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REGISTERED NURSES PERCEPTIONS OF MEDICATION ADMINISTRATION:

A NON-EXPERIMENTAL QUANTITATIVE RESEARCH STUDY

by

Renae Lynn Dougal

A dissertation

submitted in partial fulfillment

of the requirements for the degree of

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To the Graduate Faculty:

The members of the committee appointed to examine the dissertation of Renae Lynn Dougal find it satisfactory and recommend that it be accepted.

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medication administration record (eMAR) within the electronic health record (EHR), nurse to patient ratios and workload of the nurse, brings into question issues and concerns of the medication process. I have engaged in many a discussion explaining standards, policies, protocols, and safety related to medications, not only with practicing nursing colleagues and nursing students, but with attorneys as well.

Having stressed to nursing students the importance and relevance of safety for the patient, the ethical premise of administering medications on time and following the rights of medication administration (MA), one must also carefully ponder the risks of the MA process, especially when not adhered to. One must also consider our very nursing action(s). A very important issue, one that I have witnessed time and time again through the years, is that of the MA process which includes deviations from the standard with medications being administered late, omitted, given incorrectly, and/or a near miss.

Through my observations and experiences, nursing students observe and work with nurses who are affected by the issues of workload, fatigue, stress and utilize work-arounds regarding the MA process. This is often difficult to explain to a nursing student that errors have occurred during their observation of medications being administered. Nursing students believe they will never make a mistake regarding MA, yet having stressed often to my students, it is not a matter of *if*, but a matter of *when*, and how one recognizes and handles the situation of a medication error (ME) is critical; which includes reporting the error and monitoring their patient(s). Helping the student to understand drug efficacy, half-life, patient co-morbidities, age-related physical issues that can alter and/or affect drug metabolism, and the timing of

medications is extremely important, as well as the working nurse's understanding of these factors, which should always include nursing assessment and clinical decision-making. The administration of medications is serious and should not be taken lightly. A personal observation and experience that occurred during my doctoral studies, with an immediate family member in home hospice care, continues not only to haunt me to this day, but stresses the relevance and importance of clinical judgment, clinical decision-making, nursing knowledge and assessment, and safe medication practice(s) by the nurse, as our ultimate concern is the patient and their well-being.

I became affiliated with Melanie Wright, a PhD human factors engineer and researcher, while working in the Research Department at a local hospital in Boise, Idaho. Dr. Wright's focus was on system processes and why humans do what they do, in other words the human factor component in our nursing actions. Dr. Wright and I began a working relationship on several grants and research studies, focusing on improving system processes within the hospital setting to help nurses and clinical areas improve structure and how the care is delivered to our patients. Through this working association, we collaborated with Dr. Breitkreuz, a nursing professor at a local university, creating the measurement tool of perceived caution and perceived frequency in regard to the MA process. We embedded medication errors (MEs) in high fidelity simulation scenarios with nursing students and practicing RNs. This work intrigued me; therefore, the basic premise to continue to study perception of risk with the medication process in a larger context with a larger sample of practicing nurses.

Additionally, we as nurses assume the role as an advocate for our patient's and one

another, our nursing colleagues. Throughout one's nursing career, the practicing nurse should reflect upon their licensure, read often their state Nurse Practice Act, and continue to stand up for nursing practice in regard to standards, professionalism and ethics, which ultimately revolves around those patients entrusted to our care. Throughout our nursing practice, no matter the environment we work in, the number of years we work in the nursing profession, or those individuals that influence how we progress and develop as a nurse, *all* of these funnel into our being and shape us to become who we are, the intuitive professional nurse!

Therefore, no major project is accomplished by one individual person. First, thank you to my Dissertation Committee: Chair -- Karen Neill, PhD, RN, SANE-A, DF-IAFN (Interim Dean and Professor of Nursing, ISU College of Nursing, Associate Dean for Academic Affairs and Director of Graduate Studies); Second member -- Kathy Reavy, PhD, RN (Emeritus Professor of Nursing and ISU Allied Graduate Faculty); and Third member -- Jared Vineyard, PhD (Applied Research Post-Doctoral Fellow, adjunct faculty and Experimental Psychologist). A special thank you to Barb Mason, Pharm. D., FASHP (ISU Professor of Pharmacy/Director of Interprofessional Education) for fulfilling the Graduate Faculty Representative (GFR) role finalizing the dissertation process.

A very special Thank You to Kathy Reavy, PhD, RN. Over the course of my doctoral program, Dr. Reavy has provided insight and guidance in so many ways from peer, academic professor, dissertation committee second member and most of all, PhD mentor. I have enjoyed immensely the professional dialogue during this dissertation process as to relevance of the identified gap in the nursing literature and the implications for nursing practice, as we explored

To my colleague, Master's degree Thesis Chair, and long-time mentor Susan Norwood Boysen, EdD, RN, who has provided overwhelming support, guidance and words of encouragement, as well as subtle hints since the completion of my master's degree (2007) in pursuit of the PhD! For her continual inquiry as to my progress within the PhD program and Dissertation. To two of my colleagues, Barbara McNeil, PhD, RN-BC and Kathy Jaeger, PhD, RN, for their encouraging words, support and periodic check in with me during this PhD endeavor. Your support has meant more than you know!

To extended family, friends and acquaintances for your encouraging words along the way, Thank You.

A very special acknowledgement to my father for his fatherly words of wisdom, being my role model and impressing upon me from youth to adult, the importance of work ethic(s). For his never-ending support and encouragement during my doctoral program; he believed in me. Sadly, he passed away during the course of my doctoral studies. Prior to his passing, he quietly shared with me how proud he was of my doctoral accomplishment. To my mother, through the rough times since my father's passing, thank you for your supporting words and patience during this educational endeavor and for your smiles and tears along this monumental journey!

Finally, words cannot express my sincerest gratitude, appreciation and thanks to my rock, friend, support, daily companion, and confidant, William (Bill) Owens, MD (Retired Interventional Cardiologist), for your never-ending patience, emotional support, continual encouragement, countless sacrifice, exuberance and love, to help me achieve this monumental educational achievement! His continual words, "just get it done"! From the minute my Master's

degree was complete, Bill began the subtle hints for this doctoral journey, by gifting me two

beautiful frames, one for the Master's diploma and one as he explained, for the Doctoral (PhD)

diploma – thank you for inspiring me, challenging me, and most of all, believing in me – the

second frame can now be hung, it is complete!

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REGISTERED NURSES PERCEPTIONS OF MEDICATION ADMINISTRATION:

A NON-EXPERIMENTAL QUANTITATIVE RESEARCH STUDY

Dissertation Abstract—Idaho State University (2019)

Purpose: The purpose of this study was to explore Registered Nurses (RNs) perceptions of medication administration (MA), specifically related to risk, benefits, frequency, caution and medication errors (MEs) in a culture (work environment) of stress, high acuity, less work experience, high nurse to patient ratios, fatigue and emotional intelligence.

Background: RNs learn the rights of MA. RNs spend 40% of their time administering medication(s) and are responsible for 26% to 38% of MEs in hospitalized patients, subjecting them to ≥2 MEs/day. MEs occur in one of the five rights areas, during administration stages or at the bedside, accounting for 65% to 87% of all MEs. RNs must understand consequences of MEs *and* how to prevent them. MA carries great risk for RNs, especially with deviations from MA procedures. Inherent to safe MA is perception of risk which can influence an RNs clinical decision-making regarding safe practices. RNs should recognize and report MEs, whether they contribute to, observe them, or are the source of the error.

Methods: RNs (N=1475) randomly selected from the Pacific Northwest participated in an online survey with test-retest component (n=272). Measurement tools included Inquiry of Participant Medication Errors, Risk Questionnaire: Perceived Frequency & Perceived Caution and a Pharmaceutical Questionnaire. Analysis was conducted using descriptive, parametric and non-parametric statistics.

Results: We found statistical differences in RN perceptions for not reporting MEs amongst RNs and their peers. The most common reason RNs do not report MEs is not knowing one has occurred (32.5%). The second most common reason is fear of retaliation (RNs, 32.1%; peers, 28.3%). RNs reported (survey question) they were not at all likely to make MEs in the next year (47.9%); however, their peers were very likely to make MEs in the next year (22%).

Discussion: Conducting a study of RNs' understanding that MEs correlate with perception of risk contributes valuable evidence to inform nursing practice. Statistical findings related to RN perceptions and thinking during and prior to MA contribute to clinical and curricular relevance. The findings are prompts for creating and implementing improved RN decision-making tools to decrease risk and enhance patient safety.

Key Words: nurses and perceived risk, clinical decision-making and nursing, perceived frequency

CHAPTER I

INTRODUCTION

The nursing profession in the U.S. must contend with enormous pressures from the ever-changing health care system and economic forces that drive it, such as changes in science, technology and patient activism (Benner, Sutphen, Leonard & Day, 2010). These demands impact the nursing profession's ability to share, uphold and transmit core values of clinical judgment, thereby keeping patients safe and ameliorating human suffering (Benner et al., 2010). The nursing profession's core values are the foundation of the delivery of nursing services. Nurses provide a continuum of services that include direct patient care, health promotion, patient education and coordination of care (NCSBN, 2018a). Nurses are employed and practice across diverse settings such as hospitals, public health centers, schools, homes, and long-term care facilities. Nurses need to practice to the full extent of their education and training (Institute of Medicine, 2015; Institute of Medicine, 2010). The Institute of Medicine (IOM, 2010) and the National Council of State Boards of Nursing (NCSBN, 2018a) conclude that nurses are competent, qualified professionals who put patients' best interest and safety first, while optimizing efficient and quality care for patients.

Nurses, the largest of the health care professional groups, are at the forefront of patient care. Nursing's role in health outcomes is critical. Since 1998, there has been a growing shortage of nurses with 93% of hospital-based nurses reporting a lack of sufficient time and staff to maintain patient safety, detect complications early, and collaborate and communicate with other members of the health care team (Benner et al., 2010; Hughes, 2008). According to the American Nurses Association (ANA, 2018), more registered nurse jobs will be available through 2022 than any other profession. A U.S. Bureau of Labor Statistics report identified that more

than one million additional nurses are needed to avoid a further nursing shortage (American Association of Colleges of Nursing (AACN, 2019) and Haddad and Toney-Butler (2018).

Nurses in clinical settings utilize clinical reasoning and problem solving as they communicate with nursing colleagues, physicians and members of the health care team to support quality health care and improve patient outcomes. Inherent in this quality of care conversation is the avoidance of adverse events (AEs) and potential harm to patients (Codier & Codier, 2017). Medication errors (MEs) are AEs that may harm patients. Reporting a ME is, therefore, relevant communication among health care colleagues about an AD, whether made by the nurse or colleagues. Reporting errors helps nurses learn in order to avoid future mistakes (Haw, Stubbs & Dickens, 2014). Reduction of MEs not only benefits patients, but clinicians and other health care workers as well. Benefits of reduced MEs are attributed to less pain and suffering to patients and emotional well-being of the health care worker. However, the Agency for Healthcare Research and Quality (AHRQ, 2019) reports that nearly five percent of hospitalized patients experience an adverse drug event (ADE), making them one of the most common types of inpatient care errors.

Medication errors strike at the heart of being a nurse, and with this, the responsibility to do good and avoid harm, also referred to as beneficence and non-maleficence (Mayo & Duncan, 2004). Nurses should recognize and report MEs, whether the nurse is the source of the error, contributes to the error, or observes a ME. Whether nurses report the error depends on attitudes, decisions and contextual experiences (Yung, Yu, Chu, Hou & Tang, 2016).

In the hospital setting, registered nurses (RNs) provide medication to patients as ordered by the physician, with one out of three ADEs an outcome of drug administration. Nurses are taught to follow the five rights of MA, which include right drug, right dose, right patient, right

time, and right route. Medication errors occur in one of the five rights areas, usually during the administration stages or at the bedside and account for 65% to 87% of all MEs (Elliott & Liu, 2010; Härkänen, Turunen, Saano & Vehviläinen-Julkunen, 2013; Hughes, 2008; Tang, Sheu, Yu, Wei & Chen, 2007). Evidence also suggests that nurses are responsible for 26% to 38% of MEs in hospitalized patients (Elliott & Liu, 2010).

Nurses are held accountable to follow ethical codes of conduct, including safe care which is centered on decision-making. Decisions made by nurses revolve around health, safety, and ethics (Blais & Weber, 2006). Current literature suggests that nurses contribute significantly to documented errors made in MA. It is important that nurses understand the consequences of these errors and how to prevent them given that MA carries the greatest risk to the patient (Elliott & Liu, 2010; Härkänen et al., 2013; Hughes, 2008; Tang et al., 2007).

Contributing factors to MEs in nursing practice include limited staffing, turnover, stress, interruptions during administering medications, fear of retribution for making an error, and fatigue or burnout. Inherent to safe MA is the perception of risk which can influence a nurses' clinical decision-making regarding safe practices (Hughes, 2008).

Decision-making is a process described as a number of conceptual applications such as clinical reasoning, clinical judgment, and decision formulation (Maharmeh, Alasad, Salami, Saleh & Darawad, 2016). Nurses must utilize clinical reasoning which is conceptualized as the ability to logically understand and make a judgment as a clinical situation changes. Clinical judgment requires clinical reasoning across time (Benner et al., 2002). Nurses use critical thinking and clinical judgment or reasoning skills in their professional role (Benner et al., 2010). A Joint Commission report of sentinel events (which encompasses AEs) from 2004 to 2015, reported errors in communication as a frequent root cause of these sentinel events (Codier &

Codier, 2017; Noland & Carmack, 2015). The link between communication and errors has been a continuous discussion amongst nurses since the 1999 IOM report (Hughes, 2008).

Benner et al. (2002) identified that the clinician must reason about each situation and factor in gains and losses in their understanding of the situation. The clinician must also consider the patient's clinical condition. Lack of risk perception and intentional decision-making can impact attentional performance. Attentional performance is what nurses do each and every day in the clinical setting: paying attention to detail(s) of MA, providing good, safe, effective care to their patients and collaborating and communicating with the health care team. There is a need to explore and understand how MA errors may impact nurses, if and when errors happen, and if this impact might prevent errors in the future.

Clinical reasoning is a practice-based process requiring scientific and technological research-based knowledge, practical ability to discern the relevance of evidence behind general scientific and technical knowledge, and then apply this knowledge to a particular patient when forming clinical decisions. Expert clinical reasoning is socially engaged with the relationships and concerns of those who are affected by the caregiving situation (Hughes, 2008). The formulation of a clinical decision occurs with one's ability to reason and think, encompasses clinical reasoning and clinical judgment. Nurses identify the nature of clinical situations and typically pursue problem solving within their understanding of the clinical situation, noting that sometimes errors occur because the clinician misidentifies a situation. Until the clinician correctly grasps the clinical situation, the relevance and understanding of the clinical data which guide reasoning, judgment, and decision-making can be misinformed and can lead to a medical error by the clinician (Benner et al., 2002).

The clinician's ability to provide safe, high-quality care can be dependent upon his or her ability to reason, judge, and formulate clinical decisions which can be limited by lack of experience. At some point, inherent to clinical practice and decision-making is the outcome of clinical error. Errors will occur in clinical practice. These errors can occur as a result of clinical decision-making, as well as institutional system processes and/or human factors and are termed adverse events (AEs). A large portion of medical errors occur each year because of faulty communication. Patient care can be safe and error-free when members of the health care teams communicate effectively (Codier & Codier, 2017). Human factors played the most prominent role (65.2%) in fatal MEs mainly because of deficiencies in performance and knowledge (44%) of the nurse (Hughes, 2008; Tang et al., 2007).

Moving from clinical reasoning and judgment, a process referred to as *critical* reasoning, is a process where knowledge and experience are applied in considering multiple possibilities to achieve the desired goals related to the patient situation; a process using both inductive and deductive cognitive skills. Critical thinking is inherent in using sound clinical reasoning in making decisions in the clinical setting. Schunk (2016) mentions that clinical reasoning coupled with critical thinking involves how nurses think rather than what to think, a deeper thinking focused on understanding the nature of the problem.

Critical thinking in nursing as an essential component of professional accountability and quality nursing care. Critical thinking involves the application of knowledge and experience to identify patient problems and to direct clinical judgments and actions that result in positive patient outcomes. The ability to think critically uses reflection, induction, deduction, analysis, challenging assumptions, and evaluation of data and information to guide decision-making.

Expert clinicians also seek an optimal perceptual grasp, one based on understanding, attuned emotional engagement and expert clinical knowledge (Hughes, 2008).

Nurses are accountable for their decisions at a professional and organizational level. It is, therefore, imperative to develop an awareness of and support or facilitation of decision-making processes in clinical practice. Decision-making is a common activity which involves complex processes of clinical reasoning. A distinguishing characteristic of decision-making is that this process only occurs where there is uncertainty about the choices to be made (Muir, 2004). Muir (2004) cites a study by Bucknall (2000) identifying that nurses make patient care decisions every 30 seconds with three main areas integral to the process. The three areas are described as 1) intervention decisions, 2) communication decisions, and 3) evaluation decisions. Intervention decisions modify the patient situation, communication decisions give or receive information and evaluation decisions review or evaluate patient data so that current health status of the patient can be determined (Muir, 2004).

Theoretical knowledge, practical knowledge and personal knowing all influence the nurses' ability to make decisions (Wiles, Simko & Schoessler, 2013). Clinical judgment and decision-making are required components of a professional nurse. Expert nurses are known for their efficient and intuitive decision-making processes, while novice nurses (e.g., inexperienced) are known for more effortful and deliberate decision-making processes (Muntean, 2017; Nibbelink & Brewer, 2018; Petiprin, 2016b). Novice nurses take longer to make decisions and have trouble with effective decision-making. Research indicates that experienced nurses make better decisions, especially with more complicated patient care decisions. Novice nurses' lack of contextual knowledge and clinical experiences affect the way they are able to make decisions and act independently (Muntean, 2017; Nibbelink & Brewer, 2018). Clinical decision-making

requires nurses to be experienced and knowledgeable, as nurses make decisions based on their years of experience. Experienced nurses have better critical thinking abilities as demonstrated with good clinical decisions. Decision-making, however, is critical for all levels of experience (Maharmeh et al., 2016; Muntean, 2017; Nibbelink & Brewer, 2018).

Decision-making can be influenced by individual or environmental factors. Individual factors include experience, age, educational level, knowledge, communication and perceptions (Muntean, 2017). An example from Wiles et al. (2013) found individual factors in newly graduated nurses with minimal experience were inadequately prepared to care for high acuity patients in an acute care setting. Only 38% of new graduates met expectations for recognizing acute changes in patient health status. Environmental factors that capture elements surrounding the decision-making task include time pressure, interruptions and task complexity (Muntean, 2017).

As mentioned earlier, knowledge and experience comprise nurses' ability to critically think and critically reason, thereby affecting logical decisions. Clinical decision-making plays an important role in the quality of care that nurses provide to patients. Poor decision-making can lead to AEs and have negative consequences for patients with an estimated 65% of AEs preventable if nurses made better decisions (Muntean, 2017).

Given that the decisions nurses make have such high consequences, it is prudent to understand what factors influence the formulation of decisions in practice. The process of clinical reasoning contributes to this process. The decision-maker's reasoning is described as influenced by their environments, goals, and values. The combination of satisfaction and perception emphasizes the importance of human elements to the decision-making process (Muntean, 2017; Nibbelink & Brewer, 2018).

Nurses are prepared through educational curricula for licensure and practice at multiple

levels including a Licensed Practical Nurse (LPN/LVN/PN), Licensed Professional Nurse

(Registered Nurse [RN]) or an Advanced Practice Registered Nurse (APRN). Registered nurses

have varying academic education for entry into practice (i.e., associate degree, baccalaureate

degree, baccalaureate accelerated/fast track or reentry, and diploma). Nursing students, preparing

to be a registered nurse, who successfully graduate from nursing programs are prepared to take a

national exam known as the *National Council Licensure Examination for Registered Nurses*

(NCLEX-RN®). The national licensure exam measures knowledge and judgment deemed

essential for the safe practice of registered nursing. Successfully passing the national nursing

licensure exam allows nursing graduates to obtain an individual state and/or compact state

licensure to practice as a registered nurse (NCSBN, 2019b).

The National Council of State Boards of Nursing (NCSBN, 2019b) identifies that

licensure is the process by which state boards of nursing grant permission to an individual to

engage in nursing practice. Licensure is necessary when the regulated activities are complex and

require specialized knowledge, skills and independent decision-making. The licensure process

determines if the applicant has the necessary competencies to safely perform a specified scope of

practice by predetermining the criteria needed and evaluating licensure applicants to determine if

they meet the criteria (NCSBN, 2019a).

According to the Idaho Board of Nursing (IBN), the practice of nursing means the

performance by RNs of acts and services that require formal nursing education which includes

specialized knowledge, judgment and skill, which acts and services assist individuals, groups,

communities and populations in order to promote, maintain or restore optimal health and well-

being throughout the life process (IBN, 2018). The nurse's state licensure attests to the public

that the nurse is safe to practice and will safeguard the patient under his or her care (IBN, 2018; NCSBN, 2018a; OSBN, 2018; QSEN, 2014). The fundamental purpose of nursing is to ensure patient safety and, at the very least, do no harm (Cleary-Holdforth & Leufer, 2013). It is assumed that the licensed RN will be proficient in his or her delivery of care to the patient. The ANA *Code of Ethics for Nurses* identifies that nurses promote, advocate for and protect the rights, health and safety of the patient as one of its non-negotiable tenets (Hughes, 2008; Lachman, O'Connor Swanson & Winland-Brown, 2015; Winland-Brown, Lachman & O'Connor Swanson, 2015).

The IOM's Committee on Quality of Health Care in America identified how the health care system must be radically transformed in order to close the chasm between what we know to be good quality care and what exists in practice. Landmark reports from the IOM, *To Err is Human: Building a Safer Health System* (2000) and *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001), stressed that reform around the margins is inadequate to address system issues (IOM, 2000; IOM, 2001). The series of IOM quality reports addressed this wide quality chasm, as well as the *importance* of narrowing this gap with good quality care and daily practice norms. *To Err is Human* (Hughes, 2008; IOM, 2000) identified that tens of thousands, and as many as 98,000 Americans, die each year from preventable medical errors, effectively highlighting the issue of patient safety and quality to public and private policymakers, the community and consumer(s). This IOM (2000) report identified that medication-related errors (a subset of medical error) are a significant cause of morbidity and mortality and accounted for one out of every 131 outpatient deaths and one out of 854 inpatient deaths (Classen et al., 2011; Hughes, 2008).

According to the 2001 IOM report, up to one million more patients experienced some type of preventable error while hospitalized (Codier & Codier, 2017; Davidhizar & Lonser, 2003; Hughes, 2008; Peters, Slovic, Hibbard & Tusler, 2006; Pournamdar, Zare, Niksirat & Shahrakipour, 2016). A study by Andel, Davidow, Hollander and Moreno (2012) provides evidence that approximately 200,000 Americans die annually from preventable medical errors. Medical errors, in 2008, cost the U.S. an estimated $17.1 to $19.5 billion (Andel et al., 2012; Van Den Bos et al., 2011). Data from 2010 reflect that 87% or $17 billion were directly associated with additional medical costs (i.e., prescription drug services, inpatient and outpatient care) (Andel et al., 2012). Literature suggests that the rate of preventable harm may be up to 10 times higher than the IOM estimated. At the time of the Health Affairs report from 2011, as cited by Andel et al. (2012), more than 12 years had passed since the IOMs landmark report, yet experts still had a difficult time developing a concrete picture of the problem. The toll is high in terms of death, injury and loss (Andel et al., 2012; Van Den Bos et al., 2011). Preventable medical errors resulted in annual costs between $17 billion and $29 billion in hospitals nationwide (IOM, 2000; Peters et al., 2006).

The Massachusetts Technology Collaborative and Network for Excellence in Health Innovation (NEHI) (2008) found inpatient, preventable MEs cost approximately $16.4 billion annually. Each year in the U.S. serious preventable MEs occur in 3.8 million inpatient admissions (NEHI, n.d.). As cited by Van Den Bos et al. (2011), the AHRQ's 2003 Patient Safety Initiative identified factors that contribute to the occurrence of medical errors. These errors included "human problems" such as improper patient identification and incomplete assessment. The most frequent medical injuries were AEs associated with drugs. These preventable medical errors in hospitals exceed attributable deaths such as motor-vehicle

accidents, breast cancer and AIDS (Breitkreuz, Dougal and Wright, 2016; de Vries, Ramrattan, Smorenburg, Gouma & Boermeester, 2008; IOM, 2000; Kim & Bates, 2013; Tang et al., 2007).

The 2000 IOM report has led to numerous efforts to improve the quality and safety of patient care (Seiden & Barach, 2006). Despite efforts to reduce preventable AEs, such events continue, and have a significant impact on public health. The IOM report stated that a hospital patient is subject to at least one ME per day. Medication and intravenous (IV) fluid administration are integral components of clinical care, yet medication and IV fluid administration errors are frequent and can be harmful to those who receive them (Breitkreuz, Dougal & Wright, 2016; Han, Coombes & Green, 2005; Hughes, 2008).

Research suggests that it is not uncommon for clinicians to miss important patient information when administering medication (Breitkreuz, Dougal & Wright, 2016; Henneman et al., 2012; Kim & Bates, 2013). Risk reduction strategies are utilized in the health care setting and can include institutional policies and continuing education, among other strategies, with a goal to reduce MEs. These strategies are aimed at reducing risk of MEs and specifically to detect unexpected error situations in the context of high-risk tasks (Brady, Malone & Fleming, 2009; Breitkreuz, Dougal & Wright, 2016).

Compliance with error prevention strategies is expected in practice, and nurses must implement methods (e.g., evidence-based) found to be necessary and effective to prevent MEs. For example, perceived frequency and personal susceptibility to errors are expected to influence perceptions of the need for prevention strategies in practice (Breitkreuz, Dougal & Wright, 2016). Research suggests that there are important emotional components to decision-making including whether or not to comply with risk reduction practices and attentional performance. Research has linked previous experience with AEs and severity of consequences to seeking out

and complying with risk reduction strategies. Behaviors show greater consistency with attitudes when attitudes are attained through personal experience (Breitkreuz, Dougal & Wright, 2016).

People differ in the way they resolve decisions involving risk and uncertainty, and these differences are often described as differences in risk attitude. Risk attitude differentiates individuals. Nurses make clinical decisions each day, thus taking risks. Nursing tasks, however, involve a degree of risk and MA arguably carries the greatest risk. *If* and *when* nurses choose to not follow the rights of MA, harm or injury can occur (Elliott & Liu, 2010).

Risk attitude can also be identified as a perceived-risk attitude which means engaging in risky activity. Perceived-risk attitude can be defined as a tradeoff of perceived risk for perceived return; in other words, a perception of injury or possibility of benefit (Blais & Weber, 2006). Attitudes impact nurses' clinical decision-making, as nurses continuously prioritize work importance based on their attitudes (Armstrong, Dietrich, Norman, Barnsteiner & Mion, 2017).

Errors are a cognitive phenomenon reflected in human action. Human cognitive abilities and perceptions influence problem-solving abilities (Hughes, 2008; Schunk, 2016). Knowledge of risk perception during MA is significant because it contributes to RNs' increased understanding of personal judgments related to ME occurrences. Heightening nurse's perceptions of risk awareness of potential MEs as well as frequency of error occurrences is relevant knowledge. Adding to the body of nursing knowledge regarding one's own perception of risk, perceived frequency and perceived caution, is anticipated to make MA adherence more meaningful to RNs. Knowledge of risk perception during MA increases RNs' understanding of personal judgments related to ME occurrences.

The importance of conducting a study with RNs involving MEs and perception of risk is an important issue. Nurses in critical care units describe between two and five errors occur during a 14-day work period (Hughes, 2008). Metacognitive skills play an important role in many types of cognitive activities such as perception and problem solving and these skills contribute to the development of critical thinking and problem solving (Hughes, 2008; Schunk, 2016). Risk perceptions are thought to arise from a lack of understanding of complex scientific and technical information (Finucane, Slovic, Mertz, Flynn & Satterfield, 2000). The risk to the patient might be a ME; the benefit to the nurse might be saving time. In this type of situation, the nurse creates a work-around from the organizational policy or procedure with potential harm to the patient. Nurses can sometimes be responsible for causing errors, so it is important that RNs understand the consequences of these mistakes and how to prevent them (Härkänen et al., 2013).

For this dissertation, I have created the following construct figure with the arrows depicting how behavior (e.g., our actions) can be affected or influenced by risk, benefit, frequency, attitudes, and personal experience of the individual (i.e., nurse) (see Figure 1 Risk to Behavior Construct).
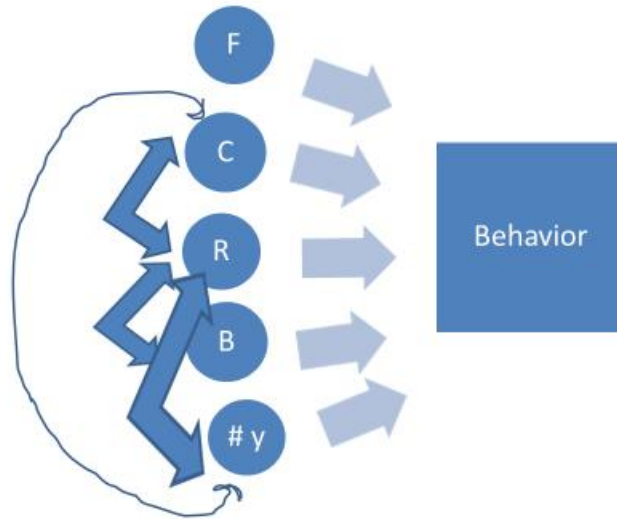
Figure 1. Risk to Behavior construct.

(F: Frequency, C: Caution, R: Risk, B: Benefit, #Y: Number of years worked as a nurse).

Research suggests that in order to plan for the prevention of and decreasing rate of MEs, understanding of the nurse's perception of MEs could be very helpful. Along with the nurse's perception and understanding of MEs with regard to the rights of MA, this becomes a patient safety issue and concern. The utmost measure that is adhered to by nurses during MA is the application of the rights of medication during MA (Abdar et al., 2014; Armstrong et al., 2017; Athanasakis, 2015).

The concept of safety skills (i.e., skills and behaviors that enhance the safe delivery of care) include non-technical skills (e.g., communication, decision-making). Non-technical skills include other behaviors such as conscientiousness, vigilance and humility. Focusing on nurses' attitudes and safety skills may provide insight in ways to minimize MAEs. Risks frequently

occur that impact safe patient care. Health care professionals must manage these risks using their knowledge and skills in complex systems while maintaining a safe level of patient care (Armstrong et al., 2017). Nurses play a central role for patients' safety. The drug administration process requires clinical and professional proficiency as well as critical thinking (Di Simone et al., 2018).

Nurses enhance quality of care and patient safety, particularly through the use of problem-solving and practice development skills. Nurses must exercise their professional judgment when administering any medication and apply their skills in any given situation so as to act in the best interests of the patient (Brasaitė, Kaunonen, Martinkėnas, Mockienė & Suominen, 2016). Fundamental steps to intercept errors in drug management and administration before the error reaches the patient include experience and skills. Positive skills, adequate knowledge, and work behaviors are important considerations to reduce MEs (Di Simone et al., 2018).

To summarize, contributing factors to nursing MEs are manifold, with deviation from procedures during MA being critical to patient safety (Brady et al., 2009). Deviations can include distractions during administration of medications, excessive workloads, and a nurse's knowledge of medications. Competency for nurses in practice is an important issue in the prevention of MEs, as drug administration is predominately a nursing responsibility (Cheragi, Manoocheri, Mohammadnejad & Ehsani, 2013). Identifying and reporting of MEs (e.g., written, verbal or both) is an ethical duty to maximize the benefits of patient care, thus improving patient safety and health of the patient.

Problem Statement

There is a need for nurses as health professional team members at the forefront of care to address MEs, thus reducing risk through enhanced clinical decision-making. Inherent to this problem is the need for nurses to contemplate or perceive potential risk to the patient. Risk increases when nurses do not perceive that their actions may contribute to or recognize when a ME might happen; known as a near miss (Claffey, 2018; Codier & Codier, 2017; Hughes, 2008). Patient risk further increases with nurses' failure to communicate or report when errors related to MA occur (Hughes, 2008). A nurse has many duties and responsibilities throughout the workday, including the safe administration of medications to assigned patients.

Nurses may spend as much as 40% of their time administering medications (Cheragi et al., 2013; Hughes, 2008). Adhering to institutional and professional guidelines, policies and procedures, and ethical standards, which include the five rights of MA, is essential to decrease risk (Brady et al., 2009; Hughes, 2008). National professional nursing organizations, such as the American Nurses Association (ANA) and American Association of Colleges of Nursing (AACN), have developed guidelines and standards for nurses (Hughes, 2008). The ANA and AACN guidelines impact the curriculum for undergraduate nursing education and accreditation. Nurses must also follow their state nurse practice act regarding standards of nursing practice.

Significance

The significance of this study of RNs' understanding that MAEs correlate with perception of risk, contributes valuable evidence to inform safe and competent nursing practice. Findings that cognitive thinking affects nursing actions when administering medication contribute to improved demonstrations of safe MA, decreased risk to hospitalized patients, nursing confidence

in his or her professional practice as well as adherence to the Nursing Code of Ethics. Information from this study fills a gap in the literature and contributions to the continual improvement of quality and safety in patient care surrounding MA.

Theoretical Framework

Meleis (2018) describes a theoretical framework as a basic structure to provide direction for research studies. Put another way, a theoretical framework provides a place for the researcher to think and strategize about the research aims. This utilization of theory and theoretical concepts to focus on the specific aims identified by the researcher, connects this current research study with established nursing knowledge.

The research framework constructed for this study derives from the category of *descriptive* theory. Descriptive theory provides meaning and explanation regarding the topic of study (Meleis, 2018). In this study, the topic of study is cognitive perception as it correlates with nursing MEs. The category of descriptive theory is intended to increase understanding of meaning and explanation (Meleis, 2018). A schema was subsequently developed from the framework to provide a visual of identified concepts from the theories to demonstrate the connectedness of the research ideas for this nursing study (See Figure 2 Dougal's Theoretical Model Schema).
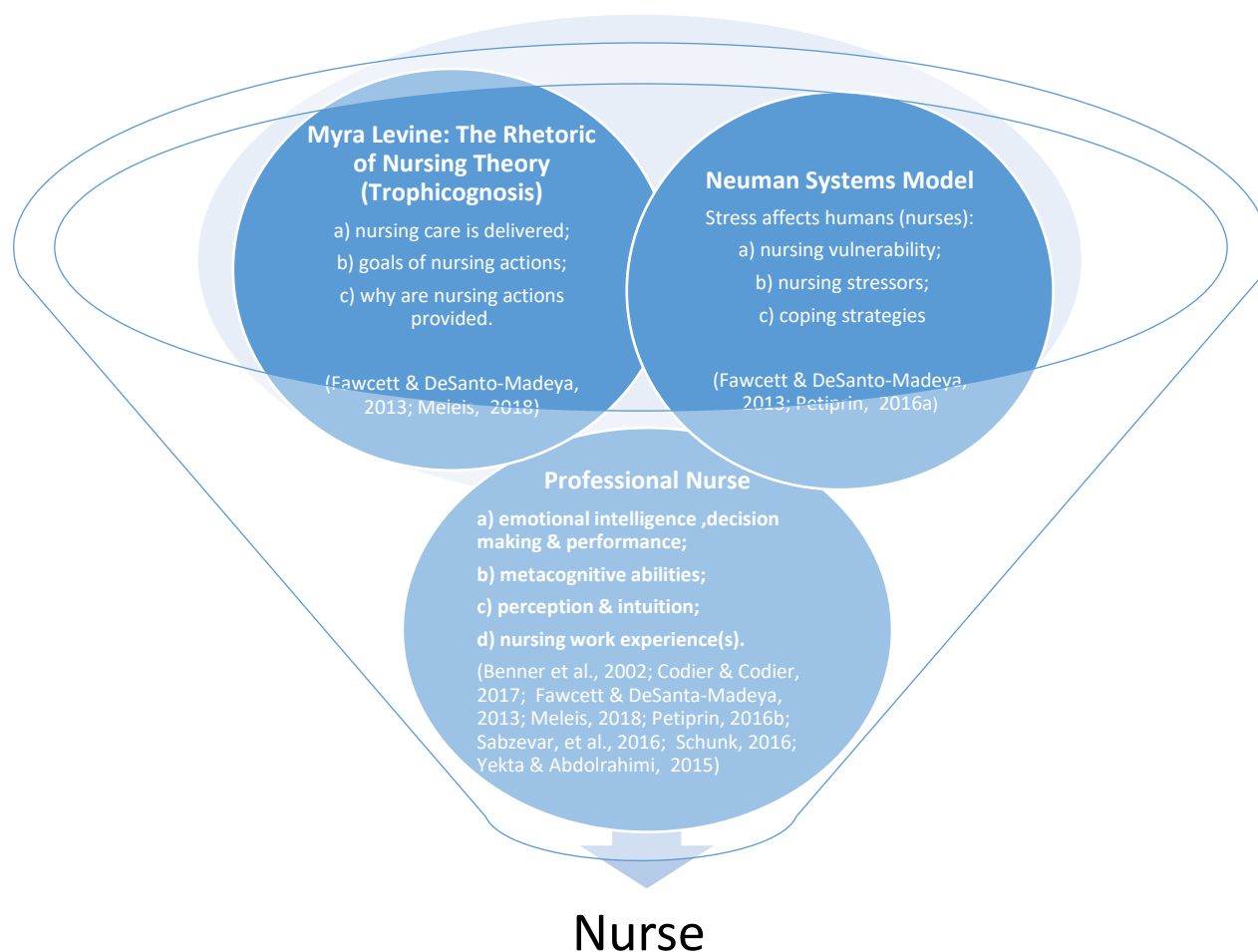
Figure 2. Dougal's Theoretical Model Schema

Based on the identified problem of this study, thoughts were framed primarily around three nursing theorists who provided the conceptual framework for this nursing study. The three nursing theorists are Myra Levine, Betty Neuman and Patricia Benner.

Myra Levine (Levine's Conservation Principles). Myra Levine's theory focused on conservation principles as a framework for nurses' actions addressing three central questions: 1) what are the ways in which nursing care is delivered? 2) what are the goals of nursing actions? and 3) why are nursing actions provided? (Meleis, 2018). Levine introduced a concept known as

trophicognosis, which better reflects nursing's focus on the art and science of nursing, emphasizing nursing care judgment based on the process of scientific method. Levine saw the process of clinical judgment as a means of focusing on nursing issues in patient care. Levine did not underestimate the importance of technical skills; instead she made a point that nursing remains characterized by a rigid dependence on procedures. She believed that nursing is expected to create an atmosphere to encourage healing and to promote adaptation. One of Levine's goals of nursing is maintenance of an appropriate balance between patient abilities, involvement in the care, and the nurses' actions (Fawcett & DeSanto-Madeya, 2013; Meleis, 2018).

Levine's theory maintains that every nursing act is dedicated to the conservation or the keeping together of the wholeness of the individual. She described that nursing behaviors are integrated in responses to internal and external environmental stimuli. Her theory is a descriptive theory that attempts to describe strategies of nursing care and of the nursing client addressing mainly phenomena, with one such phenomena being perceptual awareness responses (Fawcett & DeSanto-Madeya, 2013; Meleis, 2018). Levine reminds us that nurses must adhere to procedures and utilize clinical judgment while we focus on delivering patient care (Fawcett & DeSanto-Madeya, 2013; Meleis, 2018). Not following the rights of MA is a lack of adherence to procedure. Perceptual awareness revolves around our knowing what we know: our metacognition (Schunk, 2016). Clinical reasoning and decision-making are the thinking processes and strategies we use to understand data and choose between alternatives with regard to identifying patient problems in preparation for making nursing diagnoses and selecting nursing outcomes and interventions (Meehan, 2015).

Betty Neuman (Neuman's System Model). The second nursing theory comes from the theorist Betty Neuman. She developed the *Neuman's Systems Model*, a nursing theory based on the *individual's* relationship to stress, the reaction to stress, and the reconstitution factors that are dynamic in nature (Meleis, 2018; Petiprin, 2016a). Adaptation of Neuman's model into the practice context implies that the *individual* is the nurse. The reaction is the nurse's response to stress in the clinical work environment. The reconstitution factors are how the nurse accomplishes the clinical day or shift or tasks that need to be addressed; in other words, the resilience of the individual nurse.

Neuman's theory identifies a nurse's actions and the focus of such actions (Petiprin, 2016a). There are two central questions to this theory: 1) How can nurses organize the vast knowledge needed to deal with complex human situations that require nursing care? and 2) How do nursing clients interact, adjust to, and react to stress? (Meleis, 2018). As nurses are exposed to stressful environments, often in the clinical work setting, nurses still need to focus on the administration of medications following the MA process in an environment that includes stress. Neuman's theory describes knowledge of order and the patterns by which stress tends to attack human beings (i.e., nurses). Neuman's theory has been used to anticipate vulnerability to nursing education, to identify stressors and distractions on nursing students, and to develop intervention strategies to help students cope with nursing education. Neuman's theory is holistic in nature (Engstrom, 1984; Fawcett & DeSanto-Madeya, 2013; Meleis, 2018).

Neuman's model addresses actions, performance, patient safety and assessment of patient outcome(s). The Systems Model provides a holistic view of nursing and defines the concern of nursing to prevent stress invasion. If stress is not prevented, the nurse risks protection of the client's basic structure and maintenance for optimal client system wellness (Fawcett & DeSanto-

Madeya, 2013; Meleis, 2018; Olin, 2011). Neuman identified that the professional nurse has a responsibility to one's self, the profession, clients, colleagues, and other health disciplines to be able to present a logical and rational justification for decisions made (Fawcett & DeSanto-Madeya, 2013). The Systems Model describes nursing as concerned with all and potential stressors and deals with assessment of effect and potential effects of environmental stressors (Meleis, 2018).

Patricia Benner (From Novice to Expert). Patricia Benner is known for her nursing model of clinical competence: five levels of nursing experience based on the five levels of proficiency from the Dreyfus Model. The Dreyfus Model (1980) is a model of professional expertise that plots individual progression through five levels (Peña, 2010). Benner's five levels of clinical competence explain that nurses develop skills and an understanding of patient care over time from a strong educational foundation as well as from personal experiences. Benner describes the development of knowledge as an extension of knowledge through research and understanding through clinical experience. Benner focuses on nursing experience, clinical decision-making, and nursing intuition (Benner, 1982; Peña, 2010; Petiprin, 2016b).

Benner's theory (1982) identifies the five levels of nursing experience as: novice, advanced beginner, competent, proficient, and expert. The novice is a beginner with no experience, who is taught general rules to perform tasks. Their rule-governed behavior is limited and inflexible. The advanced beginner demonstrates acceptable performance, gains prior experience in actual nursing situations helping them to recognize recurring meaningful components. Principles and experiences begin to guide their nursing actions. The competent nurse has two or three years of experience on the job with the same field, with similar day-to-day situations. The proficient nurse perceives and understands situations as whole parts and has a

more holistic understanding of nursing which ultimately improves their decision-making. The nurse at this level, learns from experiences, what to expect in certain situations, and how to modify plans as needed. Expert nurses no longer rely on principles, rules, or guidelines to connect situations and determine actions; they have a deeper background of experience and an intuitive grasp of clinical situations (Benner, 1982; Petiprin, 2016b).

Benner's (1982) five levels of nursing experience, also known as skills, reflect changes of skilled performance. These changes are, 1) transitioning from relying on abstract principles as the nurse uses past experiences to guide his or her actions, 2) changes in the learner's perception of situations as whole parts rather than separate pieces, and 3) advancement from a detached observer to an involved performer, engaged in the situation rather than simply outside of the situation (Benner, 1982; Petiprin, 2016b).

Belenky, Clinchy, Goldberger and Tarole (1986) identified five types of knowers. One of the five types is that of Subjective knowers; these are individuals who believe and depend on their own inner voices and feelings. They have wisdom to look holistically and explain complete situations. Knowledge to them is intuitive. Meleis (2018) suggests that intuition by experts implies focus or perception of a whole situation without having to pause to construct different processes or steps. Petiprin (2016b) suggests that Benner's model focuses not on learning how to be a nurse, but rather concepts that *expert* nurses develop in addition to skills and understanding of patient care through their multitude of experiences, which includes learned knowledge.

Practice errors by nurses can cause harm to patients, families, practitioners, systems, and the profession. Benner et al. (2002) identified 21 case studies of nursing errors from nine State Boards of Nursing. Eight main contributive or causative factors were identified: 1) lack of

attentiveness, 2) lack of agency/fiduciary concern, 3) inappropriate judgment, 4) lack of intervention on the patient's behalf, 5) medication errors, 6) lack of prevention, 7) missed or mistaken MD/healthcare provider's orders, and 8) documentation errors. In a nurse's actual practice, monitoring quality of patient care, preventing and intervening in errors are central to nurses' roles. Benner et al. (2002) suggest that practitioners have a practice responsibility to learn from experience and make that learning available to other practitioners, so that experiential learning is cumulative, collective and shapes the research agenda.

Nurse's actions regarding MEs revolve around the desire to provide safe competent nursing care. Competence may take several years in the same situation. As the nurse transitions to more years of experience, the nurse's actions are guided by experience (e.g., years of experience worked, clinical environment) and decision-making (Benner, 1982; Benner et al., 2002).

The three identified nursing theorists' models reflect nursing actions that are fundamental and guide the nurse in his or her care of the patient. Nurses must be deliberate in thought, action and accountability of their care to prevent errors from occurring. Nurse performance is a combination of clinical thinking, clinical reasoning, and cognitive ability to assess situations. Nurses are exposed to stressors in everyday working environments and can be easily distracted. Distraction, conceptualized as not focusing when administering medications, can have detrimental effects to the patient and the outcome. Work performance, professionalism, appropriate handling of stress, and the ability to problem solve are all characteristics or traits of the professional nurse. Personal awareness and motivation for safety of the patient is critical to the existence of the health care provider. Improved clinical performance and motivation for

safety include the nurse decreasing potential MEs and actual MEs. Strategies to decrease MA

errors include practicing administration of medications correctly, reflecting on one's own

behavior and personal performance, reporting of MEs or near misses and understanding the level

of risk to medications not being administered correctly, late, or omitted (Cheragi et al., 2013;

Claffey, 2018; Kim, Kwon, Kim & Cho, 2011).

The three nursing theorists identify attributes and characteristics that represent the

professional nurse. The schema created for this nursing study, incorporates the theoretical

attributes and characteristics of Levine, Neuman and Benner in order to visualize a professional

nurse. The schema is representative of a funnel that blends our nursing experiences, influences,

knowledge, and actions. The funnel depiction represents the concepts from the nursing theorists

identified in this nursing study. As nurses develop from novice to expert in skill acquisition, they

practice from a variety of blended sources, colleagues and experiential factors (see Figure 2).

Rationale. Benner et al. (2002) describe that nurses must utilize clinical reasoning which

is conceptualized as the ability to logically understand and make a judgment as clinical situations

change. Clinical judgment requires clinical reasoning across time. This clinical judgment and

being able to logically understand the process of MA is meant to enhance the nurse's ability to

practice nursing in the best and safest possible way. Nurses that do not reason and use good

judgment while carrying out this critical task do not understand the complexity of this act

thereby overlooking the fact that there is a skill associated with correct MA. Benner et al. (2002)

identify that attentional performance is what nurses do each and every day in the clinical setting;

thereby paying attention to detail(s) of MA. Lack of attentiveness is displayed when nurses are

distracted, interrupted and not paying attention to details; errors happen.

Myra Levine's theory on conservation principles focused on nurses' actions. These actions addressed delivery of nursing care, goals behind nursing actions and why nursing actions are provided. Levine's vision in nursing was the process of clinical judgment as a means of focusing on nursing issues in patient care. Levine stressed that nursing remains characterized by a rigid dependence on procedures. Nurses must adhere to procedures and utilize clinical judgment while focusing on the delivery of patient care. Levine further described that nursing behaviors are integrated in responses to internal and external environmental stimuli (Fawcett & DeSanto-Madeya, 2013; Levine, 1996; Meleis, 2018; Petiprin, 2016c). It is anticipated that RNs will have distractors and interruptions while in the clinical work environment. How they adapt to these distractors and interruptions is crucial.

Betty Neuman's theory addresses the RNs relationship to stress and how he or she reacts to this stress within the clinical work environment. Her theory addresses the need for nurses to develop intervention strategies to cope within their work environment each and every day (Engstrom, 1984; Fawcett & DeSanto-Madeya, 2013; Meleis, 2018; Neuman & Fawcett, 2011; Petiprin, 2016a).

The framework for this study was adapted to conceptualize the phenomenon of nurses' perceptions of risk and benefit, perceived frequency and perceived caution associated with MEs. Nurses' actions involve clinical reasoning and critical thinking while administering medications safely to promote wellness and stability for the patient. Context, work-related experiences, intuition and communication influence nurses' clinical decision-making.

Purpose Statement

The purpose of this study was to explore Registered Nurses (RNs) perceptions of medication administration specifically related to risk, benefits, frequency, caution and medication errors (also known as adverse events [AEs]) in a culture (work environment) of stress, high acuity, less work experience, high nurse to patient ratios, fatigue and emotional intelligence (nurse performance and decision-making).

Research Questions

The following research questions for this study are grounded in the background and significance of the topic of MA performed in the work-related context of registered nurses.

1. Do registered nurses perceive risk in medication administration in everyday practice?

2. How are registered nurse's self-reporting related to medication administration errors and risk?

3. Do registered nurses perceive benefit and risk to medications during the medication administration process?

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Definition of Terms

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Adverse drug event(s) (ADEs) - Harm experienced by the patient as a result of exposure to a
   medication (Claffey, 2018; AHRQ, 2019). Injury resulting from medical intervention
   related to a drug. Adverse drug events can be categorized as injury resulting from adverse
   drug reactions, therapeutic failures, withdrawals, or MEs (Armstrong et al., 2017).
   Adverse drug events are side effects that may occur even when a medication is taken
   correctly, while others are MEs that occur when a medication is incorrectly prescribed or

administered, resulting in significant patient morbidity, increased lengths of stay in the

hospital and are costly (Casey, Hung, Distel & Prasad, 2017).

American Nurses Association Idaho (ANA-Idaho) – The following quotation is the ANA-

Idaho mission statement (2018).

> ANA-Idaho (formerly Idaho Nurses Association) is the only professional
>
> organization representing all registered nurses (RNs) in Idaho. ANA-Idaho
>
> advances the nursing profession by promoting professional development of
>
> nurses, fostering high standards of nursing practice, promoting the safety and
>
> well-being of nurses in the workplace, and by advocating on health care issues
>
> affecting nurses and the public.

The ANA-Idaho (2018) vision statement states, "ANA-Idaho is the leading voice

and advocate for the nursing profession in the State of Idaho" (ANA-Idaho, 2018).

Associate Degree Nursing – This program of study was developed after World War II to

address the evolving nursing shortage as an entry into the nursing profession. This patient

centered technically focused program of study is typically a two-year program at the

college level (Mahaffey, 2002).

Baccalaureate Degree Nursing - A standard basic or generic baccalaureate program in nursing

is a four-year college or university education that incorporates a variety of liberal arts

courses with professional education and training, preparing the student for entry-level

professional practice into nursing. The baccalaureate curriculum is designed to prepare

students for work within the growing and changing health-care environment. As nurses

take more of an active role in all facets of health care, they are expected to develop

critical-thinking and communication skills in addition to receiving standard nurse training in clinics and hospitals (AACN, 2017; AACN, 2018).

Diploma Program – The oldest and most traditional nursing education since the 1870s in the U.S. The Nightingale School of Nursing was the catalyst for many diploma programs. Nursing students learned hands-on, providing free labor for hospitals, working 12 to 18 hours each day, 6 to 7 days each week. Up to the 1960s, diploma programs were the major providers of RN graduates. A basic 2- to 3-year educational program that is designed to prepare nursing students for entry into practice. The recipient of a diploma is eligible to take the national certifying registration examination to become a registered nurse. In the United States, most diploma programs are conducted in hospitals with few located in community colleges (About Nursing Diploma Programs, 2019; Diploma Program in Nursing, Free Dictionary, 2018).

Idaho Board of Nursing (IBN) -The IBN (2018) mission statement states, "The Mission of the Idaho Board of Nursing is to regulate nursing practice and education for the purpose of safeguarding the public health, safety, and welfare" (IBN, 2018).

Licensed Registered Nurse (RN) (Professional Nurse) - A person licensed by the State Board of Nursing. The person practices nursing by: (a) Assessing the health status of individuals and groups of individuals; (b) Identifying health care problems that are amenable to nursing intervention; (c) Establishing goals to meet identified health care needs; (d) Planning a strategy of care; (e) Prescribing nursing interventions to implement the strategy of care; (f) Implementing the strategy of care, including administering medications and treatments as prescribed by those health care providers authorized to prescribe medication; (g) Authorizing nursing interventions that may be performed by

others and that do not conflict with this chapter; (h) Maintaining safe and effective

nursing care rendered directly or indirectly; (i) Evaluating responses to interventions; (j)

Teaching the theory and practice of nursing; (k) Managing the practice of nursing; and (l)

Collaborating with other health professionals in the management of health care (IBN,

2018; Idaho Department of Labor, 2017).

Medication Error(s) (MEs) - Any preventable event that may cause or lead to inappropriate

medication use or patient harm while the medication is in the control of the health care

professional, patient, or consumer. Such events may be related to professional practice,

health care products, procedures and systems. Systematic procedures may include

prescribing, order communication, product labeling, packaging, nomenclature,

compounding, dispensing, distribution, administration, education, monitoring and use

(Abdar et al., 2014; Benner et al., 2002; Durham, 2015; Hughes, 2008; Kim et al., 2011;

Svitlica, Simin & Milutinovic, 2017). An error of commission or omission at any step

along the pathway begins when a clinician prescribes a medication and ends when the

patient actually receives the medication (AHRQ, 2019; Claffey, 2018; Shawahna et al.,

2016).

Near Miss - Intercepting a ME before it reaches the patient or because the patient is able to

physiologically absorb the error without any harm (Durham, 2015; Haw et al., 2014;

Hughes, 2008). Any event or situation that did not produce patient injury, but only

because of chance. A near miss, is still an error, just one in which backup systems,

oversight, or sheer luck prevented harm (Claffey, 2018).

Oregon State Board of Nursing (OSBN) - The OSBN (2018) mission statement indicates, "The

Oregon State Board of Nursing safeguards the public's health and well-being by

providing guidance for, and regulation of, entry into the profession, nursing education and continuing safe practice" (OSBN, 2018).

Rights of Medication Administration – Traditional approach to MA includes the five rights. According to a strong consensus these five rights are the right patient, right drug, right dose, right route, and right time (Durham, 2015; Federico, 2018). The five rights of MA are a relevant component of the required curriculum for all nursing students. The nine rights include right patient, right drug, right route, right time, right dose, right documentation, right action, right form, and right response (Elliott & Liu, 2010). The ten rights include the nine rights and an additional right of right reason (Durham, 2015). Risk can be measured by application of rights of MA.

Risk Perception – Risk perception is a highly personal process of decision king, based on an individual's frame of reference developed over time. Risk is defined as "hazard times exposure equals consequence and the probability of something bad happening" (Brown, 2014). Risk perception refers to people's subjective judgments about the likelihood of negative occurrences such as injury, illness, disease, and death. Risk perception determines which hazards people care about and how they deal with them. Risk perception has two main dimensions: the cognitive dimension, which relates to how much people know about and understand risks, and the emotional dimension, which relates to how people feel about them. Risk perceptions are important precursors to health-related behaviors and other behaviors that experts recommend for either dealing with or preventing risks. Risk perceptions are important determinants of health- and risk-related decisions (Paek & Hove, 2017).

Safety in health care - Defined as the minimization of "risk of harm to patients and providers

through both system effectiveness and individual performance" (AACN, 2008).

Work-around – Defined as a plan or method to circumvent a problem…without eliminating it

(Merriam-Webster, 2019).

The next section, Chapter II is a review of the literature for the purpose of identifying

what is known and what is not known (i.e., gaps in the literature) about the identified topic and

purpose of this study.

CHAPTER II

LITERATURE REVIEW

This chapter discusses the review of the literature and identifies gaps in the literature. There are few current publications in the last five years that address this problem of nurses' perceptions of medication administration errors (MAEs) and none were found with associated risk, perceived frequency or perceived caution, other than the study by Breitkreuz, Dougal and Wright (2016).

The purpose of this study was to explore Registered Nurses (RNs) perceptions of medication administration, specifically related to risk, benefits, frequency, caution and medication errors (also known as adverse events [AEs]) in a culture (work environment) of stress, high acuity, less work experience, high nurse to patient ratios, fatigue and emotional intelligence (nurse performance and decision-making).

Search Strategy of the Literature

A literature search was conducted utilizing identified keywords within databases and search engines (i.e., CINAHL, PubMed, EBSCOhost, Ovid and Google Scholar). Keywords used were "medication errors*nursing", "nurses and perceived risk", "emotional intelligence and nursing", "nurses perceptions", "perceived risk and medications" "nursing attitudes*medications", and "clinical decision-making*nursing". The results of these searches yielded >300 articles, duplicate articles were excluded. The titles and abstracts were reviewed, and 81 full-text articles were obtained and included in this review based on the inclusion/exclusion criteria for the study.

The inclusion criteria were articles in English only, articles with research conducted both within and outside of the US, full-text articles, and within the last five years. Few articles were

found within the last five years; therefore, it was found necessary to extend the search beyond the five-year mark, with the exception of the Breitkreuz et al. article which was published in 2016. Exclusion criteria were articles that were not in the English language, only abstracts available and articles over 30 years old unless a landmark article or study.

Review of the Literature

To better understand why MEs continue to occur, how frequently they might occur, the perceived risk from the nurse's point of view when a medication administration error (MAE) occurs knowingly or not, the nurse's perception of risk in association to medications, and benefit of medications. A first search of the literature regarding MEs and in regard to nurses was completed. Also reviewed were contributing factors that might be associated with MEs during the MA process.

The literature reflected that MEs still occur despite technological processes implemented in the clinical settings, such as electronic delivery services, pharmacy robots and barcode scanners at the bedside. However, a human factors component still exists at the point of delivery (administration) of the medication to the patient. The nurse's point of view regarding why and how these errors occur as well as risk that might be associated with these errors is necessary to determine underlying issues that exist with the MA process. Literature suggests that these errors occur due to contextual factors as well as work performance issues. Nurses spend much of their time administering medications and can be directly involved in a ME or aware of a ME that occurred by someone else. Additionally, nurses may not know a ME has happened under his or her care or may actually catch an error before the error occurs.

The IOM reported in 1999, that nearly 100,000 people in the U.S. die annually from medical errors (Codier & Codier, 2017; Davidhizar & Lonser, 2003; IOM, 2000). The IOM

reported in 2000, that medical errors can be defined as the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim. Medication errors are a subset of medical errors (Makary & Daniel, 2016; Malloch, 2016). Literature reflects that as many as 440,000 patient deaths per year occur in the U.S., with medical errors now the third leading cause of death in the U.S. Root cause analysis of medical errors indicates that as much as 80% of medical errors stem from breakdown in communication between care providers and between providers and patients (Codier & Codier, 2015; Codier & Codier, 2017).

Adverse drug events (ADEs) are problems that commonly occur in health care. Medication errors are identified under ADEs and can occur in administering the treatment, in the dose or method of using a drug, and an avoidable delay in timing. The IOM indicates that failing to uncover errors and learn from errors is a medical liability. All errors, including near misses, should be reported so that organizations have an opportunity to improve their patient safety programs (Mayo & Duncan, 2004).

This literature review focuses on the perceptions of nurses regarding MEs, prevention of MEs, barriers to reporting of MEs, risk, frequency of errors and emotional intelligence (EI). These factors represent major issues and concerns in patient safety. First, however, a review of nurses' professional roles and responsibilities as directed by state Nurse Practice Acts assist in understanding the significance of safe MA.

Nurse practice act(s). State Nurse Practice Acts identify the nurse's professional role within the state in which the nurse is licensed. The Nurse Practice Act of the State of Oregon refers to competence as demonstration of specified levels of knowledge, technical skills, ability, ethical principles, and clinical reasoning, as these are relevant to the professional practice role of the registered nurse as well as providing safety for the client (OSBN, 2018). The Oregon State

Board of Nursing's (OSBNs) Scope of Practice standards for all Oregon licensed nurses reflects that nurses must ensure competency in the cognitive and technical aspects of a nursing intervention or a nursing procedure prior to performing that intervention or procedure (OSBN, 2018).

The Nurse Practice Act of the State of Idaho (Idaho Board of Nursing [IBN], 2018) identifies that the public interest is necessary to protect, therefore regulation and control of nursing is vital to safeguard the public health, safety and welfare, to promote quality health care services, to prohibit unqualified and dishonest persons from practicing nursing, and to protect against acts or conduct which may endanger the health and safety of the public (IBN, 2018).

The next sections address factors which have been shown in the literature to contribute to nursing MEs and the factors hypothesized to be related to ME which this proposed nursing study will attempt to address.

Medication errors. In large studies of hospitalized adults, MEs represent the most frequent cause of injuries from medical care (Cheragi et al., 2013; Kaushal, 2003). Approximately five percent of hospitalized adults experience an ADE and an additional five percent experience a potential ADE, where the error reached the patient, but no harm occurred (Kaushal, 2003). Reported error rates for the administration phase of medication procedures are significant, ranging from 26% to 36%, with an overall error rate of 49% for IV medications, with 73% of those errors involving bolus injections (Caldwell & Dracup, 2003; Durham, 2015; Shojania, 2003). Literature reflects that nurses estimate that between 37.4% and 67.0% of MEs are reported (Codier & Codier, 2015; Codier & Codier, 2017; Kim et al., 2011; Vrbnjak, Pahor, Štiglic & Pajnkihar, 2016).

According to the Joint Commission's analysis of root causes by event type (2004-2012),

human factors accounted for 73% of all MEs. When a nurse becomes distracted, delayed in response to patient care, and unable to logically differentiate his or her actions, he or she may lose sight of the actual purpose of their nursing actions. Based on these factors, the nurse responds to clinical situations that may not be completely (Durham, 2015).

Research literature also suggests that MAEs occur when healthcare professionals provide incorrect medications because of inappropriate behaviors, incompetent procedures, or system failures (Hung, Lee, Liang & Chu, 2016; Svitlica et al., 2017). Nurses have challenging issues such as completing morning assessments and administering medications on time. Yet, only one-third of the nurses considered interruptions during the preparation of drugs and medication as a potential cause of error(s) (Svitlica et al., 2017). Nurses are trained to adapt to over-stimulation, concentrate and perform with utmost skill (Cheragi et al., 2013; Di Simone et al., 2018; Kim & Bates, 2013; Kim et al., 2011).

Nurses have characteristics that contribute to MEs (Härkänen et al., 2013). The literature suggests that healthcare professionals have many character traits that assist them as providers of patient care. Many of these traits relate to maturity, as reflected by experience which is a significant predictor of various domains of nurse performance (Codier & Codier, 2015; Codier & Codier, 2017; Durham, 2015; Hung et al., 2016). The nurse demonstrates work performance, professionalism, appropriate handling of stress, and the ability to problem solve (Codier & Codier, 2015; Codier & Codier, 2017; Deshpande & Joseph, 2009). Communication is key for any of these traits (Codier & Codier, 2017; Durham, 2015; Haw et al., 2014).

Personal motivation for safety of the patient is another critical element to increase clinical performance, decrease MEs, increase communication, increase patient safety and be aware of potential MAEs (Deshpande & Joseph, 2009; Durham, 2015; Haw et al., 2014; Hung et al.,

2016). Development of strategies to decrease errors and administer medications correctly are reflected in enhanced personal performance and patient safety (Cheragi et al., 2013; Claffey, 2018; Kim et al., 2011). On the other hand, personal characteristics, attitudes and experiences may contribute to either increased incidence of ME (Haw et al., 2014; Hung et al., 2016; Kim et al., 2011; Svitlica et al., 2017).

Medication errors and ADEs are often used interchangeably. However, there are differences in the definitions. Adverse drug events are events that involve patient injury resulting from medication use. Some ADEs are side effects that may occur when a medication is taken correctly, while other side effects are related to MEs that occur when a medication is incorrectly administered. Due to these ADEs, patient morbidity may result including, but not limited to, increased length of hospital stays and associated increased costs (Casey et al., 2017). Nurses have an ethical obligation to report all ADEs.

The study by Shawahna et al. (2016) identified that often time's MEs are not recognized by the nurse. Recognition of a MAE is at times confusing. For example, a medication dose omitted at the prescribed time may not be recognized as an error by some nurses, resulting in underreporting of a(n) MAE. Using the Delphi technique, a group of experts came to a consensus of a proposed definition for MAEs: "A medication administration error is a deviation from the prescriber's medication order as written on the patient's chart, manufacturers' preparation/administration instructions, or relevant institutional policies" (Shawahna et al., 2016).

Nurses administer an average of 10 medication doses for each hospital patient every day and it is estimated that 1% to 2% of hospitalized patients are harmed from MEs, resulting in increased length of stay from 4 to 10 days. Exact numbers of MEs are difficult to obtain due to

some errors going undetected, some errors not reported (known as lack of communication), and some errors classified as a near miss. A near miss is an intercepted ME before causing harm to the patient (Claffey, 2018; Durham, 2015; Haw et al., 2014; Hughes, 2008). Further, as cited by Durham (2015), medication errors (MEs) are a subset of medical errors and hospital discharge codes. Death certificates may not accurately reflect a medication error, and some MEs are classified as near misses. The Committee on Identifying and Preventing Medication Errors reported that at least 1.5 million preventable MEs and ADEs occur each year in the U.S., excluding the errors of omission, making them one of the most costly and common sources of preventable harm (~$3.5 billion annually for in-hospital preventable ADEs, which comprise ~26% of all preventable ADEs). On average, hospitalized patients will be exposed to a minimum of one ME each hospital day (Durham, 2015; Pham et al., 2012).

It is critical to understand how the public perceives risk prevention. It is particularly important to have insight into the public's view of their own role in prevention and their willingness to engage in preventive behaviors to reduce their risks. A poll conducted by the National Patient Safety Foundation found that 42% of respondents had been affected by a medical error, either personally or through a friend or relative. Nurses are also a part of the public, whether they themselves or loved one's experience healthcare events, illnesses, or adverse events related to MEs (Peters et al., 2006).

Evidence from industry experts at Johns Hopkins Hospital, suggests that medical errors are the third-leading cause of death in the U.S., killing more than 250,000 patients per year. Medication errors are a subset of medical errors. Studies show that MEs affect 1.5 million Americans, leading to more than 7,000 deaths annually (Makary & Daniel, 2016; Malloch,

2016). There can be several human factors that impact MA. These factors include characteristics of individual providers such as cognitive abilities (Hughes, 2008).

Nurses with more education and experience tend to have greater knowledge of medications, while those new to a unit or the nursing profession may be at risk for errors (Armitage & Knapman, 2003). A study by Wolf, Hicks and Serembus (2006), identified inexperience as a contributor to performance (human) deficit, willingness to follow a procedure/protocol, and knowledge deficit. Therefore, conducting a study with RNs who spend part of their working time administering medications, whether new to the profession or with many years of work experience, can heighten awareness to the possibility of recognizing near misses, understanding the importance of MA including the rights of MA, and associated risks for not reporting MEs. This risk to both the nurse and the patient is critical for successful patient safety.

Perceptions of registered nurses (RNs). Errors are an integral part of human life with many errors originating from the natural process of cognitive and behavioral adaptations which develop the correct behavioral skills. Following medical orders is part of nursing performance, demonstrates competence and has a prominent role in patient safety. Giving medicine to patients is critical; factoring in the resulting errors may have unintended serious consequences for the patient (Cheragi et al., 2013).

A Serbian study found that one-third of the nurses (34%) believed that lack of communication was the factor which contributed to the potential error occurrence, and 39% considered that failure to comply with the current medication procedures was the factor which contributed to the error's occurrence. One-half (56%) thought that absence of double-checking high-risk medicines was not a significant factor contributing to occurrence of errors. This study

reflected that insufficient numbers of nursing staff was a dominant factor in regard to MAEs. Nurses indicated lack of knowledge about medications and understanding of what constitutes a ME contributed to errors. The most significant contributing factors of MEs were the system factors (Svitlica et al., 2017).

From a theoretical point of view, Svitlica et al. (2017) found contributing factors of MAEs generally can be divided into two subgroups, systems failures or omissions and those caused by failure of the health professionals themselves. The point of omissions relates to knowledge, skills and attitudes of the health care staff and factors that influence the worker in the work process. Most of the nursing literature about MAEs focused on consequences of the nursing shortage and did not address human errors. Agreement in the literature does exist regarding nurses' perceptions of the causes of MEs.

Failure to follow the five rights of MA or failure to follow MA protocols was the second most frequent perceived reason for MEs (Cheragi et al., 2013; Svitlica et al., 2017). For years there have been five rights. Over time, however, the rights have evolved, including now nine and ten rights.

Error-provoking conditions influencing MAEs included inadequate written communication, perceived high workload, ward-based equipment, patient factors, staff health status (e.g., fatigue, stress) and interruptions and/or distractions during the drug administration process (Brady et al., 2009). Adverse events associated with medication(s) appear among the primary causes of patient harm while patients are in hospitals, thereby extending hospital admissions and increasing healthcare costs. The greatest number of MEs, whether harm is caused or not, occur during prescribing and drug administration (Keers, Williams, Cooke & Ashcroft, 2013). Unsafe acts describe the acts or omissions of staff in the process of care and include skill-

based errors as well as knowledge- and rule-based mistakes and deliberate violations of practice. Training and experience, whether experienced or inexperienced, plays a role in contributing to errors. Insufficient training and experience have strong links with knowledge- and rule-based mistakes (Abdar et al., 2014; Keers et al., 2013).

Additional contributing factors such as moral distress, emotional fatigue, nursing shortages and decreased job satisfaction contribute to inadequate care (Keers et al., 2013; Ludwick & Silva, 2003). Ludwick and Silva (2003) studied 1,386 RNs worldwide (none were reported from the U.S.). They found that 78% of surveyed RNs did not give a medication or gave a medication at the wrong time, 69% believed that this error was somewhat/strongly related to shortages in nursing and 73% reported that they felt some/strong moral distress as a result. These participants also reported that they perceived other nurses made clinical errors and/or experienced untoward clinical incidents related to the nursing shortage more frequently than the study RN participants. The RN participants perceived that both they and other nurses made clinical errors related to not giving medications and/or treatments and/or giving them at the wrong times. This study mentioned that errors, whether they resulted in adverse consequences for patients or not, were seen by the public as a breach in duty and are not easily excusable.

Prevention of medication errors. Literature suggests that nurses are in an optimal position to help reduce and even prevent medication mistakes. Nurses spend more time with patients than any other member of the healthcare team, so presumably nurses have more opportunity to identify red flags and proactively catch mistakes before they happen. Medication errors can send patients back to the hospital or in extreme cases cause death (Malloch, 2016).

Research suggests that human error is found to be a key factor contributing to AEs and most MEs occur during routine patient care (Durham, 2015; Elliott & Liu, 2010). Nurses must be

prepared to not only catch their own errors, but also the errors of other healthcare workers around them. As previously mentioned, exact numbers of MEs are difficult to obtain because some errors are not noticed while others go unreported.

There are fundamental intricacies associated with the process of administering medications in a hospital setting which fail to consider human and system factors. Nurses should resist the temptation to create work-arounds when learning new technology with MA (Durham, 2015). Instead, nurses should report the issues, so improvements can be implemented (Federico, 2018). Nurses must be attentive, supportive of one with another when mistakes happen and stop tolerating work-arounds and other risky behaviors (Durham, 2015). Heightened awareness of error-prone conditions and recognition of contributing factors in the MA process are essential to patient safety (Breitkreuz et al., 2016; Elliott & Liu, 2010).

The risk of MEs is high when managing patient medications. The lack of checking habits is considered to be one of the contributing factors for MEs and specifically those related to staff. The double-checking and single-checking methods should be stressed during the undergraduate level of a professional's education. In order to prevent MEs' occurrence during medication preparation, a variety of specific methods and techniques should be followed. The utmost measures that are adhered to by nurses during MA is the application of the five rights of MA. These methods follow every step of the medication procedure effectively and minimize any potential harmful MEs (Athanasakis, 2015).

Wrong-time errors are the most prevalent administration errors. Although many wrong-time errors are benign, some medications require administration within a very narrow window to achieve the desired therapeutic result: avoiding an AE. Many electronic health record systems can alert a nurse attempting to administer a medication outside the acceptable administration

window. However, often times nurses can still work-around these technological issues (Yang &

Nelson, 2016).

Issues of look-alike, sound-alike (LASA) MEs continue to increase. Consequences of

these types of errors can range from no patient harm to death. Computer provider order entry

(CPOE) was placed within electronic health records (EHRs) to decrease these types of errors, yet

these errors continue to occur in the electronic world. It is difficult to know the actual percentage

of MEs associated with LASA drugs, but an estimated 1 per 1000 prescriptions has been

suggested in the inpatient setting. Given the average, a 1000-bed hospital will have

approximately 300,000 prescription orders in a month, this can add up to significant hazards to

patients. Barcode scanning at the bedside can reduce MEs, but only if the medication is ordered

correctly and processed correctly. It is still up to the nurse administering the medication to

understand the medication and recognize errors prior to administration (Wollitz & O'Connor,

2015).

According to the American Society of Hospital Pharmacists (ASHP) guidelines (1993) on

preventing MEs in hospitals, there are inherent risks, both known and unknown, associated with

the therapeutic use of prescription and nonprescription drugs. Medication errors compromise

patient confidence in the health-care system and increase health-care costs. Errors can occur

from lack of knowledge, substandard performance and defects of failures in the system.

Medication errors can occur by both experienced and less experienced staff. Literature suggests

that frequent interruptions during the administration process should be identified and minimized.

The ASHP guidelines (1993) provide suggestions for nurses to avoid MAEs. These

recommendations are include the following: 1) review patient medications and possible drug

interactions, 2) review original medication orders before administration of the medication, 3)

check the identity and integrity of the medication prior to administering and 4) document the

medication being administered as soon as it is completed (ASHP, 1993).

The double check procedure is another standardized process for minimizing error for

high-risk medications. With smart infusion pumps and syringe drivers, nurses found they could

still do work-arounds to override the devices, as some nurses varied on what constituted double

checking the medication. Nurses verbalized that being interrupted to double check for another

nurse created interruptions for themselves administering medications (Schwappach Pfeiffer &

Taxis, 2016). Henneman et al. (2012) identified that bar-code verification may reduce but does

not eliminate patient identification and MEs during clinical simulation of MA.

Human factors associated with MEs include performance deficit as opposed to

knowledge deficit. When these MEs occur, the responsible staff member should be an active

participant in the evaluative and discussion process aimed at preventing similar errors from

recurring (Caldwell & Dracup, 2003). Medication errors are a principal cause of accidental harm

to patients and occur when human and system factors interact with the medication process to

produce an unintended and potentially harmful outcome. Having some knowledge of the issues

that surround occurrences of MEs is, therefore, of importance for health professionals to practice

safely (Agyemang & While, 2010).

Error rates for oral drugs in the UK are between 3-5.5%, while error rates for IV

medications are almost 27% (Agyemang & While, 2010). This UK study found that 96% of MEs

could have been prevented. Error of omission (48.8%) accounted for most of the MEs, of which

54.2% were administration errors. Even though MEs are a persistent nursing problem and drug

administration is an important part of the nursing role, nurses have the responsibility of checking

the medication before administering it to the patient and verifying the correct medication. Nurses

spend about 40% of their time administering medications. Nurses are accountable for their practice and for any errors that are made in the process, including the preparation and checking of medications to be administered, monitoring the effectiveness of medication treatment, reporting adverse reactions and teaching patients about their medications (Agyemang & While, 2010).

Medication administration errors are one of the highest risk areas in nursing practice today, making the five rights of administration the cornerstone of nursing. Nurses must know the therapeutic uses of the medications they administer, side effects, precautions and contraindications. Nurses must report any MEs (Petrova, Baldacchino & Camilleri, 2010).

Medication error contributing factors can be classified into three categories, 1) individual, 2) contextual and 3) knowledge-based. Individual factors play a substantial role in nurses' decision-making process and influence their professional judgment leading to MEs. Individual factors are an essential aspect of human judgment from the perspective of the medication process. A systematic review of 12 different studies that investigated factors which contributed to MEs reported that the most common contributing factors of MEs were poor knowledge of medication, medication preparation, medication calculation and MA (Zyoud & Abdullah, 2016).

Barriers to reporting medication errors. Retrieving medications is something nurses do many times during a shift, and most of the time it goes as planned. The nurse's failure to confirm the medication's identity prior to administering the medication falls into the category of an unsafe act (Spath, 2007). The study by Hung et al. (2016), conducted in Japan, found that co-worker's attitudes, including nurse managers' attitudes are predictors for nurses' attitudes toward MAE reporting. Nurses' attitudes and co-workers' attitudes affect nurses' intention to report a MAE (Hung et al, 2016). Nurses play a significant and critical role in preventing MEs, yet

mistakes do happen. Therefore, managers should provide safe and appropriate conditions for nurses' reporting of the errors (Pournamdar et al., 2016).

An independent nationwide survey of 1039 nurses found that 97% of nurses in the study were worried about MEs. Nurses who make MEs, especially ones that could harm the patient, experience feelings of guilt, fear, loss of confidence and possible disciplinary action and are reluctant to report these errors if there is no obvious harm to the patient (Agyemang & While, 2010).

A UK study utilized vignette responses during scheduled interviews, found that 52% of the participants said they would not use the reporting system to report an error made by a colleague. Twenty-seven percent indicated they would tell senior staff but not officially report the error, while 23% said most likely a one-time event and probably would not happen again. Interesting to note, that 15% said this type of error was very common and not worth reporting. Forty-two percent indicated they would not report a near miss event involving themselves. Four themes emerged from these interviews: excusing, fear, knowledge and burden (Haw et al., 2014).

Nurses reported cognitive overload and complacency to be a barrier. Nurses reported thinking it would not happen to them because complacency is considered a latent condition that causes individuals to let down their guard. Overcoming individual and organizational complacency requires an ongoing dialogue about patient safety with the goal of creating greater awareness of what can go wrong and greater willingness on the nurse and facility to reduce potential risks and safety hazards. Underreporting of AEs is estimated to range from 50% to 96% annually; underreporting of no-harm or near miss errors is even greater (Spath, 2007). Discussion should be ongoing regarding how and why to encourage reporting as a regular part of individual practice.

Literature reflects it is a nurse's professional duty to report MEs. Reporting helps identify improvement opportunities and verification of safety measures that are already in place within facilities. Major perceived barriers identified, were fear of the consequences after reporting; people must feel safe from disciplinary action or retaliation (Haw et al., 2014; Spath, 2007). Almost 80% of nurses believed that errors might not be reported for fear of the negative reactions of managers. Less than half of participants would report an error made by a colleague (48%) or a near miss involving themselves (40%). Nursing units found higher reporting rates were correlated with unit members' perception of the risk of discussing mistakes openly (Haw et al., 2014). Other factors that are known to influence reporting are perceived attitudes and acceptance of risk. The literature suggests that understanding nurses' attitudes and perceived barriers to MAE reporting is the first step to raising the reporting rate and strengthening medication safety. Nurses' willingness to report MAEs depends on how much they are convinced that the behavior will promote patient safety and how they perceive the value of the behavior (Hung et al., 2016).

Yung et al. (2016) conducted a study in Taiwan. They identified that the patient being unharmed was the most common reason why nurses chose not to report MAEs. Regardless of whether they reported or not, nurses still possessed negative and complex feelings, including self-recrimination, heavy moods, restlessness, regret, fear and guilt, with 83% of nurses engaged in self-recrimination after reporting. Over 63% experienced restlessness after choosing not to report ($P = 0.001$). The results reflect when errors occur, many barriers other than nurses' attitudes influence nurses' decisions and make them unwilling to report the error.

As evidenced by the literature, nurses feel more guilty, worried, embarrassed, and afraid of disciplinary action than doctors and pharmacists as a result of a greater feeling of

responsibility for an error, fear of the consequences for the patient and fear of further punishment from senior staff. Accurate reporting of an individual ME is essential for identifying system faults that can contribute to the likelihood of future errors. Therefore, reporting errors helps improve medication safety by addressing systems failures, and helps to prevent future errors by allowing appropriate staff training and awareness of errors (Sarvadikar, Prescott & Williams, 2010).

Perceptions of risk (attitudes). The study by Slovic, Peters, Grana, Berger and Dieck (2007) was conducted across the U.S. with non-medical participants assessing for risk, benefit, exposure and hazards. Slovic's survey (Slovic et al., 2007) was adapted for this nursing study and is addressed in Chapter III.

A survey, examining worry associated with various causes of death including medical errors, found that participants substantially underestimated deaths occurring from medical errors. Those participants with greater worry reported being more likely to take preventive action in the hospital setting, as well as being more likely to take strategic action prior to going into the hospital. Comparing worry and risk likelihood, participants were asked to respond to 29 medical errors on a risk likelihood item. Responses were averaged for each participant and formed the Risk Likelihood Index. Correlations of Risk Likelihood with the antecedents and consequences of worry to examine their comparative strengths identified male/female and ethnicity differences. Significance was noted on varying factors ($p < 0.01$ to $p < 0.05$) (Peters et al., 2006).

Blais and Weber (2006) utilized the DOSPERT scale regarding risk. Researchers conducted a multi-level analysis in Canada with 172 respondents. Researchers state that popular interpretations of risk attitude are often considered to be a personality trait; people's perceived-risk attitude as a willingness to trade off units of perceived risk for units of perceived return.

Their belief is that the domain-specificity of risk taking seems to arise primarily from differences in the perception of the risks and possible benefits, of choice alternatives in different content domains. The trait or true attitude towards risk that shows consistency across situations lies in the evaluation of perceived risk as something that is neither desirable nor undesirable. This study assesses different components contributing to differences in apparent risk-taking behavior such as perceived risk, perceived-risk attitude and perceived benefit. Results identified significance between-domains' differences in the degree of apparent risk taking and perceived risk at the mean level of analysis. Cronbach's alpha associated with the risk-taking scores ranged from .71 to .86 and those associated with the risk-perception scores, ranged from .74 to 83. Factorial analysis of variance showed the mean risk-perception level across individuals varied significantly between domains with the greatest mean level found in the health/safety area; significance was noted at $p < 0.05$.

In summary, articles and studies suggest that humans have additional capabilities that allow them to alter their environment as well as respond to it. This creates and reduces risk. Although risk assessments are designed to aid in identifying, characterizing, and quantifying risk, the majority of people rely on intuitive risk judgments, typically called risk perceptions. The basic assumption underlying these factors is that those who promote and regulate health and safety need to understand the ways in which people think about and respond to risk. The literature shows that perceived risk is quantifiable and predictable. Risk will mean different things to different people.

Levels of knowledge seem to influence the relation between perceived risk, perceived benefit and risk acceptance (Blais & Weber, 2006; Brasaitė et al., 2016; Slovic et al., 2007). The underlying principle is to discover characteristics associated with an event and the way it is

managed that can predict the breadth and seriousness of those impacts. This impact can be associated with nurses administering medications and how they report or do not report MEs or near misses. Risk concerns may provide a rationale for actions taken. My proposed nursing study seeks to determine views of the practicing nurses regarding actions and risk.

The culture of the healthcare industry is regarded as a potential risk factor threatening the patients that it provides care for. Error free performance should not be the focus but rather design systems for safety, that is a culture of safety for the staff. Safety culture is a performance shaping factor that guides discretionary behaviors of healthcare professionals toward viewing patient safety as one of their highest priorities. Routine assessment of risk of errors and AEs in a safe environment is critical to nurses reporting errors and using caution when administering medications. The Joint Commission (TJC) requires that hospitals collect data, 1) to monitor performance, 2) on staff opinions and needs, 3) staff's willingness to report medical/health care errors, 4) perceptions of risks to patients, and 5) suggestions for improving patient safety (Nieva & Sorra, 2003; TJC, 2017).

Adverse drug events (ADEs) can be categorized as injury resulting from adverse drug reactions, therapeutic failures, withdrawals, or MEs. As evidenced by the literature, approximately 25% of ADEs are caused by MEs and thus considered preventable. In an effort to reduce ADEs, safety principles and practices have been updated referring to examining how errors are made, understanding of these errors as well as addressing these errors and practices. Strategies that have been implemented to reduce MEs are EHRs, CPOE, barcode systems and structured prescribing forms. Despite these strategies, ADEs and specifically MEs remain a common occurrence. Little is known about nurses' attitudes on updated safety practices or their skills in implementing these updated safety practices (Armstrong et al., 2017).

Armstrong et al. (2017) focused on nurses' attitudes about skills with updated safety practices and concepts. They adapted two existing scales to create one scale, The Nurses' Attitudes and Skills with Updated Safety Concepts (NASUS) with 2 subscales (Attitudes and Perceived Skills). The questions addressed, 1) if there is no harm to the patient, there is no need to address an error, and 2) ability to analyze a case to find the cause of an error. Cronbach alpha for the entire NASUS scale, the Attitudes subscale and the Perceived Skills subscales are 0.73, 0.67, and 0.71. Their study had two aims: 1) nurses' attitudes and perceived skills subscales, and 2) nurses' attitudes and perceived skills on MAE and adherence rates. For Aim 1, strength of Spearman's correlations ranged from 0.03 to 0.61. For Aim 2, a clinically significant level of association was observed between nurses' perceived skills and MAE rates, but it was not statistically significant ($r_s = 0.47$, $P = .077$). The authors identified that attitudes impact nurses' clinical decision-making and nurses prioritize work importance based on their attitudes. They address that little research has been done in nurses' attitudes, skills, and the competency framework of knowledge (Armstrong et al., 2017).

A study by De Freitas et al. (2011), describe RN perceptions and attitudes towards AEs in nursing care utilizing in-depth interviews from Brazilian Intensive Care Unit (ICU) nurses. Authors identify that ethical behavior is essential for the patient's safety. Using Schütz' theory of motivation, they explored professionals' perceptions and attitudes towards AEs because the impulses that lead RNs to act in the way they do can be better understood from this theoretical perspective. According to Schütz' theory, actions are a function of human motivation. Human actions are guided by past experiences and the personality type developed during life. Nurses in this study indicated their actions were aimed at reducing negative impacts on the patient and that the omission of a mistake is a new error. The nurse participants were open about communicating

with their boss regarding errors. The RNs perceptions and actions were saturated with meanings and motivations emerging from their own beliefs and values. Results showed that the occurrence of an error is an opportunity to learn and make changes in health care systems that are aimed at improving patient safety. The authors concluded that ethical behavior is essential for the patients' safety.

Frequency. Only two studies, Breitkreuz, Dougal and Wright (2016) and Kim and Bates (2013), were found to discuss or describe MAE frequency. The study by Breitkreuz et al. (2016) is utilized as a fundamental premise for this dissertation nursing research study along with the associated measurement tool (see Chapter III). Compliance with error prevention strategies is expected to be driven, in part, by whether nurses perceive strategies to be both necessary and effective. Perceived frequency and personal susceptibility to errors are expected to influence perceptions of the need for prevention strategies. Research suggests that there are important emotional components to both intentional decision-making and attentional performance in the context of high-risk tasks. Research links our previous experiences with AEs and severity of consequences to seek out and comply with risk reduction strategies. Behaviors show greater consistency with attitudes when attitudes are attained through personal experience. If personal experience(s) with errors changes risk perception in ways that impact behavior, then the premise of analyzing errors can impact risk perception and associated behaviors.

We, the authors (Breitkreuz, Dougal & Wright, 2016), conducting our study in the U.S., sought to address if exposure to error situations changes attitudes toward perceived frequency of events and if this changed one's reported caution in risk-related activities. We designed a survey that evaluated 1) memorability of the experience, 2) perceived frequency of AEs, and 3) perceived caution in comparison with peers. We chose to measure perceived frequency of AEs

because decisions to comply with risk reduction strategies are likely to be grounded in perceived frequency of events. For the context of the study, we utilized simulated embedded errors in patient scenarios in a simulation lab; with nursing students as our sample. After the simulated intervention and at three months, participants revealed changes from baseline regarding perceived frequency of errors ($P < 0.01$). The participants, with varying levels of experience, underestimated the frequency of MEs and IV fluid errors. There is evidence that attitude changes can impact intentional compliance with risk reduction strategies. Part of risk reduction strategies is addressing how often these types of MEs occur (Breitkreuz, Dougal & Wright, 2016).

The second study by Kim and Bates (2013), conducted in Korea, identified MAEs as representing one of the major concerns in patient safety; very few studies have been carried out on MAE frequency. The authors allude to the fact that previous studies of ME frequency have been used in surveying clinical nurses which they believe undercounts or under-documents substantial numbers.

The focus of the study by Kim and Bates (2013) was to perform direct observation utilizing a convenience sampling approach. After confirming validity and reliability, a checklist was used to evaluate the medication activities of clinical nurses. They observed 293 cases of medication activities (89 external and oral administration cases and 204 injection cases). They found nurses did not follow guidelines, including the five rights of MA. Results showed 45.6% of nurses verified the amount of medication indicated on the vial at least once for at least one-second. Only 6.5% read the name of the patient from the wristband. Administering the medication at the correct time guideline, observed only 41% of the time. Of the 31 categories assessed regarding drug administration, 17.2 items per person were successfully followed, whereas 5.7 items per person were violated. The authors concluded understanding why nurses

violate the five rights of MA and make mistakes is central to efforts to reduce MEs. Results

found high rates of MEs and non-adherence to guidelines with violations occurring in about one

of four items overall. Direct observation identified the greatest number of drug-related problems,

while incident report review identified the fewest.

What we learn from the study by Kim and Bates (2013) is that different types of errors

have very different risks resulting in harm. Some errors that occur relatively often probably have

less potential for harm and may not even be errors at all. Error prevention efforts have focused

on examining the root causes of errors that result in serious harm. However, what is overlooked

is the information related to errors that did not result in harm but had the potential to cause

serious harm. This is known as a near miss; they are still errors in MA. For nurses to continue to

prevent MEs, it is vital to adhere to the medication guidelines, protocols, and policies of the

institution where one works, in *all* circumstances. Nurses need to alter their attitude towards

what might seemingly be strict guidelines. Safety is at risk when these guidelines are not

followed. Keeping in mind the reasons for these safety measures is to improve patient outcomes,

minimize error and keeping patients safe.

**Emotional intelligence (EI) (emotional competence [EC] & personal competence
[PC]).** Nurses are educated to achieve competency, as depicted in Benner's (1982) *From Novice
to Expert* model. Competence commonly suggests the ability to appropriately perform, known as

work performance and is linked to quality, safety, and practice (Codier & Codier, 2017; QSEN,

2014). Within the realm of competence, one can experience EC as well as PC (Codier & Codier,

2015; Codier & Codier, 2017). Emotional competence is also known as a form of EI. The

presence of EC is less clearly defined and much harder to measure yet is very important and

critical in the nurse's actions related to performance and patient care (Codier & Codier, 2017).

Research demonstrates that the level of clinical performance correlates with measured EI in healthcare workers (Brown, Williams & Etherington, 2016; Vishavdeep, Sharma, Das, Malhi & Ghai, 2016). Emotional intelligence abilities improve communication, support constructive conflict resolution, and improve individual and team performance (Beckham & Riedford, 2017). Therefore, EI ability can positively affect patient safety. Development of PC requires awareness, motivation, and practice in a transformative process that requires time and effort. Persons who exhibit fewer traits of EI experience greater difficulty identifying their PC weaknesses. Healthcare professionals are trained to reflect on performance. Emotional intelligence refers to the ability to recognize and manage one's emotions, actions, stress and performance. Therefore, EI may influence the nurse's individual performance within the clinical setting, affecting patient outcomes (Codier & Codier, 2015; Codier & Codier, 2017).

What *is* known is the relationship between EI and safety in other fields; what *is not* known *is* the relationship between EI ability and patient safety with regards to nurses' actions. A Joint Commission report of sentinel events (deaths from medical errors) from 2004 to 2015, found errors in communication to be a frequent root cause of these sentinel events. The link between communication and errors has been discussed amongst nurses since publications of the IOM report *To Err is Human* in 1999 (Codier & Codier, 2017; IOM, 2000). Medication administration is part of patient safety (Petrova et al., 2010; QSEN, 2014). Literature suggests that MEs can be caused by delay, nurses' own stress, nurses' own EI, nurses' lack of knowledge of medications to be administered, lack of communication, or lack of recognition of what is defined as a ME (Codier & Codier, 2017; Petrova et al., 2010). Exploring nurse's attitudes, perceptions and knowledge of medication events, potential MEs and frequency of these errors, adds to the body of nursing knowledge regarding MA and safety, and nurses risk perception.

Literature suggests that emotional actions and self-awareness are key skills for nurses to possess while caring for patients, as they allow nurses to recognize, understand and regulate emotions and actions (Beckham & Riedford, 2017; Codier & Codier, 2017). These key skills assist the nurse in identifying the needs of the other person and to provide individualized attention to those in their care. The literature also suggests that EI abilities can make patients safer.

Competencies from the *Quality and Safety Education for Nurses* (QSEN, 2014) focus on several aspects with two being patient-centered care and safety (Codier & Codier, 2017). The QSEN collaborative is an effort to ensure that nursing programs (i.e., undergraduate and graduate) teach knowledge, skills and attitudes necessary to continuously improve the quality and safety of the healthcare systems within which they work. The QSEN competencies go beyond nursing programs; they are assessed within the clinical work environment associated to nursing performance (QSEN, 2014). Research clearly demonstrates that the level of clinical performance correlates with measured EI in nurses. As nurses experience heavier workloads (e.g., nurse to patient ratios) the potential for increased errors is ever present (Codier & Codier, 2017; Vlachou et al., 2016). Research suggests that with the staggering number of patient fatalities each year resulting from medical errors, and because most of these errors involve issues with communication, it is essential that we identify skills that support patient-centered care, accurate communication, clinical reasoning and patient safety (Codier & Codier, 2017; Giménez-Espert & Prado-Gascó, 2017; Vandewaa, Turnipseed & Cain, 2016).

Attitudes. Hung et al. (2016) found that nursing units with high proportions of expert nurses were more likely to report high MAE rates than those with few nursing experts. Expert nurses seem to commit fewer MAEs and voluntarily report more MAEs than do non-expert

nurses. The literature also suggests how nurses are trained affects MEs related to new graduate nurses. Findings suggest that the widespread inclusion of QSEN (2014) competencies in nursing programs has an impact on student's sense of readiness to perform skills related to quality and safety and their awareness of systems-level variables in their practice. Hung et al. (2016) suggest that nurses' attitudes positively influence a nurse's intention toward reporting MAEs. Findings from their cross-sectional study of 548 participants demonstrate that personal character is an important factor affecting nurses' attitudes toward MAE reporting and that reporting MAEs benefits patients. Armstrong et al. (2017) found that nurses continuously prioritize work importance based on their attitudes. This would also suggest how student nurses are trained and educated impacts their professional practice.

In addition, Cross, Bennett, Ockerby, Busija & Currey (2015) reflect that Australian nurses use the process of double- and single checking when administering high-risk medications. Nurses must possess a sound knowledgebase to ensure that medications are administered to patients safely. Nurses must demonstrate accountability when administering medications and defer deviating from MA procedures and accepted protocols which reflect safe administration practices, as deviations have been identified as contributing to MAEs (Cross et al., 2015). Evidence reflects that one-fifth of all continuous infusions have some kind of error. The most prevalent error was deviation from the prescribed administration rate with a lack of understanding of the potential implications of administering too slowly or too quickly. Personal neglect, workload and new staff are the three most common identified categories for contributory factors. Nurses may multi-task while carrying out MA and carrying out drug preparations in advance (Brady et al., 2009).

According to Yung et al. (2016), along with understanding nurses' attitudes is

understanding if nurses are more senior in years of practice, as rank and file nursing staff may possess different attitudes and perceived barriers to MAE reporting. They mention that more senior nurses possess more positive attitudes on patient safety issues than younger nurses. According to Tang et al. (2007) approximately 32% of the nurses who had made MEs had graduated within the previous year. The average length of working experience at the time the errors occurred was 2.2 +/- 0.7 years. According to Benner et al. (2002), new graduates have limited work experience and may not recognize high-risk situations or medications (Tang et al., 2007).

Literature reflects MEs have serious direct and indirect results. Direct results include patient harm as well as increased healthcare costs. Indirect results include harm to nurses in terms of professional and personal status, confidence and practice. Medication errors typically equate to serious risks to patients. A significant financial burden arises from MEs that cause direct injury and those errors that do not cause harm, may represent waste and inefficiency (Choi et al., 2016). Ten to 18% of all reported hospital injuries have been attributed to MEs. Five percent of all reported MEs to the US Food and Drug Administration (FDA) in 2001 ended in fatalities. Data from 1993 indicated that almost 7400 patients in the US died from MEs, and patient stays associated with MEs increased by 4.6 days, with costs of almost $5000 per patient (Hughes, 2008; Mayo & Duncan, 2004). Financial costs, from research before 2007, respective to medication side effects, have been estimated from $77 million (Cheragi et al., 2013) up to $77 billion (Pournamdar et al., 2016). In 2008, medical errors cost the US $19.5 billion; approximately $17 billion was directly associated with additional medical cost (i.e., ancillary services, prescription drug services, and inpatient and outpatient care). Additional costs of $1.4 billion were attributed to increased mortality rates. The authors estimate that the economic

impact is much higher ($1 trillion annually when quality-adjusted life years are applied to those that die (Andel et al., 2012).

Medication errors are typically defined as deviations from a physician's order. Hospital ME rates can be as high as 1.9 per patient per day. Sources of errors include dispensing, calculation, monitoring, and administration of medications. Nurses are at the front line when it comes to drug administration accountability. Organizations rely on nurses as front-line staff to recognize and report MEs; however, as few as 10 to 25 percent of errors are reported. Evidence reveals that there are differences in the perceptions of nurses about the causes and reporting of MEs (Hughes, 2008; Mayo & Duncan, 2004).

As evidenced by the literature, nurses encounter errors by physicians and pharmacists as well as errors by other nurses and their own actions in the course of patient care (Breitkreuz, Dougal & Wright, 2016). If the nurse is aware of the near miss or actual ME but does not perceive the ME to be serious, the error may go unreported due to fear of consequence or retaliation (Hughes, 2008; IOM, 2000; IOM, 2001; Mayo & Duncan, 2004). Most of the common types of MEs resulting in patient death involved the wrong dose (40.9 percent), the wrong drug (16 percent), and the wrong route of administration (9.5 percent) (Hughes, 2008). Medication errors are common and costly. On occasion injury can result when medications are taken; this type of injury or harm is known as an ADE. Sometimes an ADE is inevitable. Harm can be caused by errors in prescribing, administering, or the actual taking of the medication; this type of harm or damages is not inevitable. These errors are widely agreed to be a serious problem, pose a significant hazard to patient safety, and can be prevented (Choi et al., 2016; Davidhizar & Lonser, 2003; Hughes, 2008; IOM, 2018).

Technology and process-based solutions to this problem have had some success in attempting to decrease AEs. However, the human factor component remains at the sharp edge of patient care. There is a critical need to understand and improve human resilience to preventable AEs (Benner et al., 2010; Breitkreuz et al., 2016; Hughes, 2008). The reporting of all errors, those that result in harm to the patient as well as near misses, is an essential element of developing a learning culture for safety improvements. A learning culture can help healthcare providers feel comfortable and safe to report events without retribution (Hughes, 2008; Seiden & Barach, 2006). Nurses must acknowledge and report AEs and near misses while creating safe ways to discuss the system- and performance-shaping factors that enable them to occur. These factors must become part of the healthcare culture by integrating them into a healthcare professional's (nurses) curriculum and practice (Seiden & Barach, 2006).

Clinical decision-making (clinical reasoning and critical thinking). Nursing education emphasizes critical thinking as an essential component or nursing skill (Hughes, 2008; QSEN, 2014). The American Philosophical Association (APA) defines critical thinking as purposeful, self-regulatory judgment that uses cognitive tools such as interpretation, analysis, evaluation, inference, and explanation of the contextual circumstance on which our judgment is based (Facione, 1998; Nordquist, 2019).

Many articles were found to be repetitive regarding thinking strategies utilized in a nurse's clinical decision-making. Six articles are mentioned in this study. Of the articles found, they consist of theoretical based articles and literature reviews on what nurses should be doing, rather than actual research articles. Of the six articles being included in this section, only one is an actual nursing study.

There are three key definitions for nursing which define critical thinking as being influenced by knowledge and experience, using strategies to identify issues and opportunities in our nursing practice (AACN, 2008; Hughes, 2008). Critical thinking in nursing is also identified as an essential component of professional accountability and quality nursing care. Critical thinkers in nursing practice the cognitive skills of analyzing, application of standards, seeking information, use of logical reasoning and transforming knowledge to care for their patients (Hughes, 2008). The document known as the *Essentials of Baccalaureate Nursing* by the American Association of Colleges of Nurses (AACN, 2008) defines critical thinking to include 1) independent and interdependent decision-making, 2) inductive and deductive reasoning, and 3) application and intuition.

Course work as well as ethical experiences while in nursing school, should provide the graduate with the knowledge and skills to use clinical judgment and decision-making skills, engage in the nursing process by evaluating nursing care outcomes, use of self-reflection on practice and be a creative problem solver. Critical thinking involves the application of knowledge and experience to identify patient problems and to direct clinical judgments and actions that ultimately result in positive patient outcomes (Muntean, 2017; Nibbelink & Brewer, 2018). Critical reflection requires the thinker to examine, question, and use decision-making in everyday practice to provide safe care (Muir, 2004; Muntean, 2017). Critical thinking is inherent in making sound clinical reasoning. Critical thinking comes with experience and preparation to handle clinical situations (Maharmeh et al., 2016; Wiles et al., 2013). From these articles mentioned above, there are three themes that emerge, 1) the nurse develops confidence, 2) seeks assistance, and 3) makes sound clinical decisions.

Maharmeh et al. (2016) sought to describe the decision-making process and decision activities of nurses in natural clinical settings in Jordan. The authors utilized an exploratory descriptive approach, through interview and observation, of 24 critical care nurses from three hospitals. Five themes emerged as to nurse's utilization of clinical decision-making; 1) it is an on-going process, 2) autonomy, 3) experience, power and intuition 4) joint/ethical decisions, and 5) patient advocacy. The findings demonstrated that critical care nurses are likely to be more confident and effective when dealing with patients' changing situations with their own years of experience. Findings show the skill acquisition model suggested by Benner (1982) reflects that intuitive decision-making ability comes from years of practice and knowledge accumulated from similar situations or paradigm cases. The authors conclude that nurses work toward providing the best outcomes of care and treatment through implementation of evidence-based practice (EBP). The decision-making process is influenced by many factors, in particular the nurses' clinical experience and interpretation of the available evidence within the clinical setting. It was found evident that the nurse's ability to understand the clinical situation of the patient depends mainly on the nurse's clinical experience (Maharmeh et al., 2016).

Gaps in the Literature

The literature search did not identify many recent articles for perception of error or harm to the patient from the nurse's point of view. There is a gap in the literature regarding methods to improve nursing performance associated with risk and benefit, perceived caution and perceived frequency of MEs. Much of the literature suggests what we already know: nurses should follow the rights of MA whether five, nine or 10 rights as supported by their employment, report all MEs and communicate issues or concerns in the work environment related to work-arounds, technological issues and interruptions during MA. However, what is not identified is how nurses

perceive risks of not reporting which can contribute further harm to the patient or future patients. Also not identified is perception of the nurse regarding how they perceive a potential lack of professionalism, as the literature suggests that professionalism and work ethic of the nurse is to be accountable to report errors or near misses.

Part of this gap is understanding why nurses do not perceive near misses and omissions or medications administered late as MEs, and the need to report them. The literature reflects that nurses do not clearly understand what a near miss means, or what a ME means. Employed nurses have policies and procedures, in which they must follow regarding MA. Nurses should know what these policies are and adhere to them. If adherence is not followed, there comes a risk to the nurse and to the patient. One must consider how we impress upon nursing students and practicing nurses to focus during MA, to follow the system processes each and every time a medication is administered in order to safely deliver and administer each medication. In order to ensure this type of safety, nurses are relied upon to report, discuss and communicate when the processes are not followed, so we may prevent future medication issues. Reporting is crucial for patient safety and nurses need to feel safe from retaliation.

Gaps are noted in the current literature related to quality of educational preparation of nurses prepared at the Associate and Baccalaureate levels. Nursing graduates are identified as undereducated for the demands of practice (Benner et al., 2010; Cleary-Holdforth & Leufer, 2013; Hughes, 2008; Muntean, 2017; Noland & Carmack, 2015; Simonsen, Daehlin, Johansson & Farup, 2014). Reportedly only 20% of employers were satisfied with the novice nurses' clinical decision-making abilities (Muntean, 2017). Critical skills such as clinical reasoning and critical thinking were noted as lacking and concerning in the practice arena including the high number of MEs in decision-making that lead to poor patient outcomes, and in some instances,

even death (Cleary-Holdforth & Leufer, 2013; Hughes, 2008; Nibbelink & Brewer, 2018; Noland & Carmack, 2015; Popescu, Currey & Botti, 2011).

As both a nursing educator and nursing professor, utilization of various teaching-learning strategies is important to impress upon practicing nurses and nursing students the seriousness and importance of following the rights of MA. The use of actual medication case scenarios, documentaries on MEs and incidents from medication labeling issues revolving around the rights of MA in the clinical setting opens the dialogue of consequences if MA is not followed. Teaching strategies also included discussion of legal consequences if policies are not followed with the potential of MEs. Embedding purposeful medication and IV errors in simulated experiences assists the adult learner to stop and think about their actions and the medications prior to administering the medication(s). Not all of these embedded errors are identified during the simulated encounter which brings up important discussion points in the debrief of the simulated encounter. These discussion points can be mechanism of action, medication classification, purpose for the patient to receive certain medications, how patient co-morbidities might be affected or interact with medications, as well as why is this patient getting this medication.

Another strategy is one of fun, learning medications through games, what I refer to as 'name that drug', where questions are asked to the students about medications administered during clinical that day. Students were instructed they were not to administer medications without knowing each drug inside and out. If the students could not answer questions about the medication prior to administering, simply put, they were not to administer the medication(s). Discussion of simulated events with embedded errors and previously viewed documentaries helped to reinforce the process and act of MA. As part of the students clinical learning, including

a mock courtroom experience with role play utilizing questions an attorney might use helps to impress upon the nursing student potential consequences if MEs happen. This same role play, and mock courtroom experience could be done for practicing nurses from unit educators and managers in monthly or quarterly staff meetings or annual competencies. The discussion of the medication and error is crucial to the impression that remains on the practicing nurse or student nurse. Then follow with ongoing discussion of the Nursing Code of Ethics and the Nurse Practice Act. The relevance of these strategies is helping the student identify risk(s) associated with MA.

Often, policies indicate that medications have a window of opportunity to be administered (30 minutes prior to and 30 minutes after) according to the time they are ordered or per hospital pharmacy formulary. For example, if the medication is ordered to be given at 8a.m., the nurse would have from 7:30a.m. to 8:30a.m. to administer the medication. Literature suggests if a medication is given before or after the ordered / prescribed time window, it becomes a ME and should be reported as such. One other factor to consider is if medications are mixed and then not administered within the appropriate time frame. If mixed and not delivered, efficacy or bioavailability of the medication may be affected (e.g., therapeutic serum levels within the patient) resulting in potential harm to the patient (Elliott & Liu, 2010; Sabzevar, Sarpoosh, Esmaeili & Khojeh, 2016). Certain mixed antibiotics or even units of blood can expire if not administered within the appropriate timeframe.

Other gaps identified while searching the literature in regard to medications and MA include the following: first, how nurses perceive their own behavior or risk attitudes contributing to MEs; second, how nurses assess or perceive risk and benefit of medications; third, how often nurses thought or perceived MEs to occur, meaning frequency of the error; and lastly, how

nurses address or perceive caution when administering medications. Literature identifies MEs and contributing factors to MEs such as system processes or the lack thereof (e.g., interruptions while administering medications or other reasons why medications are administered late).

Benner et al. (2002) mention that the nurse practice act(s) at the state level expect that nurses will *not* carry out and will intervene prior to the administration of any inappropriate ordering of a medication by a physician or APRN. Prevention and detection of potential and actual MEs is a major expected and legitimized role of nurses. Nurses are usually the last person other than the patient who can recognize and prevent a potential ME, as nurses are the last point of administration of a medication to the patient. Patient safety depends on nurses paying attention to patients' clinical condition(s) and responses to therapies, as well as potential hazards or errors in treatment. Poor monitoring of IV patency, infusion rates of IV fluids and medications, and the infusion of wrong dilutions are classified as MEs.

Documentation errors include charting procedures of medications before they were administered. Such a documentation error can cause a patient to miss a dose of medication or a treatment and can confuse, misrepresent, or mask a patient's true condition. Medication administration and nurse's attitudes with regards to potential harm to the patient when MAEs occur is a complex issue. Nurses receive academic preparation regarding MA and the complexities of medications. Nurses must be aware of their own work performance, recognize work situations that might compromise patient safety and have heightened awareness of risk and benefit of medications. Therefore, this nursing study was necessary to explore nurse's attitudes related to MEs, nurse's perceptions of MEs and determining risk from the nurse's point of view.

Pape et al. (2005), found human factors and distractions were contributing factors for MA errors. They identified limits on human cognitive function and the degree of stimulus that is

tolerated before procedural processes actually break down. Over-stimulation can affect precision, attention span, knowledge retrieval, concentration, and skill performance. Similar factors (e.g., human factors and distractions) were identified by Breitkreuz, Dougal and Wright (2016). Yekta and Abdolrahimi (2015) identified four attributes of EI that are necessary for nurses to provide safe effective nursing care. Codier and Codier (2017) identified skills nurses need in order to provide safety to their patients. Necessary skills of EI are needed to improve patient safety in regard to MA.

Literature reminds us that ADEs are defined as events involving patient injury that result from medication use. Some ADEs are side effects that may occur when a medication is taken correctly, while other side effects are related to MEs that occur when medications are incorrectly administered. Due to these ADEs patient morbidity can result including but not limited to increased length of hospital stay and associated increased costs.

A study by Weiss and Elixhauser (2013), presented inpatient hospital data on the four most common identified ADEs from 32 states in 2011 that participated in the Healthcare Cost and Utilization Project (HCUP). The most commonly identified causes of ADEs were steroids, antibiotics, opiates and narcotics, and anticoagulants. A study using the 2013 Statewide Inpatient Databases for eight states from the HCUP, found the highest rates of ADEs involved opiates and narcotics in urban teaching hospitals, and higher rates of ADEs in rural hospitals and urban teaching hospitals involving antibiotics. Rural hospitals, known as critical access hospitals (CAHs), had significantly higher ADE rates involving opiates and narcotics ($P < .001$). Within rural Prospective Payment System (PPS) hospitals, those with higher ADE rates were larger in bed size, accredited, and publicly owned ($P < .05$). This study did not find a consistent relationship between number of full-time staff and ADE rates by type of medication in CAHs

and rural PPS hospitals (Casey et al., 2017). These studies remind us that there are risks with MA. Nurse's vigilance in identifying errors with MA are important to thwart ADEs and MEs.

Synthesis

The literature search of current research studies in the last five years was shown not to address perception of risk, behaviors and attitudes of the RN associated with MA. Studies were noted in the literature about nurse's perceptions of contributing factors of why errors occur, naming facility issues and distractions. With no current evidence found, this investigation focused on the working RN and the rights of MA, as RNs utilize decision-making processes every day in nursing practice. Nurses administer medication(s) daily while caring for patients. With MEs continuing to occur, despite efforts for patient safety initiatives and improvement in workflow processes to minimize errors during MA, nurses are still faced with MEs.

This nursing research study included measurement tools found in the literature by Breitkreuz, Dougal and Wright (2016) and Slovic et al. (2007), as the basis for this nursing survey conducted with working RNs. During the search of the literature, no evidence was found of either a consistently used measurement tool or a gold standard measurement tool for perception of risk with RNs regarding risk(s), benefit(s) and MA errors. Varying measurement tools were found for other constructs and conducted outside of the U.S. Therefore, there is a need for valid, reliable, and responsive survey tools that query perceptions of risk in regard to medications and MEs. Therefore, the two measurement tools by Breitkreuz, Dougal and Wright (2016) and Slovic et al. (2007) were utilized for this nursing study.

The next section, Chapter III, provides the research methods used to collect and analyze data of this research study.

CHAPTER III

METHODOLOGY

Chapter III describes the research methods used to collect and analyze data, thereby contributing to an understanding of the relationship of registered nurses' perceptions of risk associated with administering medication and MEs. This chapter further describes the research design, selection of the sample, research setting, ethical considerations, the measurement tools for collection of data, addresses relevance with classical measurement theory, methods used for data collection, method of data analysis, attempts to increase validity and reliability, limitations and delimitations of the study.

Timeline

A timeline was adhered to for this nursing study and dissertation. The detailed timeline is included in this dissertation (see Appendix A, Dougal Dissertation timeline).

Research Design

The purpose of the study lends itself to a quantitative non-experimental research design. A quantitative non-experimental study design was selected in order to describe and understand relationships of the phenomena of interest: RNs' perceptions of risk associated with MA and MEs and if there are relationships between some of the demographic factors and the outcome variables. For example, variables that may contribute to MEs in the workplace are age of the nurse, years of work experience, fatigue, stress, fear of retaliation and the clinical environment. The main objective of descriptive research is the portrayal of the identified population's characteristics, setting and frequency of identified phenomena. Correlational research explores interrelationships at one point in time among two or more variables of interest without researcher intervention or control (Polit & Beck, 2017).

Power Analysis. Power analysis was conducted prior to opening the survey. The estimated sample size using correlations (N=266), with an effect size of 0.20, power of 95% with alpha of 0.05. The researcher recruited a large enough sample size (N=2306) with sufficient completers (N=1475) for the initial RN survey. Due to the large sample size, significance was overpowered. Therefore, we focused on the effect size. Power analysis is used to reduce the risk of Type II errors and strengthen statistical conclusion validity by estimating in advance how big a sample is needed. As the sample size increases, power increases. The effect size is the magnitude of the relationship between the research variables (Polit & Beck, 2017).

Research Sample and Setting

Research Sample. Registered Nurses (RNs), known as the *professional nurse*, provide direct and indirect care, are patient advocates and educators. Defining features of professional nursing practice are the focus on health promotion and risk reduction, bringing a unique blend of knowledge, judgment, skills, and caring to the healthcare team (AACN, 2018). An important component of nursing care quality is safety. One of the assumptions of *The Baccalaureate Essentials* for the professional nurse is to promote safe, quality patient care (AACN, 2008). The RN encompasses licensed nurses who have successfully passed their academic curriculum (i.e., Associate degree, Diploma program, Baccalaureate degree, Diploma) and successfully passed the NCLEX-RN® (NCSBN, 2019b).

Licensed nurses who are Licensed Practical Nurses (LPNs) or Advanced Practice Registered Nurses (APRNs) have different roles, functions, and responsibilities in their professional role as defined by their academic curriculum. Licensed Practical Nurses are under the direction of the RN. Depending on the state nurse practice act the LPN is licensed under, the

LPN may or may not be able to administer medications (IBN, 2018; NCSBN, 2019). The APRN, must initially become an RN, then achieve additional advanced academic education and training to become an advanced practitioner. The professional roles and responsibilities of the APRN are different from the baccalaureate, associate and diploma RNs. The RN in the APRN role can prescribe, diagnose, perform consultation(s) and/or procedures they are trained to do, oversee and admit patients into hospital settings. APRNs typically work in clinical environments either as extensions of a physician group or as practitioners in their own clinics that are often located in rural areas (AANP, 2019; APRNs, 2019).

Nurses who are LPNs or APRNs, by self-report, were excluded from this study through the inclusion/exclusion questions (see Appendix B) because the focus of this study was identification of bedside RN perceptions of medication administration and risk. For the purposes of this dissertation, the terms licensed nurse, registered nurse and nurse are referred to as RN.

Target population. According to the NCSBN, as of August 8, 2018, there were over 3.9 million RNs in the U.S. (NCSBN, 2018a). The target population for this study were RNs who were licensed and worked in two states in the Pacific Northwest region of the U.S.: Idaho and Oregon.

The philosophy and mission of Idaho State University (ISU) College of Nursing (CON) is to increase research and scholarly productivity, thereby improving the health of Idaho residents, including the state's rural and diverse populations (ISU, n.d.). When creating this research study, I took into consideration the ISU mission of improving patient health in rural areas as well as communities. Although much of Idaho's population is located in the southern region of the state and Oregon is quite populated in the western region of the state, both states are considered to be rural (Johnson, 2007; Wolkenhauer, 2018). Two of the demographic

questions in this study were developed asking participants if they worked in non-urban (rural) or urban settings. The definition of *rural* used with the demographic section of this study is from Health Resources & Services Administration (HRSA, 2017).

Identification of sample and setting. I (researcher) am a licensed RN in both Idaho and Oregon. The Oregon State Board of Nursing (OSBN), Idaho Board of Nursing (IBN), and American Nurses Association Idaho (ANA-Idaho) were contacted via email and phone inquiring if they would be willing to assist my dissertation research study. Inquiry was made as to purchase of RN listings from their RN database in order to recruit for this online nursing study, specifically mentioning the need for email addresses to contact RNs. The two state boards of nursing agreed to send RN listings after purchase of these RN lists. The ANA-Idaho stated RN member lists were not for purchase, however they would be willing to send out to their RN members how to access the online survey after IRB approval was obtained. All three entities agreed to assist with RN list(s) (personal communication, July 2018; December 2018).

There were nominal fees for usage of each database list of RN names and email information: OSBN ($70) and IBN ($75). Fees were paid by me personally. Lists were sent from OSBN and IBN. There was no fee associated with ANA-Idaho. The IBN RN list contained only mailing addresses; further email and phone communication occurred (personal communication, December 2018; January/February 2019). At the time the survey was to begin, per the Idaho State Controller, the IBN would not distribute nurse email listings outside of the IBN as contacting nurses from an IBN email list was in conflict of the Idaho Administrative Procedures Act (IDAPA) rules (personal communication, January/February 2019). Therefore, no RNs from the IBN database (previously purchased IBN mailing list) were contacted or invited to participate in this online nursing study. I was not reimbursed for this expense from the IBN. All RNs with

email addresses on file from the OSBN and ANA-Idaho were invited to participate in the online nursing study.

Registered nurses (RNs) licensed in the states of Idaho and/or Oregon and employed in the clinical/hospital setting were the intended population for this nursing study. The study population were RN's prepared at the Associate Degree, Diploma or Baccalaureate Degree level as their entry into practice. Participants hold current licensure in the states of Idaho, Oregon or both and self-reported holding current licensure in additional states across the U.S. Participants identified their employment in workplace environments that include clinical or hospital settings, inpatient, outpatient or both, and higher learning institutions (academia). Participants self-reported employment status.

Therefore, the sample for this research study was comprised of licensed RNs who were members of the ANA-Idaho and from the State Board of Nursing in Oregon. The State of Idaho has ≥23,000 licensed RNs (IALN, 2018; NCSBN, 2018b), ANA-Idaho has ≥800 RNs as reported by the ANA-Idaho Administrative Support Staff per their membership roster (personal communication, July 2018; ANA-Idaho, 2018). The State of Oregon has ≥61,000 RNs (NCSBN, 2018b; OSBN, 2018; IALN, 2018). Idaho hospitals report a RN workforce of **>**7,000 (IALN, 2018). During 2016, 55% of RNs in Oregon worked in hospitals (Oregon Center for Nursing [OCN], 2017).

Informed consent. Recruited participants were provided the opportunity to participate in this online nursing study. Informed consent was required from each participant before any information was obtained. The Informed Consent (see Appendix C) described the purpose of the nursing research study, benefit and risk to the participant. If the participant declined to

participate they were electronically taken to the survey exit. If the RN agreed to participate he or she was electronically taken to the survey beginning with the inclusion/exclusion questions (see Appendix B) for this nursing study.

Inclusion/exclusion criteria. Studies have inclusion and exclusion criteria which help to rule in those who meet the intended sample population. Likewise, the criteria rule out those who do not fit or are not appropriate for the sample population. The first section of the online survey consisted of the inclusion/exclusion questions (see Appendix B) that were comprised of seven filter questions using Skip Logic within the Qualtrics software program. These filter questions determined participant eligibility for continuation within the study. Participants who were not deemed eligible to continue were automatically taken electronically to the survey exit, with a message thanking them for their time. If the participant was deemed eligible from the criteria questions, participants electronically proceeded to the next group of questions within the survey. Inclusion criteria for this nursing study revolved around the following criteria:

The Inclusion criteria included:

1)   RN licensed in the State of Idaho and/or the State of Oregon;

2)   Adult ≥18 years of age;

3)   Self-report able to read/speak English.

The Exclusion criteria included:

1)   RN not licensed in either the State of Idaho and/or the State of Oregon;

2)   Licensed Practical Nurse (PN, LVN, LPN);

3)   Advanced Practice Registered Nurse (APRN);

4)   Nurse <18 years of age;

5)   Self-report not able to read/speak English.

The study population comprised those who met eligibility criteria of the sample population after consent was obtained to participate in the study.

IRB. The application to conduct the study was submitted to the Idaho State University (ISU) Institutional Review Board (IRB). After the expedited review was approved, (see Appendix D, IRB Letter of Approval), I informed the ANA-Idaho and OSBN of the approval.

Participant Recruitment. Surveys that are completely electronic, relying on email contacts to obtain internet responses, are the fastest growing form of surveying occurring both nationally and internationally (Dillman, Smyth & Christian, 2014; Polit & Beck, 2017). Nurses were invited (recruited) using an online approach to participate in this study. Those RNs who were currently licensed within the OSBN RN list and those who were current members of ANA-Idaho and had email addresses on file formed the purposive population from which to select a sample. Purposive sampling is a sampling method using researchers' knowledge about the population to make selections (Nieswiadomy & Bailey, 2018; Polit & Beck, 2017). Imperative to purposive sampling for this study was RN licensure in one or both of two identified states. The researcher has worked in the clinical setting in both Idaho and Oregon.

Study participants were recruited electronically from within the identified sample populations (i.e., ANA-Idaho, OSBN) for this online survey *if* the RN email address was on file within the respective RN lists. A total of 44,095 emails were sent with the Invitation to Participate (see Appendix E) in this research study. Within this invitation were instructions on

how to access the web-based (online) survey. The survey was accessible via an included electronic link (hyperlink) within the Invitation to Participate. Potential participants could click on the link and go directly to the study, or they could copy/paste the weblink in their browser. Once the potential participant accessed the survey they were then able to view the Informed Consent. All had opportunity to access the survey and either consent or decline participation.

The survey format allowed the survey responder (once they entered the survey), to complete the survey. The responder was not able to save responses, exit and return to study questions at another point in time to complete the survey.

A fundamental premise of the nursing profession is that of helping others. According to Dillman et al. (2014), social exchange principles as noted by Blau (1964) and Homans (1961) indicate that "…people feel a sense of reward from knowing they have helped others…showing positive regard for others can also be rewarding." One could infer that nurses feel a sense of reward from knowing they help others. According to Dillman et al. (2014), "the better known an organization is to potential respondents, the greater the likelihood they [study participants] will respond provided the recipients of the request see it as a legitimate organization and do not view it in a negative way." Recruiting from RN lists in collaboration from known organizations (e.g., OSBN and ANA-Idaho), might have helped potential respondents respond to this nursing survey.

The survey questionnaires are explained in detail later in this chapter under the sub-headers of Data Collection Instruments.

Research Setting. The setting for the RN participants related to MEs is a patient-centered place of work (e.g., hospital, clinic, hospice, home-care). The setting for the RN

participant to take the online survey was a location of their choosing (e.g., place of work, home, library) on an electronic device of their choosing (e.g., tablet, computer, phone).

Ethical Considerations

Expedited review by the IRB of ISU was requested due to minimal risk of study methods to participants (ISU HSC, 2015; OHRP, 2016; Polit & Beck, 2017). The ISU IRB reviewed this minimal risk web-based (online) survey. No potential participants were contacted until approval had been granted from the IRB. No information or data were collected until each participant had provided consent to participate.

The researcher provided the administrative support staff (of the American Nurses Association Idaho [ANA-Idaho]) with the ISU IRB approval information (see Appendix D), as well as an invitation to participate in the study, including the survey link. Per prior agreement with this researcher, the administrative support staff of ANA-Idaho sent out the invitation to participate to all 569 RN members with an email address on file. The researcher did not have access to the membership email roster.

The researcher provided the OSBN with the ISU IRB approval information (see Appendix D). Additional information provided to the OSBN included title of the survey and a 2 to 3 sentence description of the survey being conducted. The invitation to participate and the survey link were sent out to the email addresses previously purchased from the OSBN by means of a created distribution list within the Qualtrics software.

Benefits. For this study, the benefit for the RN by participating in this study may enhance personal self-reflection of MA. This study helped to clarify relationships between nursing, medications and perception of risk. There was no direct compensation for participation.

Participants, however, were given the opportunity to be included in a drawing for a gift card offered as a token of appreciation from the researcher for completing the entire survey. Participants were given an additional opportunity to participate in a drawing for a gift card offered as a token of appreciation if they participated in the test-retest. Within one day after the survey closed winners of the gift cards were determined via random drawing and notified. Within one day after the test-retest winners of the gift cards were determined via random drawing and notified.

Risks. Study participants were informed of minimal to no more risk than people encounter in everyday life or during the performance of routine physical or psychological examination or tests. Due to the nature of the study, there were only minimal potential risks to participate in the study. No reporting of any kind occurred.

Data Collection

Data Collection Process. *Preview of Initial survey (pilot test).* Prior to the opening of the nursing study, the online survey was created within the Qualtrics (Q qualtrics™) Software survey program. The Qualtrics program is described in further detail later. The survey was then sent to six individuals who had volunteered to pilot test the survey (personal communication, January/February 2019) (i.e., the dissertation committee, one ISU nursing professor, and two PhD(c) doctoral students from my cohort) in order to test function, ease of navigation and provide a more accurate time for completion of the questions.

The benefit of testing questions and questionnaires helps one diagnose and solve potential problems before the survey is released to study participants as well as time to take the survey (Dillman et al., 2014). Therefore, the purpose of the pilot test of the questions were, 1)

readability and understanding of the survey questions placed within the electronic software, 2) estimation of the length of time for survey completion, and 3) functionality (mechanics) of the survey in the electronic software. Feedback was received and incorporated from those that participated in the pilot test. Minimal issues were identified, addressed, and fixed for functionality prior to participant involvement. Feedback of length of time to take the survey, ease of navigating survey, ability to move forward and backward from question to question, two typographical errors and if one question was meant to be a hard-stop question were identified and corrected.

Participants were able to move forward from question to question as well as return to previously answered questions within this part of the survey, as participants may decide to change their response prior to going on to the next question. According to Dillman et al. (2014), allowing participants the ability to back up with previous questions can improve quality of the data.

The internet was the setting for this electronic self-administered/self-reported survey (questionnaire). The premise was that study participant(s) could access and complete the survey at any time during the data collection period in the physical location of his or her choosing, using an electronic means of his or her choice (e.g., personal computer, phone, workstation computer) with internet access (Jacobsen, 2017). Survey questions were made available to participants through the means of this internet-based method and format. Participants answered the questions directly into the survey software and were instructed to begin and submit the survey after they answered the questions.

When the participants began the survey, the first screen viewed by a potential participant was that of the Informed Consent. If the participant declined to participate, they were

electronically taken to the survey exit, thanking them for their time. If the individual agreed to participate, they were then directed electronically to the next screen, Survey Welcome and Instructions (see Appendix F), where a welcome greeting was displayed including instructions how to navigate through the survey. The participant would then navigate through the survey answering survey questions. After the survey welcome, RNs answered the inclusion/exclusion questions. If potential participants did not meet inclusion/exclusion criteria, they were thanked for their time as they were directed to the survey exit.

For those participants that met inclusion/exclusion criteria, the next sections viewed were the survey questions:

- Measure A: Demographic Questions (see Appendix G) then,

- Measure B: Inquiry of Participant Medication Error (see Appendix H) then,

- Measure C: Risk Questionnaire: Perceived Frequency & Perceived Caution (see Appendix I) and then followed by,

- Measure D: Pharmaceutical Questionnaire (see Appendix J).

These data collection instruments are described in further detail later in this chapter. At this point of the survey, there was an Optional comment section (see Appendix K) for RNs to type in additional comments regarding MA. Directly following this optional section was a screen that thanked the participant for completing the nursing survey and asked if they would like to be entered into a gift card drawing (see Appendix L, Gift Card Drawing Information). The next screen viewed by participants was a Request for Follow-up Questions (see Appendix M). If the participant decided they did not want to retest they simply exited the survey as they were thanked for their time. For those that did volunteer to participate in the retest they were instructed to type

in their email address to be contacted by the researcher when the retest was available. The participants were not told at this time which six questions would be in the retest. The retest (follow-up questions) would consist of Measure C (see Appendix N, Follow-up/Retest Survey: Risk Questionnaire: Perceived Frequency & Perceived Caution).

Reminder emails throughout a study are important to remind participants to respond to the survey (Dillman et al., 2014; Polit & Beck, 2017). On Day Three of the initial survey, participants were sent a reminder email (see Appendix O, Reminder Email Day 3) to encourage participation of the survey. On Day Ten, participants were sent a reminder email (see Appendix P, Reminder Day 10) to encourage participation, including the end date of this survey. For those participants who volunteered to participate in the follow-up survey (retest) of six questions, they were sent a reminder email (see Appendix Q, Retest Email Reminder) for the retest questions within one week of the closure of the initial RN survey. Each of the participants that participated in these retest questions, viewed a screen thanking them for their participation and gave them the opportunity to be entered into a gift card drawing (see Appendix R).

Qualtrics software. The survey was conducted via the electronic Qualtrics (Q qualtrics™) Software survey program. Using this survey program, the potential participant accessed the electronic survey link and then was provided access to the survey after providing consent. The Qualtrics software is described in further detail.

Per the ISU information, Qualtrics is an Application Service Provider (ASP) with a Software-as-a-Service (SaaS) platform where one can create and distribute an online survey. Qualtrics stores the collected survey data on servers maintained by Qualtrics that can be downloaded to local workstations. The survey has a primary author under the ISU Qualtrics license who is responsible for content posted in Qualtrics, and subject to the rights and

obligations in the academic community. As the researcher, I am the primary author for this survey.

Qualtrics is both FERPA and HIPAA compliant (Qualtrics, 2018). According to the Qualtrics Security White Paper (2015), transmitted internet data is encrypted by the Transport Layer Security (TLS), meaning data and responses are secure. All data at rest are protected using electronic controls and destroyed by U.S. Department of Defense (DOD) methods delivered to a third-party data destruction service. Qualtrics enables its customers to control individual permissions of their accounts and surveys. Qualtrics deploys high-end sophisticated firewall systems, physically segmented back-end systems and high-level security on workstations. Qualtrics uses Akamai perimeter and monitoring solutions to prevent service attacks.

Data Collection Instruments. The data collection instruments (tool) utilized for this research study are introduced and described in this section. The data collection instrument is a four-sectioned questionnaire. The data collection instrument include(s): 1) Measure A: Demographic Questions (see Appendix G); 2) Measure B: Inquiry of Participant Medication Error (see Appendix H); 3) Measure C: Risk Questionnaire: Perceived Frequency & Perceived Caution (see Appendix I); and 4) Measure D: Pharmaceutical Questionnaire (see Appendix J).

A questionnaire format was utilized for this study because questionnaires are used to gather self-report data. This format is an accessible, economical and convenient method to reach a potential large number of individuals in an online survey. Nieswiadomy and Bailey (2018) mention that questionnaires may be used to measure knowledge levels, opinions, attitudes, beliefs, ideas, feelings, and perceptions.

Questions about demographics of the participants and one survey tool (Measure B) were developed for this study. The other two survey tools used in this study were adapted from Breitkreuz, Dougal and Wright (2016) and Slovic, Peters, Grana, Berger and Dieck (2007). A total of 47 questions were sent to Idaho and Oregon nurses with email addresses on file with the Oregon State Board of Nursing and the American Nurses Association-Idaho (ANA-Idaho). Data were electronically collected from online responders using the Qualtrics software program. Total number of respondents were 2306 with 1475 participants meeting inclusion criteria. Surveys were completed by the 1475 participants who met the inclusion criteria.

Measure B, Measure C and Measure D utilized the Likert scale format; Likert scales are also known as attitude scales (DeVellis, 2017; Polit & Beck, 2017). The Likert scale provides a numeric score to place respondents' answers. Scales, such as the Likert scale, provide a numeric score on a continuum to quantitatively discriminate differences in attitudes and perceptions (Polit & Beck, 2017).

In this research study, respondents were asked to register the level to which they agreed or disagreed with a set of statements. In other words, the respondent is asked to report his or her attitudes or feelings on a continuum. Typically, there are 5 to 7 response options (categories) ranging from strongly disagree to strongly agree or similarly worded anchors as the respondent indicates the strength of agreement with the statement. Likert scales measure psychological attitudes in a quantifiable way and are commonly used in many studies of health care quality and outcomes. The Likert measurement scale has variability in order to discriminate differences in the underlying attribute; otherwise, correlations with other measures will be restricted. Respondent's attitudes are often compared by examining the scores that are obtained for each

person or each group (DeVellis, 2017; Dillman et al., 2014; Jacobsen, 2017; Nieswiadomy & Bailey, 2018; Plichta & Garzon, 2009).

Measure A: Demographic Questions **(see Appendix G).** The purpose for collecting demographic information is to better understand the characteristics or attributes of the participants who volunteered information and responses to the survey questions; to get to know your population. These attributes describe our sample and determine the population for generalization of the study findings. These characteristics include but are not limited to gender, ethnicity and age as these are essential demographic variables to examine in all types of research (Grove, Burns & Gray, 2013; Nieswiadomy & Bailey, 2018). Demographic variables were selected according to the focus of this nursing study (e.g., years having worked as an RN, workplace setting and environment, employment status, academic preparation, nursing licensure, state of licensure, primary role as an RN, marital status, age, shift worked, ethnicity, gender) and if RNs administer medications to patients in their primary role as an RN. The demographic measurement tool (data collection tool) consisted of 18 questions. Time for completion of this section was anticipated to take up to three minutes. The Institutional Research and Assessment (2017) New Federal Race and Ethnicity categories, were applied and provided within this nursing survey (see Appendix G).

When this study was being organized, Benner's (1992) Novice to Expert theory correlated with my thoughts about MEs and the stress and fear associated with a new RN job. Benner's basic premise that the term *novice* implies one that is a beginner with little to no experience is taught how to perform tasks and has little flexibility in how they perform these tasks. For example, as nurses progress or transition from novice to expert, they advance from a strong foundation of abstract principles and learn how to be a nurse. Nurses use past experiences to

guide his or her actions. Nurses change in perception of situations and become an involved

performer. As the nurse transitions to more years of experience, the nurse's actions are guided by

years of experience, the clinical environment and decision-making (Benner, 1982; Peña, 2010;

Petiprin, 2016b).

   ***Measure B: Inquiry of Participant Medication Error* (see Appendix H).** This

measurement tool asked participants to answer questions in respect to their beliefs and

perspectives of making a ME within the next 12 months; not only about themselves but that of

their peers as well. Questions queried participants' perceptions of risk(s) that contribute to

making MEs. Questions further explored the use of reporting systems within the workplace

environment and if participants were likely to report MEs.

   These questions were created by the researcher for this study. These 13 questions were

designed to address participant perceptions of fear or support in the workplace environment.

Identified in the literature review section of this study, these questions target the significance that

nurses perceive regarding reporting or not reporting MEs or near miss events. Estimated time to

complete these questions, 5 to 7 minutes.

   ***Measure C. Risk Questionnaire: Perceived Frequency & Perceived Caution* (see**

Appendix I). This measurement tool (data collection instrument) was to measure the nurse's

perception of how often MEs occur in a typical clinical nursing unit (frequency of an error) and

the nurse's perception, compared to their peers, of how cautious they are when administering

medications. This tool measures MEs, IV fluid errors, and errors in the rights of MA. The

purpose of this nursing study focused on MEs and perception of risk of the practicing nurse (RN)

associated with AEs. The researcher chose to measure perceived frequency of AEs because

decisions to comply with risk reduction strategies are likely to be grounded in perceived

frequency of events, the medication error. Measuring perceived caution, as noted in the study by Breitkreuz et al. (2016) in relation to peers, is expected to reflect both intention to comply with risk reduction strategies and likelihood of behaviors in comparison to peers' behavior as a frame of reference.

Therefore, the survey previously designed for evaluating perceived frequency of AEs and perceived caution in comparison with peers was adapted for use in this study. This six-question survey was originally utilized in four previous small studies with a sample consisting of nursing students and practicing RNs. The survey by Breitkreuz et al. (2016) incorporated medication & IV fluid administration errors, wrong patient, wrong procedure, or wrong site errors and the occurrence of falls. All of these are medical events or errors that can occur in typical medical-surgical nursing units. Questions in this survey combined both medication and IV fluid errors into one question. Data from one of the previous studies (N=278) revealed a Cronbach α value of 0.53 for the frequency question and 0.85 for the caution question across different error types. Post hoc analysis from the experiment indicated stability of responses over time with Cronbach α value ranging from 0.68 to 0.88 for frequency and caution questions across time within error types.

For the purposes of this nursing study, after obtaining permission to adapt the measurement tool, two compound questions from Breitkreuz et al. (2016) that combined both MEs and IV fluids were separated into two separate questions in anticipation of strengthening the reliability of the measurement tool; one question for MEs and one question for IV fluid errors. Although two questions about falls are about risk and AEs, they were deemed not relevant to use in this study about MEs; therefore, these two questions about falls were adapted to reflect the IV fluid error question. For the current study, wording was changed to reflect the process of rights

of MA rather than procedural processes. The question on wrong patient, wrong procedure or wrong site errors was adapted to reflect errors in the rights of MA. The questions comparing the RN and peers were adapted to address MEs and IV fluid errors separately.

Adaptation of questions for this study:

1. How frequently do you believe medication errors occur in a typical 30-bed medical-surgical unit?

2. How frequently do you believe IV fluid errors occur in a typical 30-bed medical-surgical unit?

3. How often do you believe errors in the rights of medication administration occur in a typical 30-bed medical-surgical unit?

4. Compared to your peers, are you more or less cautious in the process of medication administration?

5. Compared to your peers, are you more or less cautious in the process of IV fluid administration?

6. Compared to your peers, are you more or less cautious in checking patient identity prior to an intervention?

This measurement tool was deemed a good foundation for this research study. Use of this measurement tool with adaptation was warranted related to perceived caution, frequency, and risk associated with MA. No current gold standard or commonly used measurement tool assessing or determining perception of risk in RNs and medications was found conducted in or outside of the U.S. This current study added to the reliability of the measurement tool first presented in the Breitkreuz et al. (2016) study. Although primarily testing for reliability, we further validated the study by Breitkreuz et al. (2016). The purpose for further validation is to

measure the instrument for what it is intended to measure in relation to the purpose for which it is being used (Carmines & Zeller, 1979).

All study participants answered these six questions in this nursing study. The six questions on perceived frequency and perceived caution as to risk from the participants' (RN) point of view regarding MEs that can occur in a healthcare setting were anticipated to take the participant up to three minutes to complete. Three questions within this questionnaire were designed from the Breitkreuz et al. (2016) study in a positive direction 7-point Likert format. The choices or anchors for this 7-point Likert format are: 1=about once every few years to 7=more than once every day. The next three questions were designed in a bipolar scale measuring both direction of positive and negative. The level or magnitude of how positive or how negative of opinions was gauged with a 9-point Likert scale. The choices for this 9-point Likert format are: -4=much less cautious to 4=much more cautious. The Likert format was kept the same regarding the choices or anchors for participant responses for this current nursing study.

Measurement C was also used as the follow-up six question survey (see Appendix N) in the test-retest analysis with study participants who would volunteer to take retake these six questions. According to Grove et al. (2013), independent t-tests examine differences between two independent groups and is a common parametric analysis technique used in nursing studies to test for significant differences.

***Measure D. Pharmaceutical Questionnaire* (see Appendix J).** The purpose for this measurement tool was to measure risk to those exposed (people who are exposed to this item are at risk of experiencing personal harm from the item) and benefit (how beneficial do you consider this item to be) to pharmaceutical items (medications). Participants were asked to rate each item that closely represents their beliefs about each of the items. Nurses administer medications in

clinical settings. Some medications are considered to be more risk type of medications while others are considered low risk and have much benefit to those that take them. Permission to use and adapt this measurement tool was obtained from Dr. Paul Slovic (personal communication, July 2018).

Nurses administer medications daily that have great risk, especially if given incorrectly, to the wrong patient, or administered late. Part of perception is assessing one's risk. Nurses are exposed to many stressors in the clinical setting, which can contribute to MEs and may include medications considered to be of high risk. The Slovic et al. (2007) questionnaire measures association of risk attitudes and association to risk of exposure and benefit(s) to identified pharmaceuticals. According to Slovic (1987), humans have an additional capability that allows them to alter their environment as well as respond to it; this capacity both creates and reduces risk. Most citizens rely on intuitive risk judgments, typically called *risk perceptions*. The level of one's knowledge influences the relation between perceived risk, perceived benefit, and risk acceptance (Slovic, 1987).

In the study by Slovic, Peters, Grana, Berger & Dieck (2007), responses on rating scales were anchored by descriptive phases at the extreme values (1 and 7). Each of the 32 items, were rated on characteristics of risk, similar to those found to be important in prior studies of perceived risk. Respondents rate the risk and benefit for each of the 32 items. The term risk was left undefined in the study by Slovic et al. (2007) to allow the respondents to freely interpret the term. The researchers made a point to state that as a result, risk does not necessarily refer to the probability of an AE associated with any other construct and there is no way to gauge the accuracy of a person's risk ratings by comparing them with statistical probabilities.

For the purpose of this nursing study, the term risk was left undefined to allow the respondents to freely interpret the term, as risk can be perceived differently one person to another. In addition, only the risk and benefit scales (section 4) of Slovic et al. (2007) pharmaceutical questionnaire were used, consisting of 32 of the 53 items, as the 32 items are deemed by the researcher to be appropriate for the researcher's questions.

In the study by Slovic et al. (2007), a risk perception index and benefit perception index were created by averaging each respondent's risk and benefit judgments across the 32 pharmaceutical items. Analysis of means for specific subgroups of respondents showed there were gender differences in risk perceptions for various pharmaceutical items. Slovic et al. (2007), also identified there are differences amongst ethnicity in regard to perceptions of risk. Individuals have varying beliefs about perceptions of risk and benefit based on gender differences and marital status.

According to Slovic et al. (2007) upon analyzation of the data from all scales used for the 53 items, all differences were statistically significant ($P <.05$ to $P <.001$). Findings showed that perceived risk and benefits are inversely related. The correlation of the mean responses across all items was -0.36. Across the subset of 32 pharmaceutical items, the correlation was -0.46. Most prescription medications fall into the low-risk / high-benefit category. Drugs for AIDS, hormone replacement therapy and depression fall into the high-risk / high-benefit category. Slovic et al. (2007) mention that people base their risk and benefit judgments on how they feel about the activity or technology, a process called the affect heuristic. If their feelings are favorable, then they tend to judge the risks as low and the benefits as high. If their feelings are unfavorable, then they tend to judge the opposite—high risk and low benefit. Slovic et al. (2007) state assuming the 7-point Likert scales are commensurate, that the risk mean can be subtracted from the benefit

mean for each item. Dr. Slovic's pharmaceutical questionnaire asks the study participant to make quantitative judgments about the relative riskiness of various items. A rating task elicited quantitative judgments of risk and benefits found to be of importance in previous studies of risk perception. Dr. Slovic's survey had previously been conducted in Sweden and Canada (1987 – 1991) and in the U.S. in 2003 (Slovic et al., 2007).

The sample population studied in the U.S. by Slovic et al. (2007) consisted of an online research panel that was representative of the entire U.S. population (N=2,001), response rate of ≥69%. The sample population consisted of 52% with some college education and 73% from metropolitan areas. The pharmaceutical ratings led to only two basic dimensions risk and benefit, and these were strongly negatively correlated.

Therefore, the proposed nursing study will be done in a different population from the study by Slovic et al. (2007), that of working RNs in the U.S. Utilization of this tool further contributed to reliability and validity of this measurement tool, as no evidence had been found of nurses being studied in regards to perception of risk and medications in the U.S., and no gold standard measurement tool had been found. For this nursing study, we elicited quantitative judgments of risk and benefit(s) on risk perception for the sample population from section four of the survey, which consists of 32 pharmaceutical items found to be of risk.

Slovic's questionnaire was designed in a bipolar scale, measuring both direction of positive or negative and the level or magnitude of how positive or how negative of opinions in a 7-point Likert format. This format was kept for this nursing study. There are two scales in table format: 1) Risk to those Exposed and 2) Benefits. Each scale includes the same list of 32 pharmaceutical items. Participants were asked to rate each of the items and then answers the scale that most closely represents their belief about each of the items. Response options for Risk

to those Exposed are 1=they are not at risk to 7=they are very much at risk. Response options for

Benefits are 1=not at all beneficial to 7=very beneficial. This questionnaire in the nursing survey

was anticipated to take the participant up to 15 minutes to complete. Each choice (anchor) was

explained within the scale format questionnaire.

 Classical measurement theory. The classical measurement model provided relevance

to this study regarding use of the measurement tools and the population of interest. Classical

measurement assumes that the value of each indicator in the instrument reflects the latent

variable to be studied (DeVellis, 2017). In classical measurement theory, the scoring of items on

an instrument measuring the latent variable is assumed to be caused by the latent variable, and

therefore, should correlate with each other and is conducive for use in scales (DeVellis, 2017;

Polit & Beck, 2017; Tavernier, 2009).

 Classical measurement theory states that the observed score (the score obtained from the

items) represents the true score or the quantity associated with the latent variable plus

measurement error (Munro, 2001). This measurement error is referred to as the residual score, as

it represents the imprecision inherent to some extent in any research instrument. The

measurement model is a model of how theoretical constructs are measured. The measurement

model indicates that we are hypothesizing that perceived frequency of MEs, perceived caution in

regard to MEs, attitudes of nurses, risk and benefit are all indicators for the construct behavior

(see Figure 1). The theoretical constructs are known as latent variables because they are not

measured directly by the researcher (Munro, 2001; Polit & Beck, 2017). In this study, the

construct was behavior, which was not directly measured. Causes of behavior can be how

frequent we are involved in MEs, if the nurse uses caution when administering medications,

perceives risk with medications, believes there is a benefit to medications and the number of years the nurse has worked and administered medications. Behavior can be affected by all of these however; some of the variables are associated with one another.

Data Collection Plan. The entire survey was calculated to take up to 25 minutes of the participant's time. The time was an estimate based on the pharmaceutical questionnaire as reported in the literature (Slovic et al., 2007), the Qualtrics software program once the entire survey was created within the program and those involved in the pilot test prior to the survey being sent to potential participants.

Token of appreciation. According to Dillman et al. (2014), small incentives or tokens may slightly increase participation and response rate. Therefore, as a token of appreciation for participation in the research study, study participants were offered the opportunity for two different drawing opportunities, after the initial survey and after the retest, to win one of four Amazon gift cards, for each drawing.

Gift card drawings. Each of the two gift card drawings took place within one day of the survey closure. Winners were randomly selected using the participants' email they entered into the survey (see Appendix L, see Appendix R). Those participants who won the gift cards were notified by email from the researcher, using the participants' email they entered into the survey, for the online Amazon gift card(s). The researcher asked each winner where they would like the gift card to be sent. Once this information was received, the researcher sent the gift cards within one day to the winner. Gift cards were sent within a Thank You card. The first-class postage stamps (x8), Thank You cards (x8) and Amazon gift cards (4 x $25 each = $100; 4 x $10 each = $40; total of $140) were all paid for by the researcher.

Data maintenance within the software program. During the time the survey was open, data were maintained through the computer software program. The participants responded to survey questions directly to the survey software. The survey and raw data remain in the Qualtrics software program under the researchers secure login.

Storage and maintenance of downloaded data. There was no identifying information as to the study participant associated to each completed survey or survey response. Those participants who volunteered to retest after the initial survey entered an email address for the researcher to send the link for the retest. Email addresses are not reliable for identification of a participant or individual. There were no hard copy documents from the study participant for this online nursing survey. Participation in the online survey was voluntary. Privacy and confidentiality were maintained throughout the duration of the study. Several participants contacted the researcher by phone and email during the course of the study; participant names were not shared with anyone. Only message content from emails were shared within the study results section if permission was granted by the participant. The researcher did not collect any ISP information. The researcher had access to survey data as responders participated and submitted their responses into the survey. The survey and data within the Qualtrics software program was password protected by the researcher.

Raw study data for the initial RN survey were retrieved and downloaded from the Qualtrics software within five days of survey closure into the SPSS program. Raw study data for the retest questions were retrieved and downloaded from the Qualtrics software within two days after the retest questions were completed into the SPSS program.

The initial survey was open for two weeks. For those respondents who agreed to retake the six questions, they had survey access made available to them by accessing the survey

hyperlink within the retest email sent to them following closure of the initial survey. The retest

survey was open for four days. Once the participant completed or exited the initial survey and

the retest survey, the data was then stored within the Qualtrics software.

The cleaned data were stored on the researcher's password protected laptop and

encrypted flash drive. The laptop and flash drive were maintained in the researchers locked

room, that only the researcher could access. The researcher's secure laptop has virus and threat

protection. The researcher maintained a study file documenting the progress of the study. This

file, per the ISU Human Subjects Committee (HSC) (2105), is subject to review by the (HSC),

federal or state authorities (HSC, 2015). All survey information was kept confidential.

The research records and data (file, aggregate data) will be maintained during the

research study and for at least three years after completion of the research study, per the ISU

HSC (2015) manual; IRB approval was up to five years. Confidentiality of the study participants

and the research records (file) will be maintained for the life of the data. For statistical purposes

(i.e., analyzing the data, verification of the data) only the researcher's Dissertation Committee

and applied science statistician had access to the data to ensure appropriate analysis of data. The

data is subject to audit by the ISU HSC, federal or state authorities. Aggregate data will be

reported in research publications and at conferences indicating that data were collected from two

states within the Pacific Northwest region.

Data Analysis Plan

After data collection closed data were retrieved from the survey program. Data cleaning

occurred. Data analysis commenced after data cleaning. Data were evaluated looking for smaller

groups that might have occurred needing possible weight adjustment. Weight adjustment was

deemed unnecessary. Post-stratification weighting is an adjustment that ensures that the final weighted survey sample is representative of the population of interest and may improve predictive validity (Dillman et al., 2014; Jacobsen, 2017; Polit & Beck, 2017; Slovic et al., 2007).

Data were analyzed using the IBM® Statistical Package software for the Social Sciences (SPSS®) version 25 and SAS Institute Inc., JMP® version 14. Statistical tests utilized for this descriptive correlational analysis included parametric and non-parametric tests. Statistical significance was determined using an alpha of 0.05.

The basic premise of this study was to explore RN perceptions of MA. The three research questions for this nursing study were identified in Chapter I and are presented and discussed in relation to the statistical tests conducted for each measurement tool. All participant optional comments were reviewed and are identified in the appendices.

Research Question 1. Do nurses perceive risk in medication administration in everyday practice? To answer question 1, we used descriptive reporting of RN responses, measures of central tendency, Pearson's *r*, Spearman's rho and chi-square.

Measure A: Demographic Questions (see Appendix G). Responses from this data collection tool were used to describe the sample population.

Measure B: Inquiry of Participant Medication Errors (see Appendix H). Responses from this data collection tool were used to correlate variables.

Measure C: Risk Questionnaire: Perceived Frequency and Perceived Caution (see Appendix I). Responses from this data collection tool were used to explore RN perceptions of risk.

Research Question 2. How is a(n) RN's self-reporting related to medication administration errors and risk? To answer question 2, we conducted tests of correlation (Pearson's *r*, Spearman's rho, chi-square) in order to determine relationships in the population between these three variables, perceived frequencies of medication errors, perceived caution, and perceived risk. We used descriptive reporting.

Measure B: Inquiry of Participant Medication Errors (see Appendix H). Responses from this data collection tool were used to correlate variables.

Measure C: Risk Questionnaire: Perceived Frequency and Perceived Caution (see Appendix I). Responses from this data collection tool were used to explore RN perceptions of risk.

We assessed this tool for reliability, as reliability must be continually assessed as the instrument is used with different subjects and under different environmental conditions (Nieswiadomy & Bailey, 2018). When we assess for reliability, one of the assumptions is that the items in the scale are parallel, which implies that the items measure a single phenomenon equally. There are two conditions under which real data can violate these assumptions: if the items measure a single phenomenon unequally or if the items measure more than once concept equally or unequally (Carmines & Zeller, 1979). Along with assessing each question separately for responses from the RN participants, the test-retest method was used for this measurement tool comparing the initial survey responses to the RN participants who volunteered to retake the six questions after the initial survey.

Measurement C was used as the follow-up six question survey in the test-retest analysis with study participants who volunteered to take this retest (N=816). Actual participant response

(n=440). After data cleaning total completers (n=419). Respondents were then paired by their email addresses for the test-retest comparison (N=272). According to Grove et al. (2013), independent t-tests examine differences between two independent groups and is a common parametric analysis technique used in nursing studies to test for significant differences.

Research Question 3. Do nurses perceive benefit and risk to medications during the medication administration process? To answer question 3, we used descriptive reporting, measures of central tendencies, and a paired samples t-test was conducted to determine whether or not individuals perceive risk and benefit associated with medications.

Measure D. Pharmaceutical Questionnaire (see Appendix J). Responses from this data collection tool were used to conduct correlation of 32 pharmaceutical items in regard to risk and benefit scores.

The next section of this chapter describes the statistical tests that were conducted for the research questions guiding this study.

Statistical Tests

Paired t-test. The test-retest design is common in health services research (Plichta & Garzon, 2009). The type of reliability that concerns the extent to which scores for individuals who have not changed are the same when a measure is administered twice; an assessment of a measure's stability (Polit & Beck, 2017). Test-retest reliability analysis has not been a standard feature of psychometric assessment in nursing research; test-retest reliability can be a particularly important indicator of a scale's quality (Munro, 2001; Polit & Beck, 2017). Timing decisions must balance the risks for different potential sources of error. When the time interval is too brief, carryover effects can lead to artificially high estimates of reliability while other factors, including

true change, could depress reliability coefficients. Some experts advise that the time interval between measurements should be in the vicinity of 1 to 2 weeks (Polit & Beck, 2017).

The paired t-test design looks at paired data, comparing the measurement(s) of the same variable at two different points. The variable can be measured on the same person at two different points in time (Plichta & Garzon, 2009). The statistical analysis of paired data assumes that measures are likely to be correlated because they are taken from the same or very similar participants. The paired t-test is used to measure differences in the central tendency (e.g., mean, median) in the paired data. The paired t-test is a sensitive parametric test that allows a comparison of the means of the two correlated (paired) groups or variables that are interval or ratio in measurement scale and normally distributed. To do this, the data must meet certain assumptions; therefore it is necessary to know the following: a) that only two measurements (i.e., test-retest) are compared, b) the total sample size, c) whether the two measures of the variable are normally distributed, and d) the measurement scale of the variable measuring the characteristic of interest (Plichta & Garzon, 2009). According to Plichta and Garzon (2009), if the paired t-test is used when one or more of its assumptions are not met, there is a threat to its internal validity (i.e., statistical conclusions) because the computed p-value may not be comparable to the t-distribution. However, the paired t-test can be used with confidence, and there is a lower risk of error if just a few assumptions are violated, the sample size is large, the data are not too skewed, and there is a fairly large range of values.

Correlation was conducted on the retest questions, meaning the retest scores were compared to the test scores from those participants who took both the test-retest six questions. Responses were reviewed to see if there was a significant difference in responses to each question meaning, the test-retest responses were compared for variances, differences and

correlation. The stability reliability of an instrument refers to its consistency over time. If the

subjects' responses are almost identical both times (test-retest) the instrument would be

determined to have high test-retest reliability (Nieswiadomy & Bailey, 2018). Next, the

significance level (alpha-level) was defined and the degrees of freedom (*df*) were determined. In

order to say that a statistically significant difference exists in the means of the two measures, the

computed value of the paired t-statistic must exceed the critical value (Plichta & Garzon, 2009).

Next, data were reviewed to meet the necessary assumptions: 1) the measures of the dependent

variables for the two means are correlated, 2) the dependent variable is a ratio variable, and 3)

the dependent variable has a normal distribution (Plichta & Garzon, 2009).

     Correlation (Pearson's r). A parametric test that researchers use to determine whether an

association exists between two variables of interval or ratio measurement scale, factoring in that

both variables are normally distributed (Munro, 2001; Plichta & Garzon, 2009; Polit & Beck,

2017). The correlation coefficient measures strength of the linear relationship between two

variables and can range from -1.00 to +1.00. The *r* indicates a perfect *inverse relationship*

(correlation) (-1), *no relationship* (0) and a *perfect positive relationship* (correlation) (+1). The

closer a correlation coefficient is to 0, the weaker the relationship is between the two variables

(Plichta & Garzon, 2009; Polit & Beck, 2017). If the Pearson correlation coefficient is used when

one or more of its assumptions are not met, there is a threat to its internal validity because the

computed *p*-value may not be correct. This correlation coefficient is robust to violations of

normality with large sample sizes. The Pearson correlation coefficient is sensitive to outliers,

meaning it cannot be used if there are nonnormally distributed data with outliers.

     A Pearson correlation coefficient can be used when the following assumptions are met: a)

the study participants constitute an independent random sample, b) there are two variables to be

compared, c) the two measures are normally distributed, d) the two measures are of interval or ratio measurement scale, e) the two variables form a bivariate normal distribution, and f) for every value of the first measure (x), the distribution of the second measure (y) must have equal variance, and for every value of the y, the distribution of x must have equal variance (Munro, 2001; Plichta & Garzon, 2009). Next, the significance level (alpha-level) and the critical value were defined by computing the value of the correlation coefficient (r). The r must exceed the critical value for the alpha-level that was chosen (Munro, 2001; Plichta & Garzon, 2009). The mean, SD and Pearson r were computed with the associated p-value.

Spearman's rho. This test is used for variables that assign a rank to responses or that have ordered categories. The value of r (or p) ranges from -1.00, when all points lie perfectly on a line with negative slope, to +1.00, when all points lie perfectly on a line with a positive slope. When r = 0, there is no association between the exposure and outcome. Spearman's rho is a non-parametric test that examines relationship strength. When the assumptions for a parametric test are violated, or when the data are ordinal level, then an appropriate coefficient of correlation is the Spearman's rho. The interpretation is similar to that of Pearson's r (Jacobsen, 2017; Polit & Beck, 2017).

Chi-square (χ^2). The chi-square test of independence is a test for whether the statistic differs in two or more populations (Jacobsen, 2017: Polit & Beck, 2017). The null hypothesis states that there is no correlation amongst the pharmaceutical item responses to the scale items of Risk to Those Exposed and no correlation with Benefits. The alternative hypotheses states that the item responses will be positively associated with the Risk to Those Exposed and the item responses will be positively associated with Benefits. We then defined the significance level (alpha-level) and found the critical value by computing the value of the correlation coefficient

(*r*). The *r* must exceed the critical value for the alpha-level that was chosen (Munro, 2001; Plichta & Garzon, 2009). Next, we made sure the data met all of the necessary assumptions. The mean and SD were then computed. The computations necessary to compute the Pearson correlation coefficient (*r*) and obtain the associated *p*-value were performed. The conclusion was then stated.

Limitations and Delimitations

Limitations

1) Participant sampling was limited to licensed professional nurses (Registered Nurses [RNs]) in two states in the Pacific Northwest region of the U.S., who have email addresses on file (i.e., American Nurses Association Idaho [ANA-Idaho], Oregon State Board of Nursing [OSBN]) and volunteered to participate in the study;

2) Potential responders may opt to not participate due to a web-based online survey format, fear of responding to online questionnaires (e.g., spam, virus), or unknown of who is asking the information;

3) Test-retest was only open for four days;

4) The test-retest method may have resulted in the participant remembering their response during the first test which may have influenced the response on the retest.

Delimitations

1) Cost to purchase RN lists from all 50 states and territories is a limitation, thus limiting the survey to two states in the northwestern region of the U.S.;

2)   RN listings were purchased from two State Boards of Nursing. Email addresses were

        either not available or up to date on purchased RN list(s) as some emails failed or

        bounced;

3)   Licensed practical nurses (PNs, LPNs, LVNs) were not included in this study as their

        level of education and licensure is different than the RN;

4)   Advanced Practice Registered Nurses (APRNs), based on self-reporting of academic

        preparation, were not included in this study as their level of education and licensure is

        different and more advanced than the generalist RN, as they are prepared as a

        provider;

5)   Literature identified contributing factors such as burnout and EI to MEs; these factors

        were not measured in this study.

The next section, Chapter IV, provides the analysis of collected data using identified

statistical tests as mentioned earlier in this Methodology chapter.

CHAPTER IV

RESULTS

The purpose of this chapter is to describe the findings of this quantitative nursing study

which explored Registered Nurses (RNs) perceptions of medication administration specifically

related to risk, benefits, frequency, caution and medication errors (MEs) (also known as adverse

events [AEs]) in a culture (work environment) of stress, high acuity, less work experience, high

nurse to patient ratios, fatigue and emotional intelligence (nurse performance and decision-

making).

Statistical Analysis

Statistical analysis included demographic information to describe the study population.

Descriptive statistics (mean, median, frequency, standard deviation [SD]) were conducted to

evaluate participant demographics. Inclusion/exclusion questions were reviewed and evaluated

for eligibility of the participants. Quantitative data from demographics, inquiry of MEs,

perceived frequency and perceived caution of risk, the test-retest and the pharmaceutical

questionnaire on medications were analyzed. Pearson *r*, Spearman's rho and Chi-square were

used to determine correlation, relationship and significance.

Characteristics of the Sample

Descriptive Demographics

National data of RNs are presented to compare our sample with the 2015 to 2018 national

RN workforce data. According to the NCSBN (2016) national-level survey data, *The 2015*

National Nursing Workforce Survey, respondents were licensed for an average of 20.9 years

(m=19; SD=14.8), 62.9% worked full-time and average age of the RN was 48.8 years. According

to the NCSBN (2018b) national-level survey data, *2017 National Nursing Workforce Study*,

148,684 RNs were randomly surveyed from 2017 to 2018. The average age of an RN was 51 years (91% female; 9% male). Of the RN respondents 19.2% were minorities which included the category of other and two or more races. Of the RN respondents almost 42% reported having a BSN and hospitals were the primary employment setting for ≥55% of the RNs. According to the Bureau of Labor Statistics (2018) employment data, 61% of RNs were employed in hospitals.

According to The Idaho Nursing Workforce Center at the Idaho Alliance of Leaders in Nursing (IALN, 2018), *The Idaho Nursing Workforce 2018 Report*, 37.4% of RNs are ≥55 years of age and 71% of RNs had a BSN or higher nursing degree. Ethnicity was predominately Caucasian for both male and female RNs. According to the Oregon Center for Nursing (2016) Oregon's Newest Nurses, 75% of BSN nurses and 60% of ADN nurses were employed in the hospital setting.

The sample for this study was representative of the reported national survey data from 2015 to 2018 (NCBSN, 2018b) and the Idaho Nursing Workforce Center at the Idaho Alliance of Leaders in Nursing (IALN, 2018). Table 1, Participant Demographics, describes the participants in this study.

Table 1. Participant Demographics

Variable	
Gender	
Females / Males / Prefer not to answer	86.5% / 13% / 0.5%
Age	M=48.76 (SD=13.33)
English as 1st language	Frequency (%)
Yes / No	1425 (96.6%) / 50 (3.4%)
Ethnicity	
White	1330 (90.2%)
Hispanic or Latino	62 (4.2%)
Black or African American	15 (1.0%)
Alaska Native or American Indian	14 (0.9%)
Asian	43 (2.9%)
Native Hawaiian or Pacific Islander	3 (0.2%)
More than one race	31 (2.1%)
Other	7 (0.5%)
I prefer not to answer	32 (2.2%)
Marital Status	
Single, never married	234 (15.9%)
Married or domestic partnership	967 (65.6%)
Widowed	35 (2.4%)
Divorced	225 (15.3%)
Separated	12 (0.8%)
Highest Nursing Degree	
Associate degree	398 (27%)
Diploma nurse	43 (2.9%)
Bachelor's degree	845 (57.3%)
Master's degree / Post-Master's certificate	159 (10.8%) / 9 (0.6%)
Doctoral degree	21 (1.4%)
Current Employment	
Full-time	1044 (70.8%)
Part-time	228 (15.5%)
PRN	93 (6.3%)
Number of years as an RN	
a. ≤5 yrs	285 (19.3%)
b. 6-10 yrs	251 (17%)
c. 11-15 yrs	188 (12.7%)
d. 16-20 yrs	140 (9.5%)
e. 21-25 yrs	139 (9.4%)
f. 26-30 yrs	121 (8.2%)
g. ≥31 yrs	351 (23.8%)

Note: M=mean; SD=standard deviation; %=percent

Participants self-reported working in settings of non-urban or rural (<2,500 people) (n=213; 14.44%); urban (≥2,500 people) (n=1177; 79.8%) and currently not employed (n=85; 5.76%). Participants self-reported demographic information of current active licensure as an RN (see Table 2) and states they are currently working in as an RN (see Table 3). For current areas of employment and primary role as an RN (see Table 4). Tables 5, 6 and 7 display current work setting (see Table 5), shift primarily worked (see Table 6) and type of facility they currently work in (see Table 7).

Table 2. Current Active Licensure as an RN

State	Frequency (%)
Idaho	28 (1.90%)
Oregon	1333 (90.37%)
Both Idaho & Oregon	88 (5.97%)
Other	410 (27.80%)

Note: Participants identified "Other" as states they hold current active licensure, from Hawaii to Puerto Rico (U.S. territories), across the mainland U.S. from north to south, west coast to east coast, as well as foreign countries.

Table 3. States currently working as an RN

State	Frequency (%)
Idaho	43 (2.92%)
Oregon	1056 (71.59%)
Both Idaho & Oregon	32 (2.17%)
Retired	64 (4.34%)
Other	355 (24.07%)

Note: Participants were asked to type in the 'Other' category if they worked in other states than Idaho and Oregon. Participants self-reported working from Hawaii to Puerto Rico, identified states across the mainland U.S. from west coast to east coast, north to south and upper New England. Four participants identified they work in foreign countries.

Table 4. Current area of Employment & Primary role as an RN

Variable	Frequency (%)
Current Area	
Medical-surgical unit	216 (14.6%)
Orthopedics	40 (2.7%)
Inpatient Rehab	34 (2.3%)
Outpatient Rehab	4 (0.3%)
Oncology	60 (4.1%)
Management	101 (6.8%)
Surgery/Pre- or post-op/PACU	135 (9.2%)
Special Procedures	29 (2.0%)
Outpatient services	91 (6.2%)
Critical / Intensive care (surgical, medical, coronary, trauma)	189 (12.8%)
Telemetry	103 (7.0%)
Skilled nursing facility	67 (4.5%)
Medical clinics	69 (4.7%)
Other	790 (53.6%)
a. Psych/Mental/Behavioral Health	41 (2.8%)
b. Emergency Room	103 (7.0%)
c. Home Health	44 (3.0%)
d. Infusion services	11 (0.7%)
Primary Role as RN	
Staff nurse	859 (58.2%)
Charge nurse	139 (9.4%)
Manager/supervisor/management	202 (13.7%)
Academic faculty/educator	27 (1.8%)
Nurse educator	63 (4.3%)
Certified nurse leader	9 (0.6%)
Other**	176 (11.9%)

Note: Participants were able to provide more options than one for current area of employment.
**Category of 'Other' reflects responses from participants that are more of a clinical nature (focus).

Table 5. Work setting

Work setting	Frequency / %
Outpatient	235 (15.93%)
Inpatient	680 (46.10%)
Academia	31 (2.10%)
Public Health/Community nurse	73 (4.95%)
Hospice	34 (2.31%)
Medical Office	48 (3.25%)
Extended Care	28 (1.90%)
Management	92 (6.24%)
K-12	20 (1.36%)
Other	234 (15.86%)
Total	1475

Table 6. Shift primarily worked

Shift	Frequency / %
7a-7:30pm	361 (24.47%)
7p-7:30am	240 (16.27%)
7a-3:30pm	132 (8.95%)
3p-11:30pm	48 (3.25%)
11p-7:30am	28 (1.90%)
8am-5pm	384 (26.03%)
Other	365 (24.75%)
Weekends	124 (8.41%)
Rotating day/night	35 (2.37%)
Rotating weekends & weekdays	296 (20.07%)

Table 7. Type of facility RNs currently work in

Facility	Frequency / %
Government	112 (7.6%)
Public	308 (20.88%)
Private	450 (30.51%)
Urgent Care Clinic	5 (0.34%)
Institution of higher learning (academic)	42 (2.85%)
Critical Access hospital (CAH)	149 (10.10%)
Medical teaching hospital	168 (11.39%)
Other	238 (16.14%)
Total	1475

Study Results

RN Survey

The invitation to participate was sent via email to 44,095 licensed RNs with email addresses on file with the Oregon State Board of Nursing and ANA-Idaho. Of the emails sent to RNs, 827 (18.75%) from the Oregon State Board of Nursing recipients either failed or bounced. The overall response rate from those who opened the survey, was 5.23% (N=2306). Data cleaning resulted in removal of 519 responses (22.51%) for duration <6 minutes to answer the entire survey. The researcher determined it was difficult to answer the entire survey in ≤6 minutes. This time factor was based on the time it took from similar surveys and from the individuals who previewed (pilot tested) the survey for this nursing study. Completion rate was 77.49% (n=1787). Responses were further removed if they did not meet the inclusion / exclusion criteria for the overall study and had missing data ≥20%. This data cleaning further resulted in removal of responses (n=305; 13.23%). Seven responses were removed from those that previewed (pilot tested) the survey prior to releasing the survey via email to the licensed RNs. Data cleaning resulted in removal of 831 responses (36.04%). The final completion rate was 63.96% (N=1475). Distribution of the variables to see if they were normally distributed was evaluated.

Follow-up survey (test-retest)

Prior to exiting the RN survey, all study participants were asked if they would be willing to retake six of the survey questions (see Appendix N). Participants (N=816) who volunteered to participate were instructed to type their email address directly into the survey within the Qualtrics program. Four days after the survey closed, the participants who had agreed to retake the six questions were sent an email reminder (see Appendix Q) by the researcher through the

Qualtrics software. This reminder told the participant(s) how to access the retest as well as opening date to closing date of the questions.

No further demographics were asked of the participants, as demographics were initially obtained within the RN survey. Demographics were not analyzed for the retest. From the 816 emails sent, 11 (1.35%) either bounced or failed to reach participants. A total of 440 participants responded to this survey. Response rate was 53.92%. During data cleaning, 21 responses (4.77%) were removed. Sample size was then 51.35% (n=419); completion rate was 95.23%. Removal included 12 participants for no data having been entered, two participants with >20% missing data, and seven responses from the individuals who previewed the survey prior to sending out to the RNs on the email lists provided by the OSBN and those sent from ANA-Idaho. Final sample 61.82% (N=272) for test-retest was conducted by pairing participant email addresses from the email addresses participants provided within the survey when they agreed to retest.

Both Pearson *r* and Spearman rho were conducted. Noted, because of the sufficient sample size, there was not much statistical difference between the two statistical tests (Pearson *r* and Spearman rho). Therefore, the researcher chose to report the Pearson *r* analysis. Correlations between the test-retest (two tests) results are presented in Table 8. Polit (2010) states the higher the coefficient the greater the reliability of the instrument and the more reliable are the scores. The reliability coefficient should be ≥ 0.70 to be considered acceptable. According to Calculating Test-Retest Reliability Coefficients (2019), $\geq 0.6 < 0.7$ is questionable reliability and $\geq 0.7 < 0.8$ is acceptable reliability.

Table 8. Pearson Correlations for test-retest reliability

Variable	Correlation	Count (N=272)	Lower 95%	Upper 95%	Signif Prob
How frequently do you believe medication errors occur in a typical 30-bed medical-surgical unit?	0.7468	272	0.6891	0.7951	<.0001*
How frequently do you believe IV fluid errors occur in a typical 30-bed medical-surgical unit?	0.6944	272	0.6273	0.7513	<.0001*
How often do you believe errors in the rights of medication administration occur in a typical 30-bed medical-surgical unit?	0.6519	272	0.5777	0.7154	<.0001*
Compared to your peers, are you more or less cautious in the process of medication administration?	0.6534	272	0.5794	0.7166	<.0001*
Compared to your peers, are you more or less cautious in the process of IV fluid administration?	0.6855	272	0.6169	0.7438	<.0001*
Compared to your peers, are you more or less cautious in checking patient identity prior to an intervention?	0.6243	272	0.5459	0.6919	<.0001*

Note: The higher the coefficient, the more reliable are the scores (Polit, 2010). If the coefficient (correlation) is ≥0.6 <0.7 it is considered questionable reliability (Calculating Test-retest Reliability Coefficients, 2019) and if ≥0.70 the reliability coefficient (correlation) is considered acceptable reliability (Polit, 2010; Calculating Test-retest Reliability Coefficients, 2019).

RN survey on perception, frequency & caution

To identify RNs perception of risk in regard to MA, the following research questions were asked:

- Research question 1, do nurses perceive risk in medication administration in everyday practice?,

- Research question 2, how is a(n) RN's self-reporting related to medication administration errors and risk?, and

- Research question 3, do nurses perceive benefit and risk to medications during the medication administration process?

Respondents were asked the question, in your primary role as a nurse do you currently administer medications to patients? Response option (1= yes; 2= no) (N=1475; 72.5%; m=1.28; SD=0.447). These values reflect that 72.5% of the participant RNs currently administer medications to patients in their primary role as a nurse.

Research question 1. Do nurses perceive risk in medication administration in everyday practice? Participants were asked three questions on perceived frequency of MEs and three questions on perceived caution in MA practices (i.e., rights of medication administration). The three questions on perceived risk frequency referenced MEs, IV fluid errors and errors in the rights of MA in a typical 30-bed medical-surgical unit. Respondents by self-report believe MEs occur in a typical 30-bed medical-surgical unit a few times a month or about once each week (response #4 on Likert scale; 32.1%). Respondents by self-report believe IV fluid errors occur in a typical 30-bed medical-surgical unit a few times a month or about once each week (response #4 on Likert scale; 27.0%). Respondents by self-report believe errors in the rights of MA occur in a

typical 30-bed medical-surgical unit a few times a month or about once each week (response #4

on Likert scale; 26.6%). Respondents self-report their perception of MEs occurrence as more

frequent than not based on responses from Likert scale responses 4, 5, 6 & 7, meaning they

believe or perceive MEs to occur about once each week to more than once every day in everyday

practice (see Table 9).

Table 9. Perceived Frequency

Likert Scale	1	2	3	4	5	6	7
Question							
How frequently do you believe medication errors occur in a typical 30-bed medical-surgical unit?	0.7%	8.7%	20.7%	32.1%	21.4%	9.8%	6.8%
How frequently do you believe IV fluid errors occur in a typical 30-bed medical-surgical unit?	2.0%	14.6%	25.4%	27.0%	17.9%	7.8%	5.4%
How often do you believe errors in the rights of medication administration occur in a typical 30-bed medical-surgical unit?	1.8%	11.2%	19.9%	26.6%	18.6%	10.4%	11.4%
Total %	4.5%	34.5%	66.0%	85.7%	57.9%	28.0%	23.6%

Note: Completers of nursing survey (N=1475). Completers for this question (N=1475).

Likert Scale:

1= About once every few years

2= One or more times each year

3=About once a month

4=A few times a month or about once each week

5=A few times each week

6=About once each day

7=More than once every day

The three questions on perceived caution referenced the RN compared to their peers being more or less cautious in the process of MA, IV fluid administration and in checking patient identity prior to an intervention, which represents following the rights of MA. Respondents self-report they believe, or their perception, is compared to their peers. All three questions are about the same regarding using caution in following the rights of MA. Respondents self-report they are much more cautious than their peers in following the rights of MA (responses 0, 1, 2, 3, & 4 on Likert scale) in everyday practice (see Table 10).

Table 10. Perceived Caution

Likert Scale	-4 Much less cautious	-3	-2	-1	0 About the same	1	2	3	4 Much more cautious
Question									
Q 1	0.2%	0.3%	0.5%	2.5%	28.9%	10.1%	14.6%	19.4%	23.5%
Q 2	0.3%	0.1%	0.3%	2.6%	32.7%	8.9%	12.5%	16.4%	26.2%
Q 3	0.5%	0.5%	0.9%	3.0%	39.2%	8.0%	10.6%	13.6%	23.7%
Total %	1.0%	0.9%	1.7%	8.1%	100.8%	27.0%	37.7%	9.4%	73.4%

Note: Completers of nursing survey (N=1475). Completers for this question (N=1475).

Q1: Compared to your peers, are you more or less cautious in the process of medication administration?

Q2: Compared to your peers, are you more or less cautious in the process of IV fluid administration?

Q3: Compared to your peers, are you more or less cautious in checking patient identity prior to an intervention?

Respondents were asked the question; how likely they were to make at least one ME in the next 12 months. Responses reflect that 47.9% of the participant RNs self-report they are not at all likely to make a ME in the next 12 months (see Table 11). A crosstabulation was conducted with this same question including self-report of which setting the RN works in (non-urban/rural; urban; currently not employed). Responses reflect that ≥39.44 % of the RN respondents self-report that whether they work in non-urban, urban or currently not employed, they are not at all likely to make a ME in the next 12 months (see Table 12). Chi-square (χ^2) test was conducted; χ^2(*df* 12)=29.1, p= 0.004. Chi-square measures a distribution of the population. The chi-square results indicate how likely they (RNs) are to make a ME is different for the non-urban RNs as compared to the urban RNs.

Table 11. How likely are you to make at least one
medication error in the next 12 months?

Likert Scale	Frequency (%)
1 = Not at all likely	706 (47.9%)
2	356 (24.1%)
3	133 (9.0%)
4	103 (7.0%)
5	60 (4.1%)
6	42 (2.8%)
7 = Very likely	75 (5.1%)
Total	1475

Table 12. How likely are you to make at least one medication error in the next 12
months? * In which setting do you work? Crosstabulation

		In which setting do you work?			
		Non-urban or rural (<2,500 people)	Urban (≥2,500 people)	currently not employed	Total
How likely are you to make at least one medication error in the next 12 months?	1 = Not at all likely	84 (39.44%)	561 (47.66%)	61 (71.76%)	706
	2	55 (25.82%)	290 (24.64%)	11 (12.94%)	356
	3	24 (11.26%)	104 (8.84%)	5 (5.88%)	133
	4	17 (7.98%)	85 (7.22%)	1 (1.18%)	103
	5	12 (5.63%)	47 (3.99%)	1 (1.18%)	60
	6	7 (3.29%)	33 (2.80%)	2 (2.35%)	42
	7 = Very likely	14 (6.57%)	57 (4.84%)	4 (4.71%)	75
Total		213	1177	85	1475

Research question 2. How is a(n) RNs self-reporting related to medication administration errors and risk? Descriptive statistics were conducted with the two questions, how likely are you to make at least one ME in the next 12 months (N=1475; m=2.24; SD=1.70) and, how many years have you been an RN (N=1474; m=3.92; SD=2.26). Pearson correlations were conducted; there is a statistical significance, but it is not statistically relevant ($r<0.20$).

Respondents were asked questions about reporting practices in regard to MEs. Questions included, if they are required to report any MEs through an institutional reporting system; participants responses (N=1475; yes, 85.8%; no, 14.2%). Respondents were asked, are you required to report MEs to your manager, charge nurse, lead supervisor or the provider (e.g., physician); participants responses (N=1475; yes, 93%; no, 7%).

Respondents were also asked inquiry questions about reporting of MEs. These questions referenced, how likely are you to make MEs and report MEs and, how likely are your peers to make MEs and report MEs (see Table 13). Although 93% of RNs self-report they are required to report MEs to their manager, charge nurse, lead supervisor or provider, Table 13 reflects only 71.9% were very likely to report MEs to their manager, charge nurse, lead supervisor or provider and 33.6% of their peers (RNs) were very likely to report to manager, charge nurse, lead supervisor or provider. Table 13 reflects that 47.9% of RNs think they are not at all likely to make at least one ME in the next 12 months but 22% of their peers are very likely to make a ME in the next 12 months.

Although RNs self-reported they are required to report any MEs through an institutional reporting system, Table 13 reflects that only 65.5% were very likely to report through the institutional reporting system. Interesting to note, if RNs are required to report and not all are

very likely to report, there is an inherent risk in the MA process that RNs are willing to take, even when following the rights of MA and reporting MEs are an RNs ethical duty and professional responsibility. Even if not required to report, there is a reported gap in those that do report, according to the results from Table 13. The question, how likely are you to report any medication error using your institution reporting system, bares thought that even if the prescribed medication is of low risk or low benefit to the patient (e.g., herbal medicines or vitamins) or low risk and high benefit, and an ME occurs, all should be reported based on the question asked. This means that RNs perceive a risk in everyday practice and are willing to take risks in everyday practice. This risk can be not following written orders by prescribers to administer medications on time, correctly and following the institutional policy of the rights of MA. Nurses make clinical decision-making every day in practice, failing to follow written orders, participating in or observing MEs and not reporting them as such is part of our professional responsibility.

Table 13. Inquiry of participant medication error

Likert Scale	1 = Not at all likely	2	3	4	5	6	7 = Very likely
Question							
Q 1	47.9%	24.1%	9.0%	7.0%	4.1%	2.8%	5.1%
Q 2	6.1%	1.8%	1.5%	3.9%	4.2%	10.6%	71.9%
Q 3	15.2%	5.8%	4.4%	9.8%	8.8%	11.9%	44.1%
Q 4	9.4%	2.2%	2.4%	5.4%	4.6%	10.5%	65.5%
Q 5	13.2%	15.9%	12.4%	17.6%	10.5%	8.5%	22.0%
Q 6	6.0%	3.9%	5.8%	14.3%	15.8%	20.7%	33.6%
Q 7	9.6%	6.7%	9.5%	19.3%	16.5%	17.3%	21.0%
Q 8	9.4%	3.9%	6.8%	13.6%	13.7%	17.8%	34.8%

Note: Completers of nursing survey (N=1475). Completers of question (N=1475).

How likely are you?:

Question 1: How likely are you to make at least one medication error in the next 12 months?

Question 2: How likely are you to report any medication errors to your manager, charge nurse, lead

supervisor or the provider (e.g., physician)?

Question 3: How likely are you to report any medication errors to a colleague or friend?

Question 4: How likely are you to report any medication error using your institution reporting system?

How likely are your peers?:

Question 5: Do you think your peers are likely to make a medication error in the next 12 months?

Question 6: How likely are your peers to report any medication errors to your manager, charge nurse, lead

supervisor or the provider (e.g., physician)?

Question 7: How likely are your peers to report any medication errors to a colleague or friend?

Question 8: How likely are your peers to report any medication errors using your institution reporting

system?

Keeping with the question, how likely are you to report any medication errors to your

manager, charge nurse, lead supervisor or the provider (e.g., physician)?, a crosstabulation was

conducted adding the variable of gender (see Table 14). A chi-square test was conducted

(N=1474) χ^2(*df* 12)=20.9, p=0.051. Chi-square reflects there were differences in how they (RNs)

responded in reporting MEs as to gender.

Table 14. Gender and likely to report medication errors to manager, charge nurse, lead supervisor or provider. *Crosstabulation

Question:	How likely are you to report any medication errors to your manager, charge nurse, lead supervisor or the provider (e.g., physician)?							
Likert:	1=Not at all likely	2	3	4	5	6	7=Very likely	
Gender:								Total
Male	9 (4.69%)	4 (2.08%)	4 (2.08%)	15 (1.02%)	7 (3.65%)	21 (10.94%)	132 (68.75%)	192 *(13.03%)
Female	81 (6.35%)	20 (1.57%)	18 (1.41%)	42 (3.29%)	55 (4.31%)	134 (10.51%)	925 (72.55%)	1275 *(86.50%)
Total	90	25	22	57	62	157	1061	1474

Note: Frequency (n) / (%)

Completers of nursing survey (N=1475)

1 participant omitted answering question (0.07% of total)

7 participants selected "prefer not to answer" gender (0.47% of gender totals)

*percentages represent the column total of males and females

Keeping with the question, how likely are you to report any MEs to a colleague or friend?, a crosstabulation was conducted adding the variable of gender (see Table 15). A chi-square test was conducted (N=1474) χ^2 (df 12)=19.4, p=0.080. The gender variable with this question is not significantly different (p>0.05).

Table 15. Gender and likely to report medication errors to colleague or friend

*Crosstabulation

Likert Scale	1=Not at all likely	2	3	4	5	6	7=Very likely	
Gender								Total
Male	26	16	11	28	17	24	70	192
	(13.54%)	(8.33%)	(5.73%)	(14.58%)	(8.85%)	(12.5%)	(36.46%)	*(13.03%)
Female	196	70	54	116	113	149	577	1275
	(15.37%)	(5.49%)	(4.24%)	(9.10%)	(8.86%)	(11.69%)	(45.25%)	*(86.50%)
Total	223	86	65	144	130	176	650	1474

Note:

Frequency (n) / %

Completers of nursing survey (N=1475).

1 participant omitted answering question (0.07% of total).

7 participants selected "prefer not to answer" gender (0.47% of total).

*percentages represent the column total of males and females

Included within the participant demographics previously reported (see Table 1), RNs identified gender and the number of years they have been an RN. A crosstabulation was conducted with these two variables (see Table 16). A chi-square was conducted indicating there is a relationship between gender and years as an RN. The Likelihood ratio is being reported instead of the Pearson chi-square value as we had cells with an expected count of <5. Likelihood ratio indicating there is a significance (N=1474) χ^2 (*df* 12)=23.3, p=0.026.

Table 16. Gender and number of years as an RN. *Crosstabulation

years as RN	≤5 years	6-10 years	11-15 years	16-20 years	21-25 years	26-30 years	≥31 years	
Gender:								Total
Male	51	43	19	18	18	15	28	192
	(26.56%)	(22.40%)	(9.90%)	(9.38%)	(9.38%)	(7.81%)	(14.58%)	*(13.03%)
Female	233	207	168	122	119	104	322	1275
	(18.27%)	(16.24%)	(13.21%)	(9.57%)	(9.33%)	(8.16%)	(25.25%)	*(86.50%)
Total	285	251	188	140	139	120	351	1474

Note:

Frequency (n) / (%).

Completers of nursing survey (N=1475).

1 participant omitted answering question (0.07% of total).

7 participants selected "prefer not to answer" gender (0.47% of total).

*percentages represent the column total of males and females

Registered nurses (RNs) were asked three questions about the most common reason for not reporting MEs amongst RNs, if they did not report and if their peers did not report (see Table 17). Participants identified the most common reasons they felt MEs were not reported. The most common reason why RNs did not report and peers did not report was (1) fear of retaliation / retribution (amongst RNs 32.1%; self 19%; peers 28.3%; n=1171; total 79.4%); (2) embarrassed to admit a ME (amongst RNs 25.8%; self 17.2%; peers 19.3%; n=919; total 62.3%); (3) not knowing a ME had occurred (amongst RNs 20.5%; self 32.5%; peers 24.9%; n=1151; total 77.9%). Participants identified the third reason to be not knowing a ME had occurred and identified separately as to not knowing what a ME is (n=41.7; total 5.7%). If the RN did not know what a ME error was, might they also not know a ME has occurred? Combining these two variables, not knowing a ME had occurred and not knowing what a ME is changes the results (n=1192.7; total 83.6%). If RNs do not know what a ME is or if a ME has occurred, might their risk perception of MEs or frequency of MEs and caution for MEs reflect differently?

Registered nurses (RNs) self-report they are afraid to report, embarrassed to admit to a ME and do not know a ME has occurred. They also self-report they do not know what constitutes a ME. When RNs choose to not self-report MEs, MEs cannot be addressed (e.g., system level, clinical unit level, or individual level). The risk of recurrence of MEs increases.

Table 17. RNs not reporting medication errors

Variable	Frequency (%)		
	Q1	**Q2**	**Q3**
Lack of time	169 (11.5%)	205 (13.9%)	189 (12.8%)
Fatigue	15 (1.02%)	13 (0.9%)	7 (0.5%)
Fear of retaliation / retribution	474 (32.1%)	280 (19%)	417 (28.3%)
Embarrassed to admit a medication error	381 (25.8%)	253 (17.2%)	285 (19.3%)
Not knowing what a medication error is	13 (0.9%)	24 (1.6%)	4.7 (3.2%)
Not knowing a medication error has occurred	303 (20.5%)	480 (32.5%)	368 (24.9%)
Not knowing how to report the error	33 (2.2%)	19 (1.3%)	44 (3%)
Other	87 (5.9%)	201 (13.6%)	118 (8%)

Note:

Question 1: Amongst RNs, the most common reason for not reporting medication errors is:

Question 2: If you do not report a medication error, what is your most common reason for not reporting a

medication error?

Question 3: If your peers do not report a medication error, what is the most common reason for your peers

to not report a medication error?

To address research question 3, we must first look at the list of 32 pharmaceutical items identified in the nursing survey (see Appendix J).

Research question 3. Do nurses perceive benefit and risk to medications during the medication administration process? Respondents addressed these pharmaceutical items using a Likert Scale format (1=not at all beneficial; 7=very beneficial). Respondents were to identify or rate from a general perspective how beneficial they considered each item to be. The tabulated pharmaceutical items for Benefit are identified (see Table 18). The Benefit table is noted with mean and standard deviations for the rated pharmaceutical items (see Figure 3).

Table 18. Benefit

Likert Scale	Not at all beneficial					Very beneficial	
	1	2	3	4	5	6	7
Drugs for:							
Depression	0.6%	1.6%	3.9%	11.7%	19.8%	24.3%	38.1%
Erectile dysfunction (Viagra)	3.3%	8.4%	14.8%	27.9%	20.1%	14.2%	11.2%
Epilepsy	0.4%	0.3%	0.9%	4.7%	11.0%	25.5%	57.3%
Smallpox vaccination	2.4%	2.4%	2.9%	6.4%	7.0%	11.9%	66.7%
Osteoporosis	1.0%	2.5%	4.9%	18.7%	26.1%	21.6%	25.2%
Sleeping pills	2.2%	7.3%	14.1%	27.4%	24.1%	12.4%	12.5%
AIDS	0.5%	0.1%	0.9%	3.3%	7.7%	18.2%	69.2%
Arthritis	0.5%	0.8%	4.2%	14.7%	24.4%	26.7%	28.6%
Asthma	0.2%	0.1%	1.0%	4.3%	10.4%	23.5%	60.5%
Ulcers	0.6%	1.3%	4.5%	15.7%	21.9%	26.2%	29.8%
Estrogen replacement (HRT)	1.7%	3.8%	9.4%	22.3%	24.5%	19.7%	18.6%
NSAIDS	0.5%	0.9%	6.2%	15.6%	23.1%	25.0%	28.8%
Insulin	0.3%	0.1%	0.4%	2.2%	3.6%	12.7%	80.6%
Vitamin pills	5.9%	14.6%	15.0%	26.6%	13.8%	10.7%	13.4%
Diet drugs	22.8%	27.3%	15.7%	19.1%	7.9%	2.7%	4.2%
Vaccines	1.0%	1.0%	1.2%	4.4%	4.7%	11.5%	75.9%
Alzheimer's disease	2.5%	4.5%	7.7%	18.5%	20.8%	20.1%	25.7%
Anxiety	0.8%	2.8%	5.1%	17.4%	23.6%	24.8%	25.4%
Nicotine replacement (patches)	1.8%	5.1%	8.3%	20.9%	22.4%	22.1%	19.3%
Antibiotics	0.4%	0.2%	0.9%	4.9%	9.5%	25.3%	58.8%
Birth control pills	0.9%	2.2%	3.8%	9.4%	11.7%	24.2%	47.8%
Herbal medicines	9.2%	18.2%	14.8%	27.7%	12.5%	8.2%	9.4%
Laxatives	1.4%	6.0%	12.7%	26.0%	21.9%	16.5%	15.5%
Acne medicines	2.4%	7.6%	15.7%	29.7%	20.9%	13.5%	10.1%
Cancer chemotherapy	1.3%	1.4%	2.6%	8.6%	13.1%	23.0%	50.0%
Biotechnology drugs	1.4%	1.6%	5.2%	23.8%	16.9%	20.7%	29.6%
Botox injections	12.3%	20.0%	15.3%	22.8%	14.4%	7.0%	7.7%
Aspirin	0.9%	2.0%	6.3%	19.8%	19.1%	22.8%	29.1%
Drugs for cholesterol	3.0%	5.5%	8.0%	18.5%	22.6%	20.1%	22.2%
Prescription drugs	0.5%	0.9%	3.3%	19.7%	19.4%	23.8%	32.1%
Blood pressure	0.3%	0.4%	1.5%	6.8%	16.3%	31.3%	43.4%
Allergy drugs	0.4%	1.3%	4.9%	15.9%	22.0%	27.8%	27.7%

Note: Question: In general, how beneficial do you consider this item to be?
Completers of nursing survey (N=1475). Completers for this question (N=1475).
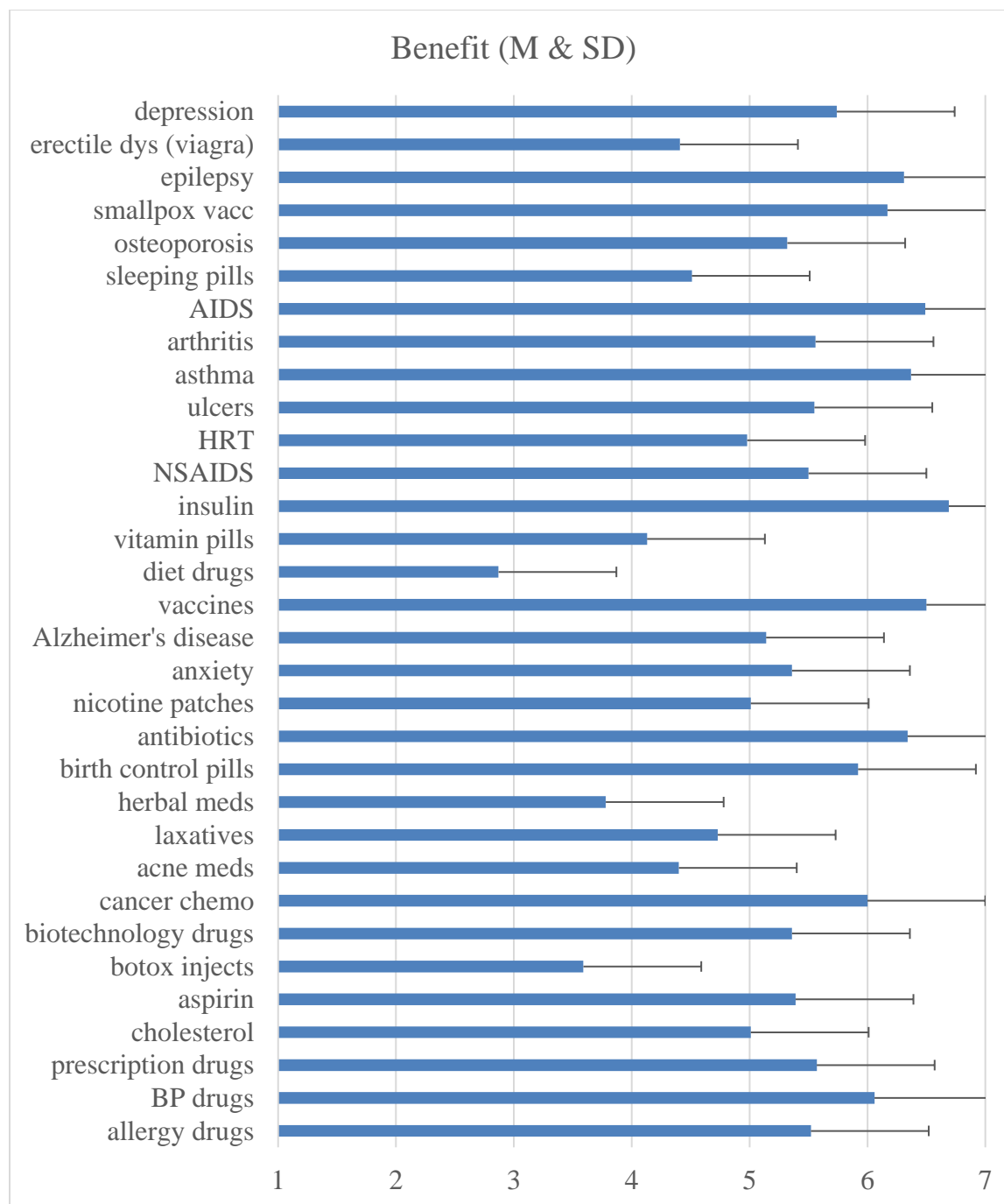
Figure 3. Benefit (M & SD) of Pharmaceutical items

Note: M=mean [blue bar]; SD=standard deviation [error bar]; Likert scale (1=Not at all beneficial; 7=Very beneficial); abbreviations: dys (dysfunction); vacc (vaccines); HRT (hormone replacement therapy); NSAIDS (non-steroidal anti-inflammatory drugs); meds (medications); chemo (chemotherapy); injects (injections); BP (blood pressure).

Next, to assess risk, we again look at the list of 32 pharmaceutical items identified in the nursing survey (see Appendix J). Respondents addressed these pharmaceutical items using a Likert Scale format (1=they are not at risk; 7=they are very much at risk). Respondents were to rate these items on the Likert Scale as to what extent you would say that people who are exposed to each item are at risk of experiencing personal harm from the item. The tabulated pharmaceutical items for Risk are identified (see Table 19). The Risk table is noted with mean and standard deviations for the rated pharmaceutical items (see Figure 4).

Table 19. Risk to Those Exposed

Likert Scale	They are not at risk						They are very much at risk
	1	2	3	4	5	6	7
Drugs for:							
Depression	5.5%	10.8%	15.4%	19.5%	21.2%	12.3%	15.1%
Erectile dys (Viagra)	7.5%	15.3%	14.4%	20.4%	18.4%	12.9%	10.9%
Epilepsy	5.4%	8.5%	10.0%	18.1%	18.8%	19.0%	19.9%
Smallpox vacc	26.0%	30.5%	11.3%	13.0%	6.6%	5.4%	6.6%
Osteoporosis	12.5%	22.6%	19.6%	23.5%	11.7%	5.2%	4.5%
Sleeping pills	3.7%	3.8%	5.4%	10.7%	16.5%	26.2%	33.2%
AIDS	7.4%	11.9%	11.7%	22.4%	14.1%	16.2%	15.7%
Arthritis	7.0%	18.6%	16.8%	25.6%	17.5%	8.0%	6.1%
Asthma	7.2%	16.9%	16.1%	21.2%	16.3%	11.8%	10.2%
Ulcers	10.6%	22.0%	20.1%	22.6%	12.1%	7.3%	4.8%
Estrogen replacement (HRT)	7.4%	14.6%	16.4%	23.4%	16.9%	12.0%	8.9%
NSAIDS	7.9%	14.9%	16.2%	20.4%	19.0%	13.1%	8.3%
Insulin	5.2%	4.1%	5.5%	10.0%	10.6%	19.3%	45.1%
Vitamin pills	34.0%	34.9%	10.9%	11.4%	3.7%	2.4%	2.3%
Diet drugs	8.5%	9.9%	12.1%	16.3%	18.0%	18.7%	16.0%
Vaccines	28.2%	36.0%	10.2%	11.1%	5.5%	3.5%	5.2%
Alzheimer's disease	9.4%	18.7%	19.0%	24.5%	13.3%	8.0%	6.7%
Anxiety	3.5%	4.3%	9.2%	15.5%	18.8%	25.6%	22.8%
Nicotine replacement (patches)	11.0%	25.1%	15.9%	22.2%	12.7%	7.3%	5.6%
Antibiotics	6.1%	12.0%	15.7%	20.3%	19.5%	14.3%	11.7%
Birth control pills	12.1%	21.0%	20.2%	21.2%	13.1%	7.3%	4.8%
Herbal medicines	13.6%	24.5%	18.2%	22.3%	9.4%	7.2%	4.2%
Laxatives	11.9%	27.5%	20.6%	19.5%	11.3%	4.7%	3.9%
Acne medicines	11.3%	23.1%	18.8%	21.6%	12.7%	7.1%	4.7%
Cancer chemo	3.1%	2.6%	3.5%	6.1%	10.8%	21.0%	52.5%
Biotechnology drugs	4.5%	4.2%	6.1%	18.2%	13.6%	18.8%	33.5%
Botox injections	6.4%	13.4%	13.0%	19.1%	18.6%	15.9%	12.7%
Aspirin	8.5%	19.9%	18.4%	20.9%	16.3%	9.3%	6.2%
Drugs for cholesterol	9.6%	21.2%	19.8%	23.7%	13.5%	6.9%	4.9%
Prescription drugs	4.0%	5.8%	10.2%	26.0%	18.2%	17.0%	17.9%
Blood pressure	4.7%	7.6%	12.9%	19.3%	19.1%	18.0%	18.0%
Allergy drugs	9.1%	23.9%	20.5%	23.5%	11.3%	6.0%	5.1%

Note: Question: Would you say that people who are exposed to this item are at risk of experiencing personal harm from the item?

Abbreviations: dys (dysfunction); vacc (vaccines); NSAIDS (non-steroidal anti-inflammatory drugs); chemo (chemotherapy).

Figure 4. Risk to those Exposed (M & SD) of Pharmaceutical items

Note: M=mean [blue bar]; SD=standard deviation [error bar]; Likert scale (1=they are not at risk; 7=they are very much at risk);

Abbreviations: dys (dysfunction); vacc (vaccines); HRT (hormone replacement therapy); NSAIDS (non-steroidal anti-inflammatory drugs); meds (medications); chemo (chemotherapy); injects (injections); BP (blood pressure).
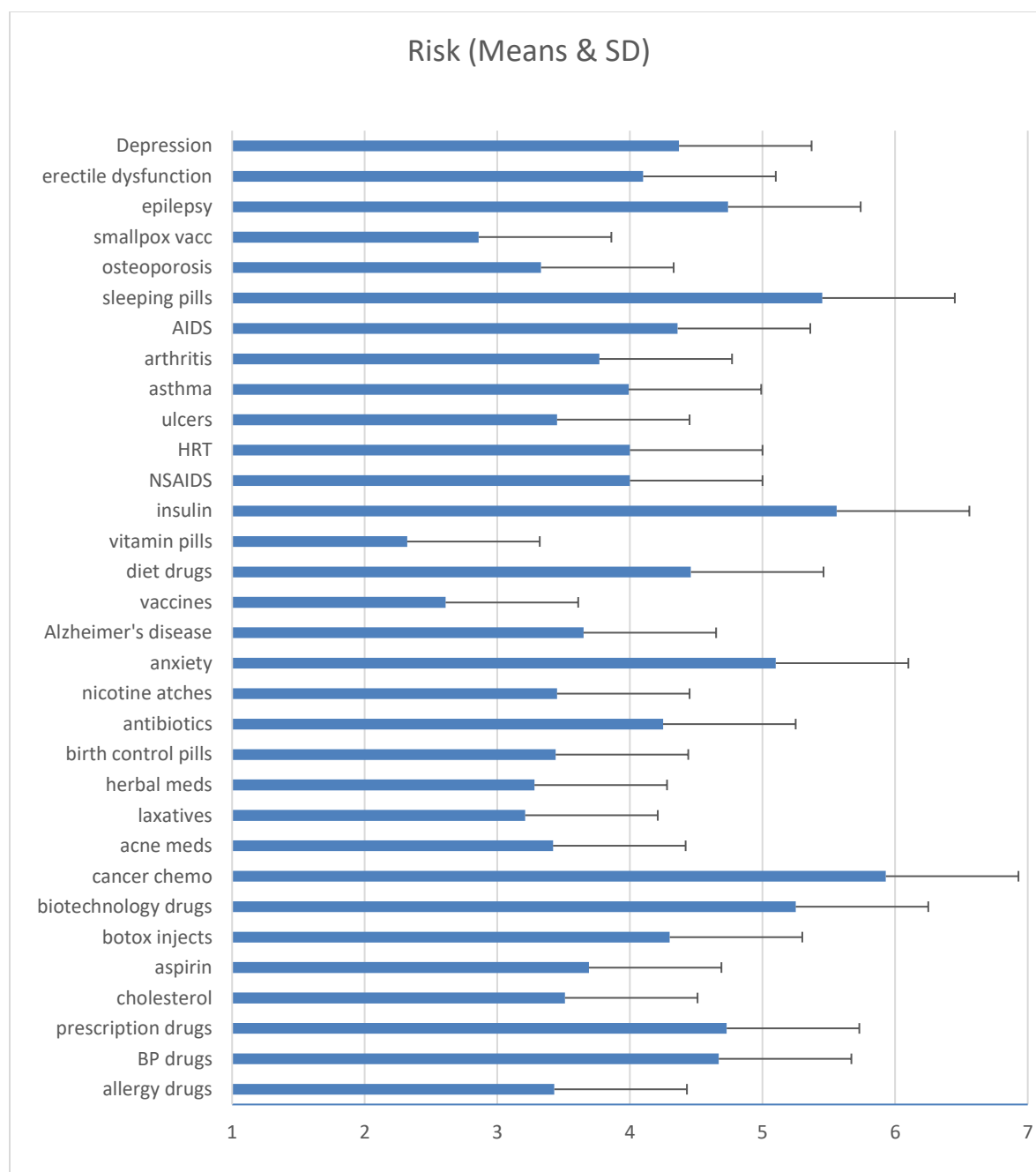
Looking at the average of risk versus average of benefit, there was a significant difference with benefit being perceived as higher (t [1471] =36.4, p<0.0001). The boxplots depict the average of risk, N=1475; m=4.02; SD=1.12 versus average of benefit, N=1475; m=5.3; SD=0.82 (see Figure 5; see Figure 6).
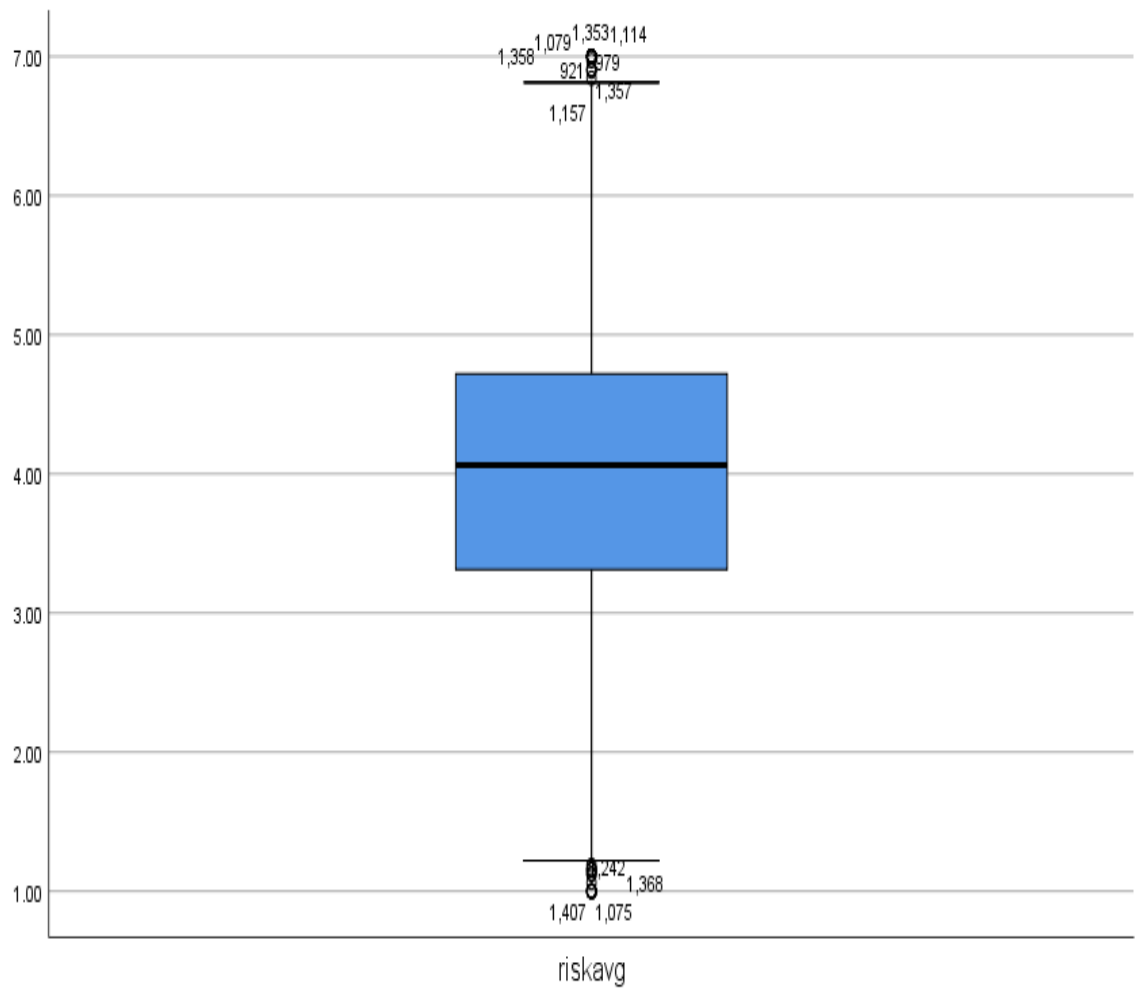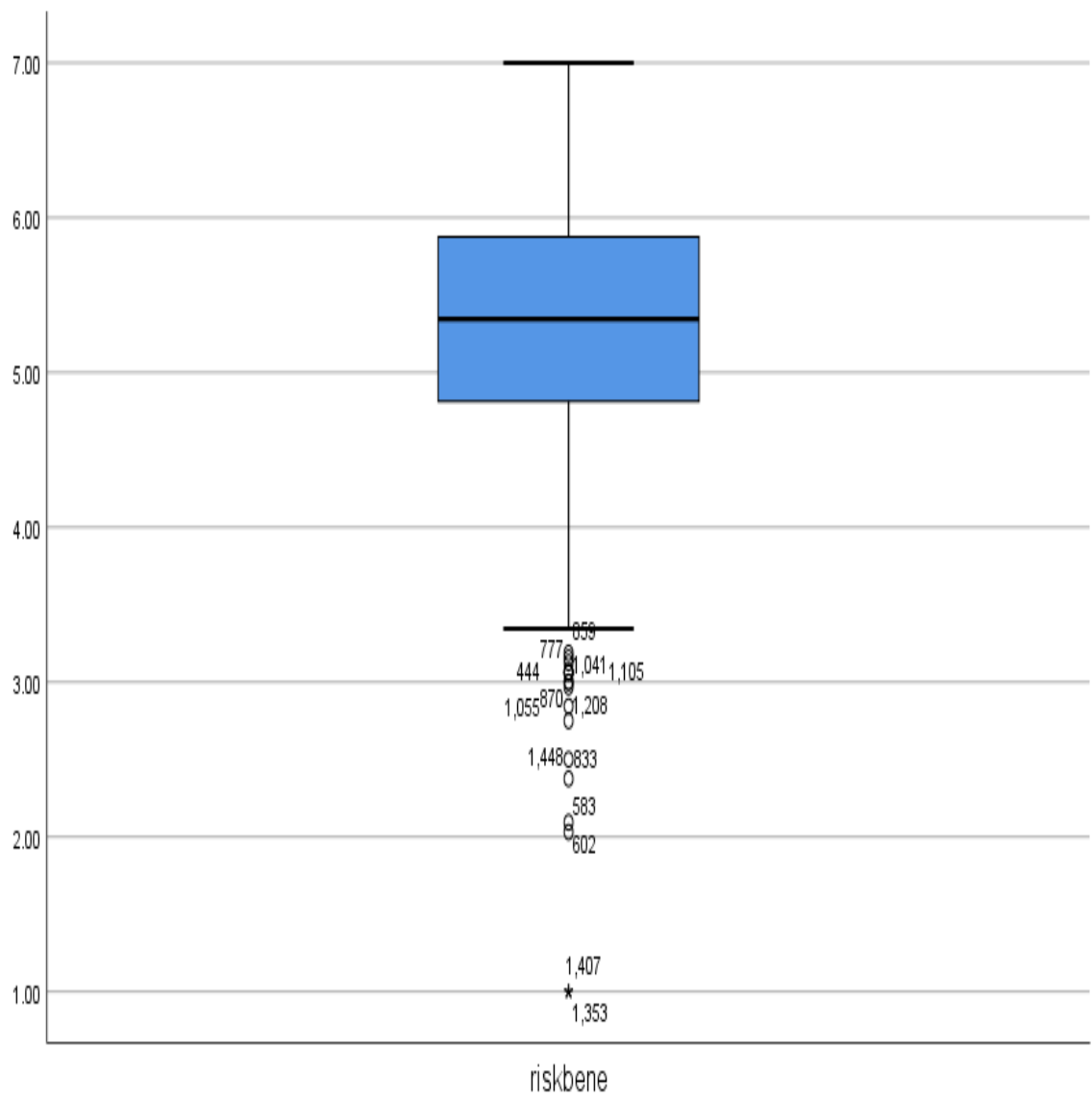
Figure 5. Risk average score boxplot

Figure 6. Benefit average score boxplot

The top seven pharmaceutical items that RNs perceived as benefit (very beneficial) for patients are Insulin (80.6%); Vaccines (75.9%); drugs for AIDS (69.2%); smallpox vaccines (66.7%); drugs for asthma (60.5%); antibiotics (58.5%) and drugs for epilepsy (57.3%). The top seven pharmaceutical items that RNs identified as being at risk of experiencing personal harm from the item are cancer chemotherapy (52.5%); Insulin (45.1%); biotechnology drugs (33.5%); sleeping pills (33.2%); drugs for anxiety (22.8%); drugs for epilepsy (19.9%) and drugs for blood pressure (18%). Note, RNs rated both Insulin and drugs for epilepsy as both beneficial and a risk to patients.

Anecdotal (Optional Comments)

Study participants, at the conclusion of the nursing study, were provided the opportunity via an optional comment format to self-report MA issues, concerns and/or risks. Five hundred and ten optional comments were reviewed; 136 comments were removed as comments were not appropriate or derogatory to the study and/or researcher (e.g., "Xxx", "n/a", "Thank you", "…interesting exercise…", "…good luck…", "…nutrition information…"). Therefore, 374 responses are presented (see Appendix S, Respondents Optional Comments).

Supplemental Comments

The ISU IRB required the researcher to provide their contact information (i.e., email & phone number) for respondents. This information was provided initially in the Invitation to Participate that was sent to potential participants. Four individuals who participated in the nursing survey emailed me (the researcher) separately sharing personal experiences. The researcher was given permission by the individual(s) to share their stories, in hopes the experience might be of help to nurses and further the professional discussion (personal email communication, February/March 2019) (see Appendix T).

Discussion

This study was to explore risk perceptions of practicing RNs involving medications. The major findings for this nursing study are identified in the following paragraphs.

For Research Question 1, we found that most RNs believed they do not make errors in MA or unlikely to, while they believed their peers were likely to make errors in MA. As we look at patterns with risk or benefit, there does not seem to be a strong relationship with the number of years one has been an RN as to risk or benefit.

For Research Question 2, we found that RNs are required to report MEs whether to their manager, charge nurse, supervisor, or provider and are required to report MEs via an institutional reporting system. However, there was a noted difference in RNs that would actually report the MEs and AEs associated with MEs for fear of loss of job, retaliation, shame, blame and guilt. Although RNs know it to be their ethical responsibility, they will take a risk to not report which can increase a risk of recurrence of MEs as contributing and causative factors that are not reviewed and analyzed as is done through discussions of root cause analysis and improvement processes.

For Research Question 3, we found that nurses perceive benefit of medications by the benefit/risk average score (index): a greater benefit from the medications and a lesser risk from the medications based on the lower risk average score (index). We did not calculate this index by ethnicity as our sample population was >90% white. We did not calculate this index by marital status as our sample population was >65% married or domestic partner. We did not calculate this index by gender as our sample population was >86% female.

Study Findings

Contemplating the research questions guiding this nursing study as well as reflection of the quantitative data, the concern becomes how we use these findings for RNs at the bedside who administer medications to patients in everyday practice. Study findings can be used to heighten awareness for healthcare professionals (e.g., RNs, academic professors, hospital educators) who utilize technology in the healthcare setting specific to MA practices and processes. Findings can be used for educators whether in healthcare settings or academia when instructing and assisting students and practicing nurses to further understand the medications they administer to their patients. Findings can be used to discuss ethical principles related to reporting all MEs including near misses, and risks involved with MA, especially when deviations occur from the administration process. Findings can be used to remind all nurses about the rights of MA and potential factors that contribute to and/or may cause errors in the MA process. An RN's understanding of and adherence to institutional reporting practices and policies, which have been implemented for safety of the patient, is an ethical responsibility of the practicing RN as well as a clinical performance issue that involves clinical decision-making.

Study findings can be used for practicing nurses to ponder their own practice of MA specifically with environmental stimuli (e.g., interruptions, distractions, stress, and high nurse to patient ratios) that can contribute to ME events. Nurses must be proactive and individually develop strategies, recognize what keeps them from adherence of MA practices as well as continually strive to adapt to their work environment in order to safely administer medications to those in their care. Nurses must also support their peers in the reporting of errors and near miss events, as well as self-report incidences when they occur. Communicating these near miss

occurrences and MEs improves processes within the work environment, rather than not reporting and ignoring safety practices.

Data identified in this chapter consisted of the compilation of statistical results based on self-reported responses from RN participants. The next and last chapter discusses the Discussion of the Results of this nursing study. Also identified are the strengths, limitations, clinical implications of the results, suggestions for future research and my conclusion.

CHAPTER V

DISCUSSION OF RESULTS

The purpose of this quantitative study was to explore Registered Nurses (RNs) perceptions of medication administration, specifically related to risk, benefits, frequency, caution and medication errors (also known as adverse events [AEs]) in a culture (work environment) of stress, high patient acuity, new RNs with less work experience, high nurse to patient ratios, fatigue and EI (nurse performance and decision-making).

A voluntary comment section at the conclusion of the survey provided RN participants to share thoughts on MA issues such as risk(s), concerns and personal experiences. Four respondents emailed me to share MA issues and personal shared experiences. These comments are provided as appendices to this nursing study. This final chapter of my dissertation provides discussion of findings and implications for use of this new information as well as strengths and limitations of this study concluding with suggestions for further research in this area.

Discussion of Research Questions

Overall, several of our findings were consistent with prior research identified in the literature review in Chapter II of this nursing study. For example, participant RNs identified the 5 to 9 rights of MA are generally not followed when administering medications. Registered nurses' self-reported distractions, interruptions and multi-tasking during the MA process interfered with the critical task at hand, that of administering medication(s). Multi-tasking lends itself to distractions which leads to errors made during the MA process. Interruptions by colleagues, staff and families are distractors as well, contributing to errors. Nurses also do work-arounds, which are excuses or justifications of why the process or policy of MA was not followed. These distractions and work-arounds result in administering medications late or

contributing to errors. Respondents identified issues of short staffing, high acuity patients, high nurse to patient ratios, as well as just trying to get everything done during the long clinical shifts. These issues have also been identified in the nursing literature as contributing factors to MEs.

Participant RNs further identified that nurses are scared or fearful of reporting or admitting to an error. They are fearful of colleagues, managers or physician's finding out as well as the patient and patient families. They are fearful of shame, guilt and blame, loss of job as well as retribution and legal retaliation. Participant RNs identified that not all work environments are supportive; some are even discouraged from reporting. Errors *can* be utilized as learning opportunities.

Participant RNs also identified lack of knowledge or understanding as to what constitutes a ME or near miss and do not recognize that a ME has even occurred. Nurses allude to the concern, if there is no harm why report the ME or near miss. There is little time to get everything done in the clinical shift, especially insufficient time to report near miss events.

An underlying issue throughout the self-reported responses was the human factor component, even though not completely understood by the RN or recognized within themselves. Nurses need to reflect on one's individual performance while administering medications and report MEs no matter why the medication was administered late, omitted or a near miss. However, in order to report, one must understand what a ME is and why it is necessary to report them. Reporting can identify and perhaps solve human factor issues and system processes that can support the nurse when administering medications rather than place blame on the nurse.

Nurses within this study identified communication and reporting of MEs as crucial to decrease MEs; thereby improving patient-centered care and patient safety. As nurses, we should

not be too busy that we cannot ensure safe patient care. Following the rights of MA with every patient, every single drug, every encounter is a system process designed to decrease risk for the patient and the RN. Part of communication is utilization of the technology processes within the workplace environment. These processes can include the EHR, barcode scanning and institutional reporting systems. Do we lose the art and skill of nursing when we allow technologies to think for us? I would have to say; I think we do. Nursing managers have to review or investigate MAEs that involve nurses. If MEs are not communicated and/or reported, managers cannot do their job, detracting from patient safety.

As nurses, when we share our work-related experiences as well as personal experiences involving MEs, we learn from our mistakes and can resolve issues and concerns. Through communication and reporting of MEs, RNs are able to participate with risk management, nurse managers and other healthcare members in root cause analyses identifying issues and reasons why MEs occur. Some of these reasons can be personal issues, lack of attentiveness to detail and lack of knowledge of consequences as a result of contributing to MEs. In order for RNs to learn from MEs and develop strategies to improve system processes, one must first communicate the error and report the error. Reporting is our ethical responsibility.

An optional comment section was provided at the conclusion of the study for participants to provide additional comments regarding MA (e.g., issues, errors risk). From the 374 shared comments by study participants regarding MA, comments identified issues of failing to communicate, lack of knowledge about medications, lack of attention to detail and not following the rights of MA (e.g., 5, 6 or 10 rights). RNs must communicate in all facets of their work

environment, whether they need help, continued education or if experiencing work system issues that prevent them from work performance.

Questions within this nursing study addressed the component of RN thinking and perceptions involved during MA processes. Specifically, RNs were asked to identify what they thought about the process which consists of both positive and not so positive issues related to MA, thereby contributing to understanding what leads to MEs. Trying to understand the perspective of the RN during MA must be acknowledged and addressed in order to support the RN during their hectic stressful clinical shifts.

As one reflects on the three nursing theorists, Betty Neuman, Myra Levine and Patricia Benner, one should focus on nurses taking better care of themselves in the stressful, distracting work environment and utilizing sound clinical judgment. Registered nurse self-care contributes to better decision-making by the nurse, thereby reflecting nursing's progression of professional expertise and clinical competence.

A synopsis of the results is organized according to the three research questions guiding this nursing study.

Research question 1. Do nurses perceive risk in medication administration in everyday practice?

Respondents perceive that MEs occur weekly if not more often (daily), and yet report they are not very likely to report MEs for reasons such as fear, blame, retaliation, not knowing what constitutes an ME or knowing if one has occurred. Even though they are required to report MEs. Respondents also identified they are not likely to make MEs in the next 12 months, yet identify they may not know they have actually caused or contributed to a ME.

Complacency with reliance on technology (e.g., barcode scanning) to catch all issues or potential errors with the medication process is a risk in everyday practice. Nurses that do not follow the rights of MA each and every time, create work-arounds thus contributing to ME. The idea that barcode scanning replaces the rights of MA needs to be addressed in clinical settings in order to decrease risk and MEs. Complacency can interfere with strategies such as double checking while in the process of these critical tasks. Trusting the barcode scanning system helps to decrease errors however, the rights of MA still need to occur, as the rights of MA along with the barcode scanning system *is* the process.

Research question 2. How is a(n) RN's self-reporting related to medication administration errors and risk?

Nurses allude to, if there is no harm, why then report the ME. Respondents identified they are more afraid at the repercussions to them from a workplace environment and their job than reporting MEs which is their professional and ethical duty. The self-report reflects that there is an inherent risk when one does not report MEs. The perception of, no one will know or why report on myself rather than saying, I do not want this error to happen again should be of interest to the nursing profession and nursing managers. Trying to openly communicate why an error happened and how can we as a nursing manager and clinical unit fix the problem, whether a technological issue, system issue, clinical issue or of some other nature, needs to be identified however, without reporting, the discussion cannot ensue. We must also identify if MEs are made by newer RNs and support them in improving their knowledgebase of the medications they administer.

Research question 3. Do nurses perceive benefit and risk to medications during the medication administration process?

Respondents identified they perceive benefit to medications more than risk to medications. One might consider with so many medications administered in the clinical workplace environment during a clinical shift, RNs might be too busy to look up medications prior to giving them. Time becomes an issue, decreasing the time to prepare prior to administration of medications. There is an inherent risk with administration of medications if one does not know what they are giving and how to administer appropriately (e.g., on time, with or without food, interacting with other medications, or omission). The perception of risk to medications might reflect differently if RNs had time to look up and review the medications they administer, for example hypertensive medications, drugs for depression, and nicotine patches, as these drugs were rated low in percentage of risk on the pharmaceutical scale, yet to others carry weight at much risk.

Strengths and Limitations

Strengths. Quantitative research involves a structured survey-based approach with participant random sampling and the use of statistics to report outcomes (Jacobsen, 2017). The strength of this study is that it is a quantitative analysis of exploring whether RNs perceive risk when administering medications. The exploration whether RNs perceive risk when administering medications was an identified gap in the nursing literature. This nursing study filled this identified gap, giving data to perceptions of how nurses feel. One additional noted strength is the large number of voluntary written comments by study participants. Those comments reflect identified themes from the nursing literature as identified in Chapter II. The quantitative survey stimulated written self-reflection on the relevance of MA.

The findings infer clinical relevance in that both academia and staff nurses need consistent reminders of risk and benefit in thinking about the medications they are going to

administer rather than just a task they must accomplish during their workday. The focus should be why RNs administer medications – because there is a critical component to the administration of medications. A strong point of this study brings out the fact that we need to teach critical thinking related to MA, as MA is more than just a task. This study suggests a cultural shift needs to occur in the workplace environment, one that fosters acceptable behavior and represents professional attributes of reporting all MEs, whether near miss or ones that have occurred. The added caveat is that nurses need to know what is meant by ME.

This nursing study adapted tools from the Breitkreuz, Dougal and Wright (2016) study exploring perception of risk, frequency and caution of MA. The understanding of consequences related to MEs is crucial for patient safety. The adaptation of a standardized questionnaire by Slovic et al. (2007) which had been previously found valid and reliable added to the context of this study as well as obtaining further information of how RNs look at or perceive medications with regard to risk and benefit.

Most important was the size of the study sample (N=1475). Respondents who answered the survey reflected honest answers in regard to the reporting of MEs, whether they would report and if they do not report, why they do not report. The responses reflected fear, blame, retaliation, and environments described as supportive. Yet perceptions or feelings that the environments are not supportive identified RNs that want to be supported when they do report mishaps, near misses and all MEs.

Limitations. There are three identified limitations to this nursing study. First, this study may not be generalizable to all 50 states and U.S. territories because the sample was selected from two states in the Pacific Northwest region of the U.S. However, due to the large randomly

selected sample size, 27.80% of the RNs did report they have current active licensure in other

states and U.S. territories, and 24.07% of the RNs reported they currently work in other U.S.

states, U.S. territories and foreign countries. Therefore, it is possible the study may be

generalizable to RNs throughout the mainland U.S. and U.S. territories. Second, this study was a

web-based online survey. Online surveys can pose issues of emails going to one's spam box or

individuals afraid to open online links from senders they do not recognize thereby reducing

survey response. Third, the study was cross-sectional, describing relationships among

phenomena at a fixed point in time.

Implications of the Results

The statistical significance of this nursing study infers clinical relevance because RNs

voluntarily reported they were much more cautious compared to their peers in MA and not at all

likely to make a ME in the next 12 months; yet their peers were very likely to make a ME in the

next 12 months. Participants reported they are required to report MEs but are not very likely to

report MEs due to fear of blame for the ME. Not reporting reflects a cultural shift that needs to

occur in the workplace environment; a shift that supports the RN when errors occur. The clinical

significance pertains to the RN population, as RNs identified that medications are of benefit.

However, if reporting of MEs does not occur, how can professional nurses (RNs) discuss these

MEs, find out why they happened and keep them from occurring again and again?

Participants reported that MEs occur often in everyday practice, if not daily, yet are afraid

to report the ME. Failure to report the ME is an unsafe practice. The reporting of MEs (i.e.,

communication) *is* our ethical duty, as this communication maximizes benefit of patient care,

thus improving patient safety and health of the patient. Deviation from institutional policy in

regard to MA and lack of reporting MEs is an unsafe practice which does not support good clinical decision-making.

Suggestions for Future Research

Replication of this nursing study in other locations with similar context needs to be explored. A research study exploring perceptions of risk and EI is also needed. As identified in the literature review, EI influences our clinical decision-making. Responders voluntarily described clinical performance concerns and issues when administering medications, which we must take into account. A quantitative research study that would include how many non-licensed personnel administer medications in other clinical locations (e.g., long-term care facilities, prisons) is another proposed study to further explore MAEs. Registered nurse (RN) written comments suggested additional research studies and evidence-based practice projects for academia and/or hospitals: 1) need for enhanced knowledge related to medications, 2) critical thinking related to medications, 3) critical thinking taught with MA knowledge and practice, and 4) identification of what the nurse is thinking before giving the medication.

In academia, students are often taught pharmacology before they are admitted into nursing programs. There is then a lapse of time related to knowledge application in a clinical environment. Looking at teaching and learning of medications and risk associated with medications when errors occur is an application of learning strategy. Knowledge and administration of medication is embedded throughout a nursing curriculum in the clinical shifts that nursing students must complete. However, do we emphasize the importance and safety of medications to the students? Content on nursing ethics, such as Code of Conduct and deviations from standards of nursing practice, specifically discussing the *what if* when errors happen should

be incorporated. Real life happenings of MEs or mishaps and then dialogue looking at root cause as communication are critical for students to realize that errors in MA can have dire consequences.

The optional comments section provided insight from 374 RNs as to RN perceptions about medications related to MA practices that happen as they see them daily in real time. A qualitative research study exploring RN perceptions of risk related to MA practices encompassing real time issues of fatigue, burnout and work distractors needs to be explored. A study that utilizes a quantitative tool grounded in the descriptive questions from this nursing study should also be explored.

CONCLUSION

This dissertation filled a gap in the research literature related to the persistent risk of RNs knowingly or unknowingly making a ME. This study focused on RN perceptions and thinking during and prior to MA. The statistical evidence contributes to clinical and curricular relevance for creating and implementing prompts for improved RN decision-making to decrease risk and enhance patient safety.

For example, repetitive learning focused on thinking about MA correlates with the task of giving the medication. Although repetitive learning is typically utilized with nursing students, repetition can be useful in the clinical work environment with practicing RNs. I recommend that academic faculty and hospital educators broaden their pedagogies and clinical interactions related to MA, thereby further reducing MEs because of improved RN decision-making at the point of care.

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APPENDICES

Appendix A

Dougal Dissertation Timeline

May 2018 – July 2019

	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7
Communicate w/Diss. Com.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Write Chpts I-III & study docs	x	x	x	x	x	x	x	x	x	x	x	x		x	
Chpts I-III & study docs to Diss. Com.		x	x	x	x	x	x	x	x	x	x		x	x	
Proposal oral defense									8th						
ISU semester begins				20th					7th				13th		
IRB application, submit/obtain approval									x	x					
Recruitment after IRB approval										x					
Survey in Qualtrics, Study Begins, Data Collection (after IRB approval)									x	x	x				
Data Analysis										x	x	x	x		
Write final chapters										x	x	x	x	x	x
												x		x	x
Diss. Comm. needs final													x		

diss.														
Incorporate feedback for final diss draft									x	x	x	x	x	x
Diss. Comm. needs final diss. draft											x	x	x	x
Incorporate feedback from diss committee									x	x	x	x	x	x
Final dissertation to Diss. Committee											x	x	x	x
Final Defense														12th
Final Diss. to graduate school														x

Appendix B

Inclusion / Exclusion Questions

Instructions: After reading the following questions, please answer each question by clicking on the most appropriate response.

1. Is English your first language?
    a. Yes
    b. No

2. Age: What is your age in years? Please type your age in a 2-digit format (e.g., 42). (if the participant types in 17 or younger, the survey will automatically stop, a message on the screen will appear saying, "Thank you for your time today.")

3. Are you a graduate nurse with a temporary nursing license?
    a. Yes
    (if the participant responds to 'yes', the survey will automatically stop and a message on the screen will appear saying, "Thank you for your time today.")
    b. No

4. Please identify which state(s) you currently hold an active license as a nurse:
    a. Idaho
    b. Oregon
    c. Both (Idaho & Oregon)
    d. Retired
    e. None of the above

5. Are you a Licensed Practical Nurse (LPN/LVN or PN)?
    a. Yes
    b. No
    (if the participant responds to 'yes', the survey will automatically stop and a message on the screen will appear saying, "Thank you for your time today.")

6. Are you a Registered Nurse (RN)?
    a. Yes
    b. No
    (if the participant responds to 'no', the survey will automatically stop and a message on the screen will appear saying, "Thank you for your time today.")

7. Are you an Advanced Practice Registered Nurse (APRN)?
    a. Yes
    b. No
    (if the participant responds to 'yes', the survey will automatically stop and a message on the screen will appear saying, "Thank you for your time today.")

Appendix C

Informed Consent

Hello Nurse Participants!

I am a PhD student at Idaho State University (ISU) working on my doctoral dissertation. My research topic is to explore a nurse's perception of risk with medications.

You are being asked to participate in an online research study. The study (survey) may take up to 25 minutes of your time. This survey poses minimal risk to you as the participant. Possible minimal risks may include loss of time while answering the survey and potential slight distress while answering questions related to risk perception and medications. There is no direct benefit to you while taking the survey; however, the knowledge gained from the study results may provide insight into how nurses think about risk, perceptions of, and medication administration. Study participants may gain indirect benefit from participating, by providing answers to questions.

Participation is completely voluntary. Your responses to the survey will remain strictly confidential. Once you click/access the survey link, you will then be directed to the survey. There is no compensation for participating or consequence for not participating. If you feel at any time while taking the survey that you wish not to continue or withdraw, you may do so at any time without issue or penalty. Once you submit your responses you will be directed to then exit the survey.

Thank you in advance for your time and effort in answering the survey. If you wish to contact me with any questions about the survey, please feel free to do so either by cellphone (208) 859-4446 or email dougrena@isu.edu . This contact would be strictly confidential.

If you have any questions about this research, you may contact Dr. Karen Neill, work phone (208) 282-2102 or email neilkare@isu.edu . If you have any questions about your rights as a research participant, you may contact the ISU Institutional Review Board (IRB) at (208) 282-3371.

Thank you,

Renae L. Dougal, PhD(c), MSN, RN, CLNC, CCRP

Researcher & PhD Student

I consent to participate in this study:

☐ Consent [directed to the survey]   ☐ Decline [Thank you for your time! Exit the link]

Appendix D

IRB Letter of Approval

January 28, 2019

Renae Dougal
College of Nursing
4910 Lakeview Place
Boise, ID 83714

RE: regarding study number IRB-FY2019-147: Registered Nurses Perceptions of Medication
Administration: A Quantitative Descriptive Study

Dear Ms. Dougal:

I have reviewed your request for expedited approval of the new study listed above. This is to
confirm that I have approved your application.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in
writing within 10 business days.

You may conduct your study as described in your application effective immediately. The study is
subject to renewal on or before --, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved.
Some changes may be approved by expedited review; others require full board review. Contact
Tom Bailey (208-282-2179; email humsubj@isu.edu) if you have any questions or require
further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

Appendix E

Invitation to Participate

I am a PhD student at Idaho State University (ISU) working on my doctorate in nursing. As partial fulfillment for my doctoral degree, my doctoral dissertation research topic is to explore a nurse's perception of risk with medications. You are being asked to participate as your responses will help advance research into decreasing medication errors in healthcare!

The purpose of this study is to explore Registered Nurses (RNs) perceptions of medication administration, specifically related to risk, benefits, frequency, caution and medication errors (also known as adverse events [AEs]) in a culture (work environment) of stress, high acuity, work experience, nurse to patient ratios, fatigue and emotional competence or work performance. You can respond to the survey privately in your own personal setting.

You would be completing an online survey. The survey would take up to 25 minutes of your time. Participation is completely voluntary and your responses to the survey will be kept strictly confidential. Once you click/access the link you will be directed to the survey. As a responder to the survey, per an ISU requirement, you need to know that, "All survey information will be retained and hosted on a third party Qualtrics server and not on an Idaho State University server."

There is no compensation for participating or consequence for not participating. If you feel at any time while taking the survey that you wish not to continue or withdraw, you may do so at any time without issue or penalty.

Here is the link. You may click on the link or type into your browser: [insert survey link]

Thank you in advance for your time and effort in answering the survey. If you wish to contact me with any questions about the survey, please feel free to do so either by cellphone (208) 859-4446 or email dougrena@isu.edu . This contact would be kept strictly confidential. If you have any questions about this research, you may contact Dr. Karen Neill, work phone (208) 282-2012 or email neilkare@isu.edu . If you have any questions about your rights as a research participant, you may contact the ISU Institutional Review Board (IRB) at (208) 282-3371.

Thank you,

Renae L. Dougal, PhD(c), MSN, RN, CLNC, CCRP

Researcher & PhD student

Appendix F

Survey Welcome & Instructions

(Message will appear on screen after participant clicks on Consent tab)

Welcome!

To navigate through this survey, some questions will ask you to click on a response, while other questions will ask you to write in a short response with limited number of characters. To advance to the next page / screen simply select the arrow tab at the bottom of the page / screen, or if you need to refer to a previous question on a different page / screen simply select the arrow tab at the bottom of the page / screen. Please submit all your responses you have taken the time to answer at the end of the survey, as all responses are of great value! Once you exit or leave the survey you will not be able to access or re-enter the survey a second time. Now, begin the survey by clicking on the start / begin tab!

Appendix G

Demographic Questions

Instructions: After reading the following questions, please answer each question by clicking on the most appropriate response.

1. Ethnicity origin (or Race): Please specify your ethnicity based on the following 2017 Federal Definitions of Race and Category (You may choose more than one response if applicable):

    a. White: A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.
    b. Hispanic or Latino: A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.
    c. Black or African American: A person having origins in any of the black racial groups of Africa.
    d. Alaska Native or American Indian: A person having origins in any of the original peoples of North and South America (including Central America), who maintains cultural identification through tribal affiliation or community attachment.
    e. Asian: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
    f. Native Hawaiian or Other Pacific Islander: A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
    g. More than one race.
    h. Other (not identified above): [type in origin or race]
    i. I prefer not to answer

2. Marital Status: What is your marital status?
    a. Single, never married
    b. Married or domestic partnership
    c. Widowed
    d. Divorced
    e. Separated

3. What is your gender?
    a. Male
    b. Female
    c. I prefer not to answer

4. Education: What is the highest nursing degree or level of nursing school you have completed? *If you are currently enrolled, please select your highest nursing degree received.*
    a. Associate degree
    b. Diploma nurse

      c. Bachelor's degree
      d. Master's degree
      e. Post-Master's certificate
      f. Doctoral degree

5. Please identify your licensure as a nurse.
      a. LPN/LVN
      b. RN
      c. APRN
(if participant responds to LPN/LVN or APRN, the survey will automatically stop and a message on the screen will appear saying, "Thank you for your time today.")

6. In which states are you currently licensed?
      a. Idaho
      b. Oregon
      c. Both (Idaho & Oregon)
      d. Other: _____ [type in state(s)]

7. In which states do you currently work as an RN?
      a. Idaho
      b. Oregon
      c. Both (Idaho & Oregon)
      d. Other: _____ [type in state(s)]
      e. Retired

8. What is your current employment status?
      a. Full-time
      b. Part-time
      c. PRN
      d. Not employed

9. How many years have you been a Registered Nurse (RN)?
      a. ≤5 years
      b. 6-10 years
      c. 11-15 years
      d. 16-20 years
      e. 21-25 years
      f. 26-30 years
      g. ≥31 years

10. Please identify your current area(s) of employment:
      a. Medical-surgical unit
      b. Orthopedics
      c. Inpatient Rehab
      d. Outpatient Rehab

    e. Oncology
    f. Management
    g. Surgery/Pre- or post-op/PACU
    h. Special procedures
    i. Outpatient services
    j. Critical Care/Intensive care (surgical, medical, coronary, trauma)
    k. Telemetry
    l. Skilled nursing facility
    m. Medical clinics
    n. Other (please identify) [type in current area]

11. Please identify your <u>primary role</u> as a nurse
    a. Staff nurse
    b. Charge nurse
    c. Manager/Supervisor/Management
    d. Academic faculty/Educator
    e. Nurse educator
    f. Certified nurse leader
    g. Other

12. Please identify the work setting/environment you currently spend the <u>most</u> time in
    a. Outpatient
    b. Inpatient
    c. Academia
    d. Public Health/Community Nurse
    e. Hospice
    f. Medical Office
    g. Extended Care
    h. Management (please describe) [type in response, limited to 40 characters]
    i. K-12
    j. Other (please identify) [type in response, limited to 40 characters]

13. How many years have you worked in your <u>current</u> primary role?
    a. ≤5 years
    b. 6-10 years
    c. 11-15 years
    d. 16-20 years
    e. 21-25 years
    f. 26-30 years
    g. ≥31 years
    h. Not currently employed

14. Please characterize the type of facility you <u>currently</u> work in:
    a. Government facility
    b. Public
    c. Private
    d. Urgent Care Clinic
    e. Institution of higher learning (academic)
    f. Critical Access hospital
    g. Medical teaching hospital
    h. Other

15. In which setting do you work?
    a. Non-urban or rural (<2,500 people)
    b. Urban (≥2,500 people)
    c. Currently not employed

16. What shift do you <u>primarily</u> work? More than one response may apply.
    a. 7a-7:30pm
    b. 7p-7:30am
    c. 7a-3:30pm
    d. 3p-11:30pm
    e. 11p-7:30am
    f. 8am-5pm
    g. Other (please identify)
    h. Weekends
    i. Rotating day/night
    j. Rotating weekends and weekdays

17. If you have ≤1 year of clinical experience as a nurse, please identify which best describes your current work situation
    a. Completed probationary / orientation period
    b. In a nurse residency program
    c. Assigned a preceptor during work hours
    d. N/A

18. In your <u>primary</u> role as a nurse, do you <u>currently</u> administer medications to patients?
    a. Yes
    b. No

Appendix H

Inquiry of Participant Medication Error

Instructions: There are no right or wrong answers. Please answer honestly **based on your perspective or point of view**. After reading each question, you should rate each of the items, using the scale provided by selecting the answer on the scale that most closely represents your belief/perspective/point of view.

1) How likely are you to make at least one medication error in the next 12 months?

Not at all likely   Very likely

1   2   3   4   5   6   7

2) Are you required to report any medication errors to your manager, charge nurse, lead supervisor or the provider (e.g., physician)?
   a. Yes
   b. No

3) How likely are you to report any medication errors to your manager, charge nurse, lead supervisor or the provider (e.g., physician)?

Not at all likely   Very likely

1   2   3   4   5   6   7

4) How likely are you to report any medication errors to a colleague or friend?

Not at all likely   Very likely

1   2   3   4   5   6   7

5) Are you required to report any medication errors through an institutional reporting system?
   a. Yes
   b. No

6) How likely are you to report any medication error using your institution reporting system?

Not at all likely   Very likely

1   2   3   4   5   6   7

7) Do you think your peers are likely to make a medication error in the next 12 months?

Not at all likely   Very likely

1   2   3   4   5   6   7

8) How likely are your peers to report any medication errors to your manager, charge nurse, lead supervisor or the provider (e.g., physician)?

Not at all likely   Very likely

1   2   3   4   5   6   7

9) How likely are your peers to report any medication errors using your institution reporting system?

Not at all likely   Very likely

1   2   3   4   5   6   7

10) How likely are your peers to report any medication errors to a colleague or friend?

Not at all likely   Very likely

1   2   3   4   5   6   7

11) Amongst RNs, the <u>most</u> common reason for <u>not</u> reporting medication errors is

☐. lack of time

☐. fatigue

☐. fear of retaliation/retribution

☐. embarrassed to admit a medication error

☐. not knowing what a medication error is

☐. not knowing a medication error has occurred

☐. not knowing how to report the error

☐. other (please identify) [type in response limited to 40 characters]

12) If you do <u>not</u> report a medication error, what is your <u>most</u> common reason for <u>not</u> reporting a medication error?

□. lack of time

□. fatigue

□. fear of retaliation/retribution

□. embarrassed to admit a medication error

□. not knowing what a medication error is

□. not knowing a medication error has occurred

□. not knowing how to report the error

□. other (please identify) [type in response limited to 40 characters]

13) If your peers do <u>not</u> report a medication error, what is the <u>most</u> common reason for your peers to <u>not</u> report a medication error?

□. lack of time

□. fatigue

□. fear of retaliation/retribution

□. embarrassed to admit a medication error

□. not knowing what a medication error is

□. not knowing a medication error has occurred

□. not knowing how to report the error

□. other (please identify) [type in response limited to 40 characters]

Appendix I

Risk Questionnaire: Perceived Frequency & Perceived Caution

(These questions are voluntary. Responses are kept confidential; not used against the participant for any reason, and the participant may quit at any time.)

For the purposes of this survey, we are defining patient care error events, hereafter referred to as "*errors*", broadly as:

"Situations caused by human error or system deficiencies that result in patient harm or increased risk of patient harm. They include mistakes, omissions, and failures to follow procedures by you or other care givers. They also include errors or deficiencies in orders, policies, systems, or technologies. They include near misses and situations where an error reaches the patient, whether or not the error causes harm".

Please indicate your perceptions by clicking on the appropriate option. There are no right or wrong answers. Please answer honestly **based on your perspective or point of view**. After reading the question, you should rate each of the items, using the scale provided by selecting the answer on the scale that most closely represents your beliefs about each item.

1. How frequently do you believe medication errors occur in a typical 30-bed medical-surgical unit?
   - 1   = About once every few years
   - 2   = One or more times each year
   - 3   = About once a month
   - 4   = A few times a month or about once each week
   - 5   = A few times each week
   - 6   = About once each day
   - 7   = More than once every day

2. How frequently do you believe IV fluid errors occur in a typical 30-bed medical-surgical unit?
   - 1   = About once every few years
   - 2   = One or more times each year
   - 3   = About once a month
   - 4   = A few times a month or about once each week
   - 5   = A few times each week
   - 6   = About once each day7
   - 7   = More than once every day

3. How often do you believe errors in the rights of medication administration occur in a typical 30-bed medical-surgical unit?

   - 1   = About once every few years
   - 2   = One or more times each year
   - 3   = About once a month

4   = A few times a month or about once each week
5   = A few times each week
6   = About once each day
7   = More than once every day

4. Compared to your peers, are you more or less cautious in the process of medication administration?

| -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |

Much less cautious   About the same   Much more cautious

5. Compared to your peers, are you more or less cautious in the process of IV fluid administration?

| -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |

Much less cautious   About the same   Much more cautious

6. Compared to your peers, are you more or less cautious in checking patient identity prior to an intervention?

| -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |

Much less cautious   About the same   Much more cautious

Appendix J

Pharmaceutical Questionnaire

Instructions: This section will show you the same list of items with 2 different scales. Each scale has to do with a different characteristic of risk or benefit associated with pharmaceutical products. The first scale is "Risk to those Exposed" and the second scale is "Benefits". After reading the description, you should rate each of the items, using the scale provided by selecting the answer on the scale that most closely represents your beliefs about each item.

Risk to those Exposed

Description: Please tell the researcher to what extent you would say that people who are exposed to this item are <u>at risk</u> of experiencing personal harm from the item? (1 = they are not at risk; 7 = they are very much at risk)

	They are <u>not at risk</u>						They are very much <u>at risk</u>
Drugs for depression	1	2	3	4	5	6	7
Drugs for erectile dysfunction (Viagra)	1	2	3	4	5	6	7
Drugs for epilepsy	1	2	3	4	5	6	7
Smallpox vaccination	1	2	3	4	5	6	7
Drugs for osteoporosis	1	2	3	4	5	6	7
Sleeping pills	1	2	3	4	5	6	7
Drugs for AIDS	1	2	3	4	5	6	7
Drugs for arthritis	1	2	3	4	5	6	7
Drugs for asthma	1	2	3	4	5	6	7
Drugs for ulcers	1	2	3	4	5	6	7
Estrogen replacement (HRT)	1	2	3	4	5	6	7
Nonsteroidal anti-inflammatory drugs	1	2	3	4	5	6	7
Insulin	1	2	3	4	5	6	7
Vitamin pills	1	2	3	4	5	6	7
Diet drugs	1	2	3	4	5	6	7
Vaccines	1	2	3	4	5	6	7

Drugs for Alzheimer's disease	1	2	3	4	5	6	7
Drugs for anxiety	1	2	3	4	5	6	7
Nicotine replacement (patches)	1	2	3	4	5	6	7
Antibiotic drugs	1	2	3	4	5	6	7
Birth control pills	1	2	3	4	5	6	7
Herbal medicines	1	2	3	4	5	6	7
Laxatives	1	2	3	4	5	6	7
Acne medicines	1	2	3	4	5	6	7
Cancer chemotherapy	1	2	3	4	5	6	7
Biotechnology drugs	1	2	3	4	5	6	7
Botox injections	1	2	3	4	5	6	7
Aspirin	1	2	3	4	5	6	7
Drugs for cholesterol	1	2	3	4	5	6	7
Prescription drugs	1	2	3	4	5	6	7
Blood pressure drugs	1	2	3	4	5	6	7
Allergy drugs	1	2	3	4	5	6	7

Next, rate their benefits.

Benefits

Description: In general, how beneficial do you consider this item to be? (1 = not at all beneficial; 7 = very beneficial)

	Not at all beneficial						Very beneficial
Drugs for depression	1	2	3	4	5	6	7
Drugs for erectile dysfunction (Viagra)	1	2	3	4	5	6	7
Drugs for epilepsy	1	2	3	4	5	6	7
Smallpox vaccination	1	2	3	4	5	6	7

Drugs for osteoporosis	1	2	3	4	5	6	7
Sleeping pills	1	2	3	4	5	6	7
Drugs for AIDS	1	2	3	4	5	6	7
Drugs for arthritis	1	2	3	4	5	6	7
Drugs for asthma	1	2	3	4	5	6	7
Drugs for ulcers	1	2	3	4	5	6	7
Estrogen replacement (HRT)	1	2	3	4	5	6	7
Nonsteroidal anti-inflammatory drugs	1	2	3	4	5	6	7
Insulin	1	2	3	4	5	6	7
Vitamin pills	1	2	3	4	5	6	7
Diet drugs	1	2	3	4	5	6	7
Vaccines	1	2	3	4	5	6	7
Drugs for Alzheimer's disease	1	2	3	4	5	6	7
Drugs for anxiety	1	2	3	4	5	6	7
Nicotine replacement (patches)	1	2	3	4	5	6	7
Antibiotic drugs	1	2	3	4	5	6	7
Birth control pills	1	2	3	4	5	6	7
Herbal medicines	1	2	3	4	5	6	7
Laxatives	1	2	3	4	5	6	7
Acne medicines	1	2	3	4	5	6	7
Cancer chemotherapy	1	2	3	4	5	6	7
Biotechnology drugs	1	2	3	4	5	6	7
Botox injections	1	2	3	4	5	6	7
Aspirin	1	2	3	4	5	6	7
Drugs for cholesterol	1	2	3	4	5	6	7
Prescription drugs	1	2	3	4	5	6	7
Blood pressure drugs	1	2	3	4	5	6	7

Allergy drugs	1	2	3	4	5	6	7

Appendix K

Optional comment section

(This section will be provided at the end of the electronic survey for the participant).

This free text comment section is being provided as an opportunity for you to add any additional comment(s) you would like to make regarding medication administration (e.g., issues, errors, risks). The text box is limited to 500 characters. Thank you for your time and valuable responses!

Appendix L

Gift Card Drawing Information

Thank you for completing the survey! If you would like to be entered into a drawing for one of four Amazon Gift cards ($25 value each) please provide an email address to the researcher to be entered into the drawing. The winners will be notified by email of their win and how to access their gift card.

[insert email address]

Appendix M

Request for Follow-up Questions

Thank you for completing the survey!

I am wanting to improve six (6) of the survey questions. Would you be willing to participate by answering six (6) questions from the survey in approximately 2 to 4 weeks? If yes, you will be contacted by email approximately 2 to 4 weeks after you exit this survey with a link to access the follow-up questions. Your contact information will be kept strictly confidential.

☐ yes → please enter your contact information below [type in email address]

☐ no → thank you for your time and consideration of the follow-up questions.

Appendix N

Follow-up/Retest Survey:

Risk Questionnaire: Perceived Frequency & Perceived Caution

(These questions are voluntary. Responses are kept confidential; not used against the participant for any reason, and the participant may quit at any time.)

For the purposes of this survey, we are defining patient care error events, hereafter referred to as "*errors*', broadly as:

"Situations caused by human error or system deficiencies that result in patient harm or increased risk of patient harm. They include mistakes, omissions, and failures to follow procedures by you or other care givers. They also include errors or deficiencies in orders, policies, systems, or technologies. They include near misses and situations where an error reaches the patient, whether or not the error causes harm".

Please indicate your perceptions by clicking on the appropriate option. There are no right or wrong answers. Please answer honestly **based on your perspective or point of view**. After reading the question, you should rate each of the items, using the scale provided by selecting the answer on the scale that most closely represents your beliefs about each item.

1. How frequently do you believe medication errors occur in a typical 30-bed medical-surgical unit?

      1   = About once every few years
      2   = One or more times each year
      3   = About once a month
      4   = A few times a month or about once each week
      5   = A few times each week
      6   = About once each day
      7   = More than once every day

2. How frequently do you believe IV fluid errors occur in a typical 30-bed medical-surgical unit?

      1 = About once every few years
      2 = One or more times each year
      3 = About once a month
      4 = A few times a month or about once each week
      5 = A few times each week
      6 = About once each day
      7 = More than once every day

3. How often do you believe errors in the rights of medication administration occur in a typical 30-bed medical-surgical unit?

       1 = About once every few years
       2 = One or more times each year
       3 = About once a month
       4 = A few times a month or about once each week
       5 = A few times each week
       6 = About once each day
       7 = More than once every day

4. Compared to your peers, are you more or less cautious in the process of medication administration?

-4   -3   -2   -1   0   1   2   3   4

Much less cautious   About the same   Much more cautious

5. Compared to your peers, are you more or less cautious in the process of IV fluid administration?

-4   -3   -2   -1   0   1   2   3   4

Much less cautious   About the same   Much more cautious

6. Compared to your peers, are you more or less cautious in checking patient identity prior to an intervention?

-4   -3   -2   -1   0   1   2   3   4

Much less cautious   About the same   Much more cautious

Appendix O

Reminder Email Day 3

Dear Nurse Participant:

I am writing to ask for your help with my doctoral dissertation nursing study on RNs perception of risk with medication errors. You are part of our nursing profession that is being asked to participate in this important study. Your experience as a nurse is valuable to reduce medication errors in healthcare!

This is a friendly reminder that the survey is currently open and your responses are valuable. The survey will take up to 25 minutes of your time to complete. To begin the survey, simply click/access this survey link:

[insert link]

Your participation is voluntary and your responses are confidential. I really appreciate your help with this survey.

Many thanks,

Renae L. Dougal, PhD(c), MSN, RN, CLNC, CCRP

Researcher & Idaho State University PhD student

Appendix P

Reminder Day 10

Dear Nurse Participant:

Earlier I sent you an invitation to participate in this doctoral dissertation nursing study on RNs perception of risk with medication errors. You are part of our nursing profession that is being asked to participate in this important study. Your experience as a nurse is valuable to reduce medication errors in healthcare!

This is a friendly reminder that the survey is currently open and your responses are valuable. The survey will take up to 25 minutes of your time to complete. Providing you with a link to the survey makes it easy for you to respond. The survey will be open until Saturday February 23rd, 1155pm (2355). To begin and complete the survey, simply click/access this survey link:

[insert link]

Your participation is voluntary and your responses are confidential. I really appreciate your help with this survey.

Respectfully,

Renae L. Dougal, PhD(c), MSN, RN, CLNC, CCRP

Researcher & Idaho State University PhD student

Appendix Q

Retest Email Reminder

Dear Nurse Participant:

You are receiving this email because you have indicated you are willing to retake six questions from the nursing survey you previously participated in two weeks ago, on Nurses Perception of Risk and Medication Errors. Thank you again for agreeing to answer these six questions. Your participation is voluntary and will remain confidential.

Once you begin the short survey, the length of time to answer these questions is anticipated to be 3 to 5 minutes. The link to answer these questions will only be available until 1155pm (2355) Sunday March 3, 2019, as the study is coming to a close.

Thank you for your participation in helping to reduce medication errors in healthcare!

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Appendix R

Gift Card Drawing Information

Thank you for completing the six (6) questions! If you would like to be entered into a drawing for one of four Amazon Gift cards ($10 value each) please provide an email address to the researcher to be entered into the drawing. The winners will be notified by email of their win and how to access their gift card.

[insert email address]

Appendix S

Respondents Optional Descriptive Feedback

Study participants, through self-reflective comments, provided insight from lessons learned and reflected on an RN's responsibility and duty to those entrusted in his or her care. Participant comments were noted to center around topics previously identified from the literature review in Chapter II. These topics also reflected characteristics from the three nursing theorists, Patricia Benner (novice to expert), Myra Levine (conservation principles and nursing actions) and Betty Neuman (nurses' relationship to stress within the clinical work environment), which comprise the nursing framework for this nursing study. Participant comments reflect the topics as identified.

Medication Errors

Comments from responding RNs identified that nurses keep patients safe from harm and want to do good each and every day they care for patients. Nurses self-report, the reporting of all MEs, whether actual, near miss or observed, were means to further the professional discussion for process improvement and individual professionalism. Communicating, whether directly discussed with managers, providers (e.g., physicians), or with colleagues about MEs can help identify areas of weakness that revolve around system processes and supports colleagues in the MA process. Respondents mentioned that discussion of medication issues and errors in unit staff meetings are supportive and proactive to decrease blame, shame and further decrease errors from occurring.

Respondents also reported that distractions (e.g., telephone calls, verbal interactions, noise, families, stress and being rushed) during the MA process need to be reduced or completely absolved in order to safely administer medications. Those nurses that identified having made

errors in MA further identified they developed strategies on their own moving forward in order to keep them from committing errors again. Respondents identified these strategies as, 1) slow down, do not rush and avoid distractions, 2) think through what they were doing, 3) think about the medication, 4) follow the rights of medication administration each and every time, 5) give medications on time, and 6) double check and triple check if necessary the medications prior to administering them.

Perceptions of Nurses

Nurse respondents identified that some RNs perceive that nurses do not make errors; errors are made by the system itself while others identified that some RNs perceive that nurses did make errors caused by human mistakes. Nurse participants identified that we, as humans, are just that: human. We are all subject to human error, as none of us is perfect. Nurses identified that rushing while at work was a reason for making the error(s), trying to give medications on time, therefore bypassing the safety processes (i.e., barcode scanning) that are in place. Nurses also identified that reliance on technology is not fail safe, as nurses need to still pay attention to the act of actually administering the medications to the right patient. Respondents identified that although we use the scanning technology and electronic health records (EHRs) to correctly identify the patient, this does not mean the correct medication may actually be given to the patient. Incorrect doses can be within the medication dispensing machines as they have been incorrectly placed in the machine medication bins by pharmacy staff and/or RNs. Intravenous fluids (IV) fluids and IV antibiotics, although scanned at some point during the administration process, have been seen to be infusing at incorrect doses, still being charted within the EHR that IV fluid is infusing when in actuality the IV fluid has been discontinued or hung but not infusing. Failure to comply with the rights of MA can result in MEs.

Nurses identified that errors occur when in emergent situations (e.g., code) or in certain clinical settings (e.g., emergency department, critical care) where stress is high and there is insufficient time to comply with the system of checks and balances. Nurses identified they override medication dispensers in order to give the medication right away, rather than slowing down and taking time to double check the medication. Nurses identified they do not have time to wait for pharmacy to prepare and bring the medication therefore, they may mix and administer without double checking dose(s), patient ID and/or right drug. Nurses identified that errors are made when clinical units are short-staffed. The failure to communicate and verify medication name, dose and correct patient was noted as a reason for MEs.

Respondents identified that communication was a means of protecting oneself. Nurses choose to not report MEs as they perceive not reporting protects them from embarrassment, shame or blame. Respondents mentioned that RNs do not know the medications they are giving to their patient's as there is insufficient time to prepare (e.g., looking up the medication prior to administering) as there are just too many medications to give and to learn about. Nurses self-report that this lack of knowing about medications can be from new inexperienced nurses not knowing about medications to those that are experienced nurses because there are too many medications now and it is hard to keep up on all of them.

Comments from RNs varied whether or not the ME was an actual error, a near miss or a late medication. Giving medications late was not considered an error, as they perceived errors to be giving the wrong medication. Respondents identified they did not know what defined a ME or a near miss. However, RNs identified that it is their professional duty to report all errors.

Nurses commented, they perceived the majority of MEs occur in the last several hours of a long 12-hour shift, especially when short-staffed. Respondents identified that just trying to keep up and being overworked can increase errors to meet deadlines prior to end of shift.

Prevention of Medication Errors

Nurses identified reliance on barcode scanning as a contributor to MEs. Literature identifies that MEs have decreased due to technological advancements such as barcode scanning. Participants reported that nurses become too complacent or rely too heavily on barcode scanning and do not carry out the process of proper patient identification when administering medications with adherence to the rights of MA. Participants reported that RNs think the barcode scanning is going to "catch" all errors, when in fact RNs fail to realize that the human error component is still a factor even with technological assistance.

Nurses identified that the labeling of medications whether a vial, syringe or bottle, including the LASA medications, pose a problem with the MA process. Nurses identified having given both incorrect doses and incorrect medications to patients due to labeling issues however, RNs identified the nurse is still responsible to verify the correct medication to the correct patient. Nurses identified errors could have been prevented if they would have taken the time to discuss or question medication orders that were not clear to them (e.g., questioned the medication, dose, the right order for the right patient) whether by pharmacy or by provider (i.e., physician). Nurses identified that double checking, according to facility policy, or a personal double check for all medications was a means to prevent MEs. Nurses mentioned that having dedicated medication nurses on the clinical unit would decrease or prevent errors from happening; one person to

administer medications focuses more on the critical task without much interruption or distraction.

Nurses reported that in some states, medications can be administered in clinical settings by non-licensed staff who are not educated or knowledgeable about the medications they give; therefore, errors occur. Respondents identified omitting this method of MA and giving administration of medications back to nurses would be one means of preventing MEs. Respondents identified that nurses need more education and knowledge about medications from nursing school, continuing education materials on pharmacology, as well as updates on medications as a practicing RN.

The anecdotal comments from RNs of MEs and nurses perceptions address research question 2, how is a(n) RN's self-reporting related to medication administration errors and risk? Anecdotal comments are associated with the following topics:

Barriers to Reporting Medication Errors

Nurses reported time is of the essence in high acuity high stress clinical areas; there is not time to report every error. Participants by self-report mention, if there is no harm to the patient, why report the error or near miss? Nurses identified they did not know what a near miss was, while others indicated reporting of errors is harmful to the nurse. Nurses identified the reporting systems within institutions is cumbersome thereby, reporting takes too much time. Respondents identified they would rather give the medication late and go on about their work. Others identified, what is the harm in giving a medication late, as patients at home can take some of their medications any time they want to. Participants identified they do not mind giving some

medications late depending on what the medication is, such as a vitamin or stool softener; they perceive these medications to be a non-issue or no harm for late administration.

Nurses reported they "tell" their manager about the incident but do not report the incident via the facility reporting system; therefore, they feel they have reported the incident. Respondents identified if you report an error you are admitting you did something wrong or incorrect and do not want to admit to an error. They mentioned that admitting to errors or reporting of such can lead to loss of one's job or legal retaliation and nurses are afraid of the repercussions. Nurses mentioned that the act of making a ME should not result in loss of job, being reprimanded or legal blame. Nurses identified that although they believe the work environment to be one of safe culture settings, the process is still punitive and places shame and guilt upon the nurse.

Perceptions of Risk (attitudes)

Nurse participants identified that when mistakes are made and reported these become learning opportunities; not only for the nurse who made the error but to further prevent these errors from happening again. They also identified allowing the mistake to become a learning opportunity is supportive and unites the clinical areas that utilize this practice. Therefore, nurses are more inclined to report errors, adverse events and near miss situations. Nurses explained their clinical units have discussions about MEs, which discuss root cause(s) and as a unit they identify strategies to correct these issues.

Nurses identified that more experienced nurses are less inclined to make errors as they perceive and realize the risk that is associated with MA and take the time to do administer medications correctly. Varied responses from RNs identified they either do not make mistakes or

have never made a medication mistake (error), while other nurses mentioned that all nurses make a mistake, some just do not know they have made them. Respondents commented that if they do not catch the error someone else will. However, RNs commented that then the mistake often times is associated with the one who points it out. Respondents identified the risk is too great when giving medications with high stress, high acuity clinical environments and they change their job to avoid these high stakes situations. Nurses mentioned it is not worth losing their nursing license over these types of clinical environments and high stakes situations; we all need to report when errors occur.

The anecdotal comments from RNs of MEs and perceptions of nurses address research question 1, do nurses perceive risk in medication administration in everyday practice, and research question 2, how is a(n) RNs self-reporting related to medication administration errors and risk? Anecdotal comments are associated with the following topics:

Frequency

Nurses identified within their clinical units/areas it is hard to know how many MEs occur. However, they mentioned that MEs occur each and every day. The lack of knowing how often they occur is due to lack of reporting or underreporting of such errors. Nurses mentioned errors that occur every day are due to nurses being over worked, experiencing high stress, distracted and having too many medications to administer; RNs mentioned when they experience this type of work environment, errors happen. Nursing managers reported they must review every ME reported that involves nurses. When nurses do not report MEs, root cause analysis cannot happen which then potentiates the ME issue.

Emotional Intelligence (EI)

Respondents reported newer younger nurses have not been trained with sufficient knowledge regarding medications and medication practices, thus making a lot of errors. They identified newer younger RNs are less inclined to report them. More experienced RNs reported newer younger RNs have different traits and personalities and are not as careful or cautious in the MA process.

The anecdotal comments from RNs of MEs and perceptions of nurses address research question 1, do nurses perceive risk in medication administration in everyday practice? and research question 3, do nurses perceive benefit and risk to medications during the medication administration process? Anecdotal comments are associated with the following topics:

Attitudes

Nurses identified that more experienced RNs use intuition and nursing judgment in their clinical decision-making and care of the patient. They have experienced making MEs in years past therefore, they no longer hurry through MA, utilizing safety first. Nurses self-report, critical clinical areas (e.g., the emergency department, critical care) have more experienced RNs and tend to understand the complexity of the medications they administer. These nurses self-identified they are more expert nurses and practice personal strategies to safely administer medications. They reported that nurses are not the only ones that can contribute to MEs. They identified they tend to engage in open communication with pharmacy and physicians regarding medication preparation, unclear medication orders and administration of such medications. These expert nurses mentioned the human factor component that is involved in the MA process, that barcode scanning is meant as a safe practice and safety precaution yet realize the rights of MA

must be part of that safe practice. Respondents mentioned how one is trained in administration of medications is also how one will most likely carry out the practice, utilizing single check to double check systems.

The anecdotal comments from RNs of MEs and perceptions of nurses address research question 2, how is a(n) RNs self-reporting related to medication administration errors and risk? Anecdotal comments are associated with the following topics:

Clinical Decision-making (clinical reasoning and critical thinking)

Nurses mentioned that ethical principles should outweigh what nurses actually do when administering medications. Respondents stated that it is a nurse's duty to report MEs and near miss events. Nurses reported that clinical decision-making also means not utilizing work-arounds in clinical situations to get tasks done, but rather thinking through the process and using safety over priority. They commented a common work-around was not using the medication library on IV pumps, which are built into infusion pumps for safe delivery of IV medications. When nurses work-around this built-in safety measure, errors happen.

Thank you to the participants for taking the time to provide your valuable comments regarding MA while participating in this nursing study!

Appendix T

Supplemental Comments

Some interpretation in order to clarify meaning of survey data from the personal experiences is included. These personal experiences will be referred to as Individual One, Individual Two, Individual Three and Individual Four.

Individual One. This individual shared her work experience in the area of clinical informatics working closely with nursing staff and the use of electronic systems for MA. Individual One mentioned she was often amazed how new nurses rely heavily on technology for medication safety. She identified definite benefits to technology (e.g., barcoding medications). However, technology in no way takes the need away for a nurse to perform the five rights of MA and observe the patient. She mentioned having reviewed many mistakes by nurses for "our quality folks" that sadly resulted in nurses not putting into practice the rights of MA.

This individual also shared her own unexpected experience as a patient undergoing a much unanticipated cardiac surgical procedure (i.e., heart transplant). Her comments reflected that she was able "…to see caregivers interact with medications and provide education about medications very new to me. It was once again an eye opener."

Individual Two. This individual mentioned although she has not administered medications for many years,

"…giving out medications in the hospital was scary enough to make me change my choices of nursing careers. We were responsible to know everything there was to know about medications and possible side effects and had absolutely no time to learn about that. It was unsafe…".

Individual Three. This individual commented,

"…medication errors are very common where I work and though the culture is changing, there is still a punitive feel to reporting and self-reporting. I am not sure all of it is just human error. There are so many issues with systems and policies that sometimes it feels like we are being set up to fail."

Individual Four. This individual shared the following comments, "Medication errors come in many packages, from the error itself to the over medication errors. Outcomes can be quite variable if not utilizing all assessment and protocols to keep patients safe." She continued to share from a personal patient experience,

"…occasionally being on the other side of receiving care allows for greater perspective for your patients. What I experienced was overmedication. Pain medications that I never had prior to this surgery were ordered…in the PACU I was given Dilaudid…once back to the unit, I was asked my pain level…however not asked beyond the pain number…description…is it sharp, dull, continuous, tolerable…I was still under the influence of anesthesia, Dilaudid, and not enough sleep the night prior. I was having a problem even keeping my eyes open!...".

She goes on to mention she received multiple doses of pain medication over the next several hours. Due to these medications she found it difficult to ambulate, felt queasy, slow to respond, and then was given more medication (i.e., Zofran, oxycodone and Tylenol). Mobility became difficult, one problem compounding the other and was difficult to maintain oxygen saturation above 93% without supplemental oxygen. Her comments, "…the RN did not call the

surgeon to see about a change in orders or a different medication that I could tolerate and be more active and participatory in my care." She commented,

> "…if a person cannot maintain their Sats off O2 and barely when on 2L, what should you do? Not give more pain medication until you figure what needs to be done to maintain an open airway…just following orders and not pulling the whole picture together…".

She further shared, "using anecdotal information to get BSN students to visualize and comprehend that it is not just about getting the 5 rights of medication safety, but to integrate assessment, critical thinking, and making a plan for follow-up".

Comments from the four individual personal situations focused on specific issues and concerns with MA. The RN must not only follow MA processes but utilize sound clinical decision-making when administering pain medication or any medication to the patient. Nursing assessment, observation and nursing actions are vital to the management of the patient; managing the patient to avoid AEs.

Thank you to these four individuals who provided valuable comments to further the discussion regarding MA.