your email address with your survey responses.

Thank you for your time and willingness to share your perceptions of your experiences. Please mail this survey in the provided self-addressed envelope.