

**THE SPACE TO MAKE MISTAKES:
ALLOCATING RESPONSIBILITY AND ACCOUNTABILITY FOR
NURSING STUDENT-COMMITTED MEDICATION ERRORS**

by

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Abstract

A medication error committed by a student nurse during a clinical placement often results in the student fearing its potential impact on the patient, unit staff, and the student's educational journey. Student nurses must navigate two parallel systems during a clinical placement – the educational system and the healthcare system – and there can be confusion about what each requires of the student. Neither of these systems contain clear direction for managing student-committed medication errors and for allocating associated responsibility and accountability.

This exploratory mixed methods study examines the process by which responsibility and accountability for a student-committed medication error is allocated and the factors that influence that allocation decision. It describes key features of an ideal allocation process and suggests reasons why the current allocation process often does not meet those requirements. Qualitative data were analyzed through interpretive description and quantitative data were analyzed using descriptive statistics. The results were situated, interpreted, and triangulated within a critical realism philosophical framework.

An ideal post-error environment must incorporate a just culture. Since students must navigate both the educational institution and the healthcare facility environments during a clinical placement, a just culture must permeate both. However, students are instead colliding with a post-error environment that they perceive as not meeting key ideals of a just culture: fairness, transparency, minimization of fear, and dedication to learning. Findings of this study can be used to drive change that will better support those who are involved in a post-error process, and decrease the significant inconsistencies that are currently of particular concern.

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Glossary

Accountability: is a higher-level activity than responsibility, requiring that a person who has undertaken a task, or has chosen not to undertake it, must be able to provide the rationale or explanation for that decision (Cornock, 2011). Accountability requires that an individual be answerable for both their actions and their omissions. To give an accounting of one's decisions and actions, one needs to provide information about how well or how poorly their responsibility has been carried out for the purpose of explaining or justifying what has been done (Day, 2010; Kaler, 2002; O'Connor, Kotze, & Wright, 2011b).

Adverse Drug Event: is an injury that results from a medicine or from the lack of an intended medicine (Institute for Safe Medication Practices Canada, 2015). An adverse drug event may or may not be the result of a medication error (Institute for Safe Medication Practices Canada, 2015; Wittich, Burkle, & Lanier, 2014).

Adverse Event: is an unintended, undesired, negative outcome that is directly linked to the services provided to a patient in the healthcare system (Canadian Institute for Health Information, 2004) rather than to the patient's underlying disease process (Baker et al., 2004).

Clinical Instructor: is an individual employed by a school of nursing who supports the work of that school through clinical and laboratory assignments. In years one and two of most nursing programs, clinical instructors provide direct supervision of student nurses during their clinical placements, evaluate assignments, provide classroom instruction, and determine the student's final grade for the clinical course. In the 3rd and 4th year of many nursing programs, preceptors take on a role of direct clinical supervision during placements while clinical instructors continue to evaluate assignments, provide classroom instruction, and collaborate with preceptors when determining the student's final grade for the course.

Educational Institution: is an organization in the province of British Columbia that offers a nursing baccalaureate program and that arranges clinical placements for students as part of that educational program.

Healthcare Facility: is an organization in British Columbia that provides healthcare services to the patients of that facility and offers clinical placements to students enrolled in a nursing program.

Incident: is any irregularity that occurs in the process of medication use. Such a situation can include an adverse drug event, a potential adverse drug event, or a medication error. It can occur at any point in the medication use process. It is a general term that refers to the situation before the event is classified as a more specific type of occurrence, such as an adverse drug event (Morimoto, Gandhi, Seger, Hsieh, & Bates, 2004).

Medication Error: is the failure to complete a planned action as was originally intended, or is the failure to use a correct plan, at any point in the process of providing medication to a patient or client (Davies, Hebert, & Hoffman, 2003). Near-miss events will *not* be included in this study. To be included in this study, the medication error must have actually reached the patient, irrespective of the presence or absence of lasting patient injury.

Near-Miss: is an event in which a potential error is caught before a bad outcome occurs to the patient or client (Canadian Institute for Health Information, 2004). In a near-miss situation, the ongoing sequence of events was prevented in some way from developing any further, which averted the potentially serious safety consequences from occurring (Van der Schaaf, Lucas, & Hale, 2001). A near-miss is sometimes referred to as a *potential adverse drug event* (Morimoto et al., 2004).

Organizational Culture: is a key feature of any work environment (Chatterjee, Pereira, & Bates, 2018). An organizational culture reflects the beliefs, values, and perceptions of the employees of that organization, as well as the behavioural norms that underpin the choices and actions of those employees and are seen as giving those choices and actions meaning (Tsai, 2011).

Patient Safety and Learning System: is the centralized database for adverse events that occur in healthcare facilities in British Columbia. It is a web-based, non-anonymized, voluntary, self-reporting system.

Post-Error Environment: is the environment that surrounds and influences, but is also created out of, the response to a student-committed medication error. This environment includes all of the individuals who are involved in the post-error response (such as the student nurse, student peers, clinical instructors, and preceptors), the organizations involved (such as the educational institution and the healthcare facility), and the relevant organizational cultures.

Preceptor: is an individual “with demonstrated competence in a specific area who serves as a teacher/coach, leader/influencer, facilitator, evaluator, socialization agent, protector, and role model to develop and validate the competencies of another individual” (Ulrich, 2011, p. 1). In the context of upper-year student nurse clinical placements, preceptors are typically Registered Nurses employed by the healthcare facility where the placement is provided. Although preceptors are only used in the final year of some nursing programs, they are used in some year three courses and all year four courses of the University of Northern British Columbia nursing program.

Registered Nurse: is an individual who holds valid Registered Nurse registration with a regulatory College of the nursing profession in their place of jurisdiction. In the province of

British Columbia, this regulatory College is the British Columbia College of Nursing Professionals.

Responsibility: is the manner in which an individual undertakes and executes the duties associated with his/her role as a professional within his/her field or specialty (Berlandi, 2002). In other words, someone's degree of responsibility for an event is a function of whether that person's action or inaction either brought about an event or prevented an event from happening.

Student Nurse: is an individual who is currently enrolled in any of the four academic years of a baccalaureate nursing program at an educational institution.

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Chapter One: Introduction

Patients who access the healthcare system trust that they will receive high-quality, safe, competent care from the clinical practitioners they encounter. Student nurses are engaged in that healthcare system as both learners and supervised healthcare providers, and one of the many areas on which they focus during their educational journey relates to medication knowledge and skills. During clinical practicum placements, student nurses engage in medication preparation and administration for their patients and, as with any healthcare provider who works with medications, the possibility exists that a student will commit a medication error. Healthcare environments have historically demonstrated a blame culture in which any individual who committed a medication error has been named and censured as part of the error response. Over time, and as more research into medication errors and system responses has been performed, a focus on system contributors to such errors has developed as has a desire to remove blame from the error response (Barnsteiner & Disch, 2012; Institute of Health Policy, Management and Evaluation [IHPME], 2015). Many healthcare organizations now work toward building a “just culture”, one in which employees are supported after being involved in an unintentional error. In a just culture, learning and teamwork are paramount, reactionary responses and blaming are avoided, and accurate reporting of events and issues is encouraged (Barnsteiner & Disch, 2012; Warner, 2016).

There is some suggestion in the literature that the shift to a just healthcare culture has not occurred at the same pace in the educational realm and that student nurses continue to feel blamed by others after committing a medication error (Barnsteiner & Disch, 2012; Disch, Barnsteiner, Connor, & Brogren, 2017; Gregory, Guse, Davidson Dick, & Russell, 2007; Zieber & Williams, 2015). Many student nurses also engage in significant self-blame

for the event (Treiber & Jones, 2018; Zieber & Williams, 2015). Student nurses who are involved in a medication error must navigate two parallel systems, the academy and the healthcare facility, and they must identify and navigate the requirements and expectations of both systems (Noland & Carmack, 2015b). Relatively little within nursing curricula is focused on helping students learn to cope with an error that has occurred and to manage its aftermath (Barnsteiner & Disch, 2012; Treiber & Jones, 2018). There is a particularly significant knowledge gap related to our understanding of the events and decisions that occur post-error, who makes them, how and why these decisions are made, and how responsibility and accountability for an error is ultimately distributed amongst those who are involved. Perceptions and experiences of events for those involved in a student-committed error situation have also not yet been examined.

The purpose of this study is to gain a thorough understanding of the processes and perceptions related to the allocation of accountability and responsibility for a student-committed medication error. An exploratory mixed methods design is used to answer the following research questions:

1. How is responsibility and accountability allocated when a student nurse commits a medication error during a clinical placement in a healthcare facility?
2. What factors influence that allocation structure and in what ways are they influential?
3. What is the ideal allocation of responsibility and accountability in this type of situation?
4. Why do differences exist between the actual allocation and the identified ideal?

The participants in this study are student nurses, clinical instructors, and preceptors who were involved in a medication error that reached the patient and who either received or provided nursing education through a collaborative nursing program in northern British Columbia. Perspectives on this post-error phenomenon are also obtained from interviews of that collaborative program's educational institution leaders, as well as from interviews of administrators of healthcare facilities whose facility: (a) provides this collaborative program with student clinical placements; and (b) had one of the five highest reported student-committed medication errors in the Northern Health Authority for the academic years 2010/2011 to 2014/2015 ("Five Facilities"). These interviews are analyzed using interpretive description (Thorne, 2008). De-identified adverse event reports generated within the Patient Safety and Learning System (PSLS) in response to nursing student-committed medication errors, and recorded for each of the Five Facilities between 2010 and 2016, were also obtained. Data from these reports were converted into nominal categories to enable calculations of frequency.

The results obtained from this mixed methods research strategy are situated, interpreted, and triangulated within a critical realism philosophical framework (Bhaskar, 2000; Collier, 1994).

It is critical to understand the post-error environment from the perspectives of those required to engage in its processes. A comparison of these experiences will broaden our understanding of how and why those experiences may be similar to one another or may differ in important and significant ways. Without such a comparison, educational institutions and healthcare facilities cannot be sure if they are actually addressing the needs of student nurses and the individuals who teach them, or if they are meeting their regulatory responsibilities in

this regard. In addition, clinical instructors and preceptors cannot know if their post-error decisions and actions are having the desired effect on students they supervise. Perhaps most importantly, the needs of student nurses cannot be meaningfully identified and compared to their current experiences with the educational and healthcare systems. Student nurses are very junior healthcare providers, relatively powerless within both the educational and healthcare systems, and they are very vulnerable to others' decisions during their education journey. To date, they have not been given a clear voice in research pertaining to the experience of being involved in a medication error.

This dissertation explores the post-error phenomenon over the following five chapters. Chapter Two provides a review of the current literature pertaining to medication errors and the different approaches that have been attempted to address them. It then focuses on literature that has explored student nurse-committed medication errors specifically and the reasons why those errors may occur. The gaps that this study is aimed at filling are also identified. Chapter Three provides detailed information about the research design that is used for this study, including the philosophical framework of critical realism in which the findings are situated and interpreted. A description of the analysis process that is undertaken is provided, as is a discussion of reflexivity and ethical considerations of the study. Chapter Four details the findings of the study while Chapter Five provides discussion of those findings within the critical realism philosophical framework. Finally, Chapter Six provides conclusions of the study and implications of this work for nursing education, nursing research, and nursing practice.

Chapter Two: Background

When patients access the healthcare system, they trust and expect that the care and treatment they receive will be delivered in a safe environment by a team of competent, prepared, dedicated professionals and without any harm to their well-being. Nonetheless, every nursing encounter contains the potential for harm to occur to the patient (Brady et al., 2009; Jha, Prasopa-Plaizier, Larizgoitia, & Bates, 2010; Pugh, 2011), regardless of whether that particular encounter involves a Registered Nurse (RN) or a student who is learning to be one. The many, often complex steps involved in prescribing, preparing, and administering medications to patients, and then monitoring their effects, leave such activities open to the possibility of error (Sulosaari et al., 2015). Because medication is ordered for patients in almost all healthcare settings, adverse events related to medication can occur in almost all locations of healthcare delivery (Etchells, Juurlink, & Levinson, 2008; Masotti, McColl, & Green, 2010). Initial evidence pertaining to adverse events (and to medication errors specifically) gained through international and Canada-specific research was shocking to all participants within and outside the healthcare delivery system (Brady et al., 2009; Deans, 2005; Kagan & Barnoy, 2013; O'Hagan, MacKinnon, Persaud, & Etchegary, 2009; Wilkins & Shields, 2008). Tremendous strides have been made toward focusing attention on medication errors, and toward developing cultures that encourage accurate reporting and identify learning opportunities. However, medication errors, and how we apportion responsibility and accountability for them, remain a live issue.

The undergraduate nursing curriculum is designed to prepare students for clinical practice. A large portion of that curriculum is typically devoted to medication management knowledge and skills since nurses can spend up to 40% of their time administering

medications (Asensi-Vicente, Jimenez-Ruiz, & Vizcaya-Moreno, 2018; Miller, Haddad, & Phillips, 2016). However, it has been shown that relatively little within such curricula is dedicated to helping students learn to cope with an error that has occurred and to manage its aftermath (Treiber & Jones, 2018). As student nurses begin to assume increasing levels of responsibility for patient care during clinical placement opportunities, the experience they obtain can be exciting but still generate significant fear within those students of making a mistake (Cowen, Hubbard, & Hancock, 2016). When a medication error is committed by a student nurse during a clinical placement, the results can be highly traumatic for the student involved (Zieber & Williams, 2015) and the consequences of the error for the student, both in relation to self-confidence and academic progression, can be devastating.

The bulk of research that considers the reasons for, and implications of medication errors has, by far, been conducted in reference to RN practice rather than that of student nurses (Disch et al., 2017). This knowledge gap is unfortunate because there is speculation in the literature that inadequacies at the education stage of nurse preparation may contribute to medication errors committed after graduation (Chiou, Huang, & Chuang, 2009; Fothergill Bourbonnais & Caswell, 2014; Harding & Petrick, 2008; Reid-Searl & Happell, 2011; Reid-Searl, Happell, Burke, & Gaskin, 2013; Reid-Searl, Moxham, Walker, & Happell, 2010). However, there is a particularly conspicuous knowledge gap related to our understanding of those events and decisions that occur post-error, who makes them, how and why they are made, and how responsibility and accountability for the error is ultimately distributed amongst those who are involved.

Placing Nursing Practice and Student Nurses in a Legal and Regulatory Context

British Columbia (BC) nurses operate within both a Canadian (federal) context and a provincial one. Canadian healthcare as a system operates via national standards and principles set out in the *Canada Health Act* (1985) but, when it comes to regulating this system, that is the jurisdiction of individual provinces and territories. This system is comprised of programs that are publicly funded through taxation, cover core healthcare services for eligible Canadians, and are free to the individual at the point of care (Martin et al., 2018). Nursing is one of the healthcare professions entrusted by Canadian society to self-regulate, i.e. to oversee the professional services that peers in their jurisdiction provide to the public and to ensure that such services are provided in a safe, competent, and ethical manner (British Columbia College of Nursing Professionals [BCCNP], n.d.-d). The nursing profession in each province and territory is therefore trusted to register, license, monitor, and discipline its own members for the protection and benefit of the public (Schiller, 2015). Nationally, Canadian nurses are represented by the Canadian Nurses Association ([CNA], 2019), which promotes and advocates both for the role of nursing within the healthcare system and for healthy public policy. This national body also publishes the CNA (2017) Code of Ethics, a regulatory tool and statement of the ethical values of nurses who practice within any province or territory in Canada.

The practice of all nurses in BC is regulated by the BCCNP. This governing body not only regulates the clinical practice of its nurses but also many aspects of their educational preparation. One of the BCCNP practice standards that is most directly relevant to the topic of student-committed medication errors is Regulatory Supervision of Nursing Students (BCCNP, 2018a); it sets out the legal and ethical responsibilities of nurses who supervise

activities of student nurses in clinical settings. This document applies to the supervision of any activities carried out by such student nurses that may affect clients. Without a regulatory supervision framework in place to authorize these student nurse activities, students do not have authority to engage in them. The contents of this document apply to clinical instructors and preceptors who directly supervise student learning in clinical placements, but also speak to obligations placed on the educational institutions and healthcare facility employers who support and oversee those learning opportunities. For clinical instructors and preceptors, the process of regulatory supervision involves four primary components: knowing the student's level of competence to perform the activity; making the decision to authorize an activity; setting conditions under which the student may engage in the activity; and anticipating and managing potential and actual risks that may flow from the student's activity (BCCNP, 2018a). Educational institutions and healthcare facilities which provide clinical placements have a responsibility to provide organizational supports and resources that will be needed by those nurses who provide regulatory supervision (BCCNP, 2018a).

For those engaged in regulatory supervision of student nurses, or who are required to support those engaged in direct supervision, not meeting obligations under this practice standard could, depending upon the situation and harm caused, leave them vulnerable to allegations of professional misconduct, negligence, or even criminal wrongdoing.

Medication Error Frequency

In spite of efforts to reduce medical errors to a minimum, it is now generally accepted that adverse events are inevitable within the healthcare system (Kagan & Barnoy, 2013). One of the earliest estimates of healthcare errors on a national basis arose from the Institute of Medicine (IOM) Report in the United States (US), which suggested that 44,000 to 98,000

Americans die each year as a result of healthcare errors (Kohn, Corrigan, & Donaldson, 2000). The subsequent Canadian Adverse Events Study ([CAES], Baker et al., 2004) found that 7.5% of patients admitted to Canadian acute care hospitals in the fiscal year 2000 experienced one or more adverse events; almost 37% of those adverse events were judged as being highly preventable. By extrapolation, Baker et al. (2004) concluded that between 141,250 and 232,250 similar admissions nationally would have been associated with an adverse event and that 9,250 to 23,750 deaths from adverse events could have been prevented. This same study also found that the second-most common type of adverse event were those associated with medications/fluids, accounting for 24% of adverse events identified. To date, the CAES has not been replicated but a more recent assessment of Canadian evidence did not show significant improvements in patient safety (IHPME, 2015). Further, studies conducted in other countries, such as the United States and the Netherlands, showed little evidence of widespread improvement (Landrigan et al., 2010, as cited in IHPME, 2015; Mitchell, Schuster, Smith, Pronovost, & Wu, 2016). In some cases, there has even been an increase in the number of adverse incidents per 1000 patient days (Baines et al., 2013, as cited in IHPME, 2015).

Studies that explore the frequency of medication errors committed by student nurses are surprisingly rare. A focus on identifying contributing factors to such an error, rather than on the number of errors committed, is a common theme in those studies that do exist. Part of the difficulty in understanding the scope of this issue lies in the fact that healthcare organizations typically use incident reporting systems that are voluntary in nature (Hewitt, Chreim, & Forster, 2017; Miller et al., 2016). Students will also often underreport errors because of their fear of negative consequences, including academic penalties (Salami, 2018)

and negative reactions from instructors, unit staff, and peers (Natan, Sharon, Mahajna, & Mahajna, 2017). In addition, very few schools of nursing have implemented their own internal adverse event reporting systems that would enable tracking and trending over time (Disch et al., 2017; Miller et al., 2016; Wolfe, 2017). However, one study of Iranian student nurses did identify 153 errors in 372 observations of 52 students (Baghcheghi & Koohestani, 2008), while 124 out of 324 (38.3%) Turkish student nurses self-reported having committed 402 total medication errors during their past clinical placements (Cebeci, Karazeybek, Sucu, & Kahveci, 2015). Of the 28 student nurses interviewed by Reid-Searl, Moxham, and Happell (2010), nearly 1/3 reported making a medication error or experiencing a near-miss during a nursing education placement. Finally, Wolf, Hicks, and Serembus (2006) analyzed 1305 student-made medication errors over a five-year period that were voluntarily reported to a healthcare system database but they did not provide the number of student nurses who actually reported into the system.

The 2000 IOM Report had estimated that a hospitalized patient is subject to one medication administration error per day on average and, as a result, medication administration error became a priority area for patient safety intervention (IOM, 2007). It continues to be viewed today as a top priority for ensuring safe patient care (Asensi-Vicente et al., 2018) but with the understanding that we do not truly know the true scope of the problem being faced. The Canadian Institute for Health Information (2016) and the Institute for Safe Medication Practices Canada (2018) have cautioned that, while adverse events associated with medication are considered among the most harmful events possible during a hospital admission, the tools currently used do not capture all incidents (especially in voluntary reporting systems). However, this is not the only reason why accurate, useful

information can be difficult to find. A medication-related event may be reported in any number of possible categories within a reporting system (and thus may be missed in data captured by researchers, resulting in falsely-low, more reassuring numbers), differing definitions of “adverse event” and “medication errors” may be used by different researchers, and findings from a jurisdiction with one type of healthcare delivery system may or may not be generalizable more broadly (World Health Organization, 2016).

Why Worry About Medication Errors?

Medication errors that occur in a healthcare setting have the potential to be very costly from human, economic, and societal perspectives. Adverse events such as medication errors can have devastating and profound effects on both patients and their families (Hall & Scott, 2012; Southwick, Cranley, & Hallisy, 2015). Financial losses to a patient as the result of a medication error can accumulate for multiple reasons, including an extended length of hospitalization for recovery from the medication, the resulting absence from work (Harrison et al., 2015; Weingart, Wilson, Gibberd, & Harrison, 2000), and involvement in associated litigation (Hoffman, 2009; Rothschild et al., 2002). Financial losses can also extend to the patient’s support system as their significant others may need to take time away from work to care for the affected patient. There are also non-quantifiable costs of medication errors for the patient, such as increased pain, suffering, and anxiety, and a loss of trust in the healthcare system and in individual practitioners (Brady et al., 2009; Harrison et al., 2015; MacDermaid, 2005; Southwick et al., 2015).

Patients are not the only ones affected by a medication error. Clinicians who are involved in adverse events are known as the “second victims” in such situations because of the multi-faceted trauma that often results for them (Clancy, 2012; Dekker & Nyce, 2013;

Hall & Scott, 2012; Rappaport & Selbst, 2019; Treiber & Jones, 2018). When medication errors occur, healthcare providers can experience “the internalized judgment that amounts to a self-inflicted emotional wound, and the review and judgment of an oversight body [such as a regulatory College or court system] that reinforces those internalized self-criticisms” (Clancy, 2012, p. 2). The aftermath of the error can involve feelings of responsibility, shame, and isolation, often made worse by receiving little or no emotional support and follow-up information about the error (Jones & Treiber, 2018; Koehn, Ebricht, & Draucker, 2016). The fear of being blamed, accused, condemned, and “branded” can be a strong influence toward not reporting an error that a nurse has committed, whether that blame is perceived as coming from other healthcare team members, facility administration, or the patient. At times, that fear can focus on the potential litigation that might occur if the error does become known (Soydemir, Intepeler, & Mert, 2017; Yung, Yu, Chu, Hou, & Tang, 2016). If a nurse does not report an error that they committed, but it is instead found and reported by another individual, the non-reporting nurse is more likely to suffer additional consequences, such as discipline and reprimand, because they either committed *and* missed the error (Koehn et al., 2016) or they committed the error *and* elected not to report it. Nurses who have not themselves committed an error, but reported an error committed by someone else, may find their own work scrutinized more closely in return. They may also find themselves subject to consequences imposed by their colleagues, such as complaints and vilification (Johnstone & Kanitsaki, 2006).

For most healthcare professionals, a mistake, blameworthy or not, that results in patient harm is antithetical to their professional and personal identity. It tends to be viewed as a devastating failure to live up to the duties of their profession and to meet the expectations

of patients who trusted in their care (Dekker, 2009b). The death or serious injury of a patient from a medication error is a mark that practitioners carry with them for the rest of their lives (Nicholas & Agius, 2005). Such mistakes can cause extreme stress, depression, anxiety, and overall psychological ill health (Dekker, 2009b; Jones & Treiber, 2018). They can also lead to feelings of guilt, shock, helplessness, shame, inadequacy, anger (Athanasakis, 2019; Deans, 2005; Hall & Scott, 2012), and a disappointment of practitioners in themselves (Rassin, Kanti, & Silner, 2005). Research shows that, even months or years later, medication errors can still yield deep emotional effects on the nurses involved, including the emotional outbursts and emotional distress typical of post-traumatic stress symptoms (Athanasakis, 2019; Rassin et al., 2005). While many nurses experience an “enduring vigilance” to ensure that a similar type of error will not recur (Koehn et al., 2016, p. 570), the psychological effects of committing it can involve a tremendous loss of clinical confidence, which then increases the risk of future clinical errors (Hall & Scott, 2012; Johnson, Panagioti, Bass, Ramsey, & Harrison, 2017). This finding may be particularly germane to errors committed by student nurses since most are already working at a relatively low confidence level due to their inexperience.

Approaches to Patient Safety

While it would be ideal if medication errors never occurred, healthcare is a system that is staffed by people and created by people, and all people are subject to human fallibility. Historically, it was thought that personal vigilance was all that was required to ensure that every potential error would be caught before it reached the patient and, if it did reach the patient, then personal failings of the provider must have been the cause. This was coined the “Perfectability Model” by Leape (1994). Over time, focus shifted from shaming and blaming

the individual for an error to a clearer recognition that system factors will often cause such events or that system factors did not act as intended to prevent them. However, there is some question as to whether this shift to a systems-based approach has occurred in the educational realm at the same pace as in the healthcare realm (Disch et al., 2017; Gregory et al., 2007; Zieber & Williams, 2015). One example that the person-based approach is still prevalent within nursing education is demonstrated within an article, indicating the authors' rather startling conclusion that "medical errors are either the result of healthcare providers' wrong approach or their erroneous performance. . . . Most students believe that clinical errors can put the patient's life at risk; however, they generally do not take the issue seriously" (Kalantarzadeh & Hosseinejad, 2014, p. 2).

The person-based approach to errors. The traditional approach to medication errors solely focuses on the individual practitioner and their fiduciary duty to the patient (Benner et al., 2002; Kling, 2018). This approach is grounded in the belief that errors can and will occur only if the individual is careless in his/her work, inattentive, unmotivated, forgetful, reckless, or negligent (Anderson & Webster, 2001; Dennison, 2005; Disch et al., 2017; Heard, 2005; Page & McKinney, 2007). Adherents tend to treat errors as moral issues and therefore, once an error and the responsible party are identified, a cycle begins in which the person is 'named, shamed, and blamed' by the system as punishment (Benner et al., 2002; Clancy, 2012; Dekker, 2007; Johnstone & Kanitsaki, 2006; Reason, 1997, 2000). Because this type of response to an error is highly punitive, and often attracts the imposition of additional training, remediation, and disciplinary action, it results in a reduction in error reporting. Reasons that nurses and student nurses cite for not reporting errors include a: (1) fear of punitive action initiated by their employers, such as reprimands or termination; (2)

fear of punitive action initiated by the harmed patient/family (Dekker, 2007; Dennison, 2005; Kling, 2018; Safarpour et al., 2017; von Thaden, Hoppes, Li, Johnson, & Schriver, 2006); and (3) belief that the error will be used by peers and the employer as a negative measure of that practitioner's competence (Cohen & Shastay, 2008; Hughes & Ortiz, 2005; Hung, Lee, Liang, & Chu, 2016; Patey et al., 2007; Safarpour et al., 2017).

Student nurses have been found to be particularly likely to believe that errors can be avoided by working hard and that those who commit errors should be punished (Cox et al., 2009). They have also expressed an acceptance that mistakes are inevitable while, at the same time, they struggle with their inability to be perfect (Noland & Carmack, 2015a). Many faculty members also still hold a belief that individual vigilance is all that is required and, if a medication error occurs, then the student is at fault and his/her academic record should be impacted (Barnsteiner & Disch, 2012; Disch et al., 2017; Zieber & Williams, 2015).

Students are taught to rely on the “five rights” of medication administration: right medication; right dosage; right time; right route; and right patient (Tamuz & Thomas, 2006; Williams, 2007). These have since expanded to “ten rights” (Rohde & Domm, 2018). It is believed that, if a nurse adheres to these rights each and every time a medication is administered, then an error cannot and will not be made by that individual. However, the literature contains many examples in which system issues entirely beyond the control of the nurse came into play and, despite a strict adherence to these rights, an error still occurred (Brady, Malone, & Fleming, 2009; Dolansky, Druschel, Helba, & Courtney, 2013; Harding & Petrick, 2008; Miller et al., 2016).

Such a perfection mind-set is unworkable, primarily because practitioners are human, their patients are human, and both inevitably work within the constraints of an imperfect

system (Deans, 2005; Helo & Moulton, 2017). If the aim is to understand and reduce the number of medication errors made by practitioners, and not merely to scapegoat those caught making an error and thereby reduce practitioners' willingness to report, then the person-based approach is left wanting. Inarguably, the imposition of sanctions can serve an important purpose, such as addressing those situations in which someone's behaviour truly is negligent or purposefully harmful (O'Connor et al., 2011b; Weingart et al., 2000). Unfortunately, the legal route, and its associated sanctions, has often become the "go-to" avenue for pursuing answers rather than being only "one tradition, among a number of possible alternatives, to help us solve difficult moral and practical problems that surround mistakes and safety" (Dekker, 2007, p. 835).

The systems-based approach to errors. One of the most disconcerting aspects of submitting the actions of a healthcare provider to the criminal or civil justice system is that we remove the decisions of that individual practitioner from the context and system in which those choices were made. Instead, the focus is placed on a single decision to which blame for the negative outcome can be attached (Dekker, 2007). This is a concerning approach from a patient-safety perspective (Dekker, 2009b). Errors are seldom caused by only one single factor or one single individual. In contrast to the person-based approach, the systems approach to errors considers the ways of operating that are designed into an organizational system, so that system failures can be identified (Benner et al., 2002; Seshia et al., 2018).

The systems approach works on the assumption that human beings will err and therefore any system that relies on error-free performance by humans is destined to be fallible (Croskerry, 2010; Dennison, 2005). In fact, the most commonly-known systems model, entitled the 'Swiss Cheese' Model of Systems Analysis (Reason, Carthey, & de

Leval, 2001), is built on the supposition that professional mistakes are an inevitable part of the complex system in which they are generated (Dekker, 2009b; Seshia et al., 2018).

This movement from a person-based approach to errors to one that is system-based resulted in a shift away from traditional reporting systems. The traditional reporting systems typically required identification of the reporter and the error-maker and they focused on investigation of (and penalization for) the error. Such reporting systems were found to be quite ineffective in improving the system as a whole (Dennison, 2005; Dolansky et al., 2013). An alternate reporting system that reflected a more system-based approach would be voluntary, anonymous (or at least confidential), and would not seek to punish but instead focus on identifying opportunities to better the system (for example, Dennison, 2005; Dyab, Elkalmi, Bux, & Jamshed, 2018; Unal & Seren, 2016). This new approach arose out of the realization that an organization must consider that its system may have been at least partially at fault for allowing an error to occur. If an organization is unable to demonstrate such a shift in perspective, it risks driving errors underground and “defensive posturing, obfuscation of information, protectionism, polarization, and mute reporting systems” (Dekker, 2003, p. 84). If an organization’s reporting system does not adequately capture the numbers and types of errors, or if providers do not feel safe to provide truthful and fulsome details about those errors, then contributing factors to the event cannot be identified nor can trends and patterns be detected (Jeffs, Law, & Baker, 2007; Runciman et al., 2008). It is simply not possible to adequately, efficiently, and fairly undertake those tasks if the data from which one is working are incomplete and if only the absolutely necessary aspects of the situation are disclosed by providers. In such a situation, other factors that played a role in the decision-making and actions of the practitioner will remain well-hidden from view and analysis (Barach & Small,

2000; Brous, 2012; Goldmann, 2006). Reason (2000) emphasized the importance of management receiving complete information about errors made by staff and he defined this “reporting culture”, one in which staff disclose all of mishaps, incidents and near-misses both willingly and in detail, as crucial to effective risk management.

Moving to a purely systems-based approach is not without its own attendant issues. A purely systems-based approach would be entirely blame-free for the individual practitioner, which then does not allow an organization to call out those adverse events that truly do warrant disciplinary action (Boysen, 2013). If, for example, a healthcare provider deliberately administered an overdose of medication to a patient, few would argue that the sole cause of the event was the system in which the event took place or that the person involved should entirely escape consequences for their involvement in it. Similarly, if a healthcare provider intentionally falsified clinical data in a patient chart, then it would hardly seem reasonable or appropriate for that individual to escape all sanction. According to Reason (2000), a purely systems-based approach would focus only on how and why system defenses had been unable to stop the error rather than on who made the mistake. For unintentional errors, this may be a very reasonable perspective to take. However, for those adverse events where a person deliberately circumvented system protections in order to cause harm or damage, removal of the individual from any and all censure is much less palatable.

In addition, removing all blame from an adverse event response suggests that there can be no utility or purpose to blame, an assertion that some authors strongly refute. A demonstration of self-blame in particular has been posited as leading to strong empathy from fellow healthcare providers; this allows an individual to engage in supportive behaviour for peers involved in an adverse event and to show a willingness to forgive mistakes.

Demonstrations of self-blame can also make others, such as peers and patients, more inclined to extend that forgiveness (Collins, Block, Arnold, & Christakis, 2009; Tigard, 2019). If a person does not show self-blame after an adverse event, then others will not only be more likely to blame that person for the event but they may also attach additional blame for the failure to respond appropriately to it (Tigard, 2019). Finally, self-blame allows a healthcare provider to,

retain the belief that they are expert and powerful agents, capable of intervening against nature and helping patients, and that there are rules which, when followed, prevent bad outcomes. Blaming permits [providers] to believe they exert a degree of personal control over outcomes, and that there [can] be a different outcome next time. (Collins et al., 2009, p. 1289)

Reason (2000) noted that, rather than using a purely person-based approach or a purely system-based approach, a “just culture” should ideally be incorporated into healthcare work environments. A just culture is one that possesses “a collective understanding of where the line should be drawn between blameless and blameworthy actions” (p. 769). In a just culture, employees are supported when an error involving unintentional harm occurs. Learning, innovation, and teamwork are paramount in a just culture, reactionary responses and blaming are avoided, and accurate reporting of events and issues is encouraged (Barnsteiner & Disch, 2012; Warner, 2016). Kagan and Barnoy (2013) found a significant positive association between the existence of this type of culture and the error reporting behaviour demonstrated by practitioners who provide services within that organization. Providers who work in an organization that models a just culture build a trust that that organization will be focused on learning from an adverse event to address the true and real complexity of its causes.

When thinking about creating a just culture for the student nurse population, this would mean that errors made by students during a clinical placement would be considered within the much wider contexts of their education system as well as the practice system (Gregory, Guse, Davidson Dick, Davis, & Russell, 2009). However, it would also not remove the student from expectations that they accept responsibility for those aspects of the error situation due solely to their own choices and actions, those being separate from system contributors. The Canadian Association of Schools of Nursing & Canadian Patient Safety Institute (2018) have endorsed adopting a just culture approach to safety, specifically within nursing education.

Blame, responsibility, and accountability. A shift away from assigning blame to those involved in a medication error has been occurring over time, commensurate with the shift from a person-based approach to a systems-based approach to errors (Tigard, 2019). However, it is surprisingly rare to find clear definitions of blame in academic literature pertaining to adverse events and explorations of the ontology of this concept (Lupton & Warren, 2018). While it is possible that most authors assume a common understanding of the word “blame”, a study of the literature that is available demonstrates that there is actually no clear consensus on its meaning.

Generally speaking, the concept of blame in the adverse events literature is accepted as having the following components: “to find fault with, to censure, revile, reproach” for the purpose of proving that the blamed person either had bad intentions or lacked some particular expected ability (Harber & Ball, 2003, p. 49). When a person is blamed for a decision they made, it is because the problem was identified as residing within that person and the consequences of that choice must, as a result, be borne by that person (O'Connor, Kotze, &

Wright, 2011a). Because they become the focus of negative censure, the blamed person will be highly likely to “go underground”, activate personal defense mechanisms, stop sharing their experiences and perceptions of system vulnerabilities that contributed to the error, and be more reluctant to disclose errors in the future (Day, 2010; Lupton & Warren, 2018; O'Connor et al., 2011a). This can have significant consequences for an institution that needs to learn how to prevent errors, since they will not be receiving accurate and honest information about errors or near misses (Cooper, 2014; Disch et al., 2017; O'Connor et al., 2011b).

Anticipation that one might be blamed for an adverse event is heightened when an individual feels that they are particularly vulnerable to the decisions of others or where they have little confidence that a predictable, transparent, fair process will be applied to an examination of the event (Aveling, Parker, & Dixon-Woods, 2016). Such censure and reproach do not need to come solely from external sources however. Self-blame is the negative reaction of an individual towards their own decisions or actions in a situation, typically resulting in feelings of remorse, guilt, and regret over their involvement (Tigard, 2019). Clinicians can be particularly prone to self-blame for an adverse event that impacted a patient and it becomes ingrained into their expected error response (O'Connor et al., 2011a). One author went so far as to say that “self-blame *should* often be inescapable for the practitioner who truly values the well-being of her patients [emphasis added]” (Tigard, 2019, p. 102). Self-blame is often generated by feelings of self-doubt and remorse (Evans & Decker, 2011), largely because making an error is antithetical to personal and professional intentions for patient care and is seen as incompatible with the expectation of perfection that society holds for nurses (White, Waterman, McCotter, Boyle, & Gallagher, 2008). In

addition, nursing is still a largely female-dominated profession and there may be a gender-based element to such willingness to engage in self-blame for adverse events. For example, Bryans (1999) found that more professional women than men would blame themselves for an error, even when the mistake was not their own, and that this was likely tied closely to their concerns about negative outcomes for the client. Bryans (1999) suggested that this self-blaming response of women is tied closely to their beliefs about care and responsibility, compared to men's beliefs about ensuring the "fair, impartial and impersonal settling of disputes and sorting of problems" (p. 190).

For student nurses, the fear of being blamed for a medication error is one of the most commonly cited reasons for underreporting such errors. They fear being pinpointed as the cause of the error, thus attracting the blame for it, and suffering sanctions as a result (Gorini, Miglioretti, & Pravettoni, 2012). These sanctions can take many forms for a student, such as a low or failing academic grade (Asensi-Vicente et al., 2018; Salami, 2018; Zieber & Williams, 2015), being embarrassed in front of an instructor or peers (Kalantarzadeh & Hosseinnejad, 2014; Zieber & Williams, 2015), or even losing clinical placement opportunities for future students (Disch et al., 2017). Student nurses have been reported as readily taking on blame from both self and others for errors in which they were involved – even when the level of blame accepted was disproportionate to their actual contribution to the error (Noland, 2014). Students were also very likely to readily adopt the notion that they *must* have been in the wrong if an error occurred (Noland, 2014; Noland & Carmack, 2015a; Zieber & Williams, 2015).

Literature about adverse events within the healthcare system often contrasts the concept of blame with accountability and responsibility. Unfortunately, the ideas of

accountability and responsibility are often inappropriately conflated and confused when they are, in fact, distinct from one another (O'Connor et al., 2011b). In the context of an adverse event, having responsibility means that the individual “caused or contributed in some critical way to the event that happened, and consequently may be worthy of praise or blame” (O'Connor et al., 2011b, p. 120). In other words, someone’s degree of responsibility for an event is a function of whether that person’s action or inaction either brought about an event or prevented an event from happening. If there was a failure to fulfill one’s responsibility in a situation, then blame may be justified. If the responsibility was instead fulfilled by that person, then credit and reward may be deserved (Kaler, 2002).

In contrast, accountability is what can lead an inquirer to determine whether a responsibility has been adequately fulfilled or not. To give an accounting of one’s decisions and actions, one needs to provide information about how well or how poorly their responsibility was carried out for the purpose of explaining or justifying what was done (Day, 2010; Kaler, 2002; O'Connor et al., 2011b). Such an accounting may either be given voluntarily or the person may be compelled to provide this information. The accounting may be to any number of parties who have an interest in the information being provided: the patient, the organization, peers, a regulatory body, and the broader community, to name a few (O'Connor et al., 2011b). The accounting may be provided with reference to both external and internal benchmarks, such as the professional standards of nursing in that practice jurisdiction, the nurse’s own internalized standards resulting from years of experience, and his/her moral compass (Day, 2010). Dekker (2012) suggests that, to clarify the fundamental difference between responsibility and accountability in the context of an organizational hierarchy, consider that a person fulfilling the duties of their job will be

accountable *to* an entity (or *up* the hierarchy), but responsible *for* something (or *down* the hierarchy).

Some authors have proposed that one cannot be accountable for something over which one has no control. This presupposes a definition of accountability in which the person who provides the information must also be (at least partially) responsible for ensuring that a particular agreement was met and/or that a particular task was performed (Harber & Ball, 2003); had sufficient autonomy and capacity to decide upon the course of action that was to be taken; and had access to resources that would have allowed that individual to fulfil that responsibility (Aveling et al., 2016). Still other authors have separated some of these pre-conditions according to who holds accountability for them. For example, the accountability of an *individual* practitioner will be related to decisions that they made in the clinical situation while *organizational* accountability will be related to the resources provided by that organization to allow an individual practitioner to provide safe patient care (Duthie, 2018). Then, in order for a functional accountability system to exist, the standards and expectations that needed to be met must have been clearly conveyed, the individuals with responsibility for meeting each of those expectations and standards must have been defined, a forum must have been created in which the accounting could be provided, and the forum must have been enabled to ask questions, reach a judgement, and impose the appropriate consequences (Aveling et al., 2016).

It is generally accepted that nurses hold responsibility and accountability for the medications they administer to patients, as well as their decision-making related to such acts (for example, Cloete, 2015; Kavanagh, 2017; Vrbnjak, Denieffe, O'Gorman, & Pajnikihar, 2016). However, there is currently no similar evidence base exploring the responsibility and

accountability for medication administration by student nurses, nor is there evidence pertaining to the subdivision of responsibility and accountability for an error committed by a student who is working simultaneously within both academic and clinical systems. There is also no evidence base related to responsibility and accountability for decisions about consequences that can be imposed on a student who makes a medication error.

Striking the right balance. A number of authors have expressed concern that moving to a purely system-based approach could result in little to no responsibility and accountability for errors that truly are negligent in nature and that should attract blame of some kind to the individual (Aveling et al., 2016; Disch et al., 2017; Tigard, 2019). Any truly no-blame approach to errors would need to involve a recognition that human error is inevitable and would focus the post-error period solely on identifying lessons to be learned rather than identifying and blaming any particular error perpetrator(s) (Lupton & Warren, 2018; Winter, 2019). Because serious adverse events tend to be both complex and multifactorial (O'Connor et al., 2011a), there is a concern that the adoption of a no-blame approach may not actually support beneficial systemic change since it will not account for those individual healthcare providers whose practice truly requires changes to be safe. A sole focus on unearthing system issues and defects as causes for an adverse event will be a fruitless endeavour if it is an individual who is at fault for knowingly engaging in willful or reckless behaviour (Aveling et al., 2016). Focusing solely on system risks may also intensify gender-based differences in error responses. For example, Bryans (1999) found that when organizations focused their efforts on finding an external cause for the error or minimizing the negative impact to the organization, then women in particular internalized more blame (regardless of their actual role in the error) while men were more likely to perpetuate that

unhealthy organizational approach in future situations. However, a sole focus on disciplining those individuals who have made errors because they are working within a poorly designed or poorly functioning system is not only unfair to the individual but can also lead to increased levels of fear and a deep mistrust of the organization (Aveling et al., 2016; Harber & Ball, 2003).

Goldmann (2006) and Croskerry (2010) emphasize that, if we wish to make healthcare safer for patients, then we need to find the most effective balance between a pure person-based approach to errors and a pure systems-based approach. In other words, a just culture is what should be sought (Aveling et al., 2016; Barnsteiner & Disch, 2012; Dekker, 2009a; Duthie, 2018). However, it must also be noted that, while the safety literature recommends that individuals be held accountable for decisions that they make and for their own problematic practices, there is currently limited evidence available to demonstrate such accountability in clinical practice (Duthie, 2018).

Socialization of Student Nurses into the Nursing Profession

The process by which a person becomes knowledgeable about, understands, and becomes part of a professional community is a complex one. For a profession such as nursing, that process involves both formal and informal training, opportunities, experiences, and interactions (Noland & Carmack, 2015b). While this process extends well beyond an individual's years in nursing school and into post-graduation practice, it is the basic nursing educational program that provides the foundation for that development and is key to beginning socialization into the nursing profession (Maranon & Isla Pera, 2015).

Professional socialization is the process by which students “take in new knowledge, skills, attitudes, behaviors, values and ethical standards and make these a part of their

professional identity” (Mariet, 2016, p. 143). Time spent in clinical placements is a particularly important part of that process for student nurses. Experiencing the clinical context, and learning to apply theoretical knowledge in the clinical setting, is a pivotal and vital aspect of nursing education (Moonaghi, Mirhaghi, Oladi, & Zeydi, 2015). It not only allows students to begin to practice technical skills but, perhaps more importantly, it helps them to understand professional reality so they can compare it to preconceived ideas and to what they were taught in the classroom setting (Cowen et al., 2016; Ewertsson, Bagga-Gupta, Allvin, & Blomberg, 2017; Maranon & Isla Pera, 2015). It is this exposure to the clinical setting, combined with other aspects of their nursing university education, that helps shape a student’s idea of what a professional nurse is and does and what, as a nurse, they aspire to be (Ewertsson et al., 2017; Maranon & Isla Pera, 2015; Mariet, 2016). However, the clinical experience can also be fraught with fear and anxiety for students as they begin to enact the role of a nurse and become responsible to provide care to assigned patients. It is a time when they can lay claim to very little practical experience and yet face the combined pressures of academic scrutiny (Cowen et al., 2016; Noland & Carmack, 2015b) and a healthcare culture that expects excellence in practice (Noland & Carmack, 2015a).

There is currently a minimal amount of literature about the socialization messages student nurses receive regarding adverse events, how to recognize them, how to address them, and how to communicate about them (Noland & Carmack, 2015b). What has been reported is that students do not consistently receive training (either formally or informally) about how to communicate that an adverse event has happened, to whom this information should be conveyed, what needs to be communicated, and how to address the adverse event itself (Noland & Carmack, 2015a; Zieber, 2014). Student nurses are caught in two parallel

systems, the academic and the healthcare facility, and they must learn to identify and navigate the appropriate communication channels for both systems. Therefore, students may be required to advise their instructors of an error but also need to consider communicating to the patient, unit nurses, the responsible physician, the unit manager, and others. They may be required to document the error in the patient's chart or create an entry in the facility reporting system, but then will also need to follow their school's reporting system and/or complete academic assignments related to the event (Cooper, 2014; Noland & Carmack, 2015b). These dual processes, neither of which may be explicitly explained to the student in advance, can render the process of disclosing an adverse event both unclear and intimidating to the student.

The lack of clarity around expected processes of reporting an adverse event is interestingly layered on top of the expectation, reported by students, that there be open and honest communication about the error. The available literature indicates that students know they are expected to disclose their mistakes, thereby indicating ownership of their role in the commission of those errors, and that hiding their existence is unacceptable (Noland & Carmack, 2015b; Palominos, Levett-Jones, Power, & Martinez-Maldonado, 2019; Zieber, 2014). However, students also report receiving "mixed messages" about such transparency. For example, if a clinical instructor takes a student out of the patient room to discuss an error committed by the student, the student may receive an unspoken message that not all errors should actually be disclosed to, or discussed with, the patient. When an unspoken message does not align fully with a formal one, the student's view of the professional nursing role in that type of situation can be impacted long-term (Noland & Carmack, 2015b). For example,

it can be “difficult to ‘unlearn’ skills [and messages] acquired during entry-level assimilation” into a profession (Noland & Carmack, 2015b, p. 1242).

Student nurses and nursing education. Research pertaining to the extent and type of errors and near-misses among student nurses is limited (Asensi-Vicente et al., 2018; Barnsteiner & Disch, 2012; Reid-Searl, Moxham, Walker, & Happell, 2009), particularly research into the types of educational strategies employed by nursing schools to decrease student-committed medication errors (Gill, Andersen, & Hilsmann, 2019; Hurley, 2017; Miller et al., 2016). Nursing education regarding medication has traditionally focused on following certain rituals, such as the five (to ten) rights, even though it has become increasingly obvious that this reliance can engender a false sense of security (Dolansky et al., 2013; Fothergill Bourbonnais & Caswell, 2014; Miller et al., 2016). Further, while undergraduate nursing curricula act as the preparatory stage for safe medication management (Sulosaari et al., 2014), schools tend not to collect and analyze information related to medication errors committed by students (Miller et al., 2016; Wolf et al., 2006).

Research has thus far identified five general areas for improvement to decrease the incidence of medication errors committed by students.

1. *Drug calculations:* It has been demonstrated in multiple studies that one of the key areas in which nurses and student nurses are relatively weak is drug calculation (Aydin & Dinc, 2017; Bagnasco et al., 2016; Garcia-Gamez et al., 2019). Students themselves have identified incorrect drug calculations as one of the top five contributors to student-committed medication errors (Charkhat-Gorgich, Yaghoobi, Salehinia, Navidian, & Torabpour, 2014). It is the general understanding of the nursing profession that there is no acceptable margin of error for drug calculations since every medication error could seriously harm a patient

(Cleary-Holdforth & Leufer, 2013). And yet, when tested in an examination situation, nurses and student nurses often express that the pass rate for examinations of drug calculation ability should not be 100% since that would be “unfair” and they do not believe that obtaining less than 100% on such tests would make them unsafe to practice. In fact, when one author reported implementing a “90% or better” pass requirement in the final exam for his drug calculation course, students were “incredulous” that such a high pass rate would be required and practicing nurses became “indignant” about needing to take drug-calculation competency exams since they are able to “do it on the [hospital unit]” (Meyer, 2004, p. 13).

One integrative review examined studies that tested educational strategies on medication calculations for undergraduate student nurses (Stolic, 2014); these strategies fell into the categories of traditional pedagogy, technology-based strategies, psychomotor skills (such as the use of simulation situations), and blended learning strategies. Many of the included studies had distinct limitations, such as small sample sizes, self-selecting student participation, and the lack of a control group. Decidedly mixed results were evident in the literature review, with no educational strategy showing consistent positive impact or, where there was positive impact demonstrated in some studies, limitations of those studies often brought their generalizability and reliability into question. However, Stolic (2014) did note that educational strategies that incorporate active student involvement, such as those using interactive software with required learner participation, were often more effective than other strategies. This finding was supported in another literature review by Lee and Quinn (2019).

We do know that, to perform a drug calculation accurately, it is necessary for student nurses to have basic math skills to calculate the problem correctly; however, they must first be able to conceptualize the clinical information that is presented for a given patient and

extract necessary information in order to formulate and arrange the basic math question to be solved (Wright, 2007). It was found that there are three types of errors typically committed by student nurses in drug calculation: (1) conceptual errors, which involve a fundamental lack of understanding of the logic involved in a question or an inability to arrange the dosage calculation correctly because of not understanding what the question is asking the student to do; (2) arithmetical operations errors, which involve misunderstanding the basic math computation to be done and how to perform that calculation (e.g. in a fraction, incorrectly dividing the denominator by the numerator); and (3) computation errors, which demonstrate errors of multiplication, subtraction, and other basic mathematic computations (Mackie & Bruce, 2016; Maley & Garofalo, 2017; Weeks, Lyne, & Torrance, 2000). Although basic math skills do need to be taught and reinforced by nursing schools, research has shown that there may be a larger problem with nursing educational programs in terms of how they teach the concepts related to clinical situations that necessitate use of those math skills. Several studies identified that there is often decreasing opportunity for nurses and student nurses to practice drug calculations in their particular clinical area before being required to perform them accurately in actual patient care. The opportunity for practice has been further eroded by advances in technology, automatic medication dispensing processes, and the enhanced role of pharmacists in pre-preparing patient dosages (Hughes & Edgerton, 2005; Wright, 2008), such that nurses may be becoming increasingly unprepared to work outside less-advanced environments (Powell-Cope, Nelson, & Patterson, 2008).

It can be forgotten that the conceptual component of drug calculations that require a nurse to understand the particular clinical context of a patient to accurately generate the math problem to be solved (and determine if the calculated answer is actually reasonable in that

situation) is developed through exposure to the clinical setting and patient scenarios (Hurley, 2017; Sulosaari, Kajander, Hupli, Huupponen, & Leino-Kilpi, 2012; Wright, 2007).

However, many drug calculation practice questions given to students in the classroom are quite devoid of clinical context and instead focus solely on the mathematical operations of the calculation (Sulosaari et al., 2012). This can prevent the student from developing a “clinical sense” of the accuracy of their answers and an understanding of what the potential answer would actually mean from patient care and patient safety perspectives (Jukes & Gilchrist, 2006; Reid-Searl et al., 2009). In studies by Hurley (2017), Wolf et al. (2006), and Wright (2005), it was found that providing student nurses with calculation practice alongside clinical skills reinforced to them that drug calculations performed by nurses have clinical meaning and that students must be able to conceptualize the clinical problem being solved by the calculation.

Virtually all studies and reviews pertaining to drug calculation skills by student nurses highlight the fact that there is still substantial work to be done in researching the precise cause of drug dosage calculation errors and determining the types of teaching and learning strategies that could help combat or minimize such errors. In addition, only very limited work is currently available that specifically assesses numeracy and calculation abilities in Canadian student nurses (Mackie & Bruce, 2016).

2. *Pharmacology*: The second key area related to nursing education that may potentially influence rates of medication error is the teaching and acquisition of pharmacology knowledge. For nurses, knowledge of pharmacology allows correlation with the clinical picture to occur, allows the nurse to understand results of various diagnostic tests, and improves detection of errors, contraindications and adverse effects (Pepper, 1985, as cited in

Dennison, 2005; Moura, 2012). Without a clear understanding of basic pharmacologic principles, nurses and student nurses will be unable to fully realize the intended therapeutic benefits of a medication and its potential toxicity risk (Lilley, Rainforth Collins, Snyder, & Swart, 2017). Various authors have indicated that high rates of student-committed medication errors are a key reason why an “urgent” (Gill et al., 2019, p. 16) need exists to improve pharmacology education in undergraduate nursing programs, despite the fact that there is currently only very limited literature available “in the areas of pharmacology preparation, curriculum design and nursing performance” (Preston, Leone-Sheehan, & Keys, 2019, p. 77).

Student nurses indicate that pharmacology is one of the most difficult sciences in nursing school to learn and master, particularly because they perceive it as being taught separate and apart from clinical practice requirements (Alton, 2016; Courtenay, 1991; Latter, Yerrell, Rycroft-Malone, & Shaw, 2000, as cited in Manias & Bullock, 2002b). Other studies, such as Sanko and McKay (2017), showed that students’ understanding of pharmacology, and its impact on patient care/safety, can be enhanced when that knowledge is integrated with more meaningful learning experiences, such as simulation. Studies reinforce that students wish to receive more pharmacology education, since they perceive their current number of classes to be insufficient (Latter, Yerrell, Rycroft-Malone, & Shaw, 2000, as cited in Manias & Bullock, 2002b). Students also indicate that the depth of pharmacology knowledge they expect to retain is minimal because the classroom focus is on memorizing lists of drugs and their attributes rather than acquiring an in-depth understanding of how and why the medications work clinically (Manias & Bullock, 2002a, 2002b; Preston et al., 2019). Over time, this can lead to students doubting the relevance and importance of pharmacology

knowledge for safe clinical practice and for the prevention of medication errors and other adverse events (Manias & Bullock, 2002b). Some nursing faculty also report concern about their own in-depth competence and preparation in pharmacology, leading to academics from other disciplines teaching student nurses about these subjects. This can, in turn, contribute to an even wider gap between pharmacology theory and student understanding of its application within nursing practice (Manias & Bullock, 2002b; Smith, Elias, & Baernholdt, 2019).

However, it should be noted that it is difficult to draw firm conclusions based upon the existing literature in this area as there are few studies focusing on pharmacology specifically. These studies also primarily use quantitative methodology, such as survey data, and thus are more limited in their ability to provide understanding and rationale for responses given.

3. *Theory-practice gap*: a theory-practice gap is the gap between the theoretical or evidence-based knowledge gained by the student in the course of their education and the ability to implement such knowledge in clinical nursing practice (Greenway, Butt, & Walthall, 2019). While theory-practice gaps are considered quite commonplace in nursing (Greenway et al., 2019; Sanko & McKay, 2017), there is a concern that such gaps may contribute to the commission of medication errors in the clinical setting. Students express anxiety that they are not being taught (or that their courses are not adequately demonstrating) ways in which theory and clinical meaning are to be juxtaposed onto one another. Research shows that the theory-practice gap may be particularly pronounced in relation to medication administration given the relatively limited opportunities students have to prepare and administer medications in the clinical setting before graduation (Reid-Searl et al., 2009; Treiber & Jones, 2018; Valdez, de Guzman, & Escolar-Chua, 2013). In addition, many undergraduate nursing programs attempt to address medication safety by teaching and

assessing students in two primary areas: medication administration rights and drug calculation abilities. While these are certainly important components to safe medication practice, it still leaves unexplored many system factors that contribute to errors (Latimer, Hewitt, Stanbrough, & McAndrew, 2017).

In addition to previously-noted issues related to drug calculations and pharmacology application in the clinical setting, student nurses also identify a theory-practice gap pertaining to post-error conduct. Specifically, student nurses indicate that faculty at their educational institution emphasize the importance of students reporting medication errors, but then do not inform students of the practical steps involved in reporting such mistakes and how to communicate information about errors to other healthcare team members. Students indicate that, while classroom teaching emphasizes that they should be reporting errors, this lack of practical information is one reason they do not report mistakes that occur during their training (Noland, 2014; Noland & Carmack, 2015a). However, there are no studies to confirm that an increased focus by an educational institution on the practical steps of reporting is associated with an actual increase in student reporting of medication errors.

4. *Student supervision*: some studies found inadequate supervision of student nurses during the medication administration process. In the limited number of studies that consider this phenomenon to date, inadequate supervision of student nurses during medication administration led to significant fear, anxiety and internal conflict for students as they face the prospect of an error and potential patient harm (Reid-Searl & Happell, 2011, 2012; Reid-Searl et al., 2013; Reid-Searl et al., 2009; Reid-Searl, Moxham, Walker, et al., 2010). Absence of direct supervision of students by nurses at the bedside was found to be a key influence on medication errors committed by student nurses (Salami, 2018). A recent

Institute for Safe Medication Practices Canada (2018) study on healthcare student-associated medication incidents found that the availability of preceptors for supervision of their students was a “critical component of a safe training environment” (p. 2). Where there was inadequate oversight, medication safety became compromised.

It is also important to remember that not all supervision is quality supervision (Reid-Searl et al., 2013). Faculty members themselves express concern that not all current instructors and preceptors are adequately prepared to teach and mentor students about patient safety (Gratrix & Barrett, 2017; Tregunno, Ginsburg, Clarke, & Norton, 2014). Students echo the concern that not all supervisors model medication administration best practices (Reid-Searl et al., 2013). In addition, supervision can take many forms, ranging from the supervisor being with the student during the entire process of medication administration to no supervision being provided at all. While a student may receive differing levels of supervision during clinical placements depending upon their year of studies and demonstrated abilities, the level of supervision provided to a student at any given time is not always the precise level required to ensure patient safety and prevention of errors (Liljedahl, Engqvist Boman, Porthen Falt, & Bolander Laksov, 2015; Reid-Searl, Moxham, & Walker, 2008). This can occur for multiple reasons, such as the need for instructors to supervise multiple students at the same time (Reid-Searl, Moxham, & Happell, 2010), high clinical workload for the supervisor, and situations where the student has already earned the trust of the supervisor and has thereby become more independent in their practice (Reid-Searl et al., 2013).

Unfortunately, most of the few studies that consider supervision of students during medication administration do not include students who actually committed a medication error, such that any proposed link between the degree of supervision received and the

commission of the error could be supported with data. In addition, many of the studies use either a grounded theory approach (recognizing that this area has not yet been well-studied and needs further development to understand the scope of the issue) or questionnaires given to students, rather than in-depth interviews of participants. None of the studies use observation of the actual level of clinical supervision provided to students compared to student or instructor perceptions of that same supervision.

5. *Student fears:* students report that one of their greatest fears about nursing school is making an error that causes injury to a patient (for example, Andrew & Mansour, 2014; Cowen et al., 2016; Montgomery, Killam, Mossey, & Heerschap, 2014) and that will subsequently hinder progress in their educational program (for example, Cowen et al., 2016; Palominos et al., 2019; Zieber & Williams, 2015). Fear of being blamed, reprimanded and punished for committing a medication error while in a clinical placement is a significant reason why student errors tend to be hidden and underreported (for example, Asensi-Vicente et al., 2018; Kalantarzadeh & Hosseinejad, 2014; Kouhestani & Baghcheghi, 2008; Noland & Carmack, 2015b; Zieber & Williams, 2015). Students also report that they wish to avoid the damage to the instructor-student relationship that can occur after a student discloses their role in a medication error during a clinical practicum (Kalantarzadeh & Hosseinejad, 2014; Koohestani & Baghcheghi, 2009; Zieber & Williams, 2015). Such heightened stress and fear can lead to decreased quality of student performance in the clinical setting, compromised patient safety (Montgomery et al., 2014), and an increased risk of making errors (Asensi-Vicente et al., 2018; Aubin & King, 2015; Cebeci et al., 2015).

Some studies found that student willingness to report a medication error is quite individualistic. Personality traits, such as a high degree of assertiveness and self-confidence,

can be helpful in overcoming the fear of reporting and communicating about the error to others (Noland & Carmack, 2015a). Such traits, in addition to positive instructor reactions, family supports, and peer supports, also help students transition to a more positive mindset post-error, enabling them to eventually view the mistake as a learning opportunity (Zieber & Williams, 2015).

It is worth noting that no studies compare student fears of what might happen as the result of a medication error to instructor reports of what occurred. This is particularly relevant and important when discussing non-quantifiable repercussions, such as damage to the student-instructor relationship, or even more quantifiable ones such as assignments (which some students report as undertaking on their own as opposed to the instructor making it a learning requirement). Studies instead focus on student fears of certain consequences occurring rather than assessing how frequently those fears actually come to fruition.

Summary and Justification for this Research

There is a minimal amount of literature that describes what happens *after* a student nurse commits a medication error during a clinical placement. Instead, the literature focuses almost exclusively on potential reasons for the error occurring. The literature does not currently address the various responsibilities and accountabilities of different parties that may contribute to a medication error in which a student nurse is involved, the ways in which those responsibilities and accountabilities are ultimately allocated amongst those parties, and the ways in which the allocation decisions affect potential repercussions. In particular, the perspectives, experiences, and voices of those student nurses who are actually involved in a medication error are largely missing from the literature (Noland, 2014; Zieber & Williams, 2015). It has been noted that the “student-preceptor/nurse supervisor relationship and the

kind of interactions that take place in the event of the error” is also an area that remains largely unexplored by research (Noland, 2014, p. S37). Student perceptions of the clinical evaluation process, particularly that which occurs after a student-committed error, and the fairness of that process, were also highlighted as areas for important exploration (Brown, Neudorf, Poitras, & Rodger, 2007). There are currently no studies that use direct observation of the post-error environment to compare student nurse perceptions of that environment with those of clinical instructors, preceptors, or patients. There are also no studies that compare student nurse perceptions of the consequences they faced after committing a medication error, and the decision-making process related to those consequences, with the intentions and actions of the clinical instructor or preceptor. Finally, while there is some literature asking students about their fears of what might happen should they commit a medication error, there is no literature that compares fears articulated pre-error to what fears actually materialized if a student became subsequently involved in an error.

What we do know is that there is much anxiety and fear amongst student nurses regarding reporting medication errors, largely because of student fears that the potential repercussions will be substantial and that they are likely to be borne exclusively by the student (Disch & Barnsteiner, 2014; Dolansky et al., 2013; Gregory et al., 2007; Koohestani & Baghcheghi, 2009; Reid-Searl, Moxham, & Happell, 2010; Reid-Searl et al., 2009; Vaismoradi, Jordan, Turunen, & Bondas, 2014). Without research to know if this student perception is, in fact, an accurate picture of reality (i.e. without knowing how the accountabilities and responsibilities for a medication error by a student nurse are actually being assessed and allocated), then we cannot know if errors are being effectively addressed and if student-related consequences for the error can be considered just and appropriate.

Chapter Three: Research Design

This study explored the following four research questions:

1. How is responsibility and accountability allocated when a student nurse commits a medication error during a clinical placement in a healthcare facility?
2. What factors influence that allocation structure and in what ways are they influential?
3. What is the ideal allocation of responsibility and accountability in this type of situation?
4. Why do differences exist between the actual allocation and the identified ideal?

An exploratory mixed methods design was used to explore these research questions, and the results obtained from this mixed methods research strategy were situated, interpreted, and triangulated within a critical realism philosophy.

Mixed Methods

Mixed methods uses a combination of quantitative and qualitative research approaches and is based on the premise that this will result in: (a) a better understanding of the problem than could be achieved by either approach alone (Creswell & Plano Clark, 2007); and (b) an ability to overcome biases that may be inherent within each individual methodological approach (Lee & Smith, 2012). The mixed methods exploratory design, shown in Figure 1, had been intended to explore the research questions of this study:

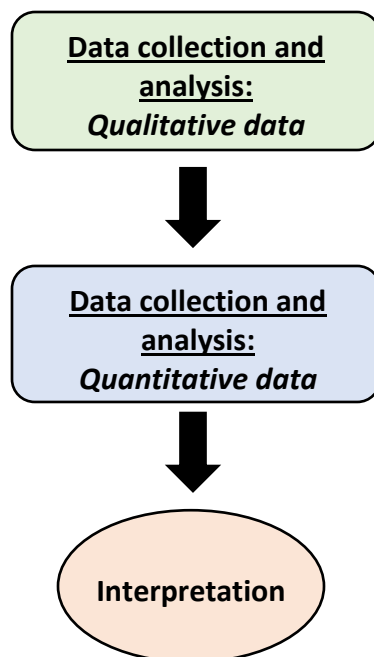


Figure 1: Exploratory mixed methods design.

With an exploratory mixed methods design, qualitative data are collected and analyzed, and then those results help to inform the quantitative process. This design is considered particularly helpful when exploration of a phenomenon is needed because applicable measures or instruments are not available or are not refined (Creswell & Plano Clark, 2011; Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005; Kroll & Neri, 2009), where the variables to be studied are themselves unknown or are unclear at the beginning of the research, or where there is (as yet) no guiding theory or framework through which to analyze the subject (Creswell & Plano Clark, 2011; Hanson et al., 2005). All three of these conditions existed for the phenomenon of interest in this study.

However, practical considerations in this study necessitated a deviation from the intended exploratory mixed methods design shown in Figure 1. Key sources of quantitative data, the PSLs and the relevant Northern Health Authority (NHA) policy and procedure,

were identified during an interview conducted with a senior-level representative of the NHA administration (“NHA Representative”) early in the qualitative process. Data from the PSLs in particular could only be accessed from this NHA Representative rather than from any other study participant. This information was requested of the NHA Representative at the time of the interview, rather than waiting until the full qualitative data phase had been completed, in order to minimize the number of times that the NHA Representative needed to be contacted about the study. The requested information was received from the NHA Representative shortly after the request was made. It is important to note that, while these particular quantitative data were collected earlier than anticipated, they were *not* analyzed until after the qualitative phase had been completed (as per the original exploratory methods design). Once the qualitative phase of the study had been completed, interview data of all participants were reviewed to determine if any further quantitative data needed to be requested. As a result, the final design of this study is shown in Figure 2:

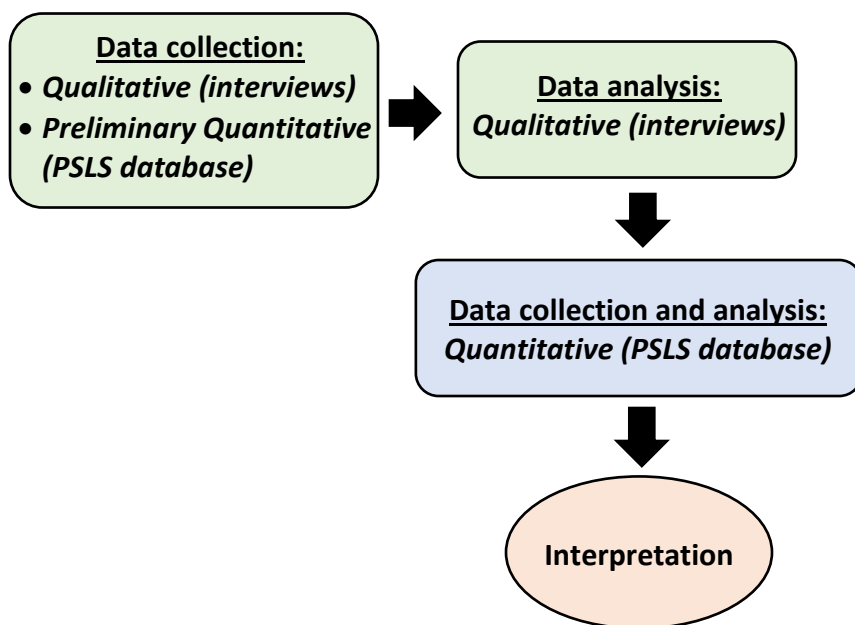


Figure 2: Revised exploratory mixed methods design.

Philosophical Framework and Methodology

Critical realism. The central argument of critical theory is that all knowledge is both (a) historical and political in nature; and (b) is shaped by multiple human interests rather than being objectively set apart from those interests. Such theory aims to highlight and challenge knowledge which has become “taken for granted” (and therefore invisible), with the aim of furthering social justice (Friesen, 2009). From an epistemological standpoint, critical realism provides that an understanding of the world will always be constructed from a combination of one’s own experiences, perceptions and standpoint rather than being able to attain an entirely independent “God’s eye” perspective (Maxwell & Mittapalli, 2010). The role of the scientist then, is to try to approximate the truth of the world, while remaining aware that all theories and propositions comprising our current knowledge base may be proven incorrect by later inquiry (Bhaskar, 1998; Maxwell & Mittapalli, 2010; Modell, 2009; Pratt, 2011). The role of critical realists in particular is to explain and critique the social conditions of interest to the study, produce policy recommendations, and produce direction for action that will help address social problems (Fletcher, 2017).

The fundamental precept of critical realism is that causal language best assists our attempts to effectively describe the truth of that world and its happenings (Easton, 2010; Schiller, 2016). Critical realism explores how different causal influences interact and influence one another to generate events, which may or may not be perceived or experienced by everyone. As a result, the critical realist philosophy uses a stratified ontology consisting of three layers of knowledge: real, actual, and empirical.

(a) *The “real” domain:* The domain of the world which is independent of the awareness and existence of human beings (Modell, 2009). It contains structures and the mechanisms

that generate phenomena (Hedlund-de Witt, 2013; McEvoy & Richards, 2006). *Generative mechanisms* refer to the “inherent properties in an object or structure that act as causal forces to produce events” (Fletcher, 2017, p. 183); these mechanisms can be natural or social, and can be activated to produce particular outcomes that may, or may not, be consciously experienced or known by human beings (Pratt, 2011; Scott & Briggs, 2009; Walsh & Evans, 2014). Generative mechanisms can “be active, but . . . under certain contextual circumstances counteractions can entail that observable effects do not take place” (Blom & Moren, 2011, p. 63).

(b) *The “actual” domain*: The actual domain of the world includes all phenomena that have been produced, without the filter of human experience (Fletcher, 2017). Humans are able to experience only a portion of those events that have been caused, or have been prevented from occurring, by the interaction of generative mechanisms (Clark, Lissel, & Davis, 2008; Mingers, 2006) and these events would still occur “whether or not they were observed or whether or not there were even observers” (Mingers, 2006, p. 20).

(c) *The “empirical” domain*: This layer of the world is comprised of human perceptions and experiences *only* (Clark et al., 2008). The empirical domain includes that which becomes known to humans through research endeavours as well as the theories that humans create regarding natural and social phenomena (Danermark, Ekstrom, Jakobsen, & Karlsson, 2002; Oladele, Clark, Richter, & Laing, 2013). The empirical domain is comprised of fallible speculations and representations of the real domain that can change over time as new experiences occur and are researched/analyzed (Pratt, 2011).

This stratified view of the world has led scientists of various disciplines to see the potential of critical realism for unpacking and understanding complex social phenomena, and

to better articulate potential causes of observed social behaviours (Brown, 2009; Maxwell & Mittapalli, 2010; Modell, 2009; Schiller, 2016). It is the primary goal of critical realism to “explain social events through reference to [generative] mechanisms and the effects they can have throughout” the three domains of reality (Fletcher, 2017, p. 183). This means that any research study based on critical realism must necessarily bring its findings (such as themes and codes) back to an explication of the three domains; causal mechanisms of the real domain will ultimately be understood through those phenomena that occur in the actual and empirical domains (Fletcher, 2017).

Using critical realism to underpin mixed methods research. Critical realism is increasingly recognized as a philosophical paradigm to ground mixed methods approaches since its stratified ontology suggests that information about phenomena experienced at the empirical level can be sought from many different sources (Walsh & Evans, 2014). A mixed methods approach develops complementary pictures through the different methodologies used, provides illustrations of context to highlight trends, and examines processes and experiences along with outcomes (Creswell, Klassen, Plano Clark, & Smith, 2011). As previously noted, critical realism is based explicitly on the belief that any particular view of the world will necessarily be partial and shaped by human interests. Because diverse and multiple viewpoints on any particular event will therefore be crucial to propose an understanding of the possible causes and experiences of that event (Shannon-Baker, 2016), mixed methods is particularly well-suited to explicating all three domains of this philosophy (Schiller, 2016). Given the complexity of student-committed medication errors, the potential number and complexity of the human and social entities involved, and the lack of applicable existing research, it was necessary to view the aftermath of a student-committed medication

error from multiple perspectives. This approach allowed for the uncovering of the various responsibilities and accountabilities to be allocated after a student-committed medication error, to understand who allocated each of those responsibilities and accountabilities, and to examine the processes and influences that led to those allocations. It also allowed for a consideration of whether the existing allocations could be considered ideal and, if not, then to uncover ways that the system could move towards a more ideal distribution. To reach a conclusion about an ideal situation, it was necessary to explore (a) *why* the current situation would or would not be considered appropriate; and (b) what power imbalances and factors created the current situation that could either help or hinder a transition to an identified ideal. The exploration of such complex social justice questions are a particular strength of the critical realism approach (Kahn, 2017).

Target Population

A population consists of an entire set of elements (be they individuals, groups, documents or events) that meet criteria specified by the researcher (Boswell & Cannon, 2014). The target populations in this study were student nurses, healthcare facilities, and educational institutions in northern BC who have been involved in a medication error committed by a student nurse during a clinical placement.

The NHA covers the largest geographic area of BC's six health authorities, an area of more than 600,000 km², but contains less than 7% of the entire provincial population (approximately 300,000 people) (Northern Health Emergency Management, 2019). Many NHA residents live in small communities of less than 500 people and, in combination with the vastness of the territory over which these communities are dispersed, face unique healthcare access challenges (Northern Health Authority, n.d.). The main campus of UNBC

is located in Prince George (population 70,000), with satellite campuses in Quesnel (population 9,900) and Terrace (population 18,500) (Government of British Columbia, n.d.). The regional hospital, the University Hospital of Northern British Columbia, is located in the city of Prince George.

Setting

UNBC offers the only registered nursing program in northern BC. The first two years of the program are provided by UNBC's program partners: the College of New Caledonia (CNC); and Coast Mountain College (CMTN), which was formerly Northwest Community College. The final two years of the program are provided to students at three UNBC campuses located in Prince George, Terrace, and Quesnel.

Health services in BC are provided via one provincial and six regional health authorities; one of these regional health authorities is the NHA. UNBC has an agreement in place with the NHA (the "NHA Agreement"), allowing for clinical placements at those healthcare facility sites named within the NHA Agreement. Most UNBC student clinical placements occur at larger healthcare facilities. Smaller, rural healthcare facilities are also used for clinical placements but they tend to have a limited number of student placements per term. As a result, these smaller facilities are much less likely to have encountered significant numbers of student-committed medication errors. The NHA Regional Director, Risk and Compliance (personal communication, April 5, 2016) identified the Five Facilities in the NHA, which had the highest reported student-committed medication errors in five academic years, from 2010/2011 to 2014/2015. To ensure anonymity, each of the Five Facilities was categorized based on criteria set out in the Northern Health Authority Distribution Framework (Quality and Planning, Northern Health Authority, 2017) and are identified in

this manner in Appendix A. All healthcare facility participants in this study were employed in these Five Facilities.

Data Sources

Two data source categories were included in this study: individual entities and social entities. Each person who was interviewed for this study was assigned a code that represented their role but allowed them to remain anonymous when findings from the study were being presented. For example, student nurse participants are identified in Chapter 4 as Student 1, Student 2, etc. Since there were very few male interviewees in any participant group, and the nursing profession is still predominantly female, there was a concern that maintaining gender identification when quoting participants could lead to identification of specific individuals. As a result, female pronouns have been used in all descriptions of specific events and all quotations included in this work. In addition, given that there were so few male interviewees in all categories of participants, it was not possible to explore any gender-based differences in the interview data.

Individual entity data sources. Individual participants who provided data about student-committed medication errors were student nurses, preceptors, and clinical instructors.

Social entity data sources. A social entity is a structure that has “identifiable human members and characteristic types of relations between them [that] have causal efficacy [such as] organizations and normative communities” (Elder-Vass, 2007, p. 467). The social entity as a causal mechanism has powers that the individuals, on their own, would not have (Elder-Vass, 2007). The social entity representatives who provided data about student-committed medication errors were: educational institution administrators and healthcare facility administrators. It was recognized that different healthcare facilities could assign

responsibility for medication errors to different employment positions or to positions that have similar roles but different titles. The NHA Regional Director, Risk and Compliance identified the most appropriate administrators within the Five Facilities from whom the necessary information could be obtained. One senior-level representative of the NHA administration (NHA Representative), was also interviewed; this individual was able to provide high-level information about adverse events that occur within NHA healthcare facilities as well as the database in which such adverse events can be reported.

Two other social entities were used as potential data sources: the BCCNP and the government (both the federal government and the BC provincial government). The BCCNP (formerly the College of Registered Nurses of British Columbia [CRNBC]) is the professional regulatory body for nursing in the province of BC. The mandate of the BCCNP involves assessing nursing education programs in BC, addressing complaints about BCCNP registrants, and setting standards of practice for the profession, including the regulatory supervision of students (BCCNP, n.d.-a). The following BCCNP documents were obtained for this study: Legislation Relevant to Nurses (BCCNP, n.d.-b), Precepting Students (BCCNP, n.d.-c), Medication Administration practice standard (BCCNP, 2010), Employed Student Registrants practice standard (BCCNP, 2012), Profile of a Newly Graduated Registered Nurse (BCCNP, 2014), Regulatory Supervision of Nursing Student Activities practice standard (BCCNP, 2018a), and Professional Standards for Registered Nurses and Nurse Practitioners (BCCNP, 2018b). With respect to governmental roles in health and health-related issues, the administration and delivery of healthcare services is the responsibility of each individual province or territory (Government of Canada, 2016). Therefore, provincial laws and regulations related to health and the provision of health-

related services were reviewed to determine if any clauses impact the allocation of responsibility and accountability for medication errors; however, none played a role in the management of student-committed medication errors. Federal laws and regulations related to health and the provision of health-related services were also examined to determine if any clauses impact the allocation of responsibility and accountability for medication errors; they did not.

The documents of interest from the BCCNP and the two levels of government were all publicly-available online from the following websites:

BCCNP: <https://www.bccnp.ca/>

Canadian (federal) government: <http://www.canlii.org/en/index.html>

BC (provincial) government: <http://www.bclaws.ca/>

In addition to interviewing administrative representatives of the educational institution and healthcare facility, documents created by these two social entities that pertain to medication errors were also sought and, where available, analyzed in this study. The following documents were initially sought from the educational institution: incident reports, learning contracts, and relevant policies and procedures. However, learning contracts and incident reports are not collected by UNBC in any central repository so collection of these was not pursued further. Further, the educational institution does not have written policies or procedures on managing medication errors committed by student nurses. The following documents were sought from participating healthcare facilities/the NHA: adverse event reports and relevant policies and procedures. Adverse event reports are generated in the form of PSLS entries; a spreadsheet of de-identified student-committed medication errors recorded in the PSLS for each of the Five Facilities between 2010 and 2016 was obtained from the

NHA Representative. Since the relevant policy and procedure document is NHA-applicable rather than facility-specific, this was also obtained from the NHA Representative. The relevant policy and procedure is: “#2-1-3-030: Patient Safety and Learning System (PSLS)”.

PSLS. The centralized database for adverse events that occur in healthcare facilities in BC is known as the PSLS. This is a web-based, voluntary, self-reporting system in which any employee, independent contractor (such as a physician), or student who provides services in a BC healthcare facility can enter information about adverse events to which they have been a party or a witness or which another person has reported to them. A reporter can choose to remain anonymous when entering such an event into the PSLS system. The criteria for an event to be entered into the PSLS are: it was an unwanted event; it was unexpected; it had the potential for harm; and it was related to the care provided by a health authority generally or by a healthcare facility specifically. By a large majority, nursing staff in BC contribute to the PSLS database more than any other user group (NHA Representative, personal communication, September 22, 2016).

By their nature, voluntary, self-reporting systems do not typically capture all adverse events that occur in an institution. Therefore, the data housed within such systems do not usually provide a complete picture of the occurrence of such events (Classen et al., 2011; IOM, 2007; Stump, 2000). For the portion of the PSLS that relates to the NHA, there are certain years for which its data are significantly more robust than for other years. Staff changes in the Risk and Compliance Department of the NHA yielded an increased focus on encouraging PSLS reports between 2011 and 2014 (K. Thomson, personal communication, November 6, 2015); the greater amount of information available for adverse events during that time period is clearly evident in PSLS data. Outside of that time period, there has been

far less reporting of adverse events into the PSLs and there is significantly less information available to analyze.

Users of the PSLs enter information into the database through a form that is customized for the particular type of event that is being recorded. For example, if the user indicates that they are reporting a medication error, then the PSLs only asks questions that are pertinent to that type of incident. Each form uses a combination of boxes for narrative entries and drop-down menus from which a user selects the most appropriate option. It is possible for users to report events anonymously into the PSLs, and the NHA Representative estimates that approximately 15-20% of entries in the PSLs are made anonymously.

Although reporters are identified by role when they create an entry in the PSLs, not all pieces of data for that particular entry are necessarily entered into the PSLs by the same individual. Once an incident has been reported into the PSLs, it is assigned to a “handler” who is usually an administrator of the relevant area of the facility in which the error occurred (such as a unit manager) and is typically at least one degree of supervision above the person who is completing the report (NHA Representative, personal communication, September 22, 2016). The PSLs sends the handler an email that an entry has been created and then the handler is responsible to follow-up on the event, speak with individuals involved, identify if any system changes are needed to prevent the error from recurring, identify any individuals who also need to be notified of the incident, and then update the PSLs with this follow-up information. The NHA Representative is also notified through the PSLs about the incident and the handler’s response. The NHA Representative can then enter additional information into the PSLs entry for that event or can clarify existing entries made by others (NHA Representative, personal communication, September 22, 2016). As a result, information

related to any particular event may be entered into the PSLS by a number of individuals who are part of the chain of actual events or who are part of the chain of follow-up processes.

Since the PSLS contains information about many types of errors or issues besides medication errors, and about incidents involving many individuals besides students, the NHA Representative narrowed the search parameters in order to generate information relevant to this study. A spreadsheet (PSLS Spreadsheet) was created by the NHA Representative in which each incident met the following restrictions:

- (i) the incident occurred in the NHA region;
- (ii) “student – nursing” was selected by the incident reporter as the individual responsible for the reported incident; and
- (iii) the incident occurred within the time period 2010 to 2016, inclusive.

It is important to note that, when a reporter chooses from the PSLS drop-down menu to indicate the role of the person most responsible for the incident, “student – nursing” is one available option. However, the reporter is not given more specific options in any drop-down menu to indicate whether the student involved was a BScN student rather than a licensed practical nursing (LPN) student. The only way to differentiate between types of student nurses in the PSLS is to specifically include this information in a narrative section of an individual PSLS entry. The PSLS Spreadsheet also does not divide out students by their program year or the particular school they attended at the time of the incident. The PSLS Spreadsheet provided by the NHA Representative includes all incidents for which the “student – nursing” option had been selected by the reporter.

The PSLS Spreadsheet includes:

- (i) the type of incident (the PSLS Spreadsheet included medication errors, unsafe patient behaviours, patient falls, and other types of incidents);
- (ii) the proximity of the error to the patient (the PSLS Spreadsheet included incidents that actually reached or affected the patient as well as those considered near-misses); and
- (iii) the particular NHA facility in which the incident occurred. Only those incidents that occurred within the Five Facilities were included in data analysis.

The NHA Representative redacted all identifying information pertaining to patients and individual providers from the PSLS Spreadsheet entries. For the majority of the entries in the PSLS Spreadsheet, it was not noted which individual made a specific statement or who chose a particular selection from a given PSLS menu.

Qualitative Phase: Interviews

Interpretive description was used to analyze content of the semi-structured interviews. Interpretive description “seeks to discover associations, relationships and patterns within the phenomenon” that is being described (Thorne, 2008, p. 50). It recognizes both the inherent value in analyzing a phenomenon systematically and the need to ensure that the analysis is re-situated in a practical context, including all of its essential social, political, and ideological complexities (Thorne, 2008). Interpretive description was therefore a strong match for this analysis that incorporated a critical realist lens.

Sample. All participants in this study were purposefully selected to provide data related to the research questions of this study. In purposeful participant selection, settings and specific individuals within settings are selected based upon the angle of the experience that

they can help to illuminate (Thorne, 2008). It is the most common sampling strategy used in qualitative research (Elliott & Timulak, 2005).

Interviews were conducted with the following participants: student nurses; preceptors; clinical instructors; and administrative representatives of the educational institutions and healthcare facilities. The purpose of the interviews was to gain a thorough understanding of the processes and perceptions related to the allocation of accountability and responsibility for a student-committed medication error.

Student nurses. For confidentiality reasons, the names of individuals who have been involved in student-committed medication errors reported into the PSLS could not be shared. It was also expected that at least some of the individuals identified within the PSLS as having committed a medication error during a clinical placement would now have already graduated from the UNBC nursing program or would have since withdrawn from the program before completing it. Because the identities of individuals involved in errors could not be disclosed, email communication with all individuals who had been student nurses in the UNBC program in the five academic years of 2010/2011 to 2014/2015 was initiated to request participants for the study. Students in first year clinical placements tend to be allowed very few interactions with patients that involve the student preparing or administering medications. As a result, the potential for a first-year student to make a medication error during such an initial placement is extremely low and so students who had only completed first year were not included in the student nurse sample size calculation. They were however, still eligible for study participation as an acknowledgement that the possibility for such patient contact still existed. Student enrollment numbers for all campuses of the UNBC nursing program over those five academic years is provided in Appendix B.

The researcher is a nursing faculty member at UNBC. Therefore, emails were sent to students by an administration representative at each educational institution so that students would not feel pressured to participate. Students were asked to connect directly with the researcher only if they wished to participate in the study or obtain further information about it. A follow-up email was sent to students by these same administrative representatives three weeks after the initial request.

Qualitative authors generally agree that it is not possible to definitively specify a sufficient sample size in advance of the study occurring (Gentles, Charles, Ploeg, & McKibbin, 2015). This is because qualitative research does not use power analysis to determine a necessary sample size but instead more commonly uses the concept of saturation, which means that new cases are added to the study until no new data emerge (Elliott & Timulak, 2005; Gentles et al., 2015). Interpretive description can be conducted on samples of virtually any size, although it has been noted that the vast majority of studies that use interpretive description tend to be fairly small (approximately 5-30 participants); it is up to the researcher to present a rationale for the number ultimately selected (Thorne, 2008). However, one factor to consider when determining sample size for an interpretive description analysis is the current state of the relevant science. If the particular field is under development and relatively little is known about the phenomenon, as is the case for student-committed medication errors, then a more robust sample size and extensive interpretive description is likely to be warranted (Thorne, 2013).

The total number of students who participated in at least one year of the UNBC nursing program across the relevant five-year time span was 1,121 students (C. Norish, personal communication, November 19, 2015). Removing those individuals who had

completed only the first-year of the program from the calculation resulted in 916 potential student participants (see Appendix B). While it was possible that some of the errors reported in the PSLs had been committed by the same student nurse, thereby reducing the pool of eligible participants, it was also possible that additional errors *not* reported into the PSLs would be identified by those who participated. It was therefore anticipated that 20-30 student nurse interviews would be required to reach saturation. Inclusion and exclusion criteria for student nurse participants are listed in Appendix C.

A total of 15 individuals who had been student nurses during the relevant time period asked to participate in the study. Six of these individuals were not eligible to participate because they had not been involved in a medication error. One student was interviewed but, because her medication error had occurred while she was in an Employed Student Nurse role, she did not meet the inclusion criteria and her data were removed from analysis. A total of eight individuals were interviewed and included in the student nurse category of participants. Since involvement in a medication error tends to be a traumatic event for a student nurse, it was not viewed as ethical to request student participation more than twice; further requests to participate could have been interpreted as inappropriate pressure to disclose and revisit this event. While the final tally of eight student participants did not reach the number of student nurses originally proposed to reach data saturation, there were distinct commonalities evident in the interviews that were conducted. The issue of saturation will be discussed further in Chapter 5.

In an effort to make students more comfortable disclosing the particulars of the medication error, and given that:

- (a) practica for this educational program typically occur in rural, remote, and northern locations where students may be identifiable from situational descriptions; and
- (b) this was not a study in which the situations of student participants needed to be linked to specific learning contracts, clinical instructors, preceptors, or PSLS entries, students were not asked to name the hospital or unit in which the error had occurred.

Clinical instructors and preceptors. Since data were collected for the five academic years 2010/2011 to 2014/2015, any preceptor and clinical instructor key informant who participated in the study needed to have been involved in a student-committed medication error during that time period.

There were approximately 300 preceptor arrangements negotiated between UNBC and individual RNs or teaching teams/groups for the school year 2015/2016. For that same school year, there were 42 part-time clinical faculty members and 7 full-time clinical faculty members fulfilling the clinical instructor role at UNBC in the final two years of the program. If a clinical instructor was involved in more than one clinical course, that individual was only counted once in this total number. Emails were also sent to each of the five clinical instructors for CMTN and the 28 clinical instructors for CNC.

To ensure that participants did not feel pressured to participate given the role of the researcher as a nursing faculty member at UNBC, emails were sent by an administration representative at each educational institution. Instructors and preceptors were then asked to connect directly with the researcher if they wished to participate in the study. A follow-up email was sent to instructors and preceptors by these same administrative representatives two weeks after the initial request and again four weeks after the initial request. Due to the need

to use intermediaries to send these communications, there were slight variances in the timelines associated with sending the emails.

It was anticipated that preceptors and clinical instructors were likely to receive information from each other, the student nurse, the educational institution and/or the healthcare facility about: (a) any allocation of responsibility and accountability for those medication errors committed by students with whom each preceptor or clinical instructor was actually paired; and (b) any allocation of responsibility and accountability to themselves. Some variability was expected between the different healthcare facilities in regard to: (a) the amount of information that was made available to clinical instructors and preceptors regarding the allocation of responsibility and accountability for student-committed medication errors generally; and (b) the processes, policies and procedures implemented by such facilities related to medication errors. As a result, it was expected that a relatively high number of preceptor and clinical instructor participants would be needed before information saturation could be reached. Based on the number of preceptors and clinical instructors who would be eligible to participate in the study, it was anticipated that 20-30 preceptors and 20-30 clinical instructors would need to participate in this study. Inclusion and exclusion criteria for preceptor and clinical instructor participants are listed in Appendix C.

A total of 18 individuals who had acted in a clinical instructor role and nine individuals who had acted in a preceptor role during the time period of interest asked to participate in the study. One of these clinical instructors and one of these preceptors had not yet been involved in a student-committed medication error and were therefore excluded from participation. Another clinical instructor requested to participate but then did not respond to further communication. Eight individuals were interviewed solely with respect to their

clinical instructor role and four were interviewed solely with respect to their preceptor role. Several individuals met the criteria for more than one role and were interviewed about all roles for which they were eligible:

- (a) six individuals were interviewed with respect to both their clinical instructor and educational institution leader roles; and
- (b) two individuals were interviewed about their clinical instructor role as well as their preceptor role.

In total, 16 interviews were completed about the clinical instructor role and six interviews were completed about the preceptor role. Since involvement in a student-committed medication error tends to be a difficult event for all, including clinical instructors and preceptors, it was not considered ethical to request instructor and preceptor participation more than three times; further requests to participate could have been interpreted as inappropriate pressure to participate in the study. While the final tally of sixteen instructors and six preceptors did not reach the numbers originally proposed to reach data saturation, there were distinct commonalities evident in the interviews that were conducted. The issue of saturation will be discussed further in Chapter 5.

Several of the 16 clinical instructors interviewed for the study had taught in more than one year of the program during the relevant time period. During the time period of interest in the study, the clinical instructor participants were responsible for students in the following years of the nursing baccalaureate program:

Program Year	Number of Clinical Instructors
Year I	1
Year II	5
Year III	11
Year IV	5

In this particular nursing program, there are no preceptor-led clinical placements in the first or second year of the program. Several of the six preceptor participants interviewed for this study had acted in this role in more than one year of the program during the relevant time period. During the time period of interest, the preceptor participants were responsible for students in the following years of the nursing baccalaureate program:

Program Year	Number of Preceptors
Year III	6
Year IV	4

Educational institution leaders and healthcare facility administrators. Senior leadership at the educational institutions were consulted to determine which educational institution leaders were likely to be most knowledgeable about the institution's medication error policies, procedures, processes, and trends. The following educational institution leaders were then contacted by email to request participation in the study:

Educational Institution	Administrators
UNBC	<ul style="list-style-type: none"> • Chair of Nursing • Coordinator of Undergraduate Programs • year-specific program leads.
CNC	<ul style="list-style-type: none"> • Program Coordinator(s) • year-specific program leads
CMTN	<ul style="list-style-type: none"> • Program Coordinator(s) • year-specific program leads

If no response was received within three weeks, then a follow-up email requesting participation was sent. Inclusion and exclusion criteria for educational institution representatives are listed in Appendix C.

A total of eight educational institution leaders asked to participate in the study; all met the study criteria and were interviewed. Two of these participants were interviewed

solely with respect to their educator role, five were interviewed with respect to both their educator role and their clinical instructor role, and the remaining individual was interviewed with respect to her educator, clinical instructor role, and preceptor roles.

The NHA Regional Director, Risk and Compliance identified those individuals in each of the Five Facilities who held responsibility and/or knowledge of the issues that were the focus of this study. Inclusion and exclusion criteria for healthcare facility representatives are listed in Appendix C. Email addresses for those individuals were obtained from the NHA and an email describing the study and requesting participation was then sent to those individuals. If no response was received within three weeks, then a follow-up email requesting participation was sent.

Eight of the healthcare facility administrators responded to the request for participation; all met the study criteria and were interviewed. The Five Facilities were all represented in these interviews, and two of the Five Facilities were represented by two participants each.

Interviews. Each interview was semi-structured in nature and occurred at a location of the participant's choosing. Interviews lasted for approximately 25-45 minutes each, depending upon the category of key informant involved and the contributions that were shared. Each key informant was offered the choice of a telephone or face-to-face interview for this study. Each interview was audio recorded and then was transcribed verbatim by a third-party transcriptionist.

As a gesture of appreciation, and as an acknowledgement of their research contribution, each participant was offered a \$10.00 gift card to their choice of either Tim

Horton's or Starbucks. The gift card was given at the conclusion of the participant's interview.

Interview analysis. A qualitative research software package, QSR-NVivo Data Analysis Software, was used to assist in the storage of interview transcripts and the organization of codes. Each interview transcript was read several times to obtain overall first impressions of the data and start the coding process. Coding involves the choice and application of a certain term, phrase or signifier to each data instance, thereby creating coded groups of information (Thorne, 2008). As an initial step, the different segments of text were tentatively labelled as codes. Then, through deeper and evolving immersion in the data, codes that were initially proposed were modified, clarified, developed further, or removed. As themes started to be identified, codes were divided into sub-codes so that more refined distinctions of higher order codes could be identified (Weston et al., 2001). Once the codes and sub-codes had been identified, the relationship of each grouping to the others was examined in order to inductively generate a coherent pattern or whole from this iterative reasoning process. As part of this stage, the potential implications of these groupings and relationships were considered, including implications for practice (Thorne, 2008). Analytic notes were maintained in order to capture questions and implications associated with this iterative reasoning process. Committing this internal dialogue to paper as the analysis unfolded also prevented a need to try to reconstruct the process after it was complete, since valuable insights were gained from understanding the movement "from there to here" once the final set of groups and organizing structure had been decided upon (Thorne, 2008).

Quantitative Phase: PSLS Database

Quantitative data collection. The PSLS Spreadsheet was received from the NHA Representative immediately following her interview. After all of the study interviews had been completed, and the interviews had been analyzed, it was determined that no quantitative data sources other than this PSLS Spreadsheet needed to be collected.

Quantitative data analysis. The PSLS Spreadsheet contained the information shown in the below table. This information was converted into nominal categories to enable calculations of frequency. Analysis of narrative comments included by PSLS reporters focused only on the time period and decisions *after* an error had occurred, in keeping with the aims of the study. It was not necessary to use SPSS or other quantitative data analysis software since the types of calculations that could be performed on these data were straightforward:

PSLS Spreadsheet

Data	Type of Data	Descriptive Statistics Conducted
Identity of healthcare facility involved	Nominal	Frequency
Type of medication error (e.g. drug calculation, patient monitoring, administration)	Nominal	Frequency
Adverse effects to patient	Nominal	Frequency
Communication channels identified between and among student, healthcare facility, educational institution	Nominal	Frequency
Impacts on student and any others involved in the incident	Nominal	Frequency
Factors involved in allocation of responsibility and accountability for error	Nominal	Frequency

Triangulation

Triangulation means that a particular research issue is being considered from more than one perspective, in order to achieve “broader, deeper, more comprehensive understandings of what is studied” (Flick, 2018, p. 5). It can involve the use of any of the following to study and understand a particular phenomenon: multiple theories, multiple sources of data, multiple methods, or multiple observers (Heale & Forbes, 2013). These multiple layers can help to avoid fundamental biases that can arise by using one method only, to confirm findings obtained via one method or one observer, and to ensure data completeness (Noble & Heale, 2019).

Multiple sources of data provided information about the post-error environment. Not only were qualitative and quantitative data sources used, but multiple sources of data within each of those categories were also mined. Quantitative data from PLS Spreadsheet were juxtaposed with qualitative data from the semi-structured interviews. Statistical data were compared to the thematic results to identify instances of convergence and divergence (Plano Clark & Ivankova, 2017). Using this approach, evidence was built for themes that were supported by both multiple data sources and multiple individuals (Creswell & Plano Clark, 2011).

Trustworthiness. The requirements for rigour in quantitative studies (reliability, replication, and validity) are not well-suited to qualitative studies. Instead, considerations of trustworthiness are considered more applicable to qualitative work (Maher, Hadfield, Hutchings, & de Eyto, 2018). The four key elements of trustworthiness are credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1986).

Credibility is present when readers are able to recognize their own experiences in the study (Guba & Lincoln, 1981). Various techniques to ensure credibility were used in this research. For example, significant time was spent with each study participant to ensure that the error event, and the participant's experience of the event, was being canvassed thoroughly. The researcher also used peer-debriefing techniques by regularly consulting with supervisory committee members to discuss the study methodology, the methods being employed, and interpretations assigned to participant contributions. The researcher also revisited interview content throughout the data immersion and interpretation process in order to check preliminary findings against the raw data. This iterative questioning of the data was evidenced in the reflective journal maintained by the researcher throughout the study process. All of these techniques are recommended in the literature as ways of ensuring and enhancing study credibility (for example, Connelly, 2016; Maher et al., 2018; Nowell, Norris, White, & Moules, 2017).

Miles and Huberman (1994 as cited in Forero et al., 2018) expanded the definition of credibility to include an examination of the expertise and authority of study investigators. The researcher is a RN with clinical experience of the context in which student nurses may commit medication errors. She is also a health lawyer with experience defending hospitals and nurses from allegations of wrongdoing, and a nursing faculty member with experience teaching nursing students about medication safety, documentation practices, professional responsibilities, and ethical practice. The work of the researcher for this study was overseen by a supervisory committee who hold extensive combined experience in nursing education, medication safety research, mixed methods studies, and philosophical underpinnings of healthcare research.

Transferability addresses the extent to which study findings will be applicable to readers in other settings or contexts (Maher et al., 2018). This particular study involved a baccalaureate nursing degree program in northern BC containing three program partners (one university and two community colleges) over multiple campuses. The setting also included the Five Facilities, all located in northern BC. Not all readers of this study will be involved with a nursing program with that particular configuration nor be involved in a healthcare facility with the same characteristics of those in this study. However, as the study process unfolded, the researcher used a reflective journal to maintain awareness of findings resulting from traits of this particular nursing program or of these particular healthcare facilities. When writing the study findings and articulating their implications, the researcher provided the “thick description” (Geertz, 1973, p. 317) necessary for readers to assess whether a finding would be transferable to their particular situation. This involved the provision of rich descriptions of the context, location, and people involved in this research (Connelly, 2016).

Dependability requires the researcher to provide sufficient detail of the steps and decisions they undertook during the study, such that another researcher would be able to repeat the work (Maher et al., 2017). For this study, a detailed draft of the intended research process to be undertaken was reviewed by the researcher’s supervisory committee members at numerous points in the research process. This ensured that the steps to be followed were clear, demonstrated a logical progression, and were supported by existing literature and committee member experience. Ethics and operational approvals were also granted following their detailed reviews of the study process. Once data collection began, the researcher kept detailed records to allow confirmation that the process was unfolding in line with the plan that had been approved.

Confirmability refers to the researcher's ability to show that the data, and interpretation of that data, truly represent the participant's responses rather than reflecting biases of the researcher (Cope, 2014). The researcher kept detailed notes during the progress of the study; this created an audit trail of researcher reflections on the data and enabled the researcher to recognize any personal viewpoints that might be influencing data interpretation. Discussions between the researcher and members of her supervisory committee occurred as the data collection and analysis processes unfolded, and these were helpful in this regard. Reflexivity of the researcher is specifically addressed in the next section.

Reflexivity. The researcher is an RN, a health lawyer, and a faculty member in the UNBC nursing program. It was therefore possible that preconceived ideas related to student-committed medication errors could potentially seep into the questions asked and/or the sources sought during the data collection process or into the interpretation of findings. It was critical to acknowledge and remain cognizant of such potential influencers in order to preserve the credibility and rigour of the study. To remain alert to the possibility that such factors might be inappropriately influencing the process, a journal was created at the beginning of the study and maintained throughout the data collection and analysis processes. This was a way to document the journey of the researcher but also to ensure continuing awareness of the need for a reflexive approach. The contents of this journal also provided a basis for discussions between the researcher and her PhD supervisor as one way to ensure that any potential biases could be made visible and accounted for. Qualitative research, particularly that which is situated within a critical paradigm, needs to be presented in a way that makes evident the researcher's own values, opinions, experiences, and positions of power and privilege. Such transparency allows both the researcher and the research consumer to

better understand how those factors may have influenced the researcher's interests, the way in which the researcher conducted the study, and the ways in which the study is ultimately interpreted and represented (Ortlipp, 2008).

After each interview, the interview process and the questions that had been asked of that participant were reviewed. It was necessary to consider whether questions had been raised, certain wording in those questions had been used, or certain elements of the error-response process had been emphasized out of a preconceived idea of what the response would have entailed or what the participant would have been considering at the time of the event. Such self-reflection allowed awareness of the possibility of "unconscious editing" and re-confirmed the need to allow the participant to guide the story they wished to share (Berger, 2015).

At several points during data analysis, the researcher also discussed themes that appeared to be arising out of the data with her PhD supervisor and various committee members. This helped to ensure adequate detaching of any preconceptions or biases from data interpretation, and created themes that truly reflected the experiences and stories of the participants (Palaganas, Sanchez, Molintas, & Caricativo, 2017).

Ethical Considerations

Written permission to conduct the study was received from all three participating program partners of the collaborative UNBC nursing program: UNBC, CNC, and CMTN. The UNBC Research Ethics Board (REB) approved the study on March 24, 2016 (see Appendix D).

Study approval was received from the NHA Research Review Board in two phases. Ethics approval to receive the names of the Five Facilities was granted on March 30, 2016

(see Appendix E). The appropriate signatory from each of the Five Facilities was contacted to request participation of that facility in the study. All Five Facilities agreed to participate and their written agreements were provided to the NHA Research Review Board for operational approval. Operational approval was granted on June 24, 2016 (see Appendix F).

An information letter and consent form, each written in easy-to-understand language, was provided to potential participants and the study was explained in detail before each interview. Each person had time to read these documents in detail and ask any questions about their contents prior to commencing the interview. No interviewee requested additional time to consider their involvement in the study after their questions had been answered. The consent form was signed by each participant before their interview commenced. No participant asked additional questions after their interview had been completed nor did any request that their interview be removed from analysis.

Each participant was assigned an alphanumeric code when the audio recording commenced for their interview. This list of assigned alphanumeric codes was kept in a secure folder on a UNBC file server. This secure folder had been specifically created by the UNBC Information Technology Department for this study. A third-party transcriptionist who had signed a confidentiality agreement provided the verbatim transcriptions. Immediately after each interview, the audio recording was uploaded by the UNBC File Portal service and a link to the file sent to the transcriptionist. This link remained active for only 48 hours to decrease the possibility that it would be inappropriately accessed. No identifying information was used in the file name. Each time that a link was sent to the transcriptionist, a reminder was included that the content of the files was not to be shared with anyone, as per the confidentiality agreement. The audio recording itself was also uploaded into the secure folder

created for this study and then deleted from the recording device. All electronic copies of the interview transcripts were kept in this same secure folder. This folder was accessible only to the researcher and the researcher's Supervisory Committee members. No names or other personal identifying information were included in the interview transcripts. No hard copies of the transcribed interviews were created. All electronic copies of documents generated in this study will be retained for a period of ten years after the dissertation has been completed and defended to allow for the generation of potential publications from the dissertation.

Involvement in a medication error, whether or not patient injury results, can be traumatizing for the practitioner; reliving the experience in front of a researcher may be no less so. Therefore, it was critical to ensure that the interview process felt as safe as possible for each participant. To facilitate such an experience, all study participants were given the option of choosing whether the interview was to be conducted via telephone or in face-to-face discussion. If the participant chose a face-to-face interview, the participant was also allowed to choose the preferred location of the interview. A total of 21 interviews were conducted face-to-face, 23 interviews were conducted by telephone, and one interview was conducted using Skype. Each participant was also offered the option of having a support person attend the interview with them; no participants requested to have a support person present.

There was the possibility that some study participants could have been colleagues of the researcher or could have been (or could become) students in one of the researcher's classes, although the researcher does not teach any clinical courses. The researcher was transparent to potential participants about this possibility and allowed each individual to decide if this impacted their decision to engage with the study. A commitment was made to

the student nurses that the researcher's teaching and research roles would be kept entirely separate and that admitting to a medication error would not affect the student's grade in any current or subsequent courses taught by the researcher. Within their consent forms, all participants were offered the option of being interviewed by a research assistant rather than the researcher; no one took up that option. The researcher also maintained awareness of this potential conflict by focusing on that issue in the reflective journal that was maintained throughout this study. This helped to ensure that any dual roles were kept distinctly separate from one another and that they did not interfere with the process of data collection and analysis.

Chapter Four: Findings

In this chapter, findings from this exploratory mixed methods study are presented. Reports contained in the PSLS Spreadsheet demonstrated that the vast majority of reported student-committed medication errors caused no harm to the patient and were related to medication administration tasks carried out in inpatient units. Perceptions of the post-error environment differed markedly between student nurses on one hand and clinical instructors, preceptors, educational institution leaders, and healthcare facility administrators on the other. The difference between perceptions of blame and requirements of ownership is key to understanding these divergent perspectives. Since there are few written documents to guide the post-error process, inconsistent approaches to managing both the event and the student experience have resulted.

Because of significant overlap that became evident within the interview data, findings related to clinical instructors and preceptors are presented together and their themes combined where appropriate. Where the finding refers to *both* the clinical instructor group and preceptor group, the word “teachers” is used rather than identifying the two groups separately. Similarly, findings related to educational institution leaders and healthcare facility administrators are presented together and their themes combined where appropriate.

The Medication Errors of Interest

There was a total of 258 incidents listed in the PSLS Spreadsheet within the time period 2010 to 2016 (inclusive) and for which a student nurse was identified as being “responsible”. Five incidents were removed from analysis since the narrative sections of these PSLS entries specifically indicated that an LPN student was responsible rather than a BScN student. Of the remaining 253 incidents, 224 (88.8%) were identified as being related to medication or

intravenous (IV) lines rather than some other type of incident, such as a patient fall. Of these 224 reported medication or IV incidents, 148 (66.8%) occurred at one of the Five Facilities.

The location where these 148 incidents took place are as follows:

Facility	Number of Medication or IV Incidents for which a Student Nurse was Identified in PSLS Spreadsheet as Being “Responsible”
A	79 (53.4%)
B	40 (27.0%)
C	10 (6.8%)
D	10 (6.8%)
E	9 (6.4%)
TOTAL	148 (100%)

Of these 148 incidents, 75 (50.7%) had been reported into the PSLS by a student, 56 (37.8%) by a nurse, and 17 (11.5%) by an individual who self-identified as “other”.

An incident that is reported into the PSLS is classified by its reporter into one of five categories, each representing a degree of harm caused to the patient. Of the 148 incidents, 132 (89.2%) were identified as being Category 1 (“no harm”), 13 (8.8%) were identified as being Category 2 (“minor harm”), and 3 (2.0%) were identified as being Category 3 (“moderate harm”). None were classified as Category 4 (“severe harm”) or Category 5 (“death”). The characteristics of each of these five categories are explained in additional detail in the British Columbia Patient Safety & Learning System Degree of Harm for Fall-Related Injuries (MacLeod, Foreman, & Wilson, 2013); despite the title of that document, these same categories are also used for non-fall-related injuries reported into the PSLS (NHA Representative, personal communication, December 13, 2017). Of the 132 incidents that were categorized in the PSLS as Category 1 (“no harm”), 5 (3.8%) were categorized as near-misses that had not actually reached the patient. Since this study focused only on medication errors that actually reached the patient, these 5 incidents were removed from the 148

potential events for study and not included in any further analysis. Therefore, the final number of incidents analyzed in this study was 143 (“Medication Errors of Interest”). To summarize, this number is comprised of only those errors in which:

- (a) the error was related to medication or IVs;
- (b) “student – nursing” had been chosen in the PSLS as the role responsible for the error (although this drop-down menu was not broken down further by type of nursing program);
- (c) the error actually reached the patient (regardless of level of injury sustained); and
- (d) the error occurred at one of the Five Facilities.

In the PSLS Spreadsheet, there are several sections in which an individual can provide descriptions in narrative form rather than selecting from predetermined options in a pull-down menu. These narrative sections are “Description of Event”, “Safety Ideas”, “Notes”, “Other Actions Taken”, and “Summary of Findings”. For many of the entries in the PSLS Spreadsheet, narrative sections were either left blank or they contained minimal information.

Specific characteristics of the Medication Errors of Interest, as derived from the quantitative analysis of the PSLS Spreadsheet, are provided in Appendix G. As a summary of Appendix G:

- the highest number of the Medication Errors of Interest between 2010 and 2016 occurred in 2013, followed by 2015;
- more of the Medication Errors of Interest occurred between the months of March and May than in any other months of the year;

- most of the Medication Errors of Interest occurred in Facility A, which was the largest of the Five Facilities;
- in all of the Five Facilities, the majority of the Medication Errors of Interest occurred in inpatient wards/resident units;
- by a significant margin, the highest number of Medication Errors of Interest were a result of “administration” issues, an option selected from the pull-down PSLS menu; and
- the top three actions taken as a result of the Medication Errors of Interest, as selected from the pull-down PSLS menu, were: fostered safety culture; provided staff education/training; and ensured checklists/protocols/policies available.

Although the vast majority of narrative entries from the PSLS reports contained little detail, the analysis yielded a focus in three areas: increasing awareness of the medication error that was being reported into the PSLS; specific consequences of the error with respect to both the educational institutions and the healthcare facilities; and the generalized strategies identified for implementation post-error.

Increasing awareness of the error. There were a number of factors that determined who first became aware of the student-committed medication error, who had to be notified after the error was discovered and by whom these notifications were made. One of these factors was whether the clinical experience was provided through a clinical instructor-led practicum or through a preceptor-led practicum. If the student was partnered with a preceptor(s) for the clinical placement, then the clinical instructor for that course was not typically on the unit with the student during the practicum. If a student-committed medication error occurred, it would typically be the student and preceptor who would

become aware of it before the clinical instructor. In some cases, the error may come to light while the student is on a break from the unit or after the student's shift ends. In such cases, a unit staff member might become aware of the error before the student and therefore the student would need to be notified of the incident by someone else.

In the PSLS Spreadsheet, it was noted that the student was aware of the error at the time it was made, or was noted as being subsequently notified, or an intent was stated to notify the student, in 96 (67.1%) of the Medication Errors of Interest. A notification of the student could have been undertaken by the preceptor, the clinical instructor, or another staff person at the healthcare facility. However, it often was not explicitly indicated in the PSLS Spreadsheet who had notified the student, who was taking responsibility for notifying the student at a subsequent point in time, or how the student became aware of the error. For some Medications of Interest, the PSLS Spreadsheet entry simply stated "student aware". In other cases, it was the student who reported the incident into the PSLS but then it was rarely stated how he or she had become aware that the error had been made.

The PSLS Spreadsheet did indicate in 50 (35.0%) of the Medication Errors of Interest that the clinical instructor and/or the educational institution had been made aware of the incident or that there was an intention to make them aware of it. In 42 (29.4%) of the Medication Errors of Interest, the preceptor is noted as being aware of the incident or that a plan was in place to make the preceptor aware. However, it is difficult to draw conclusions from these data points since the PSLS Spreadsheet does not indicate which Medication Errors of Interest occurred during preceptor-led practica and which occurred during a clinical experience led by a clinical instructor. Therefore, the number of *eligible* events for both of these circumstances is unclear.

The remaining themes can be subdivided according to the intended target/who would have responsibility to implement the consequence identified. There are three such themes: (1) consequences related to the educational institution or to be implemented by the educational institution; (2) consequences related to the healthcare facility or to be implemented by the healthcare facility; and (3) general strategies to be considered/implemented.

Educational institution impacts. In 10 (7.0%) of the Medication Errors of Interest, a specific concern was noted that the supervision of students by the clinical instructor may have been/was poor at the time the incident occurred and/or it was stated that such supervision should be improved in the future.

A number of the Medication Errors of Interest identified specific consequences that would be within the purview of a student's clinical instructor. These were as follows:

Consequence	Frequency
Additional education was provided or would be provided to student by clinical instructor	8
Student learning contract would be required by the clinical instructor	2
Student would be monitored more closely by the clinical instructor/additional checks on the medications to be given by this student would be performed by the clinical instructor	1
Clinical instructor would be initiating increased communication between the healthcare facility staff and the student	1
Clinical instructor would be imposing a failing course grade on the student	1

Healthcare facility impacts. There were entries in the PSLS Spreadsheet in which a specific concern was noted about the level of supervision of the student by the preceptor; however, this concern was noted much less frequently for preceptors than it was for clinical instructors. In two (1.4%) of the Medication Errors of Interest, a specific concern was noted that the supervision of students by the preceptor may have been/was poor at the time the incident occurred and/or it was stated that such supervision should be improved in the future.

A number of the Medication Errors of Interest identified specific consequences that would be within the purview of a student's preceptor. These were as follows:

Consequence	Frequency
Additional education was provided or would be provided to student by preceptor or preceptor was responsible to ensure that a plan was in place to ensure the learning of the student	22
Student would be monitored more closely by the preceptor/additional checks on the medications to be given by this student would be performed by the preceptor	8
Preceptor commended student for reporting the error, reminded the student that errors do happen, or consoled the student in response to the error	3
Preceptor would be allowed to follow-up with the student after the error as the preceptor deemed appropriate	1

General strategies to be implemented/considered post-error. A number of the Medication Errors of Interest identified general strategies or consequences for the error that were not specific to either the educational institution/clinical instructor or the healthcare facility/preceptor. For many of these entries, it appeared that achieving successful implementation would result from a joint effort by both of the organizations:

Strategy	Frequency
Ensure rights and checks of the medication administration process are being followed by students	33
Changes need to be made to the charting/Medication Administration Record/Kardex process or the medication order transcription process	30
Take more time to closely check (or check more frequently) the medications or the details of the medications or the MAR being used or administered by students. This strategy also includes recommendations that students should be taught better time management skills.	27
Teach students to double-check their medications before administration or have a staff or instructor double-check these for students before administration	23
Teach students to follow policies and procedures of healthcare facility/unit, including informal but standard practices for the unit	18
Encourage students to ask more questions of instructor/staff, increase or improve communication channels	18
Limit distractions and interruptions for students during the medication process	6

Other departments in the healthcare facility need to make changes related to students or medication administration process (e.g. pharmacy, unit clerks)	2
A tense learning environment needs to be improved	1
Information about medications to be provided to students/instructor by the healthcare facility in their clinical area “welcome package” needs to be updated	1

Participant Interview Findings

Five categories of participants were interviewed for this study: student nurses, clinical instructors, preceptors, educational institution leaders, and healthcare facility administrators. As the individuals at the center of the medication errors of interest in this study, it quickly became evident that the post-error perspective of student nurses was unique from the other study participants and they therefore needed to be presented as a single group. In contrast, strong commonalities in the experiences, interests, and concerns of clinical instructors and preceptors became evident during data analysis. Commonalities among healthcare facility administrators and educational institution leaders likewise emerged.

Student nurses. The strongest theme that emerged from the student nurse interviews related to blame for the error: self-blame; blame of the student by others; and ultimately some questioning of whether or not it had been appropriate for the student to receive that degree of blame. The students also discussed discovery of the error and communication of its existence within different circles. Finally, students discussed formal consequences for the error that were chosen by instructors as well as the collateral consequences that students experienced.

The medication error discussed by the eight student nurse participants had occurred in the second year of nursing education in five instances and in the third year of the program in four instances. One student discussed two separate medication errors in which she had been

involved; one of these errors had occurred in the second year of her nursing program and the other had occurred in the third year of the program. No student participants experienced their medication error during their first year of studies but this is not surprising since students in this particular collaborative BScN program have very limited (if any) involvement in the medication administration process in first year clinical practica. Of the nine medication errors discussed by participants, one was experienced while assigned to a preceptor and the remaining eight instances occurred when the students were in a clinical instructor-led practicum. For those students who volunteered the location where the error had occurred, four had occurred while the student was on a surgical unit and three had occurred on a gerontology unit. Three errors occurred when the student was completing the second-year extended practicum course but the specific clinical unit of that placement was not identified.

The type of error that was experienced can be categorized according to the “seven rights of medication administration” set out by the BCCNP (2010). Some of the medication errors discussed by the student nurses violated more than one medication administration “right” and some students disclosed more than one error during their study interview. Therefore, the total number of errors shown below is higher than the number of students involved in the study. These seven rights, and the corresponding number of medication errors that were discussed in each category by the student nurse participants, are as follows:

Medication Administration “Right”	Number of Medication Errors
Right client	3
Right medication	3
Right route	2
Right time	2
Right dose	1
Right documentation	1
Right reason	1
TOTAL	13

Theme #1: Attracting and attaching blame. The most pervasive theme arising within the student nurse interviews pertained to blame for the medication error. All of the students attached some degree of self-blame to their decisions and actions in the error situation but they also attracted blame in the error's aftermath from other people. Students discussed whether or not this self-blame and external blame had been allocated in a way that they considered fair and appropriate in the circumstances.

Me blaming me. Many of the student nurses expressed that they readily accepted blame for the medication error itself and for any patient-related consequences of that error. This readiness appeared to have its roots in two places: (1) the student's own personal characteristics; and (2) the reported assertions made by school instructors to students that a medication mistake must be owned by the person who gave the medication.

With respect to a student's own personal characteristics, many indicated that they had a tendency to feel very guilty about mistakes and "beat themselves up" over an error they perceived to be of their own doing. For example:

[After the error] happened I felt so destroyed [and] I felt like everything that I had built up about myself just kind of fell apart. . . . I'm a very self-conscious person too and very, very aware of what other people are feeling and thinking and how I'm coming across to them. . . . [The feeling that the error was following me around afterward was] just me beating myself up because I'm that way sometimes. (Student 3)

Another student participant described her reaction to one of the errors she discussed in terms of her personal need to be upfront and honest about such a situation:

[There are] so many different ways I could've handled it but I knew for my own sake I had to just take full ownership cause that's just the kind of person I am. . . . I'm not going to blame my mistake on anybody else. It was fully my error. (Student 8)

Several students indicated that this personal feeling of guilt or shame for the error and its consequences was a driving force behind the reactions they then demonstrated to others,

such as to their clinical instructor and other students in their clinical group. Student 1 indicated that she “felt so guilty” about the error that she declined to discuss it with her peers after a suggestion to do so was made by her instructor. Another student described her similar reaction to the error as follows:

I completely accepted responsibility for it and I was distraught over it. . . . [Admitting the error to my classmates felt] kind of shameful. . . . I just felt really bad that it happened. . . . I just wanted to make it right in the moment. [But] it really is an error, there’s no right, you can’t make it right. It’s happened. (Student 4)

While all of the student participants expressed concern about the impact of the error on others, some students specifically attributed their post-error feelings of “guilt” to their perception of the error’s consequences on those other individuals. For example, Student 1 stated, “I felt like I put more stress on the patient and family and the nurses [who then] have to deal with that because of my mistake”.

Several students felt that their need to take responsibility for the medication error resulted from the strong message received during their nursing education that, if a student was the one who gave the medication in error, then it would be that student’s error to accept. One participant repeated this same message numerous times during her interview:

[My instructor] said because it was my med error, it was my responsibility. . . . She said I should’ve talked to her about it but it was my mistake. . . . Cause if you give the medication, it’s your mistake. . . . We’ve had a few conversations about med errors throughout school and every time it’s been discussed, it’s always been discussed as it is your responsibility if you gave the medication. (Student 1)

This same student reported encountering this same pressure to accept blame when she wrote about the error later in the program for a different instructor:

I [asked] an instructor in [a subsequent] year about it . . . [and she said] “you’re acting like it wasn’t your responsibility”. . . . She said, “it’s your responsibility because you gave the medication”. . . . I think she felt like I was trying to put the blame on somebody else for what I did when I wasn’t trying to do that. (Student 1)

One of the students mentioned that she too had encountered this attitude towards medication errors during her education; however, she viewed the repeated emphasis as one method used by the school to try to *prevent* blame being unfairly attributed to a student in clinical practice:

We've always been warned as students to make sure that you're doing your checks and your rights and make sure you're signing in the right spot on your MARs . . . because people will always try and blame . . . the students [if issues occur]. (Student 3)

Others blaming me. Student nurse participants identified three groups of “others” whose reactions had influenced their perceptions of both the error and of themselves post-error. These influencing groups were: (1) clinical instructor and/or preceptor; (2) student peers; and (3) staff on the unit in which the error occurred.

Influence of clinical instructor and/or preceptor on blame: Given that a student's clinical practicum is one to which a grade is attached, and on which progression in the nursing program depends, any reaction of the clinical instructor and/or preceptor to a student-committed medication error will be considered closely by the student. Although some of the errors discussed by students occurred with a clinical instructor, while others occurred in preceptor-led practica, “teacher” will be used to refer to reactions of both clinical instructors and preceptors, as applicable.

Some of the students described their teacher's reaction to the error in very positive terms, indicating that the teacher was supportive and helpful in working through the error and in moving forward from it. For example, Student 1 stated that, “overall she was really nice about it and I think it was just my own guilt [that] made me feel the worst”. Two students also noted their appreciation that the teacher was willing to discuss the error on more than one occasion to help the student work through the situation and to process her own feelings

about it. This enabled the student to more clearly recognize the teacher's involvement as supportive. As one of these students noted, "[my teacher] and I did debrief more than once on it, on that incident, and I was very thankful with how she dealt with it. I was harder on myself than she was on me" (Student 4).

One student was very clear during the interview that she agreed with the way her teacher had handled the error situation, even though the teacher had imposed a significant, final consequence (i.e. failing the course) on the student:

[She] decided not to pass me. . . . [At] that time I was upset, but . . . I personally think [my error] was a serious problem. . . . I personally still respect that instructor and now I look at it in a positive way so I think that instructor helped me. (Student 6)

Unfortunately, other students were not able to view their experiences with their teachers as positive. In fact, it was the teacher's initial reaction to the error that had a significant impact on the way the student perceived the error event longer-term. For example:

This specific instructor. . . had this look of horror on her face after [the error and I thought] . . . "oh God, I'm going to fail, here we go". . . . [She] didn't take me anywhere and ask me what happened, she just [became upset with] me right then and there. And she wasn't . . . therapeutic about it at all . . . she was very dramatic . . . [with] big bulgy eyes, and I was just, oh God. (Student 3)

This same student expressed relief that the error had occurred on the final day of the clinical placement. She was clear that her teacher's initial negative reaction about the error would have significantly reduced her willingness to approach her about future issues:

I would know that she's going to be watching me, watching me, watching me. And I would just feel so embarrassed and defeated about it that I would probably just try and avoid her at all costs . . . And I don't think it should be that way. . . . [If] she was more therapeutic about it, then I would [have felt that] I know I can go to her if I screw up or if I have questions. (Student 3)

In contrast, other students noted that it was some of the *later* decision-making and statements of their teacher that were more influential on their ongoing perceptions of the

error:

[The instructor] got everyone [all the students] together and basically . . . told everyone what happened. . . . [She said] “we just had an incident here where [Student 2 name] gave [medication name] through [the wrong route] and this and this could have happened” . . . and then so basically made an example out of me. (Student 2)

I feel like I’ve disappointed a whole bunch of people [by the error and] my instructor even . . . said that to me, she [said] “this isn’t something I’d expect from you.” And it was kind of like okay, you don’t need to rub it in, I’m aware of what just happened. I think . . . the way she was talking to me, it was like a bully. (Student 3)

Finally, one student indicated that her teacher had assumed leadership over handling the error, calling the physician and creating an entry in the PSLS. The student expressed her wish that the teacher would have allowed her to participate more in the management of the situation or had, at least, discussed the error with the student after the situation had been sufficiently managed:

Even if my instructor wanted to . . . take the lead on correcting the situation . . . I definitely should have been present for . . . the phone call to the doctor and completing a PSLS at that time. . . . [And] at the end, there should have most definitely been . . . a debrief . . . [Because] thankfully there were no negative consequences to giving that medication but . . . there very well could have been. (Student 5)

Influence of peers on blame: For a number of the students, there was a distinct sensitivity to how other students in their immediate clinical group or within their program became aware of the error. Peer conference sessions typically occur only in instructor-led placements and at the end of each clinical shift. They are an opportunity for students to report on the occurrences of their day, ask questions of their instructor or each other, and gain support after a difficult event. For a number of students, an option to discuss the error in such a session was presented to them by their clinical instructor. The purpose of raising the error situation in such a forum would be to debrief the situation, to allow others to learn from their mistake, and to generate support for the student involved. While some students did accept

this sharing opportunity, others declined because they were not yet ready to share the event and their feelings with their peers. For example:

[My instructor] asked me to talk about it with the group. . . . [I] declined talking about it because I felt so guilty about it. I think I would've been able to talk about it a week later, but not the day of because I . . . was scared. . . . I didn't really want to admit I had made a mistake I guess. It makes you feel incompetent and that you're not a very good nurse because I feel that's kind of a judgment among peers. (Student 1)

In other situations, the instructor neither suggested nor required a debriefing of the error in front of the clinical group. One student noted her appreciation that she was given an opportunity to decide on her own which peers she would inform about the error: “[My instructor] took me aside, you know, and she discussed it with me . . . [but] the only reason [other students] knew is because I told them. . . . It wasn't publicized” (Student 4).

Not all students were offered a choice about making peers aware of the error. In sharp contrast was the experience of a student whose clinical instructor did not provide any option of whether the situation would be raised with the clinical group. Instead, the instructor raised the error in the debriefing session and identified the student who had been involved. This student indicated that she was subject to negative and long-term consequences from her peers as a result:

She did talk to me about it privately first. . . . It was just during the [later student] huddle [that] I wish she hadn't told . . . everyone in the group [as] it did become . . . a running joke [about me within my peer group] afterwards. . . . So I carried it around for quite a long time. . . . I wish she would've just kept it private . . . and if she . . . wanted to teach everyone else about it . . . [then] bring it up anonymously or just email later, a few days after when everyone's split [into new clinical groups]. (Student 2)

Influence of other healthcare providers on blame: Student nurses tend to be very aware of how their performance and attitude is viewed during a clinical placement, not just by their teacher, but also by other healthcare professionals on the unit. Many students are

particularly sensitive to the way in which their actions and decisions are regarded by other nurses employed in the unit where the student is engaged in a placement. For some students, as in the following two examples, this sensitivity results from a wish to find future employment within the organization (or even on the specific unit) where the error occurred or a concern that the error may jeopardize other future nursing-related opportunities:

We're always told to consider [a clinical placement as] a job interview. People are paying attention [and if you] make a good impression they're going to remember you but, if you make a poor impression, they're going to remember you as well. (Student 7)

I was like, oh my God, I just broke this . . . vision [that the nurse] had of me, and I had her writing me a reference letter too for something that I'd applied for. And she hadn't written it yet and so [I started] getting all worried, is she going to want to write it still? [And] is she going to talk about [the error] in the letter? (Student 3)

However, more of the student participants expressed concern with the way in which staff might view them immediately following the error rather than concern with longer-term consequences that the error might influence. For example, one student noted that she felt more closely watched by staff after the error occurred:

[Concern about how I was viewed by the nurses] definitely did cross my mind because . . . they knew I was a competent student . . . and I like when I can build those relationships during a short clinical. And then [the error] happened and I felt so destroyed [and] I felt everything that I had built up about myself just kind of fell apart and then I felt like I was lumped in with the other students [rather than standing out to the staff]. (Student 3)

The majority of the student participants indicated that they did *not* feel particularly concerned about the impact of the error on future employment opportunities. For some, this relative lack of concern was largely attributable to the fact that the error occurred when they were still fairly early in their nursing program. For example, Student 1 stated, "I think I was still young enough in the program that I wasn't really thinking about maybe a future job or anything yet". For others, experiencing less concern about future employment on the unit

where the error occurred was largely a function of knowing where they did, and did not, have interest in working in the future. For example, Student 2 explained that she did not worry whether staff viewed her differently after the error because it had occurred on a unit where she never intended to be employed. However, for those who did hope to someday be employed on the unit where the error had occurred, the way in which the error was managed and the support that was provided was helpful in allaying fears about future employment repercussions: “I actually really liked my surgical rotation and I remember thinking I could totally see myself working here . . . I felt put at ease . . . and that [the error] wouldn’t impact any future job stuff” (Student 8).

Students expressed that the reaction of unit nurses to the actual error, and the level of support that was shown, was often instrumental in shaping the way in which the student was able to view the error and its aftermath. Some nurses demonstrated support for the student in front of the instructor, particularly if the nurse felt responsible in some way for the error occurring:

[The nurse who had co-signed the medication given in error by the student, but did not watch her administer it] heard about the outburst that my instructor had with me . . . [and] she came later and spoke to my instructor and [supported me, saying] “I checked it with her, everything was fine” and then she came to me too and . . . apologized and . . . she was quite helpful . . . in diffusing the situation a little bit. (Student 2)

In contrast, two students felt it unfair that the nurse who had co-signed for the medication given in error did not appear to acknowledge their role in its commission, and that others did not acknowledge the other nurse’s role in the error as well. For example, Student 1 indicated that another nurse’s contribution to the error was “kind of brushed off as ‘no, that’s [still the student’s] fault’ [since I] gave the medication”. Student 6 was asked if her instructor went back to the nurse who had co-signed for the inappropriate dosage and she

replied “No. So that’s the thing . . . people want to avoid errors happening. If it happens, they try not to make it [look like their] error”.

Finally, one student noted that, while she was concerned about the other staff on the unit hearing about the error, she was also concerned that patients might become aware of her involvement in it. She expressed worry that such information could cause stress to patients who might subsequently wonder if their students were committing errors as well:

[My conversation with my teacher about the error] was at the nursing station so there were nurses coming in and out and there’s physio walking by and there’s patients and . . . I feel like it was very unprofessional. . . . I don’t think that’s something that needs to be discussed in front of patients especially because then . . . they’re going to [worry that] “oh she made a medication error, oh dear, there’s other students, I hope the other students aren’t like this”. (Student 3)

Was it really me? Although the vast majority of the students interviewed indicated that they readily and willingly accepted blame for the error, many were also able to identify other elements that, from their perspective, (a) might have *contributed* to the error occurring; or (b) did not act as intended to *prevent* the error from occurring. In the students’ view, many such factors were either not adequately taken into consideration when blame for the error was apportioned, or the students expressed concern that the identified factor had had the *potential* to cause an inappropriate distribution of blame.

Factors that may have contributed to the error occurring: A number of the students indicated that being placed in a student role can result in circumstances that are conducive to the commission of a medication error. For example, one participant reported feeling stressed and overwhelmed with the number of assignments that students are expected to juggle during a school term and she indicated that this can lead to a lack of focus during a clinical rotation:

I’m still a student and there’s still so many other things. I’m still thinking, okay I still have to journal when I get home and there’s probably that presentation and that assignment and that poster board that I have to do. . . . It’s hard to focus on okay, I’m

giving my medications right now. . . . I feel that takes away a lot from your actual clinical experience and your clinical focus. . . . I understand you have to multi-task and it's preparing you [to be a nurse] but as a second year nursing student, it's too much. Your walls are closing in, you're so lost. (Student 4)

Another student reported feeling overwhelmed and stressed more by the clinical environment itself, and this led to a reluctance to ask questions of the staff about patient care:

I was very overwhelmed cause there were so many [patients] and it was stressful and then I remember also the staff at the facility was super unhelpful to all of us. I don't think they wanted [students] there at all. (Student 8)

In another student's situation, the nurse who had asked the student to give the medication to the patient herself appeared so overtaken by the stress of the unit that the student did not feel welcome to ask questions about the medication:

[The nurse] seemed frazzled and [was] not acting appropriately. . . . She [had been] annoyed and very "get it done, get it done" [with me] . . . I felt like I was pressured into giving a medication when I wasn't comfortable. . . . I honestly don't think I would've given that medication the way I gave it if she wouldn't have been in the emotional state that she was in. (Student 1)

However, another student expressed her experience that it was not the clinical environment that made her reluctant to ask questions. Instead, being a second year student, she simply did not know what questions to ask: "I feel like you don't have the knowledge so you're constantly . . . concerned that you're going to make a huge mistake. . . . [You] have no idea cause all you've ever seen in your whole life is healthy people mostly" (Student 7).

As the following two examples demonstrate, some students expressed that their confusion about requirements of, or practices related to, the patient chart in the relevant clinical unit had been highly influential on the medication error that occurred:

At that time, you [could not] take your [Medication Administration Record (MAR) into an isolation room] . . . [so] I didn't take my MAR in there, which is how [signing for the medication] got missed because for me, part of my routine [that we had been taught for medication administration] was . . . [to] go through all your rights, you

dispense your medication, you take them in, you identify, you take [the MAR] back with you, you sign. (Student 4)

[The medication] had been [subcutaneous] the day before and it was switched to [oral] because they were . . . discharging the patient. . . . I don't remember at [this] hospital how they indicate meds have been [changed] but I think it was maybe highlighted off or something and it just totally did not register [what highlighting meant] and [so I] gave it [using the same route] I had the day before. (Student 8)

Two students indicated that patient identification systems in the facility were specific contributing system factors for the error that ultimately occurred. As one of these students explained:

At this facility none of the residents . . . have name tags or identifiers . . . [and there were] two residents that had the same [first] name . . . and I [said to my instructor] "I'm not sure who this lady is, like can you point her out". . . . And she pointed out the lady and I gave the meds and [when] we went back and checked . . . [we realized we] gave the wrong meds to the lady with the same name. . . . Myself I'm trusting my instructor [because] she knows who they are and then all of a sudden it's like, oh. (Student 5)

The other student who identified a similar systems issue had been participating in a one-day placement in long term care. Because she was in a BScN program, she was given medication administration responsibility for 20 residents with whom she was entirely unfamiliar:

They had us take 20 residents . . . [and] we had to research all of their medications the night before. . . . [And because] it was long-term care, the patients don't wear ID bands so they have these . . . binders where each resident has a photo. . . . [For this particular resident, the] photo was about 15 or 20 years old and did not look anything like her current state . . . [and I gave] her another patient's insulin dose. . . . [I] remember talking to [my teacher] afterwards and saying . . . "I don't think it's fair to be getting a student nurse to hand out medications to this many people who they don't know and with this really crappy way of identifying people". (Student 8)

One student had held other healthcare positions before commencing her nursing baccalaureate degree and had previously provided patient care in the same unit where the error occurred. Therefore, she was now interacting with former work colleagues but in her

new role as a second-year student nurse. This participant mentioned the difficulty she faced in working with former colleagues who may have confused the student and employee roles of the participant; the participant indicated that she may also have felt a blurring of these roles herself. This role confusion led to a lack of close healthcare team supervision typically received by student nurses and an inappropriate increase in task responsibility: “I feel with me being on the . . . unit where I [had] worked for years, I knew a lot of the nurses . . . personally, so [their supervision of me] would get a little bit slack” (Student 4).

Finally, several students noted that they had difficulty accessing their teacher to receive necessary medication administration guidance. This meant that a key resource was unavailable during times when that individual was needed. For example:

There were many times that I felt that I just didn't have enough supervision. I didn't have enough access to my clinical instructor. . . . I feel that we're so pressed for time in there and we're all vying for our instructor's time because . . . we couldn't give the medications until they've [been] double-checked. (Student 4)

Factors that did not act as intended to prevent the error: There were two factors that students viewed as having the potential for (and purpose of) preventing student-committed medication errors but that did not work as intended. The first such factor was a requirement that students have a nurse check and/or co-sign medications that the student planned to administer. Many student participants noted that their medication error had occurred despite inclusion of this second check by an RN. For example:

[The RN and] I double-checked the [narcotic] dose before I [gave it] but . . . the RN just had checked the dose, rather than think . . . is this safe [for this patient]? [But they expected me to think it through as a second year student] cause it had been covered in the lecture, in the theory, and they [thought] I should have that knowledge. (Student 6)

Another factor that was identified by a student as having the purpose of preventing an error, but which did not work as intended in her case, related to choices of the teacher. In this

student's situation, the teacher did not intervene when she saw the student engaging in an error and she elected instead to watch the situation unfold with another nurse from the unit, the Clinical Practice Lead (CPL):

What kind of upset me was she let me [give the insulin without checking patient identifiers]. She watched and just let me do it . . . [and it] happened in front of [the instructor and the CPL] and I think the CPL didn't say anything because technically I'm under my instructor but also my instructor . . . watched me do it and didn't say anything. . . . [The instructor] should've [said] "okay, what are you doing", or "what are you missing"? (Student 3)

Finally, one student identified her suspicion that the instructor had chosen, for a particularly concerning reason, not to discuss the error with the nurse who had co-signed for the medication. The student suspected that blame for the error may have been allocated only to her in this situation because, as a student, she would only be on the unit for a limited period of time: "The instructor is the one [who is] going to be with the nurse after I graduate so they probably will . . . want to keep a good relationship with them rather than the student" (Student 6).

Theme #2: Discovering the error. Student nurses discussed the various ways in which they had learned about their medication error as well as the ways in which the error had been communicated to others. The reaction of other individuals to this information had a significant impact on these students' short- and long-term perception of the experience and the learning that those students was able to derive from the situation.

Several of the student participants had discovered the error themselves and therefore its existence did not need to be communicated to them by others. For the remaining student participants, another individual had identified that an error had occurred; this information was then communicated back to the student. In most of these latter cases, it was the clinical

instructor who had been informed of the error (or actually discovered it) and had then spoken to the student about it.

Not surprisingly, students were highly sensitive to their teacher's reaction to the fact that an error had occurred. A significant proportion of the students felt that their teachers were sensitive to their needs and had acted supportively in the situation. The teacher's supportive reaction to Student 7 accidentally dropping medications on the floor helped this student distinguish between the severity of different medication errors:

Then I promptly spilled the medication on the floor. This is like, oh my God, I'm such an idiot, maybe I should just be a tree planter for the rest of my life and call it a day. . . . [But my] instructor [said] "don't worry about it, [we'll] just call down to pharmacy, this is how you get it re-ordered" . . . so that really helped me get over the fear.

Similarly, a supportive teacher reaction helped Student 8 understand how to evaluate an error, its potential consequences, and how to learn effectively from it:

I remember her being a really awesome, really thorough instructor who was so good at using mistakes and things for learning. . . . [She] would always have us do that sort of critical thinking piece where she would ask me the questions rather than tell me [the answers]. . . . So I remember her saying [things] like, "was there any harm to the patient? Could there have been any harm? What would that have looked like?". . . . I remember her saying, "what do you think we need to do now?" [But] she wasn't upset with me.

When teachers were perceived as being less than supportive after an error had occurred, it significantly impacted the way many of the students viewed the error and herself for having committed it. For example:

When she was yelling at me . . . I was thinking of anything I could do to salvage this situation and I felt really sorry about it too and I said "should I go to the patient and apologize" . . . and I was thinking about if I'm going to fail or not. (Student 2)

Student 3 indicated that she was also affected by witnessing the reaction of her teacher to another student who had been unable to recall the potential side effects of a

medication she was in the process of administering:

The clinical instructor [asked her] “you don’t know?” . . . [in] front of the patients, in front of the other students in the dining room, very loudly . . . [and said] “You’re going to get a slap on the wrist for that”, or something like that. And . . . I see this poor girl’s face going red and I’m [thinking], that is so unprofessional [and] it made me want to go say something to whoever’s higher up . . . [I thought] everyone who’s in the dining room right now feels like that person just screwed up. And then how do you think that makes her patients feel? Let alone how does it make [the student] feel? . . . And now she’s going to screw up [again] because you . . . exposed her in front of everyone.

Communication techniques used by a different authority figure were particularly impactful for some of the students. In Student 1’s situation, the individual who most affected how she felt about the error was not her teacher but was instead the staff nurse who had discovered the error and communicated its existence to the student. This student perceived both the content and the tone of that nurse’s communication to be strongly negative, and this impacted the student’s longer-term view of the situation:

When [the nurse] caught the error she should’ve approached me about it in a more teaching sort of way . . . and then...maybe explaining a little better what the PSLS is for, saying yes some mistakes were made but you’ve charted it, [the patient is] not at risk right now, he’ll be fine. Just maybe a little more reassuring that “you’re not going to kill this person” because that’s kind of how I felt, was that I had harmed them.

Theme #3: Experiencing the aftermath. Students faced various outcomes after the error had occurred. Not only were there formal consequences selected by the teacher working with the student, but collateral impacts were also identified by many of the student participants.

Raining down on me: Formal consequences. Students discussed both the formal consequences they had anticipated might be imposed as a result of their error as well as those consequences to which they were ultimately subjected. They also addressed their perceptions

of the fairness of the formal consequences that were selected in their situation and the factors they believe went into that decision-making.

All of the students reported that the formal consequences chosen by instructors in response to the error had been communicated to them by their clinical instructor. The formal consequences mentioned as being either considered or chosen by an instructor were: failing the clinical course; institution of a learning contract; notation in the student's written course evaluation; discussion during the student's evaluation meeting; discussion in a peer conference/ debriefing session; issuing a written assignment for completion by the student; and completion of an entry in the PSLS.

Only one student nurse, Student 6, indicated that she had failed her clinical course as a result of the medication error with which she was involved. However, many students had been concerned that course failure would be considered by their instructor in response to the error. The types of errors for which this was a significant student concern included giving medication to the wrong patient, not confirming patient identity before giving medication, and spilling medication on the floor resulting in late administration. Thus, a range of potential situations had resulted in student concern that course failure could be an outcome.

Two students described their concern with the way in which the clinical instructor communicated a decision related to passing or failing the course. One student reported doing well in her clinical placement up to the point of the error, which happened on her last day of clinical. After she gave medication via a route that students were not permitted to use, her clinical instructor told her:

[She said] "I don't even know what to do with you, this is our last day, but I don't know if I should just fail you [now]". . . . So it was a lot of stress. I guess she needed time to think. . . . And then she finally told me . . . during my final evaluation, which

was like that last thing of the day. I . . . was supposed to [have my evaluation] earlier but she . . . put me to the end of the list. (Student 2)

This student noted that her instructor leaving her without a decision for the majority of the day was concerning as she continued to care for patients at a time when her mind was elsewhere:

I felt [it] would've been better if there was resolution quicker [about] what the outcome was going to be. Because the next 3 or 4 hours I was in a daze and . . . I could've made further mistakes with patients. . . . [Given the] state that I was in, definitely I could've made a mistake or something. I was so shocked [and] very distracted, [and] focusing about my future and . . . it was all internal. . . . I was just focusing on myself . . . and what's going to happen to me and . . . I was walking around like a zombie. . . . Definitely my patient wasn't my first priority at that time. It was me. (Student 2)

Student 5 similarly noted that her instructor's lack of communication about the situation, and the potential formal consequences that were being considered by that instructor, was of concern. In her case, the instructor appeared to feel a certain degree of responsibility for the error and therefore took full responsibility for managing it. The student felt that she was left out of the communication loop, not only about the patient condition but also about the potential consequences for herself.

No students in this study were placed on a learning contract as a result of their medication error. For three of the students (Students 2, 3 and 6), the error occurred at the end of the clinical placement and the students felt that this played a role in why a learning contract was not instituted. For example:

It was the last day of the clinical and [so] she couldn't put me on a learning plan [because] there was no more clinical [shifts] . . . I'm certain if I'd done it maybe two weeks before I would've been put on a learning plan. (Student 2)

Students also reported a range of outcomes in terms of their course evaluations. In some situations, the instructor did not mention the error in either the student's written

performance evaluation or in the verbal evaluation discussion (Students 5 and 7). For others, the instructor mentioned the error during their evaluation meeting and discussed lessons learned from the event with the student (Students 2, 3, 4 and 8). Only a few students reported that a notation about the error had appeared in their written course evaluation (Students 2 and 4).

Two students reported being assigned to write reflective journal entries about the error for their instructor to review. One was required by her instructor to write specifically about safe medication administration practices (Student 3) while the other student was required to write a reflection on the learning that arose out of the situation (Student 8). A third student indicated that, while her instructor did not require her to complete such a formal assignment, the student nonetheless elected to write about the situation and her key learnings in the next journal entry she submitted (Student 1).

PSLS: Given that (a) the PSLS is the incident reporting tool for the NHA; (b) students underwent such differing experiences with the PSLS; and (c) this medication error was often the student's first time completing a PSLS entry, it is worth exploring this particular formal consequence in more detail.

A PSLS entry was not completed in all cases. For Students 1 and 8, a PSLS was required by the teacher who then assisted the student in completing that documentation. Student 4 completed a PSLS entry even though "I don't know that I had to because PSLS' are not mandatory". However, for Students 2, 3, 6 and 7, a PSLS was neither suggested nor required by the teacher after the error had occurred. Interestingly, Student 5 stated that she is aware that her teacher completed a PSLS form after the error but the student was not involved with completing that form; the student stated that she now views this as a missed

learning opportunity. She would have appreciated learning how her teacher communicated the event within the PSLs:

[My teacher] went to fill out a PSLs but I wasn't involved in it. . . . [She] just did it and so I [feel that] was kind of unfortunate . . . and looking back on it now as a nurse . . . it would've been helpful to learn that.

A number of the students reported that, looking back on the PSLs entry they completed for the medication error, they no longer view it as accurately representing the error situation. One student for whom this was a concern had felt pressured into giving the late medication to the patient before knowing what the medication was for; however, the fact that it had been co-signed was not stated in the PSLs entry written by the student. The student posited the following reason as to why she had not felt comfortable including this fact in the PSLs narrative section: "I had filled it out with my instructor and she said because it was my med error, it was my responsibility. [My instructor] said I should've talked to her about it but it was [still] my mistake" (Student 1).

Many of the student participants reported that their medication error was the first time they had encountered the PSLs or even heard of its existence. Only two of the students, Student 4 and Student 7, had completed PSLs entries before the ones created for the errors that were the subject of this study. This familiarity with the PSLs arose out of their past healthcare employment with a NHA facility. For the remaining participants, engaging with the PSLs was entirely new. Only two of the eight students recalled being previously introduced to the PSLs during their schooling; one student believed that she had heard about it in a "brief . . . slide presentation . . . in Lab" (Student 4) and the other believed she may have been taught about it in a classroom portion of a course (Student 8). All of the remaining students stated that they had never been taught about the PSLs before encountering it in the

course of managing their medication error, but they all expressed strongly that they wished they had received this education:

I think [the PSLS is] not talked about [and instead] it's just something you eventually . . . learn from hearing on the floor and your clinical instructor. . . . I'm not saying there needs to be a class on PSLS' and what happens if you make a medication error [but it] needs [to be] . . . in some class. . . . [There] needs to be a . . . formal explanation on what a PSLS is, why you're filling them out [and] when. (Student 3)

Two students recommended that an introduction to the PSLS be incorporated into a laboratory course in the future and that completing a "mock" situation with PSLS entry could help the students to better understand the form and its requirements. For example:

It would be really good [to] have to fill out and submit a PSLS as . . . a small [assignment]. . . . [Then at] least you get exposure to the form and what it's for. And then if you . . . based [the assignment] on something that actually happened and then show how those forms were audited and the changes that were made in the hospital or the facility . . . and what details need to be in there, like who was involved . . . and the fact that you can remain anonymous. (Student 7)

A lack of familiarity with the PSLS had led most of the students to be fearful of it. Students expressed that they had held concern that the PSLS was meant to be punitive; several indicated that, while they now know it is not meant to be a punitive process, they wish they had been clearly advised of that earlier in their education. For example:

I think [students fear the PSLS] because I think it's not explained well . . . [and] it's just preached that don't do it, don't screw up. Do your 10 rights, do your three checks, do your drug research before you come to clinical. . . . Just know your stuff and don't [make an error]. But it's like, okay, but what happens when you don't do it right? . . . [What] happens when it doesn't go as planned? I feel like sometimes nursing school is . . . taught towards what's supposed to happen and what's the right way to do something but [we're] never taught what happens when it goes wrong. (Student 3)

Two students indicated that they had not feared the PSLS. One student recalled that the PSLS *had* been introduced in nursing school and that it had not been presented in a way that would leave students with concern. She indicated that, "I don't feel that it is made to be

something scary and punitive. . . . You do not have to say who you are in [the PSLs], so it's made to be for patient safety" (Student 4). Another student stated that, when she had committed her medication error, her teacher had assisted her in completing the PSLs entry and had presented it as a learning opportunity for all concerned:

[My teacher had] made it very clear that this would not impact my education at all or reputation . . . [and so she] put me at ease even before we did it. [She] explained it as a tool we use in practice to record . . . any kind of error or accident so we can look at all the data together and potentially prevent it in the future. So I think the way she explained it to me is that it's a positive thing. (Student 8)

None of the student participants had heard back from the specific healthcare facility or the NHA about the error situation once an entry had been submitted into the PSLs:

I just got an email saying . . . "thank you". . . . And that's all I've ever heard from them. . . . I would like to know . . . for my own practice . . . what does happen after all this. . . . [It's] not great . . . not even letting me know how it was addressed because I was involved [and] it was my patient. To me that's like saying, "oh you can go make a medication error and it's just going to get reported but nothing will happen". (Student 3)

Perceived Fairness of Formal Consequences: A majority of the students expressed that they had generally been treated fairly by instructors in terms of consequences post-error. Student 6, the only participant who had failed her clinical course as a result of the medication error, admitted that she was upset by the course failure, perceiving it to be an unfair consequence at the time. However, she was firm in the interview that she has since come to view the course failure as a significant learning opportunity and a valuable chance to strengthen her nursing practice moving forward. She also recognized that, given the potential repercussions of the error for the patient and what the error had demonstrated about the student's lack of knowledge and critical thinking, the course failure was a fair consequence to impose.

Many students, in discussing the fairness of consequences selected by instructors after the error, commented on the perceived inconsistency between and among instructors. These students expressed that the way in which a medication error would be handled by one clinical instructor was seen as a highly unreliable indicator of the way in which another instructor might react to a similar situation. This was identified as a source of significant concern to students since they could not anticipate what consequences might be chosen by instructors in the event of a medication error; this affected their perception of the fairness of the overall process. For example, some students indicated distinct surprise that a learning contract had not been instituted as a result of their error. Much of this surprise appeared to stem from stories students had heard about other student medication errors which *had* resulted in a learning contract:

For one instructor what [leads to] a learning contract or [a] fail for your clinical is completely different than what the next one is going to [do]. And . . . it's very hard to . . . have that consistency . . . when it's more of a personality trait [of the instructor] than it is a structured . . . set of rules. . . . And if you talk to a . . . peer of yours, and you share what the error was and then they say . . . "I had all this rain down on me as a result [of the error]" versus] nothing happened [to you], it's difficult. (Student 4)

The fairness of comments written on a student's formal evaluation were of particular concern for some students. In those cases, instructors had not mentioned the error itself on the evaluation but had instead included a comment viewed by these students as a judgment. For example, Student 2 was concerned about a statement made by her instructor in the evaluation that had unfairly characterized the cause of the error:

She didn't mention [the specific error] in my final [written] evaluation . . . but she did say something about how sometimes I'm a little overconfident and I need to . . . ask questions if I'm unsure of something. . . . My perspective was that . . . I was doing everything right and I just didn't know it was a [central] line. . . . I don't really like the word overconfident as the best way of describing what it was.

With respect to the post-shift conference/debriefing session, students appreciated being given the option of whether or not the medication error would be shared with their peers. Not all students had felt they were part of a clinical group that would support the student rather than judge them, and so they had felt it was only fair for instructors to allow students to seek out their own chosen supports after the incident. Only Student 2 was forced to address the error in a post-conference and she repeatedly emphasized her perception of how unfair this was. The instructor had also not prepared the student that her identity would be disclosed when the instructor spoke about the error with the group; the student viewed this as particularly problematic because it left her feeling both singled out by the instructor and targeted for long-term ridicule by her peers.

The students in this study generally felt that their instructors exhibited fairness by taking systems issues into account when deciding on consequences. Where additional factors appeared to contribute to the commission of the student's error, most instructors acknowledged the existence of those factors. One such factor was the role played by other nurses in the error. For example, Student 1 indicated that she had felt highly pressured by another nurse to administer a medication because it was already late even though the student did not know what the medication was for, nor what it could do. Post-error, the instructor did speak to the nurse who had pressured the student into giving the medication and the student felt that the other nurse's involvement had decreased the formal consequences ultimately meted out. The situation of Student 6 however, was quite different. Although another nurse had co-signed for two dosages of morphine that were administered by the student, the student failed the clinical course because the instructor (and later the co-signing nurse herself) did not consider them to be appropriate doses in the situation. This student expressed that,

although she fully accepted responsibility for the error, she did feel it was unfair that the co-signing nurse had escaped any scrutiny of her involvement.

Breaking their vision of me: Collateral impacts. In addition to the formal consequences that were imposed in response to the error, students also experienced other impacts. These collateral impacts had significant effects on the students, often being both long-lasting and the cause of emotional distress. First and foremost, students expressed concern about the impact that the error either could have had, or did have, on important relationships with others. This concern often focused on the relationship with the student's teacher, especially as it pertained to using that teacher as a future employment reference. For example,

[My teacher had] really loved me and I [felt that] I just broke this . . . vision she had of me. And I had her writing me a reference letter too for something that I'd applied for. And she hadn't written it yet and so [I was] all worried. (Student 3)

Another student saw the reference letter that her teacher had written for her post-error and, although the teacher had not mentioned the error itself, the teacher did state a concern about the student that had arisen out of the error situation:

I had applied for an [Employed Student Nurse position] . . . and my instructor was my reference and it was a standardized . . . fill-in-the-blank-kind of [letter] and it was all well. . . . [She did not say I] made a medication error . . . [but she did say] "she can become distracted by her co-workers", which I . . . was a little bit discouraged by. (Student 4)

Other students expressed a concern about the way in which their relationships with unit nursing staff were impacted by the error. For example:

I feel like [the nurses on the floor] looked over my shoulder a little bit more after [the error and] . . . definitely I felt like I was more scared after that in working with the other nurses. . . . It's scary to ask questions [after you are involved in an error] cause you don't know how they're going to react. (Student 1)

A student who had previously been employed in another healthcare provider role on the same floor where the error occurred was also concerned about her relationships with the unit nursing staff. The fact that this student knew so many of the staff made her particularly sensitive to the way she felt her error would likely be shared and discussed:

I know what that unit . . . is like, that they're going to talk and that this has happened. That's nursing in general, is that it goes through report, "oh my God, did you see what that student did today?" And so . . . it bothered me . . . that now I'm going to be that one they're talking about. (Student 4)

Some students expressed that they had concern about the way in which the medication error would impact peer relationships and how other students might view them in the future. This concern made some participants decline to share the error with their clinical group. For example:

There is a certain amount of . . . shaming . . . or intolerance and when you're in a group of your peers and it's presented . . . [without] looking at how to prevent it in the future and how other students can learn from it, you just feel . . . very small. So I had something like that happen in [another] course . . . and I just felt so belittled . . . in front of . . . other nursing students [and] . . . you kind of have to stand up there in front of everybody and be belittled. . . . [That] impedes the whole learning process. (Student 7)

The error resulted in another collateral impact for many students: changes to their medication practices that continue to the current day. A number of students commented that the error had made them generally cautious or more careful with respect to medication administration as they sought not to make similar errors, while others described a need to now double or triple check their medications before feeling confident in administering them. Other students described a new focus on certain steps of the medication administration process which had previously been vulnerable and had contributed to the error occurring. For example, Student 6 now finds herself especially focused on knowing the 'right reason' for the medication she is giving, while Student 2 stated that, "[each] time I pick out a syringe, I

always remember the comments she made about syringe pressure and lines. [Even now] in practice, when I pick a syringe out, I always think about that. It's just something that has stuck".

Conclusion. It was very clear throughout the student interviews that many of them still experience lingering feelings of self-blame for the error situation and that many perceived blame being directed towards them by others after the error. Many expressed that they still retained full blame for the error, despite an acknowledgement that other factors may have contributed to the situation. Once the error had been discovered and communicated, it attracted both formal consequences as well as collateral impacts that were often emotionally difficult and long-lasting for the student. It was also evident from the student interviews that teachers play key roles in the impact of the error on the student's sense of self and future practice.

Clinical instructors and preceptors. Clinical instructor and preceptor participants articulated many similar ideas about roles, intentions, influences, and ideas for moving forward. The two groups have therefore been combined in discussion as "teachers" where appropriate and, where differences exist between them, those are highlighted.

While each teacher participant was asked to describe a specific situation in which a student had committed a medication error, and in which the teacher had been involved to some degree, many commented in their interviews about several student-committed medication errors in which they had been involved. Given the time that usually had elapsed since these errors occurred, participants could not always recall specific details about each situation. On other occasions, the responses of these participants involved an amalgamation of different experiences with students in the clinical setting rather than being tied to a

specific occurrence. As a result, particular errors discussed with the teachers will not be itemized in detail (as they were for the student nurse participants) unless the point being made requires that level of specificity and the detail was actually provided in the interview.

The clinical instructors and preceptors had significant areas of overlap in the way they viewed their role in student education:

1. Overseeing and supervising the practice of students in the clinical area. For example, “I’m here to . . . oversee everything [the students] are doing with the patients” (Instructor 4). One teacher (Preceptor 1) noted that this direct supervisory function is particularly prominent when working with students in earlier years of the program since they have a much more limited knowledge base to apply to practice;
2. Guiding and supporting student learning, and pushing their growth forward, as they develop their clinical practice in a given clinical area. For example, “I think the role of the clinical instructor from my point of view is to nurture, grow the students in the clinical practice setting . . . [and] encourage independence in the clinical setting . . . independence, confidence and competence” (Instructor 8). Another teacher, Instructor 5, spoke of the importance of challenging students in order to push their growth forward: “I am here to catch you when you fall. So let’s do this. I’m here to push you. . . . And once you get [a student] over those hurdles, it’s amazing how it just opens them up . . . to the possibilities of what they can do”; and
3. Acting as an RN role model. The majority of teachers referred, either directly or indirectly, to having a role model function. For example, one teacher viewed her role as “helping . . . to show [students] the ropes essentially, as to how it works. What it looks like to be a fully employed RN and all the love and responsibility that goes with

that” (Preceptor 3) while another teacher saw the role as influencing how the student learns to translate theory into clinical practice:

I think it’s really important . . . that we . . . be able to see somebody in action and role model [and be able to see] . . . what does this actually look like? The text book says . . . “be kind and compassionate and have a good bedside manner”. But what does that mean and what does that look like? (Preceptor 5)

One of the teachers summarized how she sees the role model function in terms of developing future RNs for practice:

It’s knowing what your practice should be and trying to get the students to shoot for the stars. And that’s where I want them to be. . . . And I know when the pressure of being a nurse all the time gets to [them], [they’re] going to fall a little bit but [they’re] still going to be up in the sky. (Instructor 5)

While there were many commonalities in how the teachers viewed their role in student education, there was one theme that emerged out of the preceptor interviews that was not similarly emphasized by clinical instructors: retaining final responsibility for the care provided to patients. In contrast to clinical instructors, preceptors are assigned each shift as the responsible nurse for particular patients on the floor. Preceptors were clear in their study interviews that they do not relinquish any of the final responsibility for patient care to the students who learn on their units. For example, “I’m still responsible for all of my patients. [The students] are there to help me with my patients and to be able to learn from them. But . . . it’s my responsibility to make sure that what they’re doing is safe” (Preceptor 4) and “I . . . believe that when it comes to [a student’s] practice, they’re practicing under my license, essentially. My perception . . . is that, in the end, their predominant decision-making process is to be monitored by me” (Preceptor 3).

There were also two aspects of teaching that emerged in clinical instructor interviews that were not present for preceptors. First, clinical instructors noted their key role of retaining

final responsibility for student grading. Regardless of whether or not the clinical instructors worked in tandem with preceptors for a clinical placement, it is the clinical instructors who create and grade academic assignments, evaluate student progression (with input from the preceptor), and issue a final grade for the course. In addition, in preceptor-led placements, the clinical instructors expressed a view that one of their primary roles involves being facilitators and effective communicators with preceptors and students. For example, Instructor 10 stated that,

It's my job to facilitate the . . . relationship between the preceptor and the student and then I follow up with the student to make sure [the student is] meeting their . . . learning needs, the objectives of the course, that I know . . . what's happening on the unit and I know how the student is progressing.

Teachers were asked about their roles when a medication error is committed by a student during a clinical placement. Again, they highlighted many common aspects of their process to address the situation. These commonalities are as follows:

1. Ensuring that the patient is safe. Almost all of the teachers explicitly stated that their primary concern would be whether or not the patient is safe after the error and if additional steps need to be taken to manage the situation clinically;
2. Acting as fact-finder. Teachers emphasized their need to ensure that they had gathered all relevant facts pertaining to the error situation for the purposes of patient safety, student learning, and (for clinical instructors) selecting the appropriate consequences. For example, Preceptor 3 articulated the types of information that would be sought out:

[What needs to occur is] a good review of what happened and . . . where it seemed to go wrong. I think this is of utmost importance, to retrace your steps and . . . [ask] what led up to this situation. . . . [We need to review] the what, where, when, why...[and] what contributing factors were there? . . . Let's go back and figure out . . . what we did [and] where do we go with it from here;

3. Supporting the student and encouraging them to learn from the situation. Every one of the teachers noted their concern with ensuring that students felt adequately supported post-error and were able to take the appropriate lessons from the situation. Of importance to all of these participants was that the student did not feel alone or stigmatized as a result of committing the medication error. For example, one teacher used principles of trauma-informed practice to help the student identify what needs to occur:

My first approach is to be supportive . . . ensuring the student [knows] they are safe, that I will support them in that . . . [and] that I support autonomy and choice. . . . [I] allow them to share their stories, their concerns, and then again asking questions, “so what would you do now? What do you think your next step will be for this? How can I support you in this?” . . . [Because] this should be a safe process. (Instructor 2)

Similarly, Preceptor 5 commented that:

I . . . would say [to the student that] “if you come to me and there’s an issue, you and me are a team and I’m not just going to abandon you and . . . we’re going to figure out what happened and we’re going to problem-solve”. [And] just trying to really drill this idea in that’s it’s okay if something happens . . . but I want you to learn from it.

4. Deciding upon formal consequences. Both groups of teachers agreed that, irrespective of whether a clinical instructor is on the unit with the clinical students each shift, or there is a preceptor involved, the clinical instructors are responsible for selecting formal consequences for the error (albeit with input from the preceptor). For example,

What the penalties are going to be . . . should be [decided] by the clinical instructor because ultimately they’re the one that decides where the student falls, where the student needs to be . . . and how this [error] fits in with that. . . . [The] preceptor can provide . . . objective evidence of what they saw the student doing but the judgment as to whether that’s enough to pass the course really lies with the clinical instructor. (Instructor 3)

One area that was more strongly emphasized by preceptors regarding formal

consequences relates to decisions about reporting the error. Preceptors have decisions to make about informing both the educational institution (represented by the clinical instructor) and the healthcare facility that a student-committed medication error has occurred during a preceptor-led placement. Such decision-making is a key component of the process followed by preceptors after the error but it is quite nuanced and not all preceptors followed the same process.

The strongest theme that emerged from teacher interviews related to a desire to have students take ownership for their role in the error rather than the student experiencing or perceiving blame for the situation. The teachers also discussed different avenues for discovery of such errors, and the communication of its existence within different circles. Because of the nature of their role, instructors specifically discussed potential formal consequences for the error, as well as the factors that influence their choice of consequences. Both instructors and preceptors discussed the ways that they learned about their particular role in a student-committed medication error situation.

Theme #1: Looking for ownership. While the student nurses articulated feelings of self-blame for the error, and identified perceptions of blame imposed on them by others, teachers expressed their desire to remove blame and its punitive connotations from the general error management process and from specific student situations. Instead, they focused on assessing whether or not a student involved in an error had taken appropriate ownership for their part in the situation. If a student did not take ownership for the portion of the error that was due to deficiencies in his or her own practice, then that critically affected the teacher's perception of the student, including the student's potential to be involved in more errors. For clinical instructors, a lack of ownership by the student influenced decision-making

about the particular formal consequences that would be most appropriate to impose and how many consequences would be necessary in the situation. As the following two examples show, teachers were very clear that a student's willingness to own their personal contribution to an error, would be one of their primary concerns:

[One] of the most important things I look for . . . [is does the student] take ownership of their mistakes, are they upfront about their mistakes? What's their attitude towards it? Cause I'm thinking back to a [student I failed] . . . not on her nursing skills, but on her attitude. (Preceptor 1)

Responsibility and accountability is the essential component of nursing and you need to be responsible and accountable for all of your behaviours whether that is a positive or negative behaviour. . . . I cannot let you [pass a clinical course] when you will not own your practice. (Instructor 5)

Many teachers also expressed strong concern about the long-term practice of those students who were unable to admit their own contribution to the error, or admit that an error had even taken place, and who instead tried to deny that the error occurred or inappropriately lay blame entirely on system factors. For example, Instructor 6 noted that "The student that's wanting to almost cover it up and says it's not their fault . . . blaming anything but them, I worry about that student in professional practice, moving forward". Instructor 13 expressed her similar concern in the following way:

[I have] seen the behaviour where they don't want to take responsibility and [instead] it's something [the instructor has] said or done, it's something that the patient did, it's the day on the ward . . . there's always an excuse. And . . . those are immediate red flags for me. . . . As soon as they start to play the blame game or I can see them looking for an excuse, then those students are on my radar. Because a student that genuinely wants to learn and cares about what happens, and cares about their learning, will 100% . . . own [their part in the error].

Ultimately, the particular concern raised by a student's deflection of appropriate ownership is that it appeared the student was putting "the blame on everybody else, it's everybody else's fault but [their] own, [and] that's not safe nursing" (Preceptor 4).

Divorcing perceptions of blame from taking appropriate ownership was a focus for many of the teachers. Some certainly recognized that past healthcare institution systems of incident reporting had resulted in a strong blaming culture and had led to a deep reluctance to admit one's role in an error. Teachers stated that echoes of that culture are still strongly felt by many students; teachers therefore viewed it as part of their role to remove such concerns from students' minds:

We still haven't gotten past the incident reports. So there's still that connotation of "I need to be shot at dawn, I've made a mistake here, I'm bad and I'm going to be blamed" and all those kind of things. (Instructor 9)

Students think that, because they made a medication error, they're not going to be good nurses. . . . I guarantee you, [all nurses] probably made errors that we actually didn't even know about and might not have been caught. . . . I don't think it needs to be . . . a punitive thing . . . and I want [students] to have ownership over it. That it's their learning opportunity. (Preceptor 4)

However, while the teachers certainly aim for a system that rewards honesty about errors and effective learning from them, they also recognized that building an error reporting and responding process that does not lean towards blaming is still a work in progress:

I think as a program we need to not lay blame. . . . I think we need to be more proactive in how we're doing this and purposefully design it and develop it for the betterment of student education and the program collectively. (Instructor 5)

While the teachers wished for students to take ownership of their contribution to a medication error, they also emphasized the importance of reminding students that they are human, and therefore fallible, and consequently will make mistakes in practice. Teachers did not want students to anticipate having perfect practice over their long-term nursing career, even though they certainly wanted students to strive for that goal. Reminding students of the human characteristic of fallibility was viewed as a support mechanism to help students cope with their tendency toward self-blame and self-recrimination after an error:

[The student] felt absolutely terrible . . . [even though] there was no finger pointing. This happens, “we’re humans,” I said “we just have to make sure that the patient is safe”. . . . [But the student] saw [the error as] a personal failure. (Instructor 11)

[Students always talk about] their fear of hurting someone, harming someone, killing someone, making an error. So we have that conversation of “guess what, you guys are human. In . . . however many years you have left [in practice], you’re going to make an error”. [I] talk about errors that I’ve made. . . . I don’t want to be blasé about it but [I want them] to understand that, if there is an error, I need to know. And then we’ll work through it together. (Instructor 8)

A number of teachers also expressed awareness of situations in which a student should *not* take responsibility and accountability for the entirety of the error. Where that was the case, the teachers wanted to see that the student was able to determine their contribution to the error and then take responsibility and accountability for those particular factors: “We definitely do talk about the whole situational factors in the broad discussions. I just like . . . the student saying I made a mistake and I’m taking this on . . . for the part that was mine” (Instructor 3).

While neither clinical instructors nor preceptors wanted students to take ownership of contributing factors that were system issues or had resulted from the actions of other people, preceptors more consistently emphasized the importance of this step. For example, when speaking about one student-committed medication error, Preceptor 2 recognized a number of factors that had contributed to that error:

I did recognize [that] the student was not from [the same city as the healthcare facility] and they haven’t seen a lot of these medications, and [the setup of] our MAR . . . can be confusing. [And] in all honesty, when I reviewed the medication . . . even I myself had a little bit of confusion and there was quite a discussion that was brought up around [the error] and how it could’ve been prevented.

Similarly, another preceptor felt the need to reassure a student that she should not take ownership of factors that were outside of her control, but once the error was recognized, there was a responsibility to prevent it from recurring:

Somebody [else] did not process that order . . . so it never got into the MAR for that day. . . . And I [told the student] “you [properly] checked the bloodwork . . . but the unit clerk didn’t get around to processing it. So whose fault is it? Well, it’s a combination. . . . So don’t take full ownership but do accept that now we have to go through and make sure [this patient is safe]”. (Preceptor 6)

Some of the teachers expressed that they viewed themselves to be part of the system that allowed the medication error to occur. They voiced a need to accept their own potential or actual contribution to the error that the student had committed and to ensure that the student recognized that the instructor had taken ownership of those factors. For example:

Unfortunately, to a certain degree, the student wore the error because they were the last one to administer that dose. But I said . . . “34 people before you have done that [so] it’s not just you, but this should’ve been caught and I . . . partially own this as well because I allowed you to give the dose”. (Instructor 5)

One clinical instructor saw her own contribution to the error as being in the form of formal consequences she had imposed previously. In her interview, Instructor 7 reflected on whether the amount of work she had assigned as learning for the student’s first and second errors had inadvertently set the stage for the third and final one:

So I reflected on when she did the third one and I [thought] maybe it was too much pressure, the expectations [I had set out for the earlier errors] had very short timelines. . . . So I was like, “was she up really late working on all this stuff? Was she taking care of herself?”

While certainly evident in some of the clinical instructor interviews, the degree of ownership over the error that preceptors tended to retain for themselves was notably greater. Every preceptor directly referenced a feeling of responsibility for their patients, the students, and any error that the student may have committed with those patients. For example,

[It is] our responsibility as preceptors to be going over and making sure that everything given is correct. And anything that is not [correct], like an error underneath [the student’s] action, is under ours because we’re supposed to be making sure that the right medication is given. (Preceptor 2)

Theme #2: Discovering the error. The vast majority of the errors discussed by the teachers had been disclosed to them directly by students themselves. However, there were some instances described by participants in which the student was not the one to disclose the error to the teacher. For example, Instructor 1 indicated that she had, on different occasions, been informed by the charge nurse, the preceptor, or the student. Clinical instructors in particular positioned the willingness of the student to communicate the error as a crucial step in pinpointing the student's assumption of responsibility and accountability. For example,

I tell my students . . . that if they make a med error, they deal with the immediate repercussions . . . and the second thing they do is text, call or email me. . . . [To] me, if you are not taking the accountability and responsibility to inform me, then there's a communication issue and also there's an accountability issue . . . because they do have a responsibility to inform me when things go haywire. (Instructor 10)

One instructor, Instructor 7, noted that she had received a call from the student's preceptor advising her of the error. This had triggered a 'fact-finding' process in which the instructor spoke with both the student and the preceptor about the situation. When the instructor then received subsequent calls from the unit manager about a second and third medication error committed by this same student, it was because the student was committing similar errors, not recognizing that they had committed these subsequent errors, and evidently not applying the learning from previous errors. The manager wished to have the student removed from the unit as a safety concern and therefore connected directly with the instructor about those later errors.

Several teachers described situations in which they had identified that a student-committed medication error had occurred. For example, Instructor 1 noted that she had sensed student performance concerns through chatting with the student or reading their journal assignment entries. Other teachers had identified an error after engaging in routine

checks of students and their clinical documentation (Instructors 12 and 15). Finally, Instructor 5 described a situation in which she had been walking a student through an administration process that involved medication reconstitution and programming an intravenous pump. She had chosen to allow the student to choose an infusion setting on the pump that did not match the medication order before asking the student to perform a final settings check:

If I had stopped her [from choosing the setting by saying] “no you can’t do this”, she would’ve never learned what she had inadvertently done. And it was nothing that harmed the patient by any means . . . but it was just those little pieces of the puzzle that all need to fit together nicely for safe medication administration.

Teachers reported that students very commonly displayed signs of significant emotional distress after they communicated their involvement in a medication error, with one teacher describing a student’s response as “heartbreak” (Instructor 1). As demonstrated in the following two narratives, teachers articulated their belief that it was crucial for them to adequately address the emotional needs of the students during such a difficult time so that the student could again become open to learning:

[The student] was absolutely devastated that this was going on [her] record . . . [she] accepted the mistake and felt absolutely horrible. And I know communication [with her] was quite frequent over the number of days that followed . . . “saying you’re not in trouble, you’re not at risk of failing”. . . . [It] took a lot of reassuring [saying] “I’m sorry you feel like this [but] this is part of professional practice . . . admitting you made mistakes and not only learning from them but others can learn from them as well”. (Instructor 11)

The student . . . broke down and started crying. . . . [She] thought her career was over and that she’s done, no longer ever going to be a nurse. So after calming her down, we created a plan. I said, “we’re going to do this together, you and I. This is not a penalty thing, but we need to figure out how we can support you”. (Instructor 7)

Since preceptors act as conduits to the educational institution for student-related information, they have an additional responsibility to decide whether or not to report a

medication error back to that institution. There were differing views among preceptor participants on the need to report back and in what circumstances this should be done. All of the preceptors identified that, if a report was to be made, it would be to the student's clinical instructor; none of the preceptor participants mentioned that they would report to any other educational institution representative (such as a Coordinator or program Chair). While most of the preceptors indicated that making a report to the student's clinical instructor was considered an expected, necessary step in the process of handling the error, some noted their preference that the student share the information with the instructor first. For example:

[If] she would've said, "I don't want to tell my instructor". I would've told her she had an obligation to tell her instructor and that, "if you don't tell your instructor, I'm going to have to. Because this is your clinical practice here and, in order to be professional, you do have to accept responsibility". (Preceptor 6)

Other preceptors indicated that they did not always inform the clinical instructor about a student-committed medication error, with little consistency in the factors that influenced that decision. For example, one preceptor identified frequency as a key factor. Preceptor 5 suggested that, if a student had committed the same error more than once without demonstrable learning from the events, then she would feel a need to disclose the situation to the instructor. Others considered the significance of the error to be a key factor. These preceptors differentiated between errors that could be considered minor (and therefore would be seen as resolved just by discussing them with the student) versus errors that would be considered more serious, such as:

If it had been, I think a wrong patient, wrong med, I think that I would undoubtedly [say] that's just a big mistake [that needs to be reported to the instructor]. . . . I think if there were any adverse effects [of the error] to the patient themselves, obviously I would think that's . . . absolutely worth reporting throughout the whole system. (Preceptor 3)

Several preceptors were clear that they did not feel there was sufficient communication between clinical instructors and preceptors in the current system. One participant had acted in the preceptor role for multiple educational institutions and had noted a distinct difference in the frequency of such communications. At other educational institutions, she had spoken to clinical instructors on a weekly basis and had found the relationship between the preceptor and the clinical instructor to be rooted in a formal, thorough process. However, with the current educational institution, she had been engaged in very little communication with the instructor:

The last student I had, I had almost no interaction with the clinical instructor, and the [evaluations of the student] were very quick, basically did you have any issues? No? Good. Bye. . . .I've . . . been surprised at how little communication there is between the clinical instructor and the preceptor. . . . I think a more formal process of it if there's a med error [would be helpful]. (Preceptor 1)

Another preceptor voiced the same concern about communication channels between the instructor and preceptor, but then also widened the scope of her concern by commenting on a lack of communication between preceptors and educational institution administrators as well:

[The] preceptors have to know [which instructor] they can actually contact when they need to contact them and there needs to be open communication. . . . They don't have that now, I guarantee you . . . [and] sometimes they don't know how to go farther out from there [to administration contacts]. . . . Or [even] whether they should. . . . [None] of [the preceptors] know what they're supposed to do if they have a problem with a student. Yes, they'll call the clinical instructor but then what happens if they have a problem with the clinical instructor? (Preceptor 4)

In those circumstances where a student-committed medication error has occurred, multiple preceptors indicated that an ideal process would involve a clear feedback loop back to the preceptor, something which is currently missing. For example:

The clinical instructor [should] then get back to the preceptor to finish that feedback loop . . . [about] what was done after the error [and] what was the student's attitude. .

. . [Because there might be] something specific that the university wants you to do or instructions that they've given the student that you might be expected to follow up on. (Preceptor 1)

Theme #3: Directing the aftermath. All teachers agreed that it is the clinical instructor, regardless of whether a preceptor is involved in the placement, who is ultimately responsible to decide upon formal consequences after a student-committed medication error. The one exception is that preceptors discussed having a role in healthcare facility reporting, i.e. the formal consequence of entering a student-committed medication error into the PSLS.

Supporting the student: Choosing formal consequences. There are many potential formal consequences for a student-committed medication error that could be selected by an instructor, depending upon the particulars of the situation. Instructors indicated that the choice of consequences is often difficult, requiring the consideration and weighting of many factors and for the instructor to understand and draw upon their past experience.

All of the clinical instructors, and most of the preceptors, indicated that an entry into the PSLS should be considered a requirement post-error. Most of the instructors indicated that, in the specific student situation they discussed in the interview, they had required that a PSLS entry be completed by the student or they had ensured that the preceptor in the situation had required the student to complete one. Speaking about an ideal process to follow after a student has committed a medication error, one teacher noted that there must be “a formal incident report or PSLS . . . so that [the error is] formally noted and . . . the management of that facility know” (Preceptor 1). However, not all of the teachers actually required a PSLS entry in the student-committed medication error they discussed during their interview. From one teacher’s perspective, the student had become very upset once it was discovered that a scheduled medication had been given three hours late and the student had

taken full ownership of her role in that event. The teacher had not required the student to complete a PSLS in that situation, providing the following rationale:

A half hour window [to administer all medications] is not really realistic if you have other things going on. . . . [And] the patient did get the med, there were no adverse effects and it was something that the student learned from. And I think the PSLS' are geared more towards the staff nurses who are employed there. (Instructor 13)

Several of the teachers admitted that they are often reluctant to complete a PSLS entry for student-committed medication errors, expressing that their reticence to use the PSLS developed because of an aversion to the amount of time required to complete the report, especially if the error itself was viewed as a minor one (such as a near-miss). For example:

You just think of how much writing and paperwork [is involved that it's almost] discouraging you from wanting to report things because it's just going to be so time-consuming. I understand the importance of it . . . [but] you just want to say . . . [this error is] just such a small thing, why do I have to go through this monumental amount of effort when your day is very full already? . . . I don't want to be staying after work to do these things. . . . It's difficult in my mind to . . . put a ton of effort into something where it's not directly patient related. [The PSLS report is] not something that I do . . . that affects how [patients] feel immediately. (Preceptor 3)

Almost all of the teachers strongly emphasized their belief that the primary function of the PSLS is to provide a learning opportunity for the student specifically and for the facility/NHA more broadly. However, clinical instructors in particular expressed strong sensitivity to student perceptions of the PSLS as a way to assign blame and these participants repeatedly referenced the PSLS' reputation as being a form of punishment. A number of instructors even suggested that this perception may be traced back to the negative view of the PSLS held by nursing staff on the units. Instructors described a goal of changing this perception and instead having the PSLS be viewed as a system for identifying issues,

proactively where possible, to ensure that both patients and staff find themselves in the safest environment possible:

A lot of . . . people think it's a punitive thing. They don't realize that it's just for a learning opportunity, to make sure we can try and prevent errors for the future. . . . And most staff are like that too, so it's not just students. (Instructor 14)

This strong desire of many instructors to encourage a more positive view of the PSLS, and to assist students in seeing its benefits, made them more likely to ensure that a PSLS entry was completed after a medication error:

[There is] a culture out there that says if you're doing a PSLS it's a punishment. . . . So we try to change that in lab and then I try to change that within my students in clinical. I push PSLS's even when it's not [their error] cause lots of them have found errors . . . and I'm like "do a PSLS on it". (Instructor 1)

[The student] did a PSLS, went through the process with me. I had her fill the entire thing out but I was there to guide her so she could see . . . how we access this document and how common it is and how it should not be a scary situation. This is important learning. . . . They always think that someone's going to get in trouble [when a PSLS is done]. (Instructor 12)

Despite this strongly-expressed belief about the positive intentions underpinning the PSLS, two instructors also mentioned their reluctance to complete PSLS entries for reasons that are strongly pragmatic. They suggested that these particular concerns do influence decisions about whether or not to complete a PSLS entry for a student-committed medication error:

And so what I look at . . . [is] do we need to go that step because now that puts it in Northern Health's system? I don't want to overload the system with things that are unnecessary paperwork . . . if there's no need. (Instructor 15)

So we had to go through that whole [PSLS] process which is time-consuming and annoying because the student can't do it on their own. They have to have the instructor [present] so therefore the instructor is taken away from the other 7 students while you're filling out this form over the next half hour. . . . So it's that kind of an issue that drives me absolutely insane. . . . We tell [students] . . . "please don't make drug errors because we don't want to have to do these forms". (Instructor 16)

Once a PSLS entry had been created (and the majority of teachers viewed this step as simply a requirement), clinical instructors needed to turn their minds to the possibility of additional formal consequences. Deciding which of those consequences would be appropriate in the circumstances required a weighting of many different factors, primarily hinging on the level of ownership and insight that the student was able to demonstrate:

The student that takes that professional ownership, is completely involved in the solution and in the process of getting through this and identifying where we need to improve upon, is . . . not as detrimental as that student who [says] “well it wasn’t me, it’s your fault. You weren’t there when I needed you”, or whatever the reasoning might be. That lack of professionalism . . . would be a flag to me to say this one requires [further consequences]. (Instructor 6)

All of the instructors (and almost all of the preceptors) indicated a standard practice of debriefing the error event with the student on a one-to-one basis. This was performed for several reasons, such as the need to fact-find from the perspective of the student, to gauge levels of ownership, insight and learning, and to provide emotional support. For example:

[The discussion with the student was about] asking those questions: “so what has happened . . . [and] what would you do now? What do you think your next step will be for this? How can I support you in this?” But at the same time make it quite clear that there are . . . processes . . . in place, like the PSLS specifically. And [ask] “how would you like to go through this process?” And either offer it supported or independent, however the student wants to handle it . . . [and say] “I’ll be here to support you”. (Instructor 2)

One instructor, who did not require any formal consequences beyond the PSLS entry and the individual debriefing session, explained her decision-making process in this manner, again making specific reference to the ownership demonstrated by the student:

There were [no additional consequences]. The student owned it. . . . And [it was in the context] of a medication error, which I think is just part of nursing practice. If you aren’t making near-misses with meds occasionally, then you’re probably just not reporting them. (Instructor 2)

Most instructors indicated that they tend to assign some form of written reflection aimed at demonstrating what the student had learned from the error, with the following as the typical main components of the reflection. For example:

[They] all get an assignment from me. . . . I get them to submit it as a journal but I get them to talk about the medication incident, what contributed to the medication incident, what contributes to other medication incidents and what steps can you make to prevent future and what is the proper process afterwards. (Instructor 1)

Many also asked students to complete the online CRNBC (now BCCNP) medication module to reinforce both learning and expected best practices, largely because it is considered “standard . . . of what we do for anybody that makes a medication error. It’s a good module” (Instructor 7) and “the medication module [is] quite . . . a beefy piece of work, so I do feel like that’s a reasonable repercussion for a first med error” (Instructor 10).

The reflective journal and online medication module were viewed as the least onerous consequences that instructors could require and therefore they tended to be seen as standard, minimal expectations after an error. The remainder of the potential formal consequences tended to require much more deliberation on the part of the instructors and were not used routinely. Relatively few of the instructors required learning contracts for students who had committed medication errors unless the error appeared to result from more substantial issues, the student was unwilling to take responsibility or accountability for their role in the error, or more than one error had occurred during the clinical placement. As examples:

I feel a learning contract is usually [needed] when there’s a lot more going on than one instance. [If] she had not acknowledged that that was a potential problem, if she had not accepted responsibility . . . then potentially yes, we would have to write a contract . . . so we could support her learning. (Instructor 12)

I will put learning contracts together . . . if there’s a medication error made the second time of the same type or if there’s another medication error. . . . [And if] the student hadn’t come to me and I’d found out some other way, or they had . . . [dismissed] it, then that is more than just a medication error and that would show up in a learning

contract. We would have a . . . learning contract . . . around responsibility and accountability [and] communication. (Instructor 8)

One instructor did note the significant amount of work that it takes to create an effective learning contract, implement it, and then ensure its requirements have been met:

In terms of having [the learning contract] stand up, you're linking everything back to the standards of practice [and] the trick is to get the language neutral . . . [and it needs to be] quite clear. . . . They are a lot of work. . . . You do have to chase people around to sign them because they need to be signed by the clinical instructor, the clinical lead and the coordinator of the program and the student. (Instructor 10)

Practices of the instructors varied substantially with respect to encouraging students to discuss the error in front of their peers. None of the instructors indicated that they *require* a student to share during a post-shift conference that they had committed a medication error. However, two instructors did indicate that, if a student elects not to share the error, then the instructor will still raise the situation without attaching identifying information. For example:

So every shift there's something that goes awry, that's just the nature of the beast. . . . So I [raise the situation and then] people start to ask questions and eventually the person who's involved in it speaks up. And . . . if they don't, I . . . keep them afterwards and we have a debrief because you can tell that they haven't processed it yet. You don't want them leaving the situation feeling that they're the worst nurse in the world and never wanting to return. (Instructor 5)

When the choice of discussing the event is left up to the student involved, sharing is still encouraged to allow others to learn from the event and to generate peer support for that student. The following two narratives demonstrate this encouragement:

The students aren't obligated to share anything . . . [but in the group debrief session] I'm really looking for learning and so that student can learn both from their own experience and from the experience of the [other] students. . . . [In this instance], I don't think there was a student at that point who hadn't made a med error and so the group was extremely supportive. . . . There wasn't anything predatory or . . . laterally violent about the whole process. (Instructor 2)

When something like that happens, if it's okay with the student, I like to discuss it with the entire group, just so the entire group can learn from the mistake and I usually

really stress that everybody makes mistakes, even me, and this is for learning.
(Instructor 4)

Whether the commission of a medication error appears on a student's formal evaluation documents also varied between instructors. Most of the instructors indicated they make it their practice to always mention on an evaluation if a student-committed medication error occurred during the placement. As examples:

I make sure . . . [it] gets documented in their mid-term or it gets documented in their final. I try not to belabour it, but . . . [I write] a one-page summary [and] within that summary I'll say [that the student] showed responsibility for practice when they committed a medication . . . error, took responsibility, handled it well, learned from it. . . . So I'll document in there saying that it's happened but then . . . it's more than the [error itself], it's the student's response to it. (Instructor 1)

I always . . . follow-up with an instructor evaluation and I did [write that,] "apart from one medication error, there were no safety concerns and all the proper procedures and policies were followed up in regards to the error". . . . [And the student] said "do you really have to include that" and I said "yeah, I do [because] if I put there's no safety issues, then . . . I would be lying". (Instructor 11)

One instructor did identify her belief that, because students had, at one time, been able to use clinical evaluation documents as part of employment applications, a practice had developed over time for instructors to write more cryptically about error events:

In the past, we have always felt that . . . unless it's a repeated issue of some magnitude, we don't put them on their evaluations because we feel that that stigmatizes the person. . . . So we [don't note the error] on their evaluations but we might make a statement like, "student recognized that not giving medication at 0800, there were other options that she could've done". . . . [We don't want to explicitly say in the evaluation] "you screwed up". (Instructor 16)

In terms of the most severe formal consequence available to a clinical instructor, i.e. failing the student in the clinical course, a number of instructors did report the experience of failing a student for medication errors committed during their placement. However, they indicated that they reserve that option for very specific types of situations and never undertake it lightly. Again, a student's ownership of the error played a key role in

determining whether or not the situation escalated to a course failure. Making repeated errors without demonstrating adequate learning from previous situations was also a significant consideration. For example, a student in Instructor 7's clinical group made the same error with the same medication three times during a single clinical placement. Because this student was not able to demonstrate and apply learning from the various activities her instructor had required of her, and given a need to ensure patient safety, the student was unsuccessful in that clinical rotation. As another example:

The students I have failed because of a medication error, it hasn't been one instance, it's [that] they've been consistently inconsistent. . . . [They've] always missed something . . . and then it'll go fine and the next time we go to do it they'll make the same mistakes and then I'll tell them that you're not developing your practice. . . . And usually when that happens . . . I've seen . . . where they don't want to take responsibility. (Instructor 13)

Another instructor described a situation in which a student's unsafe practice, and her refusal to accept responsibility and accountability for her practice issues, led to the instructor removing the student from clinical, failing the student, and then feeling pressure to justify that decision to educational institution administration:

The student . . . committed a significant error and [wasn't] willing to own it at all. . . . I said . . . patient safety [comes] first and . . . responsibility and accountability is the essential component of nursing and . . . you need to take responsibility for this. And [the student] absolutely flat-out refused. I said, . . . "you've basically compromised . . . every [professional] standard at this juncture . . . you're going home . . . [and] if this lack of responsibility and accountability continues, you will not successfully navigate your clinical rotation because ethically I cannot let you [pass] when you will not own your practice". . . . [The student] went right to the Dean's office and said that I . . . kicked them out of clinical for no good reason. . . . [I received] this emergency phone call on the ward from the Dean's office and I explained the situation . . . [and I said,] "I'm not comfortable with having this student come back to clinical, I don't feel that they have met their competencies, I don't feel that they're willing to learn or receive feedback and . . . I refuse to have this student back in my clinical group". (Instructor 5)

Supporting the teacher: Improving the system. Teachers identified strengths and challenges associated with a historically smaller nursing program that has, to date, largely relied on informal means of communicating role expectations and guiding individuals in their role. Many of the teachers suggested that the development of key resources needed to truly understand and flourish in their roles has not necessarily kept up with the growth of the program over time. Clinical instructors in particular identified two main areas they view as key to improving the transparency and consistency of any formalized process to address student-committed medication errors (this was not discussed by preceptors because they are not decision-makers within that formalized process). These two key areas are: (1) communication and reporting; and (2) written guidance. Both of these areas were identified as being particularly important in orienting new clinical instructors to the expectations and requirements of the educational institution should a student-committed medication error occur; however, even those instructors who were highly experienced in the role identified a desire for clarity in these areas.

Communication and Reporting: All of the clinical instructors identified a preference that a more formalized process of learning and sharing be instituted. This was highlighted with respect to two specific communication channels: communication between the educational institution and the healthcare facilities/NHA, and then communication within the educational institution itself.

There was a clear desire for increased formal sharing of student-related information between the educational institution and the healthcare facilities. One instructor identified existing clinical leadership meetings as an effective way of sharing information between the educational institution and the healthcare facilities/NHA; these meetings also have the added

benefit of developing valuable cross-organization relationships. However, this instructor recognized that this particular strategy may not always be present or feasible in all communities:

[We are] lucky in [town name] that we have an open collaboration between the university and the [healthcare facilities] and we have clinical leadership meetings . . . [where] we can have those conversations [and] where we're building [relationships] with the management teams. . . . So you can have these conversations . . . [as well as] collaboration and discussion so I'm feeling fortunate that we are that way in this community. (Instructor 6)

Many of the instructors also noted their preference for a more formalized 'feeding back' of information about student-committed medication errors from the healthcare facility/NHA to the educational institution. These instructors stated a belief that, while they ensure PSLS reports are completed after a student has committed a medication error, information from those reports are not formally fed back to the educational institution to allow it to understand trending of errors over time. For example:

I would like to see [an] agreement or working relationship . . . between [the educational institution] and NHA with the PSLS so that, when a student is involved in a PSLS, [the school] gets a copy. . . . I'd like to see if our students are part of any kind of PSLS, doesn't matter what it is because there's a great breadth of things that they cover . . . [but] I would recommend that highly. (Instructor 9)

The instructors noted that the absence of a formal mechanism for feedback about student errors places the educational institution at a distinct disadvantage. It is unable to verify perceptions of student error trends and, if it is unable to confirm these perceptions, then school leaders will not be able to accurately identify the most appropriate ways to advance and better the nursing program or to address student needs proactively. Instructor 9 indicated her concern that "it's really important just to track [each error] through and learn from it. Cause otherwise it's just going to keep happening". Other instructors confirmed this view:

We as an educational institution never get any feedback related to those [PSLS entries]. . . . So what we hear maybe is anecdotally “oh there’s so many more student errors!” but I’m like, really, in the context of how many more student med errors are there, is it actually students committing the med errors or is it students reporting the med errors. . . . How are you going to feed that back to us so that we can address it . . . so it’s all hearsay and innuendo at this juncture [and] you need the data to be able to change the trajectory. (Instructor 5)

There was also a recognition that, once such data are shared, it would need to be “rolled up” into a form that is easily accessible as well as feasible to continue collecting long-term:

Tracking it. And [then] having it in such a form, like a dashboard . . . [that] is not cumbersome. Because you know, the [program Chairs] and [program Coordinators] . . . don’t have time to sift through a ton of information. It somehow needs to roll up . . . into a succinct dashboard. (Instructor 9)

Many instructors also discussed informal communication channels that have developed over time within the educational institution. All of the instructors emphasized the crucial role of colleague consultation in deciding what they could do in situations of student error generally and what they should do in specific situations; one instructor referred to this as a valued “community of practice” (Instructor 10). For most instructors, such interactions comprised the primary (and sometimes only) way they gained information about the options available to them:

[When you are a new instructor] you’re trying to find somebody who does it by the book so that you can learn what due process is and then you can adapt it to how you do it. . . . And I just asked a million and one questions until I felt comfortable in my practice as a clinical instructor . . . [and] I go and I seek somebody out who has been doing this for a lot longer than I have and I just present it as “I have this scenario, what would you do?” (Instructor 13)

It was not lost on the instructors that there can be limitations and drawbacks with a system that has traditionally relied almost exclusively upon informal colleague communication as the vehicle for learning the instructor role. For example, “I had to find a

mentor that I could trust because I have also been given misinformation before” (Instructor 13), and “I know that we’ve been kind of [a] small [program] and ‘kitchen table’ kind of people and I think we’ve communicated well. But I think we’re getting more sophisticated now and it’s time for some [formal documentation]” (Instructor 9). Other instructors, while acknowledging the tremendous value of informal mentorship within the school, also identified a need for more formalized channels of support to be provided to instructors. Instructor 10 indicated that past practice has been for instructors to find their own mentors and their own information about process requirements/expectations and that there has traditionally been “no formal [mentorship process], but there’s lot of informal mentorship”. She suggested that formalizing such support would be helpful to both novice and experienced instructors alike. Instructor 8 similarly believed that a formal mentorship program would help to better communicate role expectations, and create a sounding board for newer instructors, when she said that “I think part of [the requirements] should be that new instructors [be] assigned to someone . . . who can mentor them through that process”.

Finally, all of the instructors indicated that they have developed their own practice of determining when to report student-committed medication errors to the clinical lead or Coordinator at the school. However, this step was not written anywhere as a requirement. For example, Instructor 9 noted that, “it makes common sense [to report to the Coordinator] and so I do. But I’m not aware of a process”.

Written Guidance: Teachers noted a distinct lack of useful written resources to help guide them in understanding their roles and the intended process should a student-committed medication error occur. Many of the preceptors pointed to a preceptor “manual” that had been provided to them by the educational institution; however, none of the preceptors

referenced its contents as being helpful in guiding their decision-making and actions if they experienced student issues generally or if a student committed a medication error. In interviews, the manual was generally referenced only in passing, if at all, as a resource. In fact, one preceptor indicated that she had been creating her own preceptor manual over the years:

I'm making my own preceptor manual. [The institution's document is] a 30-page manual but . . . 25 of those pages are [about] evaluations. [In terms of what to do if there is a student issue, it is] not at all [helpful]. I think it would be helpful . . . if you had a better guideline [saying] "if there's a med error, please call this person, please follow the following steps". Or "if there's any kind of other issue, this is what you should do". (Preceptor 1)

Teachers were not able to identify any educational institution policies or procedures that were specific to either student-committed medication errors or to student issues encountered during a clinical placement. Instructors expressed concern about this perceived lack of formal written guidance for first-time instructors in particular; they expressed that they had not been fully aware of their roles and responsibilities in such a situation:

There was no formal . . . rubric or flow sheet or anything and so I honestly felt like a fish out of water . . . and I struggled because I thought "am I being too hard" and "am I being the mean teacher", "am I being unrealistic?" (Instructor 13)

Instructor 1 also pointed out the difficulty associated with not knowing the correct steps to follow when an instructor is the individual earmarked for all other parties to contact in the event of a student-committed error: "[You] know, everything in the preceptor manual [says] to do this, this, this and then contact the clinical instructor. . . . [We] have a preceptor manual and we have a student manual but there's no clinical instructor manual".

Some preceptors did mention preceptor workshops or orientation sessions that had been arranged by the educational institution but one preceptor also noted the following: "we used to have preceptor workshops but they don't talk about specifically any errors and med

errors or that kind of thing” (Preceptor 6). However, another preceptor who regularly attended preceptor orientation sessions saw significant value in them and strongly recommended that they need to be made mandatory by the educational institution. She felt that this would go a long way toward making expectations in the event of student issues more clear to preceptors:

I think that it needs to be a requirement for the university when they [engage preceptors] regardless of how long [they’ve] been teaching for, that they must attend an orientation session. Every year. . . . If you can’t attend it, you need to make arrangements to meet with the person who’s leading [it to attend another day] . . . I think we need to get to that point . . . where [if you don’t attend] we’ll offer [the preceptorship] to someone else. Because we’re not on the same page as clinical instructors . . . [and] that’s not the way it needs to work. (Preceptor 4)

Because instructors are also the ones responsible for determining formal consequences in an error situation, it was expected by others that instructors would have ready access to any documentation that would need to be completed. However, when some instructors requested documents (such as a template learning contract) that were needed to address student learning in error situations, they found them difficult to obtain. For example:

I know that getting hold of the actual paperwork to put somebody on a formal learning plan is tricky cause I had . . . wanted to put two students on a learning plan . . . and the request for the appropriate paperwork went through two people and I never ended up getting it in the end. (Instructor 2)

In the absence of educational institution documents to guide teachers in a student-committed error situation, it might be expected that they consult guidance provided for employees of the NHA. Interestingly, none of the preceptors mentioned the general PSLS reporting policy, applicable to all adverse events happening within NHA healthcare facilities, as a guiding document. However, many preceptors did note the expectation of completing a PSLS for an event such as a medication error; it is therefore possible that they may just not have considered the PSLS reporting policy as an applicable “policy or procedure” when

asked about them during study interviews. In contrast, instructors did refer to those policies and procedures of the NHA that relate to error situations. While these resources do not, of course, speak to formal educational consequences that could be required by the clinical instructor (with the exception of a PSLS expectation for a medication error), they did provide some structure for the instructor regarding more immediate, necessary responses. Many of the instructors indicated that “[a] student error and my error as a practicing nurse would be handled the same way [at the healthcare facility]” (Instructor 1) because “we follow through the reporting processes as per the established [NHA] guidelines and policies that govern medication errors” (Instructor 6).

A number of the teachers emphasized the importance of their past experience when deciding how to best deal with a student-committed error and what their role needed to be in such situations. For example, two teachers emphasized repeatedly that they had learned these aspects of their role “[by] trial and error” (Preceptor 4; Instructor 7). Another participant, when asked how she had known what to do in her first experience with a student-committed medication error, replied that “I brought [that knowledge] from my own practice” (Instructor 12). Another teacher added that, as she gained more experience dealing with situations of student-committed errors, she had become more confident in her judgment about what her response should be:

Each situation . . . is significantly different and I find when you were a newbie clinical instructor, it was a lot harder to differentiate that. As you gain more experience, you become more confident in recognizing the red flags and knowing how to intervene and what the steps are that you can do to mediate the situation. . . . [So] unfortunately, it’s an educating guessing game to a certain degree. (Instructor 5)

Other instructors perceived their past nursing experience as being explicitly recognized by the educational institution during the hiring process; these instructors

suggested that this then led to an institutional expectation that the instructor would already know what to do in error situations:

[You are] hired based on your qualifications and certainly in the hiring process they identify . . . if you have those skills that you can do these kind of investigative discussions with students . . . but the training wasn't there so much as the interview process guided that. (Instructor 6)

I think they do interview us well to make sure we're responsible practitioners and, if we're responsible practitioners, we know what processes are already in place. . . . And we're responsible for using them, so I think we're screened well in that sense to make sure we're going to be onboard with that. (Instructor 1)

All of the instructors voiced a level of support for a written document to guide expectations and requirements in the event of a student-committed medication error. Some were wholeheartedly in support of such a document being created while others were more cautious, concerned that it might have the unintended consequence of either stifling instructor judgment or preventing creative or novel solutions. For those who were fully supportive of such a document, it was largely to ensure consistency in the process. Such consistency, and a clear understanding of expectations and requirements, was viewed as a benefit for the instructors as well as for the students who would be subject to consequences for the error:

I think a formalized process is an excellent idea for treating students consistently and fairly, so they know . . . [that this] is what I have to do, this is what I can expect is going to happen to me. . . . I really like [the idea of an] algorithm or a process to follow when a medication error is committed so that each student is dealt with fairly and consistently and . . . both instructors and the students know what the next step is and . . . there aren't any grey areas and [no] students who are treated differently. (Instructor 11)

Instructor 10, while emphasizing that she would not want to substantially alter the nature and purpose of an effective learning environment for students (or what she termed “the space to make mistakes”), still agreed that improved clarity would be helpful:

[Students] are...human, and do need space to be allowed to make mistakes. But like everyone else, the expectation is that you then learn as a result of the error. . . . I think the conversation needs to be collaborative [between instructor and student] . . . [but I do also] think it would be nice [to be able] to say you made a med error [so] you are going to do x, y and z and that's something the school can [develop].

While there was general agreement that a formal document to outline expectations of instructors in these situations could be helpful, there were also concerns expressed that such a document might be too prescriptive. Instructors were cognizant that they need to retain a certain amount of latitude to take individual student or situational factors into account when identifying the appropriate consequences to select: “[There is] always going to be a grey area just because there is that subjectivity component of it. But at least [a formal document would be] something there that you can refer to or reflect on” (Instructor 13). This was confirmed by Instructor 2 as follows:

[It would need to be] just a broad instruction package, much more procedure-oriented. . . . As far as actual practice, that is so incredibly nebulous and I find that both in my role as clinical instructor at the hospital and a clinical instructor with students at the university, each case is usually so unique that [any stated consequences] beyond an individualized learning plan would be sort of fruitless.

Other instructors were particularly cautious about the intended classification of the formal document as that would inform how prescriptively it might be viewed. Most were hesitant to call for a policy or procedure specific to student errors; instead, instructors used a variety of other possible terms to describe what the desired document could be, such as “algorithm” (Instructors 1 and 14), “pathway” (Instructors 8 and 13), “toolkit” (Instructor 14), “tool” (Instructors 8 and 13), “process” (Instructors 1, 9 and 11), “guideline” (Instructor 7), and “flow graph” (Instructor 1). This reluctance appeared to stem from a desire to strike an appropriate balance: keeping the available options as open as possible to the instructor and preserving deference to an instructor’s decision-making given their knowledge of situational

facts, while still aiming for improved consistency and documentary support for the instructor to rely upon.

Two instructors were clear that they felt a full formalized policy was needed to provide clarity and consistency in situations of student-committed medication errors. One instructor believed that, if the expectations were in the form of a policy, then it would be more strongly supported by the educational institution. She asserted that it “needs to be something that is consistent, it needs to be true policy so that it’s supported” (Instructor 12). The other participant who wished to have a formal policy document in place also later mentioned that a guideline document would be helpful. However, she had initially referenced the implied increased backing of the educational institution that accompanies a formal policy, which could then act as support for the instructors in their decision-making:

As an instructor, it would be great to be able to just pull up a document that [says] “this is our policy on medication errors. This is our school’s level of where we go and how we step it up [and how we decide what is going to happen]”. (Instructor 7)

Regardless of the format or classification of the document itself, there was a general consensus among the participants as to what that document should contain in order for it to be useful to instructors. The instructors revealed that the following components would be viewed as critical in such a document:

Key Features of Document	Instructor References
<ul style="list-style-type: none"> • require that a collaborative conversation occur between instructor and student to ensure learning expectations and consequences are clear, student has input into the identified learning needs, and student feels supported 	7, 10, 11, 12
<ul style="list-style-type: none"> • provide assistance/examples to help instructor determine when formal consequences are warranted and what options are available to choose from 	4, 7, 8, 10, 11
<ul style="list-style-type: none"> • identify paperwork that needs to be completed by instructor, including when a PSLS entry is required 	2, 8, 13, 16
<ul style="list-style-type: none"> • identify those individuals at the school to whom instructor must report the error and when it must be reported 	9

• build in requirement for educational institution to provide mentorship and emotional support for the instructor	6, 8, 9, 13
• explicitly leave room for instructor discretion in addressing the error and requiring formal consequences	7, 10, 11
• ensure that the final document is available/distributed to all instructors and is also available to students	9
• ensure that document is clear, easy to follow and understand	4, 9

Conclusion. Clinical instructor and preceptor participants articulated many similar ideas about roles, influences, and ideas for moving forward. Both groups emphasized the importance of students taking ownership over their contribution to the medication error that was committed and for students to be transparent when communicating with them about the error. Decisions about formal consequences for the error rest in the hands of clinical instructors as opposed to preceptors, with the exception of PSLS reporting where both groups of teachers have a role. Teachers indicated that, in the past, informal communication channels have primarily been utilized to understand their roles generally, and in situations of student-committed medication errors more specifically, but a belief has developed that written guidance and more formal mentorship programs now need to be considered.

Educational institution leaders and healthcare facility administrators. The eight healthcare facility administrators (“administrators”) who participated in the study represented a variety of roles. The following are the titles by which the administrators referred to themselves:

Type of Role	Number of Administrators
Clinical Nurse Educator	1
Program Manager/Program Leader/ Inpatient Unit Leader	4
Clinical Practice Leader	1
Patient Care Coordinator	1

These seven administrators were each assigned to at least one specific unit of their particular healthcare facility. The majority were responsible for more than one unit. Of the five interviewed administrators who fall into this category, three were assigned to two units, one was assigned to three units, and the final individual in this group was technically responsible for one unit but, because that unit is in a rural hospital, that single unit admits patients from almost every specialty (e.g. medical/surgical, alternate level of care, palliative, post-operative and gynecology). Each of these seven administrator participants also identified the program years of BScN students who are assigned to clinical placements on their units:

Study Participant	BScN Program Year(s) of Student Clinical Placements
Administrator 1	3, 4
Administrator 2	2, 3
Administrator 3	1, 2, 3, 4
Administrator 4	4
Administrator 5	2, 3, 4
Administrator 6	3
Administrator 7	3, 4

A total of eight educational institution leaders (“educators”) who had acted in that role during the relevant time period requested study participation; all met the study criteria and were interviewed. Two of these participants were interviewed solely with respect to their educator role, five were interviewed with respect to both their educator role and their clinical instructor role, and the remaining individual was interviewed with respect to her educator, clinical instructor role, and preceptor roles. Only the information provided by these individuals that relate to their educator role has been included in this section of the analysis. The educator participants represented a variety of leadership roles (several educators held

more than one educational institution leader role during the relevant time period, often concurrently):

Type of Role	Number of Educators
Program Coordinator	5
Lab Coordinator	1
Academic Lead	2
Clinical Lead	2
Program Chair	1

In their interviews, it became evident that both educators and administrators desire to develop an overall culture that will respond fairly and effectively to student-committed medication errors, namely a just culture. For educators, student learning formed the basis of that desired just culture while, for administrators, their primary focus was on the patient safety that could be achieved through student learning. Both groups also addressed the supports and post-error communications that are needed to ensure a positive learning environment for student learning.

Theme #1: Fostering a just culture for student learning. Both educators and administrators recognized that, to give students the best chance to successfully navigate their clinical placements, a positive, fair culture to support their learning must be present. In the words of one participant,

I can't stress enough [the importance of] the learning process, the non-blame culture. Because when we start to create a culture of blame . . . people become afraid and that's when you're more likely to get hiding of errors, not coming forward, or a real negativity around it. (Educator 4)

However, because the roles of the educators and administrators are quite different, their particular contributions to the just culture that is needed are likewise different as well.

Educators. As a demonstration of this just culture, educators expressed an appreciation for the tremendous amount of information that students need to be able to piece together to achieve success in their various clinical placements. Such necessary information was identified by many educators in their interviews and included such areas as theory, sociological and cultural understanding, communication skills, and mechanical skills. Educators commented that demonstrating to students an appreciation of their program's difficulty is a key component of ensuring an environment that is conducive to learning: "We don't often stand back and give our students credit for the amount of diverse knowledge that they're having to piece together [in clinical]. It's really unlike any [other] profession in a sense" (Educator 4).

The educators were clear that they play a significant role with respect to addressing student-committed medication errors after they have occurred. However, it also became evident in the interviews that intentions of many of these educators are shifting from *reacting* to errors to implementing *proactive* measures and strategies to prevent errors from occurring in the first place. To accomplish this, educators often use lessons from past student-committed medication errors to design strategies that will hopefully prevent similar errors from recurring in the future. For example, identified student deficits will often be used to drive curriculum content decision-making and many of these educators are directly involved in such curriculum development. At these educational institutions, this has taken the form of both laboratory course development and the implementation of required examinations, such as the medication-specific Objective Structured Clinical Examination (OSCE) and medication-specific quizzes:

I think ultimately it's [for school leaders] to see . . . if there are areas where . . . [students are] not as strong . . . [and] look at the med errors that get made . . . [to ask]

are they not doing their checks? Are they not doing their rights? Is there a process piece that's problematic? Is there a gap in their learning that we can . . . reinforce and readdress? . . . In this last third year we did . . . a medication quiz . . . during lab. . . . And the variation in practice [by students ranged] from textbook to unsafe. (Educator 8)

However, Educator 6 did express a concern that sometimes schools react too quickly to revise curriculum content after only a single student error and therefore may not be sufficiently purposeful about the changes:

[There is] a lot of . . . miscommunication or misconstruing. Like one student makes an error [and it's] "oh my God, we need to go back and redo the whole medication safety principles". . . . So I think we need to be more proactive in how we're doing this and purposefully design it and develop it for the betterment of student education and the program collectively as a whole, not [just for] isolated entities.

In terms of proactive strategies to prevent future medication errors, educators also expressed significant frustration with student perception of learning contracts. Educators viewed learning contracts as a positive tool for student development, with the potential to make learning expectations of everyone involved (instructor/preceptor and student) clear and unambiguous and to resolve any student issues that had led to the error. However, they were also aware of the student perception that learning contracts are often used as a post-error punitive measure:

[We have] tried to change people's perceptions of a learning contract . . . that this is a way to plan and communicate the expectations, the learning. This is a way of giving students the tools for success. . . . At the end of the day it's all about putting the expectations [in writing], the detailed plan to help someone be successful. (Educator 4)

Because the negative perception of a learning contract has existed for a long time, a resistance to sharing learning contracts between clinical instructors has developed. Rather than assisting future instructors to know the issues that a student may need to focus on to build a successful clinical practice, there is a concern that sharing learning contracts can bias

the next instructor against the student before the student commences the new placement. As a result, learning contracts developed by college instructors in the first two years of this collaborative program are not shared with instructors who teach at the university during the final two years. For the same reason, even instructors within the same educational institution do not share learning contracts of students who have made errors or demonstrated practice deficits in earlier placements. This lack of transparency, what Educator 3 referred to as “a confidentiality thing on steroids”, has largely grown out of recognition that students fear disclosing their involvement in a medication error. Given student perceptions that instructors are likely to impose significant consequences (such as course failure) for even a single medication error, educators believe that this fear extends to sharing past learning difficulties with upcoming instructors. This lack of transparency has led to a decreased ability of instructors to ensure that students with learning deficits are identified as early as possible in a new placement:

The cracks in the practice, they don't go away . . . [leading to] a situation where you have a student who is at the end of fourth year [and who] is not successful. And sometimes that just happens because . . . it all fell apart in that [later] placement and other times it's a student who struggled [earlier but] it hasn't been addressed. (Educator 4)

Some educators referenced an informal process that has developed over time to replace the lack of transparency for learning contracts. This informal process is geared toward allowing instructors to obtain the information they need to ensure the learning needs of students:

I might call up my colleagues [at the other educational institution] and say we've got this student who seems to be really struggling with medications . . . is this a trend? . . . Is there anything that happened in [a previous placement] cause they've got two fairly good sized clinical rotations in [that previous year] so [this learning need] may have come up [before]. (Educator 5)

Despite this widespread practice of not formally sharing past learning contracts, many of the educators strongly indicated support for sharing this information for the benefit of student learning; they identified a wish to work toward increasing transparency in this regard. At the university, students are told that they are required to share the contracts with future instructors, although educators noted that this expectation is not currently enforced:

If students have a learning plan, they are required to bring that forward. Unfortunately . . . we've really tried to get instructors to demand it . . . but it doesn't always happen. . . . Or students are too afraid and they've got a clean start [in a new placement so] they don't want to go back and say "I had two learning contracts". (Educator 4)

Administrators. Although two administrators (Administrators 1 and 7) stated that they were not clear on which policies and procedures would govern a student-committed medication error, the remaining administrators stated that the reporting process is governed by NHA general policy and procedure related to errors. There is no policy that is unique to students and any errors in which they are involved; therefore, students are expected to report their errors into the PSLS as would any healthcare provider who is employed by the health authority. Interview discussions with the administrators therefore largely revolved around the PSLS, their role within it, and the data that it can generate.

All of the interviewed administrators are designated as "handlers" in the PSLS, meaning that they receive notifications of all PSLS entries associated with their particular clinical units. Because of this individual's role within the NHA, the NHA Representative receives notification of all reports that are entered into the PSLS. After receiving notification of a PSLS entry, the administrators have responsibility for numerous steps in the PSLS process, each geared toward identifying and generating the learning that can contribute to a safer clinical environment. The administrators stated that their first step is to seek out additional information to supplement that contained within the entry itself. To that end,

administrators are responsible for reviewing the PSLS entry, gathering additional necessary information about the event, and creating a plan of action. This typically involves interviewing the staff or student involved in the error, and/or its aftermath, to acquire detailed information:

[It is] my role to directly follow up with either the nurse or student, whoever it may be. . . . If I open up the PSLS and identify . . . [that the error involved] a student [then] I would speak with the preceptor and the student directly. That would be my step to get their side of the story [and learn] what happened, how everything progressed in this error. (Administrator 2)

One of the administrators noted that her practice is to speak to the student as her *final* step in the investigative process, after she has already gathered information from the chart and other sources. Her reasoning was that she wanted to ensure she would already be aware of any system contributors that might have impacted the error situation by the time she spoke with the student:

As much as you hold [students] accountable and responsible, I'd want to make sure . . . that I had a handle on everything that was going on in the department and in the hospital before I . . . went to [the student] and talked to her about a plan and how we could avoid [the error]. (Administrator 7)

Only two administrators said that they do not typically speak directly to the student themselves after receiving a PSLS notification. If a student is involved, then another administrator, such as a clinical practice lead, is asked to connect with the student's instructor/preceptor and request that that individual discuss the situation with the student. This communication path has developed because of logistical challenges that make direct connection by the administrator more difficult:

[At times] we just have a nice informal discussion with instructors or students but those are rare because usually I'm not here. . . . My day is busy and I'm not around and they don't connect. . . . And following up with instructors [to talk is] next to impossible cause I never see them. . . . But I have been sending them emails. (Administrator 5)

Several of the administrators mentioned that the very nature of the PSLS also makes follow-up with students and instructors/preceptors more challenging. The PSLS allows for anonymous reports to be entered in order to increase the general willingness of healthcare providers to report issues. However, this makes follow-up on a specific entry more difficult since the administrator will then not necessarily know who committed the error, who actually found the error, or even under what specific circumstances the error was committed. This makes meaningful learning from the error more difficult to achieve as well:

The majority of [PSLS reports] are anonymous. . . . They're afraid of retribution . . . but how do you follow-up and how do you make it a learning opportunity? Even with the instructors, many of them will put it as an anonymous. . . . You end up making a blanket statement to everybody and . . . [sending] these generalized memos . . . or we notify the [school that] "heads-up, there has been a number of med errors". . . . But I cannot follow-up because I don't have any more than this information. (Administrator 5)

When administrators follow up on a student-committed medication error that has been entered into the PSLS, they are aiming to fill information gaps remaining from the content of the PSLS entry. One reason to seek such additional information is to discover if any system issues contributed to the error; rectifying these will increase the overall safety of the organization. For example:

[It is] part of my role to . . . [determine if this] was this a system problem. Was this that there weren't the supports in place? Was there not enough staff that day? Was the patient load really heavy? Was it a bizarre day and just a one-off? . . . Is this a potential high risk problem? Do we need to create policy? (Administrator 1)

This focus on uncovering system contributors to the error was foremost in all administrator interviews. The most immediate concern of administrators was to create a plan to address the immediate, triggering situation and ensure patient safety. However, it was also hoped that this investigation would enable them to distinguish between (a) those parts of the

error caused by a student's decisions and actions, and (b) those parts that were more attributable to the system surrounding the student at the time. An accurate delineation between these two components was seen as essential to create a learning environment for students that was fair and that minimized blame. This would also encourage honest reporting, allowing the organization to have a greater awareness of potential safety issues. For example:

[We need to] remove that blame and for nurses or students to understand that errors do occur and that, just because a PSLS was completed, it's not about them as individuals, it's about that whole systems thing and [they're] in a learning role. And if they're being blamed or accused of something, that's not going to promote them going forward and learning from the event. (Administrator 3)

Creating a plan of action typically also involves increasing awareness on the unit so that healthcare providers can be more watchful of the circumstances that led to the error and be involved in any necessary unit-specific practice changes. As explained by Administrator 2:

One avenue that we use is our staff meetings [and] we usually bring up as our first topic . . . any recent big medication errors . . . [identified from] the Patient Safety Learning System and we openly discuss them. We don't pinpoint, we don't blame, we don't even name who was . . . responsible. . . . We don't want to hide anything that we're working on from people or hide what happened. Because what happens is word gets around and then it gets [mis]construed as well and people start pointing fingers, blame...

The administrators also retained a focus on any changes that would need to be implemented beyond the specific unit. However, while the administrators identified various unit-specific *practices* that have changed over time as a result of system factor identification, they did not similarly speak about modifying or creating formal *policies and procedures*. Administrator 1 noted that the health authority discourages unit-specific policies and procedures in favour of ones that can be applied more broadly to help prevent issues from recurring and ensure patient safety:

[The] policy office is very against anything unit specific. . . . So we look at it through a regional lens first . . . because if it's safe for [this particular population of] patients then it should be for [that population of] patients throughout the region.

Administrators also highlighted another purpose of the PSLS data. Once information is in the PSLS, it can be used to identify trends impacting individual clinical areas or the broader organization. Data that have been collected can be collated in different ways and distributed back to administrators in the form of reports for their particular areas of interest (NHA Representative). Although information in those reports tends to be placed into broad facility- or region-wide categories, thereby losing some potential for interpretation by individual administrators, each administrator does retain access to data for his or her own clinical areas:

[There] is a monthly report on all PSLS' but there's nothing indicating [whether it involved] a student or not. It's just . . . usually categorized by falls, by pressure ulcers, by medication errors, by behavioural, and a few other columns. . . . [But I can] isolate the areas by [handler] name. So if I put my name in, [I can still access] everything that I was a handler of. (Administrator 2)

Several administrators noted specifically that the data that reside in the PSLS can be powerful in either supporting or debunking perceptions of student-committed medication errors. One of the administrators indicated that a pharmacy technician in the facility conducts an audit for her particular unit and, on one noted occasion, this technician identified a relevant "spike" in errors and reported it to the administrator:

[One] of our pharmacy techs . . . audits [the PSLS data] for me and [advised] there's been a huge spike and this correlates with the students. And then if they see that a student has committed errors like missed meds or unsigned meds, they note it [for me that] this was a student. (Administrator 5)

Another administrator who discussed her view of such trends shared a different perspective on the data. In her case, she was part of a facility-wide medication safety meeting in which she reviewed a spreadsheet of medication errors. It had originally been proposed at

that meeting that students were the cause of the increased number of errors occurring over the timeframe in question and it was therefore proposed that the educational institution be notified. Administrator 3 questioned however, “but who has decided that that was [the fault of] the students?”. The administrator then undertook a “deep dive” into the data to determine if the assumption that students were causing the increased number of errors was, in fact, accurate:

So we delved into it a little bit further because the very first thing I think everybody went to [was] that the students were making the errors. However, what [I later] identified wasn't necessarily that students make an error, it was related to busyness of the amount of people in the medication room . . . [and] not necessarily that it was the students themselves making errors . . . and once we delved into [the] PSLS . . . [we discovered] it was a systems issue.

Theme #2: Support. Many administrators and educators felt that ensuring students are adequately supported is very important in developing a desired culture for student-committed medication errors. As a result, understanding the vulnerabilities and concerns of students related to errors, and how they relate to the supports that would be useful, is critical. Administrator 6 noted that students are “quite vulnerable” to the influence or impact of system factors because of their lack of experience with patients, with their own role in the healthcare system, and with the resources that are available should they have concerns. In addition, students have not yet typically acquired sufficient knowledge to understand the likely consequences of any particular error. Educators in particular noted that students often immediately assume they have caused significant negative health effects to the patient by an error, and have invited significant negative career consequences for themselves; this results in extreme stress. For example:

[After the student administered the medication] I said “so what do you need to do for patient safety now?” [and the student said] “Oh my God, I killed him!” . . . I'm like “he's fine, he's totally fine but you need to report what you did”. . . . And she was

mortified to the point where . . . [she thought] “I’m never going to get a job on this ward because I’ve just made this error”. (Educator 6)

Both educators and administrators noted that students typically feel devastated after making a mistake and the support of the student’s educational institution and healthcare facility is critical in shifting the focus from blaming to learning. For example:

Once the student does have a med error, I know it’s devastating to them . . . [and] so I’m wondering if they just need a little bit more support after it happens. . . . I just think . . . we should . . . be able to support them a bit more, and help them work through it emotionally. (Administrator 4)

Both administrators and educators viewed it as their role to ensure that their organization reacts appropriately to an error that has occurred and has taken all relevant factors into account when deciding on the appropriate response for a given situation. Both groups noted that one of the most important factors that they take into account is the level of ownership taken by the student for the error and the degree of appreciation the student has for its seriousness. For example,

[If a student] is not taking accountability . . . that really is an alarm bell for me. Because to me, it’s like they’re not connecting the professional practice, the judgment, the underlying pharmacology, the physiology, the understanding of the clinical setting and the process of nursing that client. And the importance of it. (Educator 4)

However, both administrators and educators were clear that they also do not want a student to take ownership of those aspects of a situation that were not under their influence. Therefore, when administrators are deciding on next steps for their facility, and when educators are discussing available courses of action with a clinical instructor, both want to ensure that any contributing factors have been identified and taken into account. For example:

I’ve had that situation as well where . . . the practice issue is not . . . with the student. It can also be with the unit. . . . In terms of our own scope of practice. . . . If there is

an issue . . . in the practice setting [then it becomes about] advocacy on all parts really. (Educator 4)

Once the student's actual contribution to the error has been pinpointed, and any of their practice or knowledge deficits identified, the support that is needed for the student to be successful becomes the primary focus for the educator in particular. As noted by Educator 4, if the student "is open to that, being accountable . . . it's completely the opportunity to say let's strip this away, let's help you get this right, let's put the missing pieces of the jigsaw in".

Administrators suggested that their role in supporting students post-error can also be key to helping students move forward. However, they noted that they rarely receive feedback about the success or failure of measures that a facility has implemented to address a specific student situation once the educational institution becomes involved in addressing it. As a result, administrators do not always know if they have supported these students in the most effective, positive way possible and they may remain unsure as to whether anything could have been done differently to benefit the student. They indicated that such feedback would be helpful to them moving forward. For example, Administrator 7 stated that, "I just want to . . . know that I wasn't missing anything in the process [I undertook]. . . . [I would like] confirmation that everybody is doing [the process] this way and I'm not throwing anybody under the bus".

Most of the educators indicated that they view themselves as a type of overseer of remediation processes for students. If the student is to continue in the program, educators work with the clinical instructor to ensure that necessary supports are in place for the student to address issues in the current placement, but also prevent recurrences in future placements where expectations will continue to grow. For example, many of the educators review

learning contracts designed by instructors to try to resolve specific student issues. As a part of such review, educators ensure that the language of the contract is clear and that any expectations identified for the particular student meet certain criteria:

I see the learning contract before it gets sent to the student or when it's first being discussed with the student. . . . If it's fairly straightforward, the plan looks robust, my role will be to sign and then I'll . . . [tell the instructor] you seem to have a really good handle on this, it's a well-documented plan. . . . But I really look for what the student [needs to accomplish and] . . . what's achievable, demonstrable. (Educator 4)

Educators also demonstrated awareness that, once students have learned best practices in the school laboratory, they will then proceed to undertake their practica in an actual clinical environment. There, they will be exposed to a multitude of different practitioners and practices, not all of which conform to the best practices taught in school. This can place students in a difficult position. Students may adopt those poor practices, believing them to be acceptable because a respected clinical practitioner has demonstrated them as such. Students may also feel intimidated in the clinical setting, which might lead to reluctance to either question different practices or to continue using best practices taught to them in school. Such alternate practices can then lead to student-committed medication errors during a clinical placement (Educator 4). Educators stressed their desire to support students and empower them to question whether the revised practices or shortcuts they are being shown in a placement still conform to basic safety principles; if they do not, then the student needs to feel supported to continue to use the best practices learned in school:

I think one of the other things that we've done . . . [is] support our students to understand that they're going to see differences in practices . . . [but] counselling [students] to be confident in the sense of speaking out . . . [and] to say "well, this is the best practice, this is what I'm expected to do". (Educator 4)

Because the educators recognized that fear of negative repercussions often underpins student reluctance to disclose that an error has occurred, they have also been considering

other strategies to help generate more consistent instructor/educational institution responses to an error and to minimize subjective influences on decision-making. As one strategy to minimize student fear with respect to the post-error process, and to help students better understand the potential consequences that they can expect after an error, educators discussed increasing overall transparency of the post-error process. Educators suggested that this transparency could be accomplished in a number of ways. First, the language in learning contracts should clearly inform the student of the consequences to be chosen for the immediate error being faced and for any subsequent errors that may be committed. For example:

We just started putting language in this year with every learning contract that says something like “note that this is the first instance of this and for that reason, these are the possible consequences. However, if this or similar instances happen in the future, we would expect that the consequences would be bumped up”. (Educator 5)

Second, educators suggested that the post-error process which a student can expect a clinical instructor to follow should be fully transparent to the student. One student had mentioned that the school focuses its curriculum on how to prevent errors from occurring but does not dedicate time to describing the process to be followed once an error has occurred.

Awareness of this lack of transparency to students was demonstrated in educator interviews:

We go through . . . three labs of medication administration safety, how to draw up the meds, how to do the math [and] we focus a lot on the skill side of it. We don’t really go into what happens if [there is an error]. So that’s certainly something that would be useful [to share with students]. (Educator 7)

Educators indicated that students currently are not made aware of the potential consequences they may realistically face for committing a medication error and they therefore tend to jump to the conclusion that an instructor will select the most severe repercussions. Educators discussed the need to be more open with students about the range of

consequences open to clinical instructors to choose from; it was felt that this would make the student more willing to disclose that an error had occurred and to feel more supported in the process. To that end, educators supported the idea of a written pathway or flowchart that could assist students in understanding potential consequences, the types of factors that an instructor might take into account in deciding which to select, and the resources available to support the student:

I also think . . . [that] if we had a flowchart [we should share] that with students, because I don't think that should be elusive because I think that contributes to that blame. [Students] should see [that] if this happens, these are some of the options that might be used. . . . This is what might happen and . . . these are your resources. (Educator 4)

The role of the educator was not limited to overseeing students. Many of them are also responsible for selecting and hiring instructors and preceptors, ensuring they are adequately prepared to fulfill their role for the institution, and then providing ongoing support. When the educators identified elements of a desired culture related to student-committed medication errors, they not only addressed the needs of students but also those of clinical instructors. Since preceptors do not choose the formal consequences for an error, many of the educators' observations and suggestions related to clinical instructors only.

Educators discussed a desire to increase support available to clinical instructors after they were hired by the institution. They noted that, at many of the campuses, clinical instructors are offered the opportunity to attend an annual orientation. However, not all campuses have the resources to provide a formal orientation to their instructors and not every situation allows the timing of an instructor hire to coincide with such an event. For those campuses where a formal orientation is offered to clinical instructors, they are used to provide information about expectations of the role. However, few clinical instructors actually

attend these orientation sessions. Educators suggested that this may be due to the high volume of sessional clinical instructors used by their particular institutions, where the instructors already hold employment as practicing RNs and then add clinical instruction to their existing workload. Educator 1 indicated that there are significant benefits to this approach of using high numbers of sessional instructors, such as a decreased theory-practice gap given that instructors will be current practicing nurses. However, all of the educators acknowledged the challenges that also accompany the use of such a framework, such as the need for institutions to ensure that instructors maintain knowledge that is current and the potential for discontinuity when there is a stream of instructors entering and leaving the sessional role term-over-term. The educators also indicated that it is challenging to ensure a supportive learning culture for sessional instructors, particularly ones who are new to the educational institution and/or to the instructor role. At the largest campus, one educator estimated that only 8 of 59 sessional instructors typically attend any given annual orientation and it is often the same individuals who attend the session year after year (Educator 4). One reason proposed for this low attendance is that those who are engaged through sessional contracts have less time to attend an institutional orientation because they already hold a full or part time nursing position. Some educators also pointed out that sessional clinical instructors are not specifically compensated for attending an educational institution orientation session, which may also contribute to their low orientation attendance rate.

Because of this lack of attendance, educators have worked on finding alternate ways to share important orientation material with instructors, such as distributing flash drives that contain key documents, creating faculty manuals, and offering one-on-one orientation sessions. Since newer instructors will not know the process to follow if there is a student

issue, or even who to contact at the educational institution in such an event, educators see it as important to attempt the widest possible dissemination of this information:

So we've instituted orientation, we've created a faculty manual [and] I spend probably an average of two to four hours with each new clinical instructor going through orientation, answering questions, discussing evaluations, discussing journals, discussing their roles and responsibilities, discussing how we can possibly deal with a challenging student, going through what a learning contract would look like if they had to do one, and some examples. (Educator 6)

While acknowledging the need for these types of alternate communication and support strategies, some educators also noted that such alternatives cannot make up for seeing instructors at a formal orientation where they can interact as a group and have a discussion "about things that have happened and how [others] dealt with it. . . . It's really important to have that . . . community of practice . . . to bounce ideas off of people and say 'oh I did this' and 'don't do that, it wasn't a good idea'" (Educator 8).

It is interesting that, when discussing student-committed medication errors and the processes to manage them, educators repeatedly emphasized the importance of more clinical instructors attending the institution's orientation to learn about this issue. However, when asked specific questions about the content of the orientation, many educators acknowledged that there is currently little information on this topic included in orientation material. Some educators indicated that a more specific focus on errors during orientation could assist instructors in learning what needs to happen after an error occurs and the process they should be following. For example, Educator 5 mused in her interview that "maybe we should go through medication errors specifically when we go through those examples in orientation. We . . . definitely don't say this is what to do if there's a medication error". However, other educators were more reluctant to conclude that teaching clinical instructors how to manage student-committed medication errors should be a priority or is a topic that should even be

included in an orientation. For example, Educator 2 articulated her position as, “I’m going to say no because there’s a zillion errors students can make and so . . . the time [needed] to talk about each [type of] potential error would be huge”.

Some educators also noted their desire to see more information about student-committed medication errors included in the preceptor orientation session. Since the preceptor orientation at these educational institutions is offered entirely online (and tends to be accessed as individuals rather than as a group session), preceptors have reported to educators that they feel they do not have adequate learning or support on a number of issues from the educational institution:

Most [preceptors] don’t have any education [about student-committed medication errors] now that the preceptor orientation has moved online. I still don’t know how many preceptors have done it, but it seems like a lot of preceptors are thirsty for information [which currently] gets funneled through the clinical instructor. (Educator 5)

Aside from the provision of orientation material, educators also work to ensure a supportive learning environment by providing one-on-one support to instructors or preceptors facing a difficult student situation, such as a medication error. This one-on-one support is requested of educators in a variety of ways, such as requests to assist instructors to develop clear, useful learning contracts for a student who has committed an error (Educators 1, 4, 5 and 6) and assisting instructors to make decisions about a student’s progress in the course (Educators 1, 2, 4, 5 and 6). For example:

I tell clinical instructors 24/7, here’s my home number, you call me any night and day to bounce ideas off of because I know it’s a complex environment. . . . Amongst ourselves we do a lot of sharing so we’re not working in silos. Cause we want the support of our colleagues to help us make wise decisions. (Educator 2)

Educators are also engaged in providing support to clinical instructors who decide to fail a student as a result of medication error(s) or in response to a pattern of problematic

practice (Educators 1, 4, 5 and 6). Educators noted that this is a critically important function of their role. One of their concerns in such a situation is the well-being of those instructors who must make and deliver such a difficult decision, as it can be traumatizing. Several educators explained this concern as follows:

I think this is really important [that] people felt they would be supported in the decisions that they made. . . . [In one case where the student made several medication errors and then appealed her failing grade] it was really tough for that teacher and I don't think she taught for another year and a half after that because that was so traumatic to have to go through and justify [her decision]. (Educator 1)

[It is] really important to support that . . . instructor through that journey and allow them to have a sounding board . . . because they need to be heard and they need to be able to express their emotions and their frustrations and not be judged based on it. But [instead they need to] be given resources or some suggestions. (Educator 6)

In addition, educators were highly concerned about the emotional well-being of the student receiving the failing grade as well as the ongoing safety of the public. They noted that, if an instructor does not feel supported in the decision to issue a failing grade, then that instructor may become reluctant to fail future students who put themselves or the public at risk with their clinical decision-making. Students who are allowed to pass when their practice is so problematic will then continue to participate in future clinical placements and may either fail at a later stage in the program (after additional time, effort and monetary investment) or will graduate and be a risky practitioner:

[It] is challenging when [student difficulties are] not resolved. My fear . . . [is that if] it's not addressed, the cracks in the practice, they don't go away. . . . And certainly, you know, it's not an easy thing to fail a student. So there has to be pretty robust supports [for the instructor] around that. (Educator 4)

Finally, the same flowchart or pathway that educators had previously recommended for transparency of process for students could, many of them noted, also be used to support the learning of instructors. Since that proposed pathway document would show the formal

consequences available to an instructor who encounters a student-committed medication error (and under what circumstances each option might be considered) and the process steps to follow, it could enable role clarity for instructors in these situations. It was also viewed as a way of making instructors more comfortable and confident in the choices they make in a difficult situation. However, while many educators were attracted to the idea of a pathway or flowchart to help instructors in this area, others questioned the feasibility of that strategy. For a relatively small institution with limited resources, there was a concern that there may be insufficient faculty available to take on the challenge of creating such a document and maintain it over time:

There should be a place for that kind of thing . . . [but] we just haven't been successful in having [it in the past]. [The concern is] who's going to put it into a form, who's going to update it, how's this going to be done? Who's going to have that accountability? It's the [concern about] maintenance keeping it as it is. (Educator 1)

Theme #3: Information-sharing. There were two aspects of information sharing discussed in the interviews. First, administrators discussed their decision-making related to notifying the educational institution about individual students involved in an error. Second, both administrators and educators addressed the identification and discussion of factors in student-committed medication errors that were attributable to the system in which the student had been engaged.

Administrators discussed the factors that play a role in deciding when to contact the educational institution about a student-committed medication error as well as what information to convey. The student's level of ownership over their part in an error was a critical component in deciding on the communications that would be warranted. For example:

The people that report with their names [in the PSLS entry] are looking for feedback [and they have taken] ownership of [the error]. . . . Or they'll tell me what they know right in the PSLS which . . . [means] they've decided what they're going to do with their practice and that's all I can ask of them. And so taking that ownership . . . is a beautiful thing [when it] happens. I don't need to do anything [further]. They've already done it. (Administrator 5)

The other main factor that impacted notification decisions of an administrator was the broader context of that student's practice. If the medication error was harmful or part of a pattern of problematic practice, for example, then this could impact the notifications to be made and the way in which the information was conveyed to the school:

[As part of the investigation] I would look for a pattern [in errors and] . . . the degree of the error and then . . . gauge my involvement. . . . If I was really concerned about this nurse's practice in the future, and this was their final practicum, . . . that would drive me to be more stringent with what I say . . . [and] be more strong or more forward with what I would say to the school. (Administrator 7)

With respect to identification and discussion of system contributors to student-committed medication errors, educators and administrators each addressed the topic from within their own context. For example, many educators voiced a desire to collect data and conduct data analysis within their own educational institutions regarding student-committed medication errors. These educators posited that, if such information was to become available, then there could be a more accurate understanding of the error phenomenon and more effective strategies to address it could be created; the assumption was that this would, in turn, lead to a more positive student experience as well as increased patient safety. While almost all of the educators were certain that this information is not currently collected by the school, there was one educator who believed that another educator at the school's central campus may collect this type of information (however, that other educator stated in her own interview that she does not collect these data). Therefore, it was almost uniformly agreed that there is currently no formal process in place in the schools for this data collection:

We . . . don't collect any data on student errors at all . . . [and] we don't do any trending on errors in knowledge in the lab [either]. There are checkpoints at which medication knowledge and performance are key pieces, such as OSCEs . . . so if you . . . cannot perform accurately, then you're not let into the clinical setting. . . . But in terms of collecting data on it, we don't. (Educator 1)

Most of the educators indicated that they would prefer that the educational institutions formally collect this information on student-committed medication errors so that trends can be identified and addressed proactively. For example:

We have to be proactive. . . . [If there is a trend, we have to determine] how can we tackle that as a school. . . . So I quite like the idea of . . . having some way that we can use that information meaningfully to drive change for the better . . . [and can know] that we're tackling it . . . with the individual student but [also] more systematically. Bring it back to the curriculum. (Educator 4)

However, there was one educator who was not fully convinced that such information should be collected by the schools:

My question would be why do we need that information [about medication errors]? More so than errors on any other aspect of nursing practice? . . . I think it might be helpful. But I'm not convinced it would be worth [it when we are] looking at all the things we have to collect information on and report on . . . and what would we do with that [specific information]? (Educator 1)

Another educator emphasized that, while data on student-committed medication errors are not formally collected by the educational institutions, informal processes have developed over time to share observations amongst faculty members at the smaller campuses:

We're just a small [number of] clinical instructors in each clinical experience so we do a lot of verbal check-in . . . [and] when I think about how we make adjustments on how we're teaching, it is based on sharing amongst our clinical instructors. If we see a pattern, then we need to change, we look at why and are we dropping the ball somewhere and how do we rectify that. (Educator 2)

Several of the educators also mentioned that, as a necessary first step in identifying and addressing trends, the schools need to ensure that their instructors are actually completing documentation about the student-committed medication errors that occur.

Without this step, necessary information will not even be available to analyze, as articulated by Educator 4 as follows: “I think [a good process] would start with the documentation. So we need to really support our instructors . . . to complete comprehensive documentation [so we] get the information we need . . . [because] you need to be capturing all the events”.

Another strategy identified by many educators to enable educational institutions to capture trending data involves an improved communication loop with the NHA. Although it is strongly encouraged by the NHA and the educational institutions that a PSLS entry be completed for each student-committed medication error, the NHA does not currently release information from its PSLS back to the schools. As a result, the educational institutions are unable to use such data to identify trends about student-committed medication errors and to adjust their curriculum or instruction accordingly. Many educators saw this as regrettable and wished that this information exchange could be implemented, even if on an anonymized or aggregated basis. For example:

So I think that is probably one of the key pieces is to find a reporting back process through Northern Health because they claim that our students aren't practice ready or that they're making errors or they're doing whatever but [they are providing] no evidence to back that up. [Instead, it seems] like one person's perspective or how they're construing the data. (Educator 6)

A few educators with this perception of a weak communication loop posited reasons why stronger information sharing practices do not currently exist. One involved a concern the NHA might have about releasing information that may contain patient data:

When it comes to things like safety and risk and error reporting, I've never understood what the gap is but the information has never been shared. So part of me wonders on an organizational level if . . . [it is] because there may be . . . patient data in there. So I think there's [an] issue around data protection management. (Educator 4)

Another educator noted that the educational institutions are always in need of student clinical placements. As a result, she suggested that schools do not wish to push the holder of those placements significantly in order to acquire the desired data, in case those data were to implicate specific hospital units in student-committed medication errors:

[It is] a difficult situation to be in because we're desperate for placements, we don't want to push too hard. And then in general I think that our school likes to address things when there are multiple instances of it and do it at a higher level so that we're not pointing fingers at a specific unit, especially in a small town. (Educator 5)

Administrators expressed a similar desire for a stronger communication loop with the educational institutions but they did not indicate a concern that the data being exchanged could result in negative repercussions for their healthcare facilities. Instead, administrators viewed information exchange as one way of improving clinical placements they can provide to students. They noted that their intent is to ensure that healthcare facilities provide good quality learning opportunities for students, with difficulties minimized. For example:

I don't really hear anything [back]. . . . Instead I'm just . . . on the sidelines as an assist really if they absolutely need something. And then usually after they leave . . . there's no follow-up or anything on how their practicum went or any problems [they encountered] along the way. (Administrator 2)

Both groups also identified improved information sharing as a key way to ensure that system contributors to student-committed medication errors can be identified. There was a wide range of system factor examples identified in the educator and administrator interviews, ranging from students being inappropriately used as additional RN staff on particular units (Educator 5) to unclear patient name bands (Educator 1) to inappropriate medication practices modeled by unit RNs (Educators 2 and 6). Both educators and administrators indicated that, once these system contributors have been identified, then a dialogue between the school and the healthcare facility can occur to better manage, or even eliminate, the issue.

Many of the administrators went one step further in their interviews, specifically noting their hope that, once system contributors have been identified, any practice, policy or procedure changes that result at the facility will be shared more readily and earlier in the process.

Currently, even those changes that directly impact students do not typically trigger a request for early school input. This was identified by administrators as an area for future improvement:

I don't know if we've ever considered the university in the development [of those] things and perhaps that's something that should be done. . . . We should be going back to the university . . . [to say] "this is what we're having to put into place because of repetitious errors of students or staff . . . [and] we are a teaching hospital so how do we work together on solving that down the road?" . . . Maybe we should be more inclusive [in] policy development and making sure [the schools] are aware of those policies that get put into play on different units and things like that. So [they become] more aware of that process. (Administrator 1)

The assumption being made by both administrators and educators is that, if system contributors can be reduced or eliminated, then student-committed medication errors may likewise decrease. This demonstrates a common recognition that students should not be asked to take ownership for system factors that are outside of their control. However, educators in particular highlighted that a delicate dance is sometimes necessary when an educational institution needs to communicate with a healthcare facility about its perception of system factors that contributed to an error. For example:

The errors are not always on the student's side. And . . . [they're] also outside of our control in a sense but we do have these phenomenal relationships with our health authority partners. So we have the relationship to start that feedback but at the same point it's delicate. . . . [We need to ensure that] we are keeping that bigger world picture in mind. (Educator 4).

Conclusion. Both the educator and administrator groups have the desire to develop a culture at their respective institutions that responds to student-committed medication errors in effective and fair ways. Both groups addressed the need for a positive learning environment

in which student learning and patient safety can be ensured, as well as more effective post-error information exchange between their institutions.

Chapter Five: Discussion

This research study explored the decisions, actions, and experiences that follow a student-committed medication error, and was undertaken with the intent of answering the four research questions stated in Chapter 3. Perspectives and experiences were obtained from clinical instructors and preceptors (collectively, “teachers”), students, educational institution leaders (“educators”), and healthcare facility administrators (“administrators”). After completing the data analysis process, it became clear that these four research questions could be effectively combined in a discussion structured by the critical realism domains; the domains for the post-medication error environment are shown in Figure 3. This is in keeping with the intention of critical realism as a philosophical framework, since it is the primary goal of critical realism to explain and understand phenomena of the actual and empirical domains through reference to causal mechanisms of the real domain (Fletcher, 2017). While there were some commonalities in the events that occurred for each group of participants, there were also differences in either the events that occurred or any given group’s awareness that an event was actually taking place. These events of the actual domain (and the reasons why groups experienced events in the way that they did) ultimately resulted in their differing perceptions of the error response culture (i.e. the empirical domain).

The primary inferential process used in critical realism for qualitative data is retrodution. While retrodution requires a constant movement between the three domains of reality as one seeks to better understand the phenomenon under study (Fletcher, 2017), some critical realism researchers linearly present their findings by first identifying those generative mechanisms that cause events and then discussing the human perceptions and experiences that result; for example, Sword, Clark, Hegadoren, Brooks, and Kingston (2012). However,

to truly demonstrate the emancipatory purpose and potential of critical realism, the discussion arising out of these research studies should unfold differently. Rather than a unidirectional approach that starts in the real domain and moves out to the empirical, the discussion should start from the participants' descriptions of their experiences (empirical domain) gathered as part of data collection. The researcher will then explore the events (actual domain) and causes (real domain) that resulted in those reported experiences. The emancipatory aim becomes truly evident as the discussion effectively reverses direction from that point; it has to wend its way back through the domains by highlighting what changes need to occur in that real domain to positively affect human experiences and perceptions of the social phenomenon. In effect, the researcher uses experiences shared by participants for the purpose of understanding causes of events they encountered; by recommending changes to the causal influences, the experiences and perceptions can then be positively impacted. This is the approach that has been taken in the below discussion.

Perceptions of the Error-Response Culture

Each group of participants reported their own perceptions of the error-response culture they had experienced. While teachers, educators, and administrators all recognized that a blame culture had traditionally been present in nursing and healthcare, they each perceived themselves as taking deliberate action to replace it with a just culture where the focus was on accepting appropriate ownership and generating meaningful learning

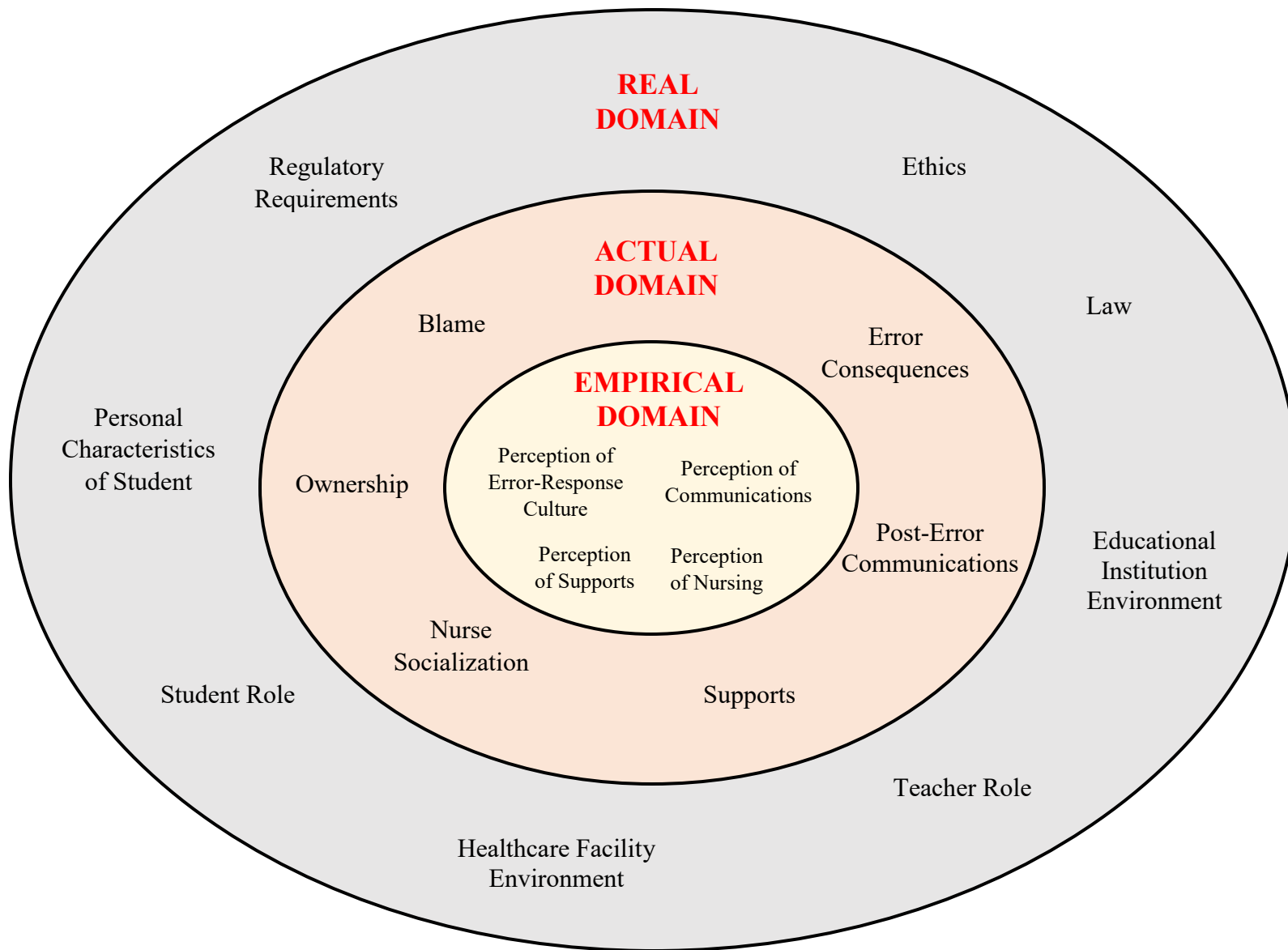


Figure 3: Critical realism domains in the post-medication error environment.

opportunities. After each error event, they felt it important to consider whether their response to the error had adequately demonstrated fairness, an openness to and appreciation of learning by the student, a concern for patient safety, and, for teachers and educators, a consistency with other decision-makers in similar situations. However, while virtually all individuals in these three groups felt that they were modelling a just culture when they reacted to student-committed medication errors, and were playing a role in changing that culture for the better, students felt that the laying of blame was still strongly prevalent in the current environment. Students used the word “blame” extensively in their interviews. They experienced both a high degree of self-blame as well as blame from others, even when the student knew they had not been the sole cause of the error situation. While students expressed that they felt particularly susceptible to accepting a high degree of blame given their inexperience and low self-confidence in the clinical setting, such acceptance did not mean that the students considered this response to be fair.

It was clear that students felt that there was a lack of transparency in the error response process because they were typically not informed of the process by which responsibility and accountability for the error had been allocated and what factors had been taken into account by those with the ability to decide on post-error consequences. This led to student concern that learning, and truly uncovering and addressing contributing factors in the situation, were less important than finding someone who could be blamed for it taking place. As a result, students were left wanting the very type of error response culture that teachers, educators, and administrators believed they were already attempting to provide: one built on fairness, transparency, minimization of fear, and meaningful learning. In other words, students were still left seeking a just culture.

Error consequences. Teachers and students (and sometimes educators) were aware of the formal consequences imposed after an error had taken place. For example, if a learning contract was being implemented by the clinical instructor, then both the instructor and the student (and the preceptor, if it was a preceptor-led placement) would certainly be aware of its terms and conditions. Only for those formal consequences that had an impact on student progression in the education program, such as a learning contract or a failing grade, would instructors typically make educators aware of their imposition. The literature has supported that, for struggling or unsafe students in particular, it is critical that instructors maintain such communication about student progress with educators (Melrose, Park, & Perry, 2015). Healthcare facility administrators would typically only become aware of a formal consequence if a student needed to be removed from their clinical placement before it had come to its natural end. Because it was commonly understood that, for all formal consequences except PSLS entries, only the instructor was permitted to choose and impose them, there were events involved in the imposition of formal consequences that often became known only to certain actors in the situation. This resulted in differing perceptions of the process of choosing formal consequences, which then significantly influenced each group's perceptions of the broader error-response culture.

The student role is one of tremendous vulnerability since they are highly subject to others' decisions and evaluations at all times in their education journey (Jamshidi, Molazem, Sharif, Torabizadeh, & Kalyani, 2016; Molloy & Bearman, 2019; Rafiee, Moattari, Nikbakht, Kojuri, & Mousavinasab, 2014; Vaismoradi & Parsa-Yekta, 2011). When students have committed a medication error during a clinical placement, they are required to look to their teacher (particularly their clinical instructor) to become aware of what formal

consequences they are to face. To a significant degree, they must also simply trust that their teacher will take other individual or system contributors to the error into account when deciding upon the responsibility and accountability that the student should take for the error. Students then need to trust that this allocation will be reflected in the formal consequences that are imposed. Because students accept that the teacher role is one of authority and tremendous power over the student's education journey (Rafiee et al., 2014), most students in this study did not push back, even against imposed formal consequences that were perceived as not taking contributing factors into account. This lack of pushback resulted in some students not even sharing (with teachers or in the PSLS report) that other factors had played a role in the error event. This is very concerning. If the teachers, the educational system, or the healthcare system are not fully aware or appreciative of such contributing factors, and instead focus solely on the student who was involved in the event, then the allocation of responsibility and accountability will inevitably be unfairly skewed toward the student. If the allocation process is flawed in this way, then it is highly likely that consequences imposed for the error will: (1) not address factors that actually contributed to the error; and (2) will be unduly harsh on the most vulnerable, powerless player in the system, who often has the most to lose. Expectations of such a response can potentially lead to student unwillingness to admit that an error even occurred, resulting in a lack of learning opportunities for all involved and losing a chance to make the system safer in the future (Cooper, 2014; Disch et al., 2017; O'Connor et al., 2011b; Salami, 2018).

Students reported that the process by which their instructor had determined formal consequences to impose was often opaque, not shared with the student, or did not appear to take relevant contributing factors into account. These findings were echoed in Vaismoradi

and Parsa-Yekta (2011). In such situations, it became difficult for the student to truly accept the outcome of that process despite their tendency to acquiesce to decisions made by those in a teaching role. The only written resource that either students or teachers could consult to obtain clarity about post-error expectations relate to the PSLS system in effect at the healthcare facility. The educational institutions who participated in this study have no written policies or procedures for instructors to follow post-error or which might help students to identify expected process steps, a problem found in many nursing education programs (Disch et al., 2017).

Despite instructors' emphasis on the importance of retaining independence when they respond to error situations, and the importance of judging the particular circumstances of any given error situation, instructors agreed that a guidance document would undoubtedly be helpful to them. Such a document was envisioned as not only outlining the available formal error consequences to choose from, but it would help instructors to understand the types of factors to be taken into account when deciding upon a particular formal consequence. Instructors noted that a guidance document would provide particular comfort and confidence to novice instructors because they would know they were taking the appropriate steps in a post-error situation and were acting consistently with others across situations. Hunt, McGee, Gutteridge, and Hughes (2016) confirmed the importance of instructors having access to clear, easy-to-follow, and easy-to-understand written student evaluation processes. Such processes serve a dual purpose of giving instructors confidence that they are taking appropriate steps to support the student while simultaneously ensuring that those steps will engender educational program support for the instructor.

With respect to instructors requiring students to share the error with peers in a post-

shift debriefing session, students uniformly expressed a desire to have such sharing be driven by the personal choices and characteristics of the student. Students were firm that the student alone should be the one to decide if the situation would be shared with peers, under what circumstances, and with which peers. Those students who had been required by their instructors to share the event typically experienced long-lasting and emotionally destructive impacts as a result. Instructors who had shared a student-committed medication error in a post-shift debriefing session (even in a way that did not specifically identify the student by name) identified their focus as being on the learning that could be generated for the rest of the group and the good that could result for the affected student by generating additional peer support. In other words, instructors focused on their beneficent intent and the possibility of helping all students in their clinical group to avoid claims of negligence in the future. Students unequivocally did not view forced sharing through this lens and felt that such a formal consequence only highlighted the power differential between themselves and their instructors.

There were variations in the way that different groups viewed the collateral impacts of the error response. Teachers and educators focused in their interviews on the formal consequences that were being selected and imposed while administrators focused on post-error process; none of these groups stated a recognition that students might suffer from impacts beyond those formal ones. For example, students were highly cognizant of how others (such as their teacher or the unit nursing staff) would view them post-error. The students also became hyper-attuned to verbal or behavioural suggestions that the error had lowered the level of respect with which they were viewed (Zieber, 2014) or that unit staff were discussing the event and the student amongst themselves. It is worth noting that the

healthcare facility in which the error occurred is often one that students hope to join as fully-credentialed practitioners and therefore the impact of the error on possible future employment is often seen by students as incredibly important. Those who act in teacher roles are also often a source of employment or graduate education references in the future and students become concerned as to whether the error will impact a teacher's willingness to provide a positive reference. Depending upon the personal characteristics of the student, and their desire to join a particular unit or use the particular teacher as a reference in the future, this became more or less of a concern for them.

Blame vs. ownership. One of the clearest threads that weaved its way through study interviews involved student experiences of receiving and accepting blame for the medication error compared to the stated intentions of all other participant groups to eliminate blame from the post-error environment and instead focus on appropriate ownership from the student. These two very different events of blame and ownership, and diverging interpretations of what other individuals were actually seeking and experiencing in regard to them, is critical to understanding why students had such a different perception of the error-response culture from the other groups.

Perceptions that they were receiving blame for the error situation, as well as experiencing strong feelings of self-blame, were very common amongst the students. The presence of self-blame was a function of: (1) the allocation of responsibility and accountability the student perceived from others; (2) the allocation of responsibility and accountability they had assumed for themselves. The degree of self-blame accepted by a student was often not in proportion to the student's actual role in the error event (such as when students reported that their own personalities were such that they readily assumed fault,

even if other factors had demonstrably contributed to the error occurring). This tendency to self-blame was further heightened by educational institutions that had emphasized that, if a student gave a medication in error, then it was their error to accept because “good nurses do not make errors” (Oermann, Shellenbarger, & Gaberson, 2018, p. 28). Such a categorical message received by students did not leave room for them to assert that other factors could or should be taken into account when divvying up responsibility and accountability for that mistake (Disch et al., 2017). The educational institution environment, including the role of the teacher, that students experienced once the error became known often reinforced their perception that they were being blamed for the event. For example, if a student perceived that their teacher viewed them negatively *as a person* post-error, or if the consequences imposed by an instructor were perceived by the student as being inappropriately severe given the error circumstances, then this contributed to student perception that they were being targeted for blame. Healthcare facilities often reinforced this message, as students mentioned PSLS reports that did not include contributing factors to the error, unit staff who did not acknowledge their own role in the error, and a perceived lessening of respect afforded to students by unit staff after an error had occurred. Many of these same messages from healthcare facilities were reported by students who participated in Zieber’s (2014) study about nursing students involved in medication errors.

Students were able to differentiate between both the types (self-blame vs. blame received from external sources) and degrees of blame that they experienced post-error. For example, they could identify differences between a personal level of self-blame and guilt that would have been present regardless of the reaction of other people; the degree of self-blame that resulted from the response to the error that they received from teachers, peers, and other

unit staff; the degree of blame received that they perceived as being fairly earned; and the degree of blame that they perceived to have been inappropriately directed towards them. It was evident that students consistently undertook their own assessment of the allocation of responsibility and accountability they felt they deserved in the situation. However, when others (such as teachers and unit staff) exceeded that self-assessed allocation of responsibility and accountability, then the remainder was perceived as blame directed towards the student. It is important to note that no student suggested any opposition to accepting responsibility, accountability, and consequences that were warranted given the situation. This acknowledgement that there may be justifiably shared responsibility and accountability is a key feature of a just culture, in which individuals understand that they will be held accountable for their actions but will not be blamed for system factors outside of their control (Barnsteiner & Disch, 2017). As has been suggested as ideal by Aveling et al. (2016) and Duthie (2018), students in this study clearly sought that just culture rather than one that reflected a purely systems-based approach or a purely person-based approach. However, a just culture approach was not what they typically experienced, and students therefore perceived the culture of blame as still entrenched within the healthcare system.

In contrast, teachers, educators, and administrators emphasized that they did not want students to experience post-error external blame or self-blame, and they recognized how debilitating and traumatizing such a response could be for a student. These groups were well-aware of the long-standing historical presence of a “blame culture” within healthcare (O'Connor et al., 2011a). They indicated that they view such a negative professional culture as both unethical and undesirable, especially given the vulnerable, relatively powerless nature of the student role. Instead, teachers, educators, and administrators intended to project

their desire for appropriate ownership so the student would take responsibility and accountability only for those aspects of the error that were due to their own decisions and actions and would feel able to accept learning opportunities to help them to move forward. A learning environment which would foster such characteristics has been characterized as ideal by Barnsteiner and Disch (2017).

Both teachers and students recognized that an appropriate level of ownership is a vital demonstration of professionalism and ethical behaviour (Gregory et al., 2007). However, what students might have misunderstood was that an expectation of appropriate ownership did not equate to blame for the event, and that their teachers, educators, and administrators were not seeking such ownership as a way to imply blame of the student. In addition, teachers, educators, and administrators were clear that they were only expecting students to accept an *appropriate* level of ownership. They were not intending to insinuate, either by actions or words, that they expected the student to take responsibility and accountability for system factors that were beyond their control or for the actions of other people who had contributed to the error.

It is important to recognize that teachers in particular were aware of the power inherent in their role in the post-error environment; they understood that their reaction to the error was one of the most highly influential factors in the student's post-error experience (Baraz, Memarian, & Vanaki, 2015). As part of recognizing the power in their post-error role, teachers identified ways in which they exercised that power for the purpose of supporting a just error-response culture. For example, teachers noted their beneficent intent in deciding upon formal consequences as well as their attempts to conduct a transparent and complete investigation into the error event. They also mentioned the importance of taking

contributing factors into account when assessing responsibility and accountability, seeking meaningful learning opportunities for the student as well as the healthcare facility and educational institution, and intervening if they saw the student being censured by others for their role in the error.

Nurse socialization. The time when a student is in nursing school, and during which they begin to experience the nursing profession from within, is critical to developing an understanding of the attitudes, values, and standards of that profession (Maranon & Isla Pera, 2015; Mariet, 2016). Factors that were considered by a teacher, peers, and other staff members as they conducted their own responsibility and accountability allocation assessment each delivered messages to a student about what they could expect from others as part of the error-related response. Since not all students encountered providers who were honest and forthright about their own contributions to the student-committed error, students perceived an unfortunate readiness to “pin the blame” on the most junior, vulnerable, and powerless healthcare providers in the situation (i.e. the students). This student perception of being highly vulnerable to the reaction and decisions of others in the clinical setting has been articulated by authors such as Lee and Yang (2019), Darbyshire, Thompson, and Watson (2019), and Sidhu and Park (2018). However, students who encountered a particularly helpful, supportive, and understanding reaction to the error instead came to view the healthcare environment as quite forgiving of students. Such students felt perceived as fallible human beings who were particularly vulnerable to the decisions, influences, and perceptions of others at this point in their professional journey, a finding shared by Zieber (2014).

All of the groups who were interviewed for this study stated their desire for a fair, transparent, and effective process of allocating responsibility and accountability after a

student-committed medication error. Teachers, educators, and administrators all understood that the response a student receives from nurse colleagues tends to become highly internalized and often plays a key role in shaping their views of nursing culture (Lee & Yang, 2019; Mariet, 2016). They recognized that the response to the error helps to socialize these students, either positively or negatively, into the profession of nursing and leads into their understanding of what it means to be a practicing nurse and professional colleague. While no one wanted to see a student in a situation in which they must experience an error response, teachers, educators, and administrators hoped that students who did find themselves participating in such a process would experience nursing as a profession that truly wants to see them learn and grow from their involvement in the situation. They were clear that they did not want to contribute to an environment that resulted in student fear and shame for being less-than-perfect human beings.

Perceptions of Communications

Perceptions of post-error communication channels and communication content depended largely on the particular group to which one belonged. Most students experienced a mixture of supportive communications (such as those from peers with whom the student had elected to share the error event) and ones which confirmed their belief that they were being blamed for the situation. In contrast, teachers perceived their communications with students to be highly supportive and positive, and focused on the meaningful lessons that could be generated from the situation. This is a key difference that will be explored further. All groups, including educators and administrators, identified areas in which improvements could be made to the communication channels that were used as well as the messages that were being relayed and received.

Student nurses appeared quite conflicted about the various communications they experienced post-error. The person who was most influential on the post-error experience of the student was clearly the teacher. Students looked to this individual for their immediate post-error response and they tried to extract every possible message from teacher communications that would suggest the student would be understood and treated both supportively and fairly. A few students expressed that post-error communications from their teachers had indeed been helpful, supportive, and fair, and that this made them perceive the overall error-response culture in that same way; such a student response to perceiving instructor supportiveness and fairness after a medication error has also been reported by Zieber (2014). In these circumstances, communications from teachers had been sufficiently transparent that students felt that time and effort had been invested to hear and acknowledge factors that could influence the allocation of accountability and responsibility in their situation. This made students perceive the formal consequences that were ultimately imposed as reasonable and warranted in the situation. Overall, these students perceived that their teachers were doing their best to react beneficently, with an eye toward what the student needed to grow meaningfully from the situation.

However, other students indicated that the ways in which formal consequences were communicated to them, the words and tones used, and the evident watchfulness over student practice that occurred post-error, all conveyed that blame for the error was being attached to the student. This accords with Zieber's (2014) description of nursing student reactions to others' responses in a medication error situation. Often, this teacher response was reported by students even in those situations where the student had not been the sole cause of the error and contributing factors had been identified and shared with their teacher. Students were

profoundly attuned to their teacher's reaction, watching for signs that they were being blamed for the error and how serious the formal consequences from an instructor might be, and gauging whether the error had negatively impacted the teacher's judgment of the student's potential as a future nurse.

If such cues were found or sensed, then that negativity compounded the student's own tendency toward self-blame. It also led to student perception that they were being viewed negatively by that teacher and that the error was being attributed solely to student incompetence or carelessness. Such reactions were deeply painful to students and often led to their perception that the nursing profession had not yet moved toward a just culture mindset (Zieber, 2014). It also often led to longer-term student feelings of self-doubt, self-blame, and a fear of future inability to fulfill the nursing role adequately (Zieber & Williams, 2015). While it is certainly possible that a student's propensity to self-blame may colour their interpretation of teacher communications, a possibility also suggested by Zieber and Williams (2015), teachers still need to evaluate whether their communications contain language that unknowingly convey blame or that do not accurately or transparently articulate the process by which the teacher is making allocation decisions, thereby leaving room for this student interpretation. For example, Seyedrasooli, Zamanzadeh, Ghahramanian, and Jabbarzadeh Tabrizi (2019) noted that some clinical instructors in their study admitted to reacting "honestly" and with "emotional excitement" after being informed of a student-committed medication error. Those instructors conceded that their in-the-moment reactions could reasonably have been interpreted as admonitions or reprimands to the student.

All of the teachers interviewed for this study perceived themselves as going to great lengths to minimize suggestions of blame and to eliminate unfairness in the process by which

they allocated responsibility and accountability. When students (who were usually the ones who discovered the error) conveyed the existence of the error to their teacher, students shared their understanding of the situation and, often, they identified various factors that had contributed to the error. During this communication, teachers assessed the student's reaction to the error; they looked for both verbal and nonverbal demonstrations that the student was taking the error seriously and was accepting ownership over their role in the situation. However, if they found an indication that the student was taking too much responsibility and accountability for the error considering the presence of contributing factors, then teachers felt driven to point that out to the student.

A demonstration of ownership by the student also directly impacted the formal consequences that an instructor decided to impose. For example, if either a preceptor or an instructor discovered the error from someone other than the student, but subsequently learned that the student had already been aware of it, this significantly impacted that teacher's perception of student ownership over their part in the error. After an instructor had been advised of such a circumstance by a preceptor, or if the instructor had directly experienced it with the student, it consistently resulted in more severe formal consequences being imposed by the instructor. For all teachers, this willingness to disclose was a demonstration of the student's ethics in the situation (such as their commitment to beneficence, non-maleficence and veracity), the personal characteristics of the student (such as a commitment to honesty and transparency), and their acceptance of their professional obligations to themselves, their patients, and their colleagues.

If the teacher assessed the communication from the student and determined that she had already generated meaningful learning from the event, and had taken ownership over

those choices and actions that were under her control, then a preceptor might only have required a PSLS entry (and, in some cases, would not have even reported the situation to the instructor) while an instructor might not have required any formal consequences beyond the PSLS. It is possible that some teachers undertook much of this analysis solely on an internal basis. They may have assumed that students would be able to connect their explanations to the teacher with the imposed formal consequences without the teacher explicitly laying out their thought process in that regard. If so, then teachers may have underestimated the traumatizing nature of a medication error for a student nurse and the vulnerability of a student to teacher decisions. That many teachers may not fully appreciate the degree of trauma experienced by students who are involved in a medication error has also been suggested by Zieber (2014). What students might have intuitively understood, or been able to piece together or pick out in a less stressful situation, might very well have needed to be made explicit by the teacher to ensure that the student would not misinterpret the teacher's reactions, intentions or decisions.

As in Zieber (2014), students in this study indicated that communication channels with their teachers were critical after a medication error had been committed. In particular, it mattered to students whether the teacher kept the communication channel open after hearing about the event or if they shut it down. For example, in one situation discussed by a student, her instructor had advised her that she did not know what formal consequences to impose, needed to think about it, and then left that student to provide patient care. The student stated that this led to her catastrophizing her instructor's likely response to the error, and it also put patient safety in jeopardy because her mind was solely engaged with her instructor's potential responses to the error during the time she was providing care to other patients.

Transparency about the allocation decision that the teacher will be making, and keeping students “in the loop” in real time about the process being undertaken by the teacher, is critical to creating a more positive perception of the error-response culture for those students.

The communication channel between a student and her peers was likewise crucial to student perception of the error-response culture. Students wanted to be the ones to decide whether that particular communication channel would be open or closed, and what the content of messages shared through that channel would be. When that channel was instead forced open by an instructor during a post-shift debriefing session, it removed the autonomy of that student to decide on the supports that would be most helpful in working through, and healing from, the error event. While instructors considered sharing with peers through the lens of beneficence, and generating meaningful learning for the peer group, the student who had committed the error felt that the instructor had violated their duty of non-maleficence toward the student and was taking advantage of the power of a teacher role. Students felt strongly that this was a decision for which the student must have the final say. Students know their peer groups much more intimately than instructors do, and would know if beneficial support is likely to be generated or if lateral mistreatment would be a more likely outcome, a concern echoed by student nurses in Zieber (2014). Students wanted teachers to remember that, once an incident had been shared with the peer group, it was the student who moved on in their education journey with those same peers. The instructor did not. As a result, emotionally damaging teasing or jokes from peers could have far-reaching, longer-term effects for the student.

Teachers were very protective of their informal communication channels and they appreciated having colleagues and administrative personnel who were willing and able to

consult on individual error situations. For instructors, the informal mentorship that had developed over time at these schools was clearly viewed as valuable, informative and supportive to those who needed to make decisions about student-committed medication errors. The value of this type of mentorship was explicated by Nowell, White, Benzies, and Rosenau (2017); they explained that informal mentorship often develops more naturally because it involves a relationship between two like-minded individuals who often share a similar teaching philosophy or teaching approach. The lack of prescriptive policies and procedures at these educational institutions made colleague-to-colleague and colleague-to-administrator consultations particularly necessary so that instructors could have higher confidence that they were not missing requirements and that they would have support in their decision-making. Therefore, any future steps taken to modify the communication channels available to instructors, or that would be required to be consulted before acting, would need to take these perceptions of value into account.

However, both groups of teachers (and instructors in particular) were very open to the possibility of having written guidance to formalize key steps in the process and to outline available options. Teachers asserted that such clarity of expectations for all those involved in the error response (students, teachers, educators, and administrators) would result in improved predictability and consistency in terms of the number of communications to be expected, the content of those communications, and the preferred means of communicating. There would also be a decreased likelihood that inappropriate or unwarranted communications would be incorporated into the error response. This would then lead to increased student trust that only those with a “need to know” would be contacted, and that collateral consequences associated with breaching the privacy and confidentiality of

vulnerable students would be minimized. However, instructors in particular expressed concern that such a written process could become too regimented and prescriptive and not leave sufficient flexibility for unique situations. This was reflected in their strong preference for guiding documents rather than formal policies and procedures.

Instructors and preceptors alike noted their desire to increase communication and share student feedback with each other, indicating that both the student experience and teacher experience would benefit if these lines of communication were to be used more frequently. The importance of ensuring that such communication loops are in place for those reasons has been highlighted by authors such as Dahlke, O'Connor, Hannesson, and Cheetham (2016) and Trede, Sutton, and Bernoth (2016). For example, preceptors who brought their concern about a student to an instructor indicated that a feedback loop back to the preceptor about subsequent student progress and development was quite rare. As a result, they were often left unsure about whether there were changes they needed to implement for that student in future shifts, whether their interventions had been helpful to the student or the school, and what they could improve for future similar situations with other students. This communication gap further led to instructors and preceptors feeling largely disconnected from one another rather than considering themselves to be an effective dyad for the benefit of the student, the educational system, and the nursing profession. Both groups of teachers expressed this as an opportunity that was being unfortunately lost, and one that should be a focus for resolution in the future.

In a similar vein, educators and administrators indicated that their communication with each other about student errors was quite minimal. Both groups were very aware that the PSLS has an ability to capture valuable trending data pertaining to student errors but this

information was not shared, even in aggregate form, with educational institutions so they could use it to address broader student issues proactively. In addition, administrators noted that, when they shared information about a specific student concern, they rarely received feedback about the success or failure of measures they had taken to address it. As a result, administrators typically would not know if anything could have been done differently to benefit that student or to prevent such situations in the future, a concern previously noted in the literature (Cooper, 2014; Disch et al., 2017; O'Connor et al., 2011b). As with the communication gap between instructors and preceptors, both educators and administrators considered this scarcity of information sharing to be an unmet opportunity for valuable learning that could have:

- strengthened the relationship between them; and
- helped them each to:
 - develop a more accurate, fulsome understanding of individual student-committed medication errors and then aggregate this information so that strategies could be developed to prevent and address them; and
 - assist each to identify and develop necessary policies, procedures, guidance documents, and expectations of practices that, all together, could be used to provide more direction and clarity to those involved in these types of situations.

It was proposed that using such communication channels for these purposes would lead to a more positive student and teacher experience and would contribute to increased patient safety. This call for increased feedback loops pertaining to patient safety and nursing student practice has also been supported by authors such as Vaismoradi (2012) and Barnsteiner and Disch (2017).

While it is possible that the educational institutions could collect their own data about student-committed medication errors, this does not currently happen in the schools involved in this study. The decision not to collect such information was generally viewed as impacting the ability of educational institutions to address student issues proactively and on the basis of sound data. While the decision not to collect such information is actually quite common amongst nursing schools (Miller et al., 2016; Wolf et al., 2006), having tools and processes for tracking data about errors and then identifying trends from those data is considered key to implementing a just culture within nursing education (Barnsteiner & Disch, 2017).

Perceptions of Supports

Similar to their perceptions of post-error communications, perceptions of available supports and resources depended to a significant degree on the particular group to which one belonged. Students perceived that it was possible to obtain support from numerous sources in the post-error environment, such as teachers, peers, the educational institution, and the healthcare facility; this does not mean however, that they were ultimately the recipients of such support. To students, it was critical that they received support from the person with the most influence over their post-error experience (i.e. the teacher) but they also typically sought support from self-selected peers. Zieber (2014) similarly found that students looked for critical post-error support from their instructors. He also found that students involved in an error often turned to their peers for post-error support, but many students desired an even greater willingness of peers to share and commiserate about error experiences. Teachers perceived themselves as offering positive and valuable support to students but then gave mixed reviews on the supports that they themselves received from others. Educators and administrators largely cast themselves in the role of post-error support providers rather than

seeking out or needing support of their own. All groups were able to identify areas for improvement related to the supports and resources that could be developed and provided as part of the post-error environment.

Teachers agreed that they had been able to access support from colleagues and supervisors when addressing a student-committed medication error. This ability to access a one-on-one resource for information, guidance, and support was viewed as invaluable and helped many teachers (instructors in particular) to make decisions on formal consequences, address student-related issues, and move forward from an event that had been traumatizing to them as well (Hunt et al., 2016; Seyedrasooli et al., 2019). Some instructors called for a more formal mentorship program to be developed and implemented in their educational institution to ensure that novice instructors, who might not yet know their more informal resources, would still have access to support and guidance. Instructors expressed that more formalized mentorship would ensure some degree of consistency in the information shared with and by instructors, since it was often difficult to ascertain the accuracy of information shared through an informal model and determine whether it actually aligned with the aims and intentions of the educational institution. Given the level of instructor backing for both formal and informal support systems however, instructors and educational institutions might consider two parallel support tracks – acknowledging instructors who want to seek information from informal mentors of their choice while also instituting a more formalized program of mentorship to ensure that all instructors receive and implement similar direction (Melrose et al., 2015). Mentoring of clinical instructors by others who are both experienced and high-performing is considered best practice in the context of clinical education, and such opportunities should be fostered by educational institutions and healthcare facilities alike

(Nick et al., 2012; Reising, James, & Morse, 2018)

A number of instructors did identify a desire for increased formal, written documentation to help them understand what they needed to do in an error situation, who to notify, and what consequence options would be available to choose from. This same desire for clear and easy-to-follow written direction about post-error expectations was reported by many nursing faculty members in Disch et al. (2017). It is not surprising that this request for written direction was most strongly advocated by instructors since their role was almost exclusively responsible for selecting and imposing formal consequences and they were the designated point of contact for all others in the post-error environment. While the exact format that such written resources should take was not consistent across all instructors, there was general agreement that more formalized written guidance was desired and needed – both in advance of error situations occurring and at the time an instructor actually encountered one. Instructors were clear that such a document would need to leave room for an instructor’s subjective assessment of the situation but, with that caveat, they believed it could still provide valuable information in terms of: identifying necessary contact people; providing template documents (e.g. learning contracts); listing available options for formal consequences; suggesting factors to be taken into consideration when making decisions; noting available supports for students; and noting available supports for instructors who need to make very difficult choices after a student-committed medication error. Finally, it is important to remember that, under the Regulatory Supervision of Nursing Student Activities (BCCNP, 2018a) practice standard, educational institutions and healthcare facilities maintain responsibility for providing organizational supports and resources that are needed by nurses who act as regulatory supervisors of students. Since instructors indicated that they need

additional support in the form of written guidance, then it becomes the role of these organizations to ensure that such resources are made available. Instructors viewed the establishment of appropriate and accessible supports as an important recognition of the difficulty that they often face in making allocation and consequence decisions that can significantly impact a student's academic and personal journey. Reising et al. (2018) have similarly confirmed the key role of healthcare facilities and educational institutions in ensuring that appropriate processes are in place to orient and mentor clinical instructors.

Students generally looked to their teachers and their peers to provide them with emotional support post-error. For many of the students, their teacher was perceived as having provided positive, supportive feedback and assistance as the student navigated the post-error process and any associated fallout. Melrose et al. (2015) reinforced the importance of emotional support provided by teachers as students journey through difficult and challenging clinical situations. For others, a perceived lack of empathy, concern, and support from the teacher made an already difficult situation even harder to work through (Zieber, 2014). For those students whose teacher had taken over the error response in its entirety, the student felt deprived of any learning opportunities that could have taken place and were therefore left feeling as though support and learning for the student had become secondary to the teacher's need to "fix" the situation. Melrose et al. (2015) similarly proposed that an effective clinical instructor is one who is not overly controlling or cautious about student practice and who involves the student in clinical decision-making. It is important for teachers to remember that, as much as the student may have contributed to the error situation, they are also highly emotionally invested in making things right to whatever extent possible. Removing the student from that opportunity left them with the impression that they could be part of causing

an error but were not capable of helping to manage its aftermath. This was a devastating message to send to students and one which impacted those students' beliefs in their potential to become competent, capable, independent practitioners.

Most students indicated that they had certain close friends in the nursing program who helped them deal with the fact that the error had occurred and the consequences that had been imposed, but students were quite clear that they wished to choose those peers who would act as their emotional support. This assertion was also evident in Zieber's (2014) work, where students indicated that they carefully selected those peers with whom they would share the error experience. When an instructor chose to inform a student's peers about the error, or forced the student to disclose it to the peer group in a post-shift conference, the hurt and distrust it generated within the student was both long-lasting and deep. Instead of feeling supported, the student developed a negative perception of the process as a whole, particularly if the peer group was not particularly supportive or close-knit. Because students are very vulnerable to others' decisions at all times in their education journey, they often felt they had no choice but to accept a response to the error they perceived as unfair, such as a requirement to share the event with the clinical placement peer group. Such a requirement left a deep impression on those students and resulted in a clear vision of how they would treat student nurses in similar situations of vulnerability after they had graduated and were engaging in their own supervisory opportunities.

Administrators and educators indicated that they wanted to support teachers and students in any way they could post-error. Both administrators and educators recognized the difficulties faced by teachers and students in their roles in the post-error environment. Administrators expressed their belief that teachers were aware of the PSLS policy and

procedure and knew that all medication errors committed by students fall into the category of being reportable into the PSLS. In addition, healthcare facilities have designated handlers for each unit so any PSLS report about a student-committed medication error could be followed up and any necessary supports for those involved could be identified and implemented.

While administrators did acknowledge that not all errors are reported into the system, a common feature of voluntary reporting systems according to the Agency for Healthcare Research and Quality (2019) and the Institute for Safe Medication Practices Canada (2018), administrators did not seem to be aware of some of the reasons why teachers might not encourage PSLS reports by students. For example, one preceptor expressed her belief that the PSLS system should not be overloaded with student-committed medication errors because it is actually primarily intended to capture issues experienced by unit staff. It is crucial for healthcare facilities to be aware of the true reasons why these reports are not being entered into their incident-reporting system given that they use this system to identify, understand, and address trends among such events (Vrbnjak et al., 2016). If the reason for not entering an error situation into the PSLS system is based on a misunderstanding of the system's purpose, then that can only reduce the quality of the data contained within that system and decrease the usefulness of supports generated from interpretation of those data.

Perceptions of Nursing

Student and teacher perceptions of the nursing profession as a whole were impacted by the error response process in which they had been engaged. Students expressed a sense that the historical adage of “nurses eat their young” still exists, a finding recently echoed by Darbyshire et al. (2019), Anderson and Morgan (2017), and Gillespie, Grubb, Brown, Boesch, and Ulrich (2017). This perception was heightened when students, being the most

vulnerable and junior members of the nursing team, were allocated the most (or sole) responsibility and accountability for a medication error, even if that situation had been made particularly susceptible to error by other factors beyond their control.

There was a concern expressed by students that the nursing educational system was not truly comprehending the workload and pressures it was imposing on those in the student role, from the number of assignments they were given to the complexity of the material being learned during their educational journey to the combination of clinical placement and academic expectations that needed to be met in a short period of time. This same concern has been expressed by student nurses in numerous other studies, such as Dimkpa and Inegbu (2013), Reising et al. (2018), and Ab Latif and Mat Nor (2019). As one student in this study noted, the stressful workload and high set of expectations led to student nurses feeling as if their “walls [were] closing in” and left them particularly susceptible to making an error.

Teachers expressed belief that they were doing all they could to combat the culture of blame that has historically been part of the nursing profession, and to welcome students into the fold. They recognized that their response to a student-committed medication error would be key to ensuring that the profession is graduating safe, competent, effective practitioners – the broad aim of the Regulatory Supervision of Nursing Student Activities (BCCNP, 2018a) practice standard. It was clear that teachers perceived their role as ensuring patient safety in addition to providing meaningful student learning opportunities, and they emphasized that nurses are ultimately responsible for providing care that patients and the healthcare system can trust. While authors such as Disch et al. (2017) have reported that some instructors receive overt blame from their educational institution for not preventing a student-committed medication error, that was not reported by instructors as a concern in this study.

The lack of transparency with which many teachers made decisions in the post-error environment, and consequent lack of fairness with which many students viewed responsibility and accountability allocation decisions of the teachers, means that there is still much room for improvement. Such changes would not be solely on the shoulders of the teachers however, and teachers in this study pointed to others who must accept key roles in making this happen. They indicated that teachers, educators, and administrators need to work together to create a process that is both tenable and maintainable in education and practice environments, and that is accessible to, and understood by those who have decision-making authority post-error. Students need to be able to access this information so that they can feel reassured that they have been treated fairly in the allocation of responsibility and accountability for the error. In Zieber (2014), students similarly called for greater transparency and clarity from their nursing programs regarding the “practical processes involved with identifying mistakes, clarifying the severity of mistakes, and proceeding towards resolution and correction of the mistake” (p. 126); this change was also requested by students in Vaismoradi and Parsa-Yekta (2011) and echoed in Oermann et al. (2018).

A fair, effective, and transparent allocation process would ensure that graduating nurses have demonstrated key tenets of professionalism and ownership over their practice, and that the overarching importance of patient safety is being evidenced as students make their way through clinical practica courses. It would also demonstrate valuing of student nurses by ensuring that they do not suffer inappropriate or unfair consequences for a situation that may not have been entirely of their own making. Finally, such a process would demonstrate valuing of teachers by dramatically increasing the level of support that is available to help them make consistent, predictable, fair, defensible decisions about student

progress in clinical settings (Barnsteiner & Disch, 2017; Hunt et al., 2016). It is hoped that students who find themselves participating in such a process would subsequently see nursing as a more welcoming, inclusive, safe, and forgiving membership, valuing those who are new to the profession and to the provision of patient care. According to Vaismoradi and Parsa-Yekta (2011), both instructors and students have a strong desire for student evaluation processes that are transparent, objective, and that minimize inconsistency and uncertainty for those involved.

Study Limitations

This study was conducted with a focus on one baccalaureate nursing program that is offered collaboratively between a university and two community colleges in northern BC. The nature of this collaborative program means that movement toward a just culture for student-committed medication error situations needs to occur at all of the partner institutions to have the desired effect on student and teacher experiences and their perception of the nursing profession more broadly. This may not be the case for all baccalaureate programs because not all programs are offered through a partnership between multiple educational institutions. Further, those educational institutions that are situated in larger urban centers may not have the same concerns about limited clinical placement opportunities that were evident for the institutions in this study, and that affected some of the concerns and considerations put forward by them.

This study used purposeful selection of participants who would be able to provide data related to the research questions of this study. This sampling technique has the benefit of ensuring that participants selected for the study are “information-rich cases for study in-depth . . . [and] from which one can learn a great deal about issues of central importance to the

purpose of the research” (Patton, 2002, p. 46). However, this non-random technique also raises the possibility of researcher bias because it is the researcher who determines what needs to be known and sets out to engage participants who are available, willing to participate, and can express their experience and perceptions articulately and reflectively (Etikan, Musa, & Alkassim, 2016).

This study asked participants who have been involved in a traumatic, often personally devastating event, to revisit that situation and discuss what happened, the impact on their personal and professional identities, and the deeper meaning it held (and may continue to hold) for them. For student nurses in particular, the event also took place during a transformational and vulnerable time in their personal, professional, and educational journeys. This was a significant request to make of these individuals and it may have impacted who chose to come forward and volunteer for study participation. As a result, the data in this study may only be representative of the experiences of those individuals who had personalities that allowed them to process and discuss difficult past events, who had already worked through their emotions in the situation, or whose particular circumstances had not been as traumatic as others may have encountered. This, of course, changes the data that were available to analyze for the study.

In addition, this study did not attempt to link specific student nurse participants with their specific teachers. This decision meant that less personal identifying information needed to be disclosed by participants but it also meant that it was not possible to compare and contrast differing perspectives of the same error event.

Finally, the issue of data saturation needs to be re-visited. The original data saturation estimates proposed for this study were not reached for student nurses, clinical instructors, or

preceptors. However, interpretive description can be conducted on samples of virtually any size, and the vast majority of studies that use interpretive description tend to be fairly small, in the range of 5-30 participants (Thorne, 2008). There were also clear commonalities evident in the data for student nurses, clinical instructors, and preceptors, and the obtained data were “multi-layered, intricate, detailed, [and] nuanced” (Fusch & Ness, 2015, p. 1409) – all attributes that are critical when assessing saturation in qualitative data. As stated by O’Reilly and Parker (2012), “within qualitative research, sufficiency of sample size is measured by depth of data rather than frequencies” (p. 193) and the richness of information acquired through this study was very strong. Not reaching initial estimates for data saturation would not render the research findings invalid, but instead would indicate that the door remains open for further exploration of the topic (O’Reilly & Parker, 2012) and this is the first study to consider the allocation of responsibility and accountability of student-committed medication from the perspectives of multiple parties to that process. From a pragmatic perspective, it was also decided that further attempts to contact potential participants, beyond the number of email communications used, would not be ethical considering the trauma of the events sought to be explored.

This was a study about a phenomenon that has not been explored in such detail, and from so many different perspectives, before now. Because there were distinct commonalities evident in the interviews that were conducted, even without reaching the original saturation numbers proposed, this study sets the stage well for future research focused on this post-error environment.

Chapter Six: Conclusion

This study examined the environment, including the healthcare facility and educational institution organizational cultures, that exist after a student-committed medication error. It considered the perspectives of student nurses, clinical instructors, preceptors, educational institution leaders, and healthcare facility administrators, as well as quantitative data (particularly from the PSLS, a centralized database for adverse events that occur in healthcare facilities in BC) to explicate and better understand that environment. The study examined the process by which responsibility and accountability for a student-committed medication error is allocated and the factors that influenced that allocation decision. It also described key features of the ideal allocation process and posited reasons why the current allocation process often does not meet those requirements.

The process by which responsibility and accountability is to be allocated, and in what form that responsibility and accountability is to be demonstrated, has few clearly-delineated requirements. Teachers are given extensive latitude to determine whom and what to ask about the error, and what significance to attach to the information they receive as part of any investigation they conduct into the situation. The role of the instructor is particularly critical in the post-error process as they become the main point of contact for others about the error situation, and they have the ability to decide upon formal consequences for the student once the allocation process is complete. The only exception is that preceptors share an ability to require a PSLS entry to be completed about the error. Communication channels are important in the post-error environment as the existence of an error is conveyed to a teacher, students explain their role in it, information is sought about potential contributing factors to the error situation, formal consequence decisions are conveyed and completion of consequence

requirements (such as those set out in a learning contract) are met, and emotional and informational supports are provided.

Students typically experience significant levels of self-blame post-error and they often perceive themselves as attracting additional blame from both the educational system and the healthcare system. This occurs despite the stated intention of teachers, educators, and administrators to move away from a blaming culture and into one that focuses on appropriate ownership by the student for their part in the error situation. An appropriate level of ownership by the student is the single-most influential factor identified by teachers when they allocate responsibility and accountability for the error, and its presence or absence greatly impacts the formal consequences that are ultimately selected.

Ideally, any system contributing factors that are beyond student control would be taken into account in the allocation of responsibility and accountability for the error, and such considerations would be reflected in the severity and types of formal consequences that are ultimately selected for imposition. Beyond the formal consequences however, teachers need to be aware that students can suffer collateral impacts post-error and may require additional support to manage those effects. Such collateral impacts might take the form of negative peer or unit staff reactions, or a fear of requesting employment references from those who are aware of the error. Students are exquisitely attuned to the reactions of those around them after an error occurs and watch closely for signs that they are being perceived differently as a result of the event. The trauma of involvement in a medication error can be long-lasting for a student and it is important for student support to be prioritized as a result. In addition, teachers who need to make difficult decisions after an error, or who may have

been directly involved in its commission, can suffer similarly traumatized reactions and may also need to receive support from colleagues and supervisors.

Students can have a difficult time accepting that an allocation process was fair, or that the selected formal consequences were justified, if the steps and considerations of that process are not shared with them or if it appears that the student is being held responsible for factors that were beyond their control. Students also reported that there is tremendous inconsistency across instructors with respect to the handling of errors, the support offered to students, and the formal consequences that may be imposed. Students called for a significant increase in process transparency and consistency to help address this important issue. Instructors agreed that the post-error process is not consistent across instructors and they called for the creation of guidance documents to help instructors better understand the steps expected of them in reaching allocation and formal consequence decisions.

While all participant groups highlighted the “just culture” as being ideal for responding to a student-committed medication error, it is evident that their perceptions of how far nursing and healthcare have moved toward implementing that ideal actually diverge quite markedly. Indeed, there has been some suggestion in the literature that the shift to a just healthcare culture has not occurred at the same pace in the educational realm and that student nurses continue to feel blamed by others after a medication error. A just culture, where students could expect to be supported if they become involved in an unintentional error, and in which blaming is avoided and learning is of prime importance, would need to be incorporated into both the academy and clinical environments since student nurses straddle both systems during their educational journey.

The findings of this study have important implications for the nursing profession and the broader healthcare system in key areas of education, research, and practice.

Implications of this Study for Education

This study has particularly direct implications for the education of student nurses. Teachers, educational institutions, and healthcare facilities need to become and remain aware of the tendency of student nurses to self-blame after their involvement in a medication error. Supports need to be put in place to help students identify and manage the emotional sequelae of their involvement in a medication error, so they can become open to the lessons that present themselves and move forward in a healthy way from the event. All who are part of the post-error environment should be aware that student nurses will be profoundly attuned to their reactions and often, in addition to self-blaming, will readily accept suggestions of blame from others as their due. Clinical instructors and preceptors in particular need to ensure that they are not inadvertently contributing, through words and insinuations, tone of voice, or actions, to a message of blame for the student. Clinical instructors and teachers were clear about their desire to see appropriate ownership from students and create a just culture in the education environment rather than suggesting blame or contributing to the continuation of a blame culture. However, since student nurses often catastrophize the likely response of instructors and preceptors to the error, it will be necessary for those individuals to respond to students in ways that correspond appropriately to the severity and intentions of the situation.

Both teachers and students in this study understood that an appropriate level of ownership is a vital demonstration of professionalism and ethical behaviour. However, what needs to be more clearly and explicitly conveyed to students is that an expectation of appropriate ownership does not equate to blame for the event; in this way, there can be no

misunderstanding of the purpose for which teachers, educators, and administrators are seeking such ownership. In addition, it needs to be made clear to students that what is expected is an *appropriate* level of ownership. Teachers, educators, and administrators should not be insinuating, either by actions or words, that they expect the student to take responsibility and accountability for system factors that were beyond their control or for the actions of other people who contributed to the error. Students should be encouraged to honestly divulge these contributing factors to their teachers without fear that reprisals may be forthcoming from the teacher or other individuals.

Part of the reason that student nurses often leap to the conclusion that their medication error will incur only severest of consequences is because the post-error process to be followed by teachers is often not transparent, nor does it follow a set, accepted, predictable route. Therefore, teachers should ensure that the student is explicitly made aware of factors the teacher is taking into account (such as the level of student ownership and any system-based contributors to the error) when they are deciding upon allocation of responsibility and accountability, as well as the process that is being followed to reach that decision. The student should be explicitly informed of linkages the teacher intends to draw between the student's role in the error and any formal consequences that are being imposed. Wherever possible, the student should be involved in decisions regarding disclosure to peers and their preferences in this regard should be respected.

Support for teachers who are involved in student-committed medication errors is similarly critical and should be considered a priority for educational institutions. Clinical instructors in particular were united in their request for written guidance to help them understand what they need to do, and whom to contact, after an error occurs. The current

PSLS policy and procedure document provides guidance on reporting requirements and expectations within the context of the NHA, but does not speak to any parallel reporting track that is expected for and by the educational institution. The PSLs policy and procedure also does not address academic consequences that teachers could impose nor considerations that teachers might take into account when determining what those consequences will be. While it may not be necessary to implement a formal policy or procedure on this issue, a guiding document that advises instructors of usual steps to be followed post-error, who to notify and how, and what consequence options are available to choose from, would help to minimize the degree of inconsistency that is currently such a strong concern of students. A central repository for template documents, such as learning contracts, that may be needed post-error would also be helpful. This would also assist novice instructors to better understand their role in such situations, without relying so heavily on informal communication networks to share this information. When developing such a document, it will be important for educational institutions to confer with instructors to identify the document's intended purpose and ensure that it meets those identified needs. Establishing this type of support for teachers would act as an important recognition of the difficulty that teachers often face in making allocation and consequence decisions that can significantly impact a student's academic and personal journey, and would likely reduce occurrence of the "failure to fail" tendency that can lead to unsafe or unprepared practitioners graduating from nursing schools in the future (Bachmann, Groenvik, Hauge, & Julnes, 2019).

For students, this guidance document would provide some comfort that teachers were being required to explore and consider potential contributing factors to the situation and that there was a demonstrated interest of the educational institution in protecting students from

inconsistent or unfair error consequences; in turn, this might also prevent the highly stressful and very common catastrophizing of their teacher's likely response to a student error.

Guiding documents can be an important form of support for both clinical instructors and preceptors, but it should also be remembered by educational institutions and healthcare facilities that handling student-committed medication errors and other difficult student-related situations can be quite traumatizing for the teachers involved. Institutions and facilities should ensure that a need for emotional support of clinical instructors and preceptors can be identified and that appropriate support will be accessible in such situations.

Finally, it is important for educational institutions and healthcare facilities to re-examine their existing communication and feedback loops to ensure that information about student-committed medication errors, individual and system contributing factors, and relevant practice changes can be easily and readily shared. This will allow both organizations to learn from one another and to proactively address issues, wherever possible. It should also be reinforced to clinical instructors and preceptors that ongoing information exchange between them is critical to student and clinical placement success.

Implications of this Study for Research

This is the first study about student-committed medication errors that focuses on the allocation of responsibility and accountability for those errors and considers the perspectives of multiple parties to the process. The findings from this study can be used to provoke broader conversations about the process of such allocation, the factors that influence it, and the fairness of the process and its outcomes. However, it will be important for future research to focus on these questions in other contexts as well, such as larger educational institutions which may already have written guidance in place about handling error situations and which

have not historically relied so heavily on informal communication networks to share messaging and expectations. Future research would also be helpful to gain a more in-depth understanding of the identified gaps between student perceptions of blame for the event and teacher perceptions that they are responding in ways that minimize the suggestion of blame. In addition, this study did not attempt to link student participants with teacher participants so that the same medication event could be considered from multiple angles. Research that can draw those direct connections will be useful in identifying reasons for differing perceptions of the post-error environment its processes.

There are very few published studies that have used a critical realism framework to understand the domains of nursing-related events generally, and no others that have used this framework to articulate the various aspects of a post-medication error environment. The critical realism lens was helpful in this study to uncover reasons why a post-error process might unfold the way it does, and to identify reasons why the current process may be different from one that could better meet the needs of those involved in the situation. If longer-term, meaningful, and effective changes to the existing process are to be implemented, it is crucial that the system be able to identify generative mechanisms that have led to the status quo and whose interests might be affected by any proposed change. Critical realism, with its focus on identifying and understanding causes of events, the events that occur, and the perceptions and experiences of those involved, is well-suited to future research in this area.

Implications of this Study for Practice

When a student nurse commits a medication error during a clinical placement, unit staff may not fully appreciate that their responses also form part of the post-error

environment experienced by that student. This study showed that students who have committed medication errors do watch the reaction of unit staff to the situation and they do consider both short- and long-term implications of staff response, such as viewing the student with less respect and the potential for jeopardizing future employment opportunities. Staff should be aware that this is often a worry of students and that it can affect the lens through which a student may interpret a staff member's words and actions post-error. Staff should therefore be cognizant of their role in ensuring that a just culture exists post-error and that those who have been involved in the situation feel supported as part of the healthcare team. Committing to an environment that supports a just culture for everyone, including students, is likely to result in decreased perceptions of blame being imposed post-error; this, in turn, is likely to decrease the fear of reporting and increase the transparency of events that impact patient care and student experience.

The study also highlighted the importance of PSLS reports in understanding both individual and system contributors to medication errors and in identifying proactive measures that could help prevent error situations in the future. At the same time, the study revealed that not all student situations that warrant a PSLS entry are actually being reported into the system. There were several reasons given for choosing not to report the event into the PSLS, including the pragmatic consideration that the reporting process takes time away from patient care or a belief that reports about student-associated events could overwhelm the system. Regardless of the reason for not reporting into the PSLS, an incomplete view of patient care is the result. The missing information might have instigated broader system change, but also could have impacted decisions made by the healthcare facility about responsibility and accountability allocation. Healthcare facilities should ensure that expectations pertaining to

incident reporting are clear and that unit staff, teachers, and students are adhering to them as much as possible, with the understanding that this is still a voluntary reporting system.

Conclusion

We are just beginning to understand the post-error environment that student nurses encounter following the commission of a medication error, and to appreciate the role that various individuals and organizations can have on the student experience. What became evident in this study was that students, teachers, educational institution leaders, and healthcare facility administrators can leave the situation with vastly different perceptions of what unfolded and the process that underpinned key decisions. A student's experience in the post-error environment can significantly impact their view of the nursing profession they hope to join. Socialization messages often become highly internalized and become strong influences on a nurse's future reactions, behaviours, and decisions.

All of the participants agreed that an ideal post-error environment must incorporate a just culture. Since students must navigate both the educational institution and the healthcare facility environments during a clinical placement, it is essential that a just culture will permeate both. However, students are instead colliding with a post-error environment that they perceive as not meeting key ideals of a just culture: fairness, transparency, minimization of fear, and dedication to learning. Without true system transformation to the just culture perspective, and a wholehearted dedication to its implementation, the "name, shame, and blame" culture that many of nursing's most vulnerable team members currently encounter is much more likely to be perpetuated.

References

- Ab Latif, R., & Mat Nor, M. Z. (2019). Stressors and coping strategies during clinical practice among diploma nursing students. *Malaysian Journal of Medical Sciences*, 26(2), 88-98. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6687220/>
- Agency for Healthcare Research and Quality. (2019, September). *Reporting patient safety events*. Retrieved from <https://psnet.ahrq.gov/primer/reporting-patient-safety-events>
- Alton, S. (2016, March). Learning how to learn: Meta-learning strategies for the challenges of learning pharmacology. *Nurse Education Today*, 38, 2-4. <http://dx.doi.org/10.1016/j.nedt.2016.01.003>
- Anderson, D. J., & Webster, C. S. (2001). A systems approach to the reduction of medication error on the hospital ward. *Journal of Advanced Nursing*, 35(1), 34-41. doi:10.1046/j.1365-2648.2001.01820.x
- Anderson, L. B., & Morgan, M. (2017). An examination of nurses' intergenerational communicative experiences in the workplace: Do nurses eat their young? *Communication Quarterly*, 65(4), 377-401. <https://doi.org/10.1080/01463373.2016.1259175>
- Andrew, S., & Mansour, M. (2014). Safeguarding in medication administration: Understanding pre-registration nursing students' survey response to patient safety and peer reporting issues. *Journal of Nursing Management*, 22(3), 311-321. doi:10.1111/jonm.12134
- Asensi-Vicente, J., Jimenez-Ruiz, I., & Vizcaya-Moreno, M. F. (2018). Medication errors involving nursing students: A systematic review. *Nurse Educator*, 43(5), E1-E5. doi:10.1097/NNE.0000000000000481
- Athanasakis, E. (2019, May 16). A meta-synthesis of how registered nurses make sense of their lived experiences of medication errors. *Journal of Clinical Nursing*. Advance online publication. doi:10.1111/jocn.14917
- Aubin, D., & King, S. (2015). Developing a culture of safety: Exploring students' perceptions of errors in an interprofessional setting. *Journal of Interprofessional Care*, 29(6), 646-648. doi:10.3109/13561820.2015.1045060
- Aveling, E.-L., Parker, M., & Dixon-Woods, M. (2016). What is the role of individual accountability in patient safety? A multi-site ethnographic study. *Sociology of Health & Illness*, 38(2), 216-232. doi:10.1111/1467-9566.12370
- Aydin, A. K., & Dinc, L. (2017). Effects of web-based instruction on nursing students' arithmetical and drug dosage calculation skills. *Computers, Informatics, Nursing*, 35(5), 262-269. doi:10.1097/CIN.0000000000000317

- Bachmann, L., Groenvik, C. K. U., Hauge, K. W., & Julnes, S. (2019). Failing to fail nursing students among mentors: A confirmatory factor analysis of the Failing to Fail scale. *Nursing Open*, 6, 966-973. doi:10.1002/nop2.276
- Baghcheghi, N., & Koohestani, H. R. (2008). Nursing students' errors in preparation and administration of intravenous drugs. *Strides in Development of Medical Education*, 5(1), 43-49.
- Bagnasco, A., Galaverna, L., Aleo, G., Grugnetti, A. M., Rosa, F., & Sasso, L. (2016). Mathematical calculation skills required for drug administration in undergraduate nursing students to ensure patient safety: A descriptive study. *Nurse Education in Practice*, 16(1), 33-39. doi:10.1016/j.nepr.2015.06.006
- Baker, G. R., Norton, P. G., Flintoft, V., Blais, R., Brown, A., Cox, J., . . . Tamblyn, R. (2004). The Canadian Adverse Events Study: The incidence of adverse events among hospital patients in Canada. *Canadian Medical Association Journal*, 170(11), 1678-1686. <https://doi.org/10.1503/cmaj.1040498>
- Barach, P., & Small, S. D. (2000). Reporting and preventing medical mishaps: Lessons from non-medical near miss reporting systems. *British Medical Journal*, 320(7237), 759-763. doi:10.1136/bmj.320.7237.759
- Baraz, S., Memarian, R., & Vanaki, Z. (2015). Learning challenges of nursing students in clinical environments: A qualitative study in Iran. *Journal of Education and Health Promotion*, 4. doi:10.4103/2277-9531.162345
- Barnsteiner, J., & Disch, J. (2012). A just culture for nurses and nursing students. *Nursing Clinics of North America*, 47(3), 407-416. doi:10.1016/j.cnur.2012.05.005
- Barnsteiner, J., & Disch, J. (2017). Creating a fair and just culture in schools of nursing. *American Journal of Nursing*, 117(11), 42-48. doi:10.1097/01.NAJ.0000526747.84173.97
- Benner, P., Sheets, V., Uris, P., Malloch, K., Schwed, K., & Jamison, D. (2002). Individual, practice, and system causes of errors in nursing: A taxonomy. *Journal of Nursing Administration*, 32(10), 509-523. doi:10.1097/00005110-200210000-00006
- Berger, R. (2015). Now I see it, now I don't: Researcher's position and reflexivity in qualitative research. *Qualitative Research*, 15(2), 219-234. doi:10.1177/1468794112468475
- Berlandi, J. L. (2002). Ethics in perioperative practice: Accountability and responsibility. *AORN Journal*, 75(6), 1094-1099. [https://doi.org/10.1016/S0001-2092\(06\)61611-6](https://doi.org/10.1016/S0001-2092(06)61611-6)
- Bhaskar, R. (1998). *The possibility of naturalism: A philosophical critique of the contemporary human sciences* (3rd ed.). London, UK: Routledge.

- Bhaskar, R. (2000). *From east to west: Odyssey of a soul*. Oxfordshire, UK: Taylor & Francis Ltd.
- Blom, B., & Moren, S. (2011). Analysis of generative mechanisms. *Journal of Critical Realism, 10*(1), 60-79. doi:10.1558/jcr.v10i1.60
- Boswell, C., & Cannon, S. (2014). *Introduction to nursing research: Incorporating evidence-based practice* (3rd ed.). Burlington, MA: Jones & Bartlett Learning.
- Boysen II, P. G. (2013). Just culture: A foundation for balanced accountability and patient safety. *The Ochsner Journal, 13*(3), 400-406. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3776518/>
- Brady, A. M., Malone, A. M., & Fleming, S. (2009). A literature review of the individual and systems factors that contribute to medication errors in nursing practice. *Journal of Nursing Management, 17*(6), 679-697. doi:10.1111/j.1365-2834.2009.00995.x
- Brady, A. M., Redmond, R., Curtis, E., Fleming, S., Keenan, P., Malone, A. M., & Sheerin, F. (2009). Adverse events in health care: A literature review. *Journal of Nursing Management, 17*(2), 155-164. doi:10.1111/j.1365-2834.2008.00887.x
- British Columbia College of Nursing Professionals. (n.d.-a). *About BCCNP*. Retrieved from <https://www.bccnp.ca/bccnp/Pages/Default.aspx>
- British Columbia College of Nursing Professionals. (n.d.-b). *Legislation relevant to nurses*. Retrieved from <https://www.bccnp.ca/Standards/RPN/resources/topics/Pages/legislation.aspx>
- British Columbia College of Nursing Professionals. (n.d.-c). *Precepting students*. Retrieved from https://www.bccnp.ca/Standards/RN_NP/resources/casestudies/workplace/employedstudentnurses/Pages/preceptor.aspx
- British Columbia College of Nursing Professionals. (n.d.-d). *Regulatory philosophy*. Retrieved from <https://www.bccnp.ca/bccnp/Pages/MandatePurpose.aspx>
- British Columbia College of Nursing Professionals. (2010, July). *Practice standard for Registered Nurses and Nurse Practitioners: Medication administration*. Retrieved from https://www.bccnp.ca/Standards/RN_NP/PracticeStandards/Lists/GeneralResources/RN_NP_PS_MedicationAdmin.pdf
- British Columbia College of Nursing Professionals. (2012, March). *Practice standards: Employed student registrants*. Retrieved from https://www.bccnp.ca/Standards/RN_NP/PracticeStandards/Lists/GeneralResources/RN_NP_PS_EmployedStudents.pdf
- British Columbia College of Nursing Professionals. (2014, March). *Profile of a newly graduated Registered Nurse*. Retrieved from https://www.bccnp.ca/becoming_a_nurse/Documents/RN_profilenewgrad390.pdf

- British Columbia College of Nursing Professionals. (2018a, September). *Practice standard: Regulatory supervision of nursing student activities*. Retrieved from https://www.bccnp.ca/Standards/RN_NP/PracticeStandards/Lists/GeneralResources/RN_NP_PS_RegulatorySupervision.pdf
- British Columbia College of Nursing Professionals. (2018b, September). *Professional standards for Registered Nurses and Nurse Practitioners*. Retrieved from https://www.bccnp.ca/Standards/RN_NP/StandardResources/RN_NP_ProfessionalStandards.pdf
- Brous, E. (2012). TAANA/AALNC joint position statement: Criminal prosecution of health care providers for unintentional human error. *Journal of Nursing Law*, 15(1), 33-35. <http://dx.doi.org/10.1891/1073-7472.15.1.33>
- Brown, G. (2009). The ontological turn in education: The place of the learning environment. *Journal of Critical Realism*, 8(1), 5-34. doi:10.1558/jocr.v8i1.5
- Brown, Y., Neudorf, K., Poitras, C., & Rodger, K. (2007). Unsafe student clinical performance calls for a systematic approach. *Canadian Nurse*, 103(3), 29-32.
- Bryans, P. (1999). What do professional men and women learn from making mistakes at work? *Research in Post-Compulsory Education*, 4(2), 183-194. doi:10.1080/13596749900200051
- Canada Health Act*, RSC 1985, c C-6.
- Canadian Association of Schools of Nursing & Canadian Patient Safety Institute. (2018). *Learning outcomes for patient safety in undergraduate nursing curricula*. Retrieved from <https://www.casn.ca/wp-content/uploads/2018/08/CPSI-EN-FINAL-r-Apr-2019.pdf>
- Canadian Institute for Health Information. (2004). *Health care in Canada*. Retrieved from https://secure.cihi.ca/free_products/hcic2004_e.pdf
- Canadian Institute for Health Information. (2016, October). *Measuring patient harm in Canadian hospitals*. Retrieved from https://secure.cihi.ca/free_products/cihi_cpsi_hospital_harm_en.pdf
- Canadian Nurses Association. (2017). *Code of ethics for Registered Nurses*. Retrieved from <https://cna-aiic.ca/html/en/Code-of-Ethics-2017-Edition/index.html>
- Canadian Nurses Association. (2019). *Who we are*. Retrieved from <https://www.cna-aiic.ca/en/about-us/who-we-are>
- Cebeci, F., Karazeybek, E., Sucu, G., & Kahveci, R. (2015). Nursing students' medication errors and their opinions on the reasons of errors: A cross-sectional survey. *Journal of Pakistan Medical Association*, 65(5), 457-462.

- Charkhat-Gorgich, E.-A.-H., Yaghoobi, M., Salehinia, H., Navidian, A., & Torabpour, M. (2014, January). The types and causes of medication errors in nursing students. *Science Road Journal*, 2(8), 48-54.
- Chatterjee, A., Pereira, A., & Bates, R. (2018). Impact of individual perception of organizational culture on the learning transfer environment. *International Journal of Training and Development*, 22(1), 15-33. doi:10.1111/ijtd.12116
- Chiou, S.-F., Huang, E.-W., & Chuang, J.-H. (2009). The development of an incident event reporting system for nursing students. *Studies in Health Technology and Informatics*, 146, 598-602. doi:10.3233/978-1-60750-024-7-598
- Clancy, C. M. (2012). *Alleviating 'second victim' syndrome: How we should handle patient harm*. Retrieved from <http://www.ahrq.gov/legacy/news/commentaries/comvictim.htm>
- Clark, A. M., Lissel, S. L., & Davis, C. (2008). Complex critical realism: Tenets and application in nursing research. *Advances in Nursing Science*, 31(4), E67-E79. doi:10.1097/01.ANS.0000341421.34457.2a
- Classen, D. C., Resar, R., Griffin, F., Federico, F., Frankel, T., Kimmel, N., . . . James, B. C. (2011). 'Global trigger tool' shows that adverse events in hospitals may be ten times greater than previously measured. *Health Affairs (Millwood)*, 30(4), 581-589. doi:10.1377/hlthaff.2011.0190
- Cleary-Holdforth, J., & Leufer, T. (2013). The strategic role of education in the prevention of medication errors in nursing: Part 2. *Nurse Education in Practice*, 13(3), 217-220. doi:10.1016/j.nepr.2013.01.012
- Cloete, L. (2015). Reducing medication errors in nursing practice. *Nursing Standard*, 29(20), 50-59. doi:10.7748/ns.29.20.50.e9507
- Cohen, H., & Shastay, A. D. (2008). Getting to the root of medication errors. *Nursing*, 38(12), 39-47. doi:10.1097/01.NURSE.0000342031.85246.a1
- Collier, A. (1994). *Critical realism: An introduction to Roy Bhaskar's philosophy*. New York, NY: Verso.
- Collins, M. E., Block, S. D., Arnold, R. M., & Christakis, N. A. (2009). On the prospects for a blame-free medical culture. *Social Science & Medicine*, 69(9), 1287-1290. doi:10.1016/j.socscimed.2009.08.033
- Connelly, L. M. (2016). Trustworthiness in qualitative research. *MedSurg Nursing*, 25(6), 435-436.
- Cooper, E. (2014). Nursing student medication errors: A snapshot view from a school of nursing's Quality and Safety Officer. *Journal of Nursing Education*, 53(Suppl. 3), S51-S54. doi:10.3928/01484834-20140211-03

- Cope, D. G. (2014). Methods and meanings: Credibility and trustworthiness of qualitative research. *Oncology Nursing Forum*, 41(1), 89-91. doi:10.1188/14.ONF.89-91
- Cornock, M. (2011). Legal definitions of responsibility, accountability and liability. *Nursing Children and Young People*, 23(3), 25-26. doi:10.7748/ncyp2011.04.23.3.25.c8417
- Courtenay, M. (1991). A study of the teaching and learning of the biological sciences in nurse education. *Journal of Advanced Nursing*, 16(9), 1110-1116. doi:10.1111/j.1365-2648.1991.tb03372.x
- Cowen, K. J., Hubbard, L. J., & Hancock, D. C. (2016, August). Concerns of nursing students beginning clinical courses: A descriptive study. *Nurse Education Today*, 43, 64-68. <http://dx.doi.org/10.1016/j.nedt.2016.05.001>
- Cox, K. R., Scott, S. D., Hall, L. W., Aud, M. A., Headrick, L. A., & Madsen, R. (2009). Uncovering differences among health professions trainees exposed to an interprofessional patient safety curriculum. *Quality Management in Health Care*, 18(3), 182-193. doi:10.1097/QMH.0b013e3181aea237
- Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). *Best practices for mixed methods research in the health sciences*. Retrieved from http://obsr.od.nih.gov/scientific_areas/methodology/mixed_methods_research/pdf/Best_Practices_for_Mixed_Methods_Research.pdf
- Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage Publications, Inc.
- Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Croskerry, P. (2010). To err is human - and let's not forget it. *Canadian Medical Association Journal*, 182(5), 524. doi:10.1503/cmaj.100270
- Dahlke, S., O'Connor, M., Hannesson, T., & Cheetham, K. (2016, March). Understanding clinical nursing education: An exploratory study. *Nurse Education in Practice*, 17, 145-152. <https://doi.org/10.1016/j.nepr.2015.12.004>
- Danermark, B., Ekstrom, M., Jakobsen, L., & Karlsson, J. C. (2002). *Explaining society: Critical realism in the social sciences*. New York, NY: Routledge.
- Darbyshire, P., Thompson, D. R., & Watson, R. (2019). Nursing's future? Eat young. Spit out. Repeat. Endlessly. *Journal of Nursing Management*, 27(7), 1337-1340. doi:10.1111/jonm.12781
- Davies, J. M., Hebert, P., & Hoffman, C. (2003). *The Canadian patient safety dictionary*. Ottawa, ON: Canadian Patient Safety Institute.

- Day, L. (2010). Error, blame, and professional responsibility. *American Journal of Critical Care, 19*(3), 296-298. doi:10.4037/ajcc2010839
- Deans, C. (2005). Medication errors and professional practice of Registered Nurses. *Collegian, 12*(1), 29-33. doi:10.1016/s1322-7696(08)60480-1
- Dekker, S. (2012). *Just culture: Balancing safety and accountability* (2nd ed.). Boca Raton, FL: CRC Press.
- Dekker, S. W. (2007). Criminalization of medical error: Who draws the line? *ANZ J Surg, 77*(10), 831-837. doi:10.1111/j.1445-2197.2007.04253.x
- Dekker, S. W. A. (2003). When human error becomes a crime. *Human Factors and Aerospace Safety, 3*(1), 83-92.
- Dekker, S. W. A. (2009a). Just culture: Who gets to draw the line? *Cognition, Technology & Work, 11*(3), 177-185. doi:10.1007/s10111-008-0110-7
- Dekker, S. W. A. (2009b). Prosecuting professional mistake: Secondary victimization and a research agenda for criminology. *International Journal of Criminal Justice Sciences, 4*(1), 60-78.
- Dekker, S. W. A., & Nyce, J. M. (2013). Just culture: "Evidence", power and algorithms. *Journal of Hospital Administration, 2*(3), 73-78. <https://doi.org/10.5430/jha.v2n3p73>
- Dennison, R. D. (2005). Creating an organizational culture for medication safety. *Nursing Clinics of North America, 40*(1), 1-23. doi:10.1016/j.cnur.2004.10.001
- Dimkpa, D. I., & Inegbu, B. (2013). Student nurses perception of poor academic performance in Bayelsa State, Nigeria. *Global Journal of Human Social Science, Linguistics & Education, 13*(4). Retrieved from https://globaljournals.org/GJHSS_Volume13/1-Student-Nurses-Perception-of-Poor-Academic.pdf
- Disch, J., & Barnsteiner, J. (2014). Developing a reporting and tracking tool for nursing student errors and near misses. *Journal of Nursing Regulation, 5*(1), 4-10. [https://doi.org/10.1016/S2155-8256\(15\)30093-4](https://doi.org/10.1016/S2155-8256(15)30093-4)
- Disch, J., Barnsteiner, J., Connor, S., & Brogren, F. (2017, October). Exploring how nursing schools handle student errors and near misses. *American Journal of Nursing, 117*(10), 24-31. doi:10.1097/01.NAJ.0000525849.35536.74
- Dolansky, M. A., Druschel, K., Helba, M., & Courtney, K. (2013). Nursing student medication errors: A case study using root cause analysis. *Journal of Professional Nursing, 29*(2), 102-108. doi:10.1016/j.profnurs.2012.12.010
- Duthie, E. A. (2018). Accountability: Challenges to getting it right. *Journal of Patient Safety, 14*(1), 3-8. doi:10.1097/PTS.0000000000000161

- Dyab, E. A., Elkalmi, R. M., Bux, S. H., & Jamshed, S. Q. (2018). Exploration of nurses' knowledge, attitudes, and perceived barriers towards medication error reporting in a tertiary health care facility: A qualitative approach. *Pharmacy*, 6(4). doi:10.3390/pharmacy6040120
- Easton, G. (2010). Critical realism in case study research. *Industrial Marketing Management*, 39(1), 118-128. <https://doi.org/10.1016/j.indmarman.2008.06.004>
- Elder-Vass, D. (2007). Social structure and social relations. *Journal for the Theory of Social Behaviour*, 37(4), 463-477. <https://doi.org/10.1111/j.1468-5914.2007.00346.x>
- Elliott, R., & Timulak, L. (2005). Descriptive and interpretive approaches to qualitative research. In J. Miles & P. Gilbert (Eds.), *A handbook of research methods for clinical and health psychology* (pp. 149-159). New York, NY: Oxford University Press.
- Etchells, E., Juurlink, D., & Levinson, W. (2008). Medication errors: The human factor. *Canadian Medical Association Journal*, 178(1), 63-64. doi:10.1503/cmaj.071658
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4. doi:10.11648/j.ajtas.20160501.11
- Evans, S. B., & Decker, R. (2011). Disclosing medical errors: A practical guide and discussion of radiation oncology-specific controversies. *International Journal of Radiation Oncology, Biology & Physics*, 80(5), 1285-1288. doi:10.1016/j.ijrobp.2011.04.015
- Ewertsson, M., Bagga-Gupta, S., Allvin, R., & Blomberg, K. (2017). Tensions in learning professional identities - nursing students' narratives and participation in practical skills during their clinical practice: An ethnographic study. *BMC Nursing*, 16(1). doi:10.1186/s12912-017-0238-y
- Fletcher, A. J. (2017). Applying critical realism in qualitative research: Methodology meets method. *International Journal of Social Research Methodology*, 20(2), 181-194. <http://dx.doi.org/10.1080/13645579.2016.1144401>
- Flick, U. (2018). Triangulation in data collection. In *The SAGE handbook of qualitative data collection* (pp. 1-22). Thousand Oaks, CA: Sage Publications Ltd.
- Forero, R., Nahidi, S., De Costa, J., Mohsin, M., Fitzgerald, G., Gibson, N., . . . Aboagye-Sarfo, P. (2018). Application of four-dimension criteria to assess rigour of qualitative research in emergency medicine. *BMC Health Services Research*, 18(1). <https://doi.org/10.1186/s12913-018-2915-2>
- Fothergill Bourbonnais, F., & Caswell, W. (2014). Teaching successful medication administration today: More than just knowing your 'rights'. *Nurse Education in Practice*, 14(4), 391-395. <http://dx.doi.org/10.1016/j.nepr.2014.03.003>

- Friesen, N. (2009). *Re-thinking e-learning research: Foundations, methods, and practices*. New York, NY: Peter Lang Publishing.
- Fusch, P. I., & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, 20(9), 1408-1416. Retrieved from <http://nsuworks.nova.edu/tqr/vol20/iss9/3>
- Garcia-Gamez, M., Morales-Asencio, J. M., Garcia-Mayor, S., Kaknani-Uttumchandani, S., Marti-Garcia, C., Lopez-Leiva, I., . . . Iglesias-Parra, M. R. (2019). A scoping review of safety management during clinical placements of undergraduate nursing students. *Nursing Outlook*. Advance online publication. <https://doi.org/10.1016/j.outlook.2019.06.003>
- Geertz, C. (1973). *The interpretation of cultures*. New York, NY: Basic Books Inc.
- Gentles, S. J., Charles, C., Ploeg, J., & McKibbin, K. A. (2015). Sampling in qualitative research: Insights from an overview of the methods literature. *The Qualitative Report*, 20(11), 1772-1789. Retrieved from <http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=2373&context=tqr>
- Gill, M., Andersen, E., & Hilsmann, N. (2019). Best practices for teaching pharmacology to undergraduate nursing students: A systematic review of the literature. *Nurse Education Today*, 74, 15-24. doi:10.1016/j.nedt.2018.11.017
- Gillespie, G. L., Grubb, P. L., Brown, K., Boesch, M. C., & Ulrich, D. (2017). "Nurses eat their young": A novel bullying educational program for student nurses. *Journal of Nursing Education and Practice*, 7(7), 11-21. doi:10.5430/jnep.v7n7P11
- Goldmann, D. (2006). System failure versus personal accountability – the case for clean hands. *New England Journal of Medicine*, 355(2), 121-123. doi:10.1056/NEJMp068118
- Gorini, A., Miglioretti, M., & Pravettoni, G. (2012). A new perspective on blame culture: An experimental study. *Journal of Evaluation in Clinical Practice*, 18(3), 671-675. doi:10.1111/j.1365-2753.2012.01831.x
- Government of British Columbia. (n.d.). Northern community profiles. Retrieved from <https://www2.gov.bc.ca/gov/content/careers-myhr/job-seekers/featured-careers/living-working-northern-bc/northern-community-profiles>
- Government of Canada. (2016). *Health system and services*. Retrieved from <https://www.canada.ca/en/health-canada/services/health-cards.html>
- Gratrix, L., & Barrett, D. (2017, January). Desperately seeking consistency: Student nurses' experiences and expectations of academic supervision. *Nurse Education Today*, 48, 7-12. <http://dx.doi.org/10.1016/j.nedt.2016.09.005>

- Greenway, K., Butt, G., & Walthall, H. (2019, January). What is a theory-practice gap? An exploration of the concept. *Nurse Education in Practice*, *34*, 1-6. <https://doi.org/10.1016/j.nepr.2018.10.005>
- Gregory, D., Guse, L., Davidson Dick, D., Davis, P., & Russell, C. K. (2009). What clinical learning contracts reveal about nursing education and patient safety. *Canadian Nurse*, *105*(8), 20-25.
- Gregory, D. M., Guse, L. W., Davidson Dick, D., & Russell, C. K. (2007). Patient safety: Where is nursing education? *Journal of Nursing Education*, *46*(2), 79-82. doi:10.3928/01484834-20070201-08
- Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches*. San Francisco, CA: Jossey-Bass Publishers.
- Hall, L. W., & Scott, S. D. (2012). The second victim of adverse health care events. *Nursing Clinics of North America*, *47*(3), 383-393. doi:10.1016/j.cnur.2012.05.008
- Hanson, W. E., Creswell, J. W., Plano Clark, V. L., Petska, K. S., & Creswell, J. D. (2005). Mixed methods research designs in counseling psychology. *Journal of Counseling Psychology*, *52*(2), 224-235. doi:10.1037/0022-0167.52.2.224
- Harber, B., & Ball, T. (2003, November). From the blame game to accountability in health care. *Policy Options*, *24*(10), 49-54.
- Harding, L., & Petrick, T. (2008). Nursing student medication errors: A retrospective review. *Journal of Nursing Education*, *47*(1), 43-47. doi:10.3928/01484834-20080101-05
- Harrison, R., Walton, M., Manias, E., Smith-Merry, J., Kelly, P., Iedema, R., & Robinson, L. (2015). The missing evidence: A systematic review of patients' experiences of adverse events in health care. *International Journal for Quality in Health Care*, *27*(6), 424-442. doi:10.1093/intqhc/mzv075
- Heale, R., & Forbes, D. (2013). Understanding triangulation in research. *Evidence-Based Nursing*, *16*(4), 98. doi:10.1136/eb-2013-101494
- Heard, G. (2005). Errors in medicine: A human factors perspective. *Australasian Anaesthesia*. Retrieved from http://www.anzca.edu.au/resources/college-publications/pdfs/books-and-publications/Australasian%20Anaesthesia/australasian-anaesthesia-2005/05_Heard.pdf/view
- Hedlund-de Witt, N. H. (2013, June). *Critical realism: A synoptic overview and resource guide for integral scholars*. Retrieved from https://foundation.metaintegral.org/sites/default/files/Critical%20Realism_4-12-2013.pdf

- Helo, S., & Moulton, C.-A. E. (2017). Complications: Acknowledging, managing, and coping with human error. *Translational Andrology and Urology*, 6(4), 773-782. doi:10.21037/tau.2017.06.28
- Hewitt, T., Chreim, S., & Forster, A. (2017). Sociocultural factors influencing incident reporting among physicians and nurses: Understanding frames underlying self- and peer-reporting practices. *Journal of Patient Safety*, 13(3), 129-137. doi:10.1097/PTS.0000000000000130
- Hoffman, S. Z. (2009). No-fault solutions to the problem of medical injuries: A focus on Sweden as a model. *Annals of Health Law*, 18(2), 73-93.
- Hughes, R. G., & Edgerton, E. A. (2005). Reducing pediatric medication errors: Children are especially at risk for medication errors. *American Journal of Nursing*, 105(5), 79-80, 82. doi:10.1097/00000446-200505000-00035
- Hughes, R. G., & Ortiz, E. (2005). Medication errors: Why they happen, and how they can be prevented. *Journal of Infusion Nursing*, 28(2 Suppl), 14-24. doi:10.1097/00000446-200503001-00005
- Hung, C.-C., Lee, B.-O., Liang, H.-F., & Chu, T.-P. (2016). Factors influencing nurses' attitudes and intentions toward medication administration error reporting. *Japan Journal of Nursing Science*, 13(3), 345-354. doi:10.1111/jjns.12113
- Hunt, L. A., McGee, P., Gutteridge, R., & Hughes, M. (2016, April). Failing securely: The processes and support which underpin English nurse mentors' assessment decisions regarding under-performing students. *Nurse Education Today*, 39, 79-86. <https://doi.org/10.1016/j.nedt.2016.01.011>
- Hurley, T. V. (2017). Experiential teaching increases medication calculation accuracy among baccalaureate nursing students. *Nursing Education Perspectives*, 38(1), 34-36. doi:10.1097/01.NEP.0000000000000097
- Institute of Health Policy, Management and Evaluation. (2015, November 9). *Beyond the quick fix: Strategies for improving patient safety*. Retrieved from <http://ihpme.utoronto.ca/wp-content/uploads/2015/11/Beyond-the-Quick-Fix-Baker-2015.pdf>
- Institute of Medicine. (2007). *Preventing medication errors*. Washington, DC: The National Academies Press.
- Institute for Safe Medication Practices Canada. (2015). *Definitions of terms*. Retrieved from <https://www.ismp-canada.org/definitions.htm>
- Institute for Safe Medication Practices Canada. (2018, February 28). *ISMP Canada safety bulletin: Students have a key role in a culture of safety: A multi-incident analysis of student-associated medication incidents*. 18(2). Retrieved from <https://www.ismp-canada.org/download/safetyBulletins/2018/ISMPCSB2018-02-MIA-Student-Incidents.pdf>

- Jamshidi, N., Molazem, Z., Sharif, F., Torabizadeh, C., & Kalyani, M. N. (2016). The challenges of nursing students in the clinical learning environment: A qualitative study. *The Scientific World Journal*, 2016. <http://dx.doi.org/10.1155/2016/1846178>
- Jeffs, L., Law, M., & Baker, G. R. (2007). Creating reporting and learning cultures in health-care organizations. *Canadian Nurse*, 103(3), 16-17, 27-28.
- Jha, A. K., Prasopa-Plaizier, N., Larizgoitia, I., & Bates, D. W. (2010). Patient safety research: An overview of the global evidence. *Quality & Safety in Health Care*, 19, 42-47. doi:10.1136/qshc.2008.029165
- Johnson, J., Panagioti, M., Bass, J., Ramsey, L., & Harrison, R. (2017, March). Resilience to emotional distress in response to failure, error or mistakes: A systematic review. *Clinical Psychology Review*, 52, 19-42. <http://dx.doi.org/10.1016/j.cpr.2016.11.007>
- Johnstone, M. J., & Kanitsaki, O. (2006). The ethics and practical importance of defining, distinguishing and disclosing nursing errors: A discussion paper. *International Journal of Nursing Studies*, 43(3), 367-376. doi:10.1016/j.ijnurstu.2005.04.010
- Jones, J. H., & Treiber, L. A. (2018). More than 1 million potential second victims: How many could nursing education prevent? *Nurse Educator*, 43(3), 154-157. doi:10.1097/NNE.0000000000000437
- Jukes, L., & Gilchrist, M. (2006). Concerns about numeracy skills of nursing students. *Nurse Education in Practice*, 6(4), 192-198. doi:10.1016/j.nepr.2005.12.002
- Kagan, I., & Barnoy, S. (2013). Organizational safety culture and medical error reporting by Israeli nurses. *Journal of Nursing Scholarship*, 45(3), 273-280. doi:10.1111/jnu.12026
- Kahn, P. (2017). Teaching in higher education as a collective endeavour. In B. Leibowitz, V. Bozalek, & P. Kahn (Eds.), *Theorising learning to teach in higher education* (pp. 157-171). New York, NY: Routledge.
- Kalantarzadeh, M., & Hosseinnejad, M. (2014). Underreporting of medication errors in nursing students: A threat to patient safety. *Journal of Medical Ethics and History of Medicine*, 7. Retrieved from <http://jmehm.tums.ac.ir/index.php/jmehm/article/view/120/102>
- Kaler, J. (2002). Responsibility, accountability and governance. *Business Ethics*, 11(4), 327-334. <https://doi.org/10.1111/1467-8608.00292>
- Kavanagh, C. (2017). Medication governance: Preventing errors and promoting patient safety. *British Journal of Nursing*, 26(3), 159-165. doi:10.12968/bjon.2017.26.3.159
- Kling, S. (2018). Disclosing medical error: Changing the culture of medicine. *Current Allergy & Clinical Immunology*, 31(2), 85-87.

- Koehn, A. R., Ebricht, P. R., & Draucker, C. B. (2016). Nurses' experiences with errors in nursing. *Nursing Outlook*, 64(6), 566-574. <https://doi.org/10.1016/j.outlook.2016.05.012>
- Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (2000). *To err is human: Building a safer health system*. Washington, DC: National Academy Press.
- Koohestani, H. R., & Baghcheghi, N. (2009). Barriers to the reporting of medication administration errors among nursing students. *Australian Journal of Advanced Nursing*, 27(1), 66-74. Retrieved from <http://www.ajan.com.au/Vol27/Koohestani.pdf>
- Kouhestani, H., & Baghcheghi, N. (2008). Refusal in reporting medication errors from the viewpoints of nursing students in Arak University of Medical Sciences. *Iranian Journal of Medical Education*, 8(2), 285-291. Retrieved from <http://ijme.mui.ac.ir/article-1-859-en.html>
- Kroll, T., & Neri, M. (2009). Designs for mixed methods research. In S. Andrew & E. J. Halcomb (Eds.), *Mixed methods research for nursing and the health sciences* (pp. 31-49). Chichester, UK: Blackwell Publishing Ltd.
- Latimer, S., Hewitt, J., Stanbrough, R., & McAndrew, R. (2017, May). Reducing medication errors: Teaching strategies that increase nursing students' awareness of medication errors and their prevention. *Nurse Education Today*, 52, 7-9. <http://dx.doi.org/10.1016/j.nedt.2017.02.004>
- Leape, L. L. (1994). Error in medicine. *Journal of the American Medical Association*, 272(23), 1851-1857.
- Lee, J. J., & Yang, S. C. (2019). Professional socialisation of nursing students in a collectivist culture: A qualitative study. *BMC Medical Education*, 19(1), 254-258. <https://doi.org/10.1186/s12909-019-1690-z>
- Lee, S., & Smith, C. A. M. (2012). Criteria for quantitative and qualitative data integration: Mixed-methods research methodology. *Computers, Informatics, Nursing*, 30(5), 251-256. doi:10.1097/NXN.0b013e31824b1f96
- Lee, S. E., & Quinn, B. L. (2019, January). Incorporating medication administration safety in undergraduate nursing education: A literature review. *Nurse Education Today*, 72, 77-83. doi:10.1016/j.nedt.2018.11.004
- Liljedahl, M., Engqvist Boman, L., Porthen Falt, C., & Bolander Laksov, K. (2015). What students really learn: Contrasting medical and nursing students' experiences of the clinical learning environment. *Advances in Health Sciences Education*, 20(3), 765-779. doi:10.1007/s10459-014-9564-y
- Lilley, L. L., Rainforth Collins, S., Snyder, J. S., & Swart, B. (2017). *Pharmacology for Canadian health care practice* (3rd Cdn. ed.). Milton, ON: Elsevier Canada.

- Lincoln, Y. S., & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *Naturalistic Evaluation*, 1986(30), 73-84. <https://doi.org/10.1002/ev.1427>
- Lupton, B., & Warren, R. (2018). Managing without blame: Insights from the philosophy of blame. *Journal of Business Ethics*, 152(1), 41-52. <https://doi.org/10.1007/s10551-016-3276-6>
- MacDermaid, L. J. (2005, July 26). *First, do no harm: Medical error in Canada*. Retrieved from <http://www.cchse.org/assets/awardsprogram/SDLfirst.pdf>
- Mackie, J. E., & Bruce, C. D. (2016, May). Increasing nursing students' understanding and accuracy with medical dose calculations: A collaborative approach. *Nurse Education Today*, 40, 146-153. <https://doi.org/10.1016/j.nedt.2016.02.018>
- MacLeod, S., Foreman, J., & Wilson, K. (2013, July). *British Columbia Patient Safety & Learning System: Degree of harm for fall-related injuries*. British Columbia: BC PSLS Central Office.
- Maher, C., Hadfield, M., Hutchings, M., & de Eyto, A. (2018). Ensuring rigor in qualitative data analysis: A design research approach to coding combining NVivo with traditional material methods. *International Journal of Qualitative Methods*, 17(1), 1-13. <https://doi.org/10.1177/1609406918786362>
- Maley, B., & Garofalo, P. F. (2017). Use of dimensional analysis in an associate degree nursing program. *Journal of Nursing & Healthcare*, 2(2). Retrieved from https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1166&context=ny_pubs
- Manias, E., & Bullock, S. (2002a). The educational preparation of undergraduate nursing students in pharmacology: Clinical nurses' perceptions and experiences of graduate nurses' medication knowledge. *International Journal of Nursing Studies*, 39(8), 773-784. doi:10.1016/s0020-7489(02)00008-1
- Manias, E., & Bullock, S. (2002b). The educational preparation of undergraduate nursing students in pharmacology: Perceptions and experiences of lecturers and students. *International Journal of Nursing Studies*, 39(7), 757-769. doi:10.1016/s0020-7489(02)00018-4
- Maranon, A. A., & Isla Pera, M. P. (2015). Theory and practice in the construction of professional identity in nursing students: A qualitative study. *Nurse Education Today*, 35(7), 859-863. doi:10.1016/j.nedt.2015.03.014
- Mariet, J. (2016). Professional socialization models in nursing. *International Journal of Nursing Education*, 8(3), 143-148. doi:10.5958/0974-9357.2016.00107.0
- Martin, D., Miller, A. P., Quesnel-Vallee, A., Caron, N. R., Vissandjee, B., & Marchildon, G. P. (2018). Canada's universal health-care system: Achieving its potential. *The Lancet*, 391(10131), 1718-1735. [https://doi.org/10.1016/S0140-6736\(18\)30181-8](https://doi.org/10.1016/S0140-6736(18)30181-8)

- Masotti, P., McColl, M. A., & Green, M. (2010). Adverse events experienced by homecare patients: A scoping review of the literature. *International Journal for Quality in Health Care*, 22(2), 115-125. doi:10.1093/intqhc/mzq003
- Maxwell, J. A., & Mittapalli, K. (2010). Realism as a stance for mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *SAGE handbook of mixed methods in social & behavioral research* (2nd ed., pp. 145-167). Los Angeles, CA: Sage Publications, Inc.
- McEvoy, P., & Richards, D. (2006). A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of Research in Nursing*, 11(1), 66-78. doi:10.1177/1744987106060192
- Melrose, S., Park, C., & Perry, B. (2015). *Creative clinical teaching in the health professions*. Retrieved from <https://pressbooks.com/app/uploads/sites/116910/2019/05/Creative-Clinical-Teaching-in-the-Health-Professions-1557547389.pdf>
- Meyer, T. (2004). Calculating drug dosages - accurately. *American Journal of Nursing*, 104(11), 13. doi:10.1097/00000446-200411000-00002
- Miller, K., Haddad, L., & Phillips, K. D. (2016, January). Educational strategies for reducing medication errors committed by student nurses: A literature review. *International Journal of Health Sciences Education*, 3(1). Retrieved from <http://dc.etsu.edu/ijhse/vol3/iss1/2>
- Mingers, J. (2006). Philosophical foundations: Critical realism. In *Realising systems thinking: Knowledge and action in management science* (pp. 11-31). London, UK: Springer.
- Mitchell, I., Schuster, A., Smith, K., Pronovost, P., & Wu, A. (2016). Patient safety incident reporting: A qualitative study of thoughts and perceptions of experts 15 years after 'To Err is Human'. *British Medical Journal Quality & Safety*, 25(2), 92-99. doi:10.1136/bmjqs-2015-004405
- Modell, S. (2009). In defence of triangulation: A critical realist approach to mixed methods research in management accounting. *Management Accounting Research*, 20(3), 208-221. <https://doi.org/10.1016/j.mar.2009.04.001>
- Molloy, E., & Bearman, M. (2019). Embracing the tension between vulnerability and credibility: "Intellectual candour" in health professions education. *Medical Education*, 53(1), 32-41. <https://doi.org/10.1111/medu.13649>
- Montgomery, P., Killam, L., Mossey, S., & Heerschap, C. (2014). Third year nursing students' viewpoints about circumstances which threaten safety in the clinical setting. *Nurse Education Today*, 34(2), 271-276. doi:10.1016/j.nedt.2013.09.019
- Moonaghi, H. K., Mirhaghi, A., Oladi, S., & Zeydi, A. E. (2015). A journey across an unwelcoming field: A qualitative study exploring the factors influencing nursing students' clinical education. *Health Science Journal*, 9(4). Retrieved from

- <http://www.hsj.gr/medicine/a-journey-across-an-unwelcoming-field-a-qualitative-study-exploring-the-factors-influencing-nursing-students-clinical-education.pdf>
- Morimoto, T., Gandhi, T. K., Seger, A. C., Hsieh, T. C., & Bates, D. W. (2004). Adverse drug events and medication errors: Detection and classification methods. *Quality and Safety in Health Care, 13*(4), 306-314. doi:10.1136/qshc.2004.010611
- Moura, M. L. (2012). The importance of education of pharmacology for nursing graduates. *Educational Research, 3*(12), 952-953. Retrieved from <https://www.interestjournals.org/articles/the-importance-of-education-of-pharmacology-for-nursing-graduate.pdf>
- Natan, M. B., Sharon, I., Mahajna, M., & Mahajna, S. (2017, November). Factors affecting nursing students' intention to report medication errors: An application of the theory of planned behavior. *Nurse Education Today, 58*, 38-42. <http://dx.doi.org/10.1016/j.nedt.2017.07.017>
- Nicholas, P. K., & Agius, C. R. (2005). Toward safer IV medication administration: The narrow safety margins of many IV medications make this route particularly dangerous. *American Journal of Nursing, 105*(3 Suppl), 25-30. doi:10.1097/00000446-200503001-00006
- Nick, J. M., Delahoyde, T. M., Del Prato, D., Mitchell, C., Ortiz, J., Ottley, C., . . . Siktberg, L. (2012). Best practices in academic mentoring: A model for excellence. *Nursing Research and Practice, 2012*. doi:10.1155/2012/937906
- Noble, H., & Heale, R. (2019). Triangulation in research, with examples. *Evidence-Based Nursing, 22*(3), 67-68. doi:10.1136/ebnurs-2019-103145
- Noland, C. M. (2014). Baccalaureate nursing students' accounts of medical mistakes occurring in the clinical setting: Implications for curricula. *Journal of Nursing Education, 53*(Suppl. 3), S34-S37. doi:10.3928/01484834-20140211-04
- Noland, C. M., & Carmack, H. J. (2015a). Narrativizing nursing students' experiences with medical errors during clinicals. *Qualitative Health Research, 25*(10), 1423-1434. doi:10.1177/1049732314562892
- Noland, C. M., & Carmack, H. J. (2015b). "You never forget your first mistake": Nursing socialization, memorable messages, and communication about medical errors. *Health Communication, 30*(12), 1234-1244. doi:10.1080/10410236.2014.930397
- Northern Health Authority. (n.d.). *Northern Health 2017/18 to 2019/20 service plan*. Retrieved from https://www.northernhealth.ca/sites/northern_health/files/about-us/reports/strategic-service-plans/documents/service-plan-2017-2020.pdf
- Northern Health Emergency Management. (2019, February). Emergency response roles & responsibilities. Retrieved from https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/emergency-response-roles-responsibilities-contacts.pdf

- Nowell, L., White, D. E., Benzies, K., & Rosenau, P. (2017). Exploring mentorship programs and components in nursing academia: A qualitative study. *Journal of Nursing Education and Practice, 7*(9), 42-53. doi:10.5430/jnep.v7n9p42
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*(1), 1-13. <https://doi.org/10.1177/1609406917733847>
- O'Connor, N., Kotze, B., & Wright, M. (2011a). Blame and accountability 1: Understanding blame and blame pathologies. *Australasian Psychiatry, 19*(2), 113-118. doi:10.3109/10398562.2011.562296
- O'Connor, N., Kotze, B., & Wright, M. (2011b). Blame and accountability 2: On being accountable. *Australasian Psychiatry, 19*(2), 119-124. doi:10.3109/10398562.2011.562293
- O'Hagan, J., MacKinnon, N. J., Persaud, D., & Etchegary, H. (2009). Self-reported medical errors in seven countries: Implications for Canada. *Healthcare Quarterly, 12*, 55-61. doi:10.12927/hcq.2009.20967
- O'Reilly, M., & Parker, N. (2012). "Unsatisfactory saturation": A critical exploration of the notion of saturated sample sizes in qualitative research. *Qualitative Research, 13*(2), 190-197. doi:10.1177/1468794112446106
- Oermann, M. H., Shellenbarger, T., & Gaberson, K. B. (2018). *Clinical teaching strategies in nursing* (5th ed.). New York, NY: Springer Publishing Company.
- Oladele, D., Clark, A. M., Richter, S., & Laing, L. (2013). Critical realism: A practical ontology to explain the complexities of smoking and tobacco control in different resource settings. *Global Health Action, 6*. doi:10.3402/gha.v6i0.19303
- Ortlipp, M. (2008). Keeping and using reflective journals in the qualitative research process. *The Qualitative Report, 13*(4), 695-705. Retrieved from <https://nsuworks.nova.edu/tqr/vol13/iss4/8/>
- Page, K., & McKinney, A. A. (2007). Addressing medication errors: The role of undergraduate nurse education. *Nurse Education Today, 27*(3), 219-224. doi:10.1016/j.nedt.2006.05.002
- Palaganas, E. C., Sanchez, M. C., Molintas, M. V. P., & Caricativo, R. D. (2017). Reflexivity in qualitative research: A journey of learning. *The Qualitative Report, 22*(2), 426-438. Retrieved from <https://nsuworks.nova.edu/tqr/vol22/iss2/5>
- Palominos, E., Levett-Jones, T., Power, T., & Martinez-Maldonado, R. (2019, June). Healthcare students' perceptions and experiences of making errors in simulation: An

- integrative review. *Nurse Education Today*, 77, 32-39. <https://doi.org/10.1016/j.nedt.2019.02.013>
- Patey, R., Flin, R., Cuthbertson, B. H., MacDonald, L., Mearns, K., Cleland, J., & Williams, D. (2007). Patient safety: Helping medical students understand error in healthcare. *Quality & Safety in Health Care*, 16(4), 256-259. doi:10.1136/qshc.2006.021014
- Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Plano Clark, V. L., & Ivankova, N. V. (2017). Why use mixed methods research? Identifying rationales for mixing methods. In *Mixed methods research: A guide to the field* (pp. 79-104). Thousand Oaks, CA: Sage Publications. <https://dx.doi.org/10.4135/9781483398341>
- Powell-Cope, G., Nelson, A. L., & Patterson, E. S. (2008, April). Patient care technology and safety. In R. G. Hughes (Ed.), *Patient safety and quality: An evidence-based handbook for nurses* (pp. 201-220): Agency for Healthcare Research and Quality (US).
- Pratt, D. (2011). *Critical realism*. New York, NY: Springer Verlag Dordrecht.
- Preston, P., Leone-Sheehan, D., & Keys, B. (2019, March). Nursing student perceptions of pharmacology education and safe medication administration: A qualitative research study. *Nurse Education Today*, 74, 76-81. <https://doi.org/10.1016/j.nedt.2018.12.006>
- Pugh, D. (2011). A fine line: The role of personal and professional vulnerability in allegations of unprofessional conduct. *Journal of Nursing Law*, 14(1), 21-31. doi:10.1891/1073-7472.14.1.21
- Quality and Planning, Northern Health Authority. (2017, January 13). *Northern Health service distribution framework: Draft*. Northern Health Authority: BC, Canada.
- Rafiee, G., Moattari, M., Nikbakht, A. N., Kojuri, J., & Mousavinasab, M. (2014). Problems and challenges of nursing students' clinical evaluation: A qualitative study. *Iranian Journal of Nursing and Midwifery Research*, 19(1), 41-49. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3917184/>
- Rappaport, D. I., & Selbst, S. M. (2019). Medical errors and malpractice lawsuits: Impact on providers - Part 2 of 6. *Pediatric Emergency Care*, 35(6), 440-442. doi:10.1097/PEC.0000000000001856
- Rassin, M., Kanti, T., & Silner, D. (2005). Chronology of medication errors by nurses: Accumulation of stresses and PTSD symptoms. *Issues in Mental Health Nursing*, 26(8), 873-886. doi:10.1080/01612840500184566

- Reason, J. (1997). *Managing the risks of organizational accidents*. Brookfield, VT: Ashgate Publishing Company.
- Reason, J. (2000). Human error: Models and management. *British Medical Journal*, *320*(7237), 768-770. <https://doi.org/10.1136/bmj.320.7237.768>
- Reason, J. T., Carthey, J., & de Leval, M. R. (2001). Diagnosing "vulnerable system syndrome": An essential prerequisite to effective risk management. *Quality in Health Care*, *10*(Suppl. II), ii21-ii25.
- Reid-Searl, K., & Happell, B. (2011). Factors influencing the supervision of nursing students administering medication: The registered nurse perspective. *Collegian*, *18*(4), 139-146. doi:10.1016/j.colegn.2011.05.003
- Reid-Searl, K., & Happell, B. (2012). Supervising nursing students administering medication: A perspective from registered nurses. *Journal of Clinical Nursing*, *21*(13-14), 1998-2005. doi:10.1111/j.1365-2702.2011.03976.x
- Reid-Searl, K., Happell, B., Burke, K. J., & Gaskin, C. J. (2013). Nursing students and the supervision of medication administration. *Collegian*, *20*(2), 109-114. <https://doi.org/10.1016/j.colegn.2012.04.003>
- Reid-Searl, K., Moxham, L., & Happell, B. (2010). Enhancing patient safety: The importance of direct supervision for avoiding medication errors and near misses by undergraduate nursing students. *International Journal of Nursing Practice*, *16*(3), 225-232. doi:10.1111/j.1440-172X.2010.01820.x
- Reid-Searl, K., Moxham, L., & Walker, S. (2008). Medication administration and final year nursing students. *Studies in Learning Evaluation Innovation and Development*, *5*(2), 46-55. Retrieved from <http://ro.uow.edu.au/smhpapers/155>
- Reid-Searl, K., Moxham, L., Walker, S., & Happell, B. (2009). Internal conflict: Undergraduate nursing students' response to inadequate supervision during the administration of medication. *Collegian*, *16*(2), 71-77. doi:10.1016/j.colegn.2008.11.002
- Reid-Searl, K., Moxham, L., Walker, S., & Happell, B. (2010). Supervising medication administration by undergraduate nursing students: Influencing factors. *Journal of Clinical Nursing*, *19*(5-6), 775-784. doi:10.1111/j.1365-2702.2009.03074.x
- Reising, D. L., James, B., & Morse, B. (2018). Student perceptions of clinical instructor characteristics affecting clinical experiences. *Nursing Education Perspectives*, *39*(1), 4-9. doi:10.1097/01.NEP.0000000000000241
- Rohde, E., & Domm, E. (2018). Nurses' clinical reasoning practices that support safe medication administration: An integrative review of the literature. *Journal of Clinical Nursing*, *27*(3-4), e402-e411. doi:10.1111/jocn.14077

- Rothschild, J. M., Federico, F. A., Gandhi, T. K., Kaushal, R., Williams, D. H., & Bates, D. W. (2002). Analysis of medication-related malpractice claims: Causes, preventability, and costs. *Archives of Internal Medicine*, *162*(21), 2414-2420. doi:10.1001/archinte.162.21.2414
- Runciman, W. B., Baker, G. R., Michel, P., Jauregui, I. L., Lilford, R. J., Andermann, A., . . . Weeks, W. B. (2008). The epistemology of patient safety research. *International Journal of Evidence-Based Healthcare*, *6*, 476-486. doi:10.1111/j.1479-6988.2008.00117.x
- Safarpour, H., Tofighi, M., Malekyan, L., Bazyar, J., Varasteh, S., & Anvary, R. (2017). Patient safety attitudes, skills, knowledge and barriers related to reporting medical errors by nursing students. *International Journal of Clinical Medicine*, *8*(1), 1-11. doi:10.4236/ijcm.2017.81001
- Salami, I. (2018). Nursing students' medication errors and adherence to medication best-practice. *Open Journal of Nursing*, *8*(5), 281-291. doi:10.4236/ojn.2018.85024
- Sanko, J. S., & McKay, M. (2017). Impact of simulation-enhanced pharmacology education in prelicensure nursing education. *Nurse Educator*, *42*(5S), S32-S37. doi:10.1097/NNE.0000000000000409
- Schiller, C. J. (2015). Self-regulation of the nursing profession: Focus on four Canadian provinces. *Journal of Nursing Education and Practice*, *5*(1), 95-106. doi:10.5430/jnep.v5n1p95
- Schiller, C. J. (2016). Critical realism in nursing: An emerging approach. *Nursing Philosophy*, *17*(2), 88-102. doi:10.1111/nup.12107
- Scott, P. J., & Briggs, J. S. (2009). A pragmatist argument for mixed methodology in medical informatics. *Journal of Mixed Methods Research*, *3*(3), 223-241. https://doi.org/10.1177/1558689809334209
- Seshia, S. S., Young, G. B., Makhinson, M., Smith, P. A., Stobart, K., & Croskerry, P. (2018). Gating the holes in the Swiss cheese (part I): Expanding Professor Reason's model for patient safety. *Journal of Evaluation in Clinical Practice*, *24*(1), 187-197. doi:10.1111/jep.12847
- Seyedrasooli, A., Zamanzadeh, V., Ghahramanian, A., & Jabbarzadeh Tabrizi, F. (2019). Nursing educators' experiences regarding students' mistakes in clinical settings. *Iranian Journal of Nursing and Midwifery Research*, *24*(6). doi:10.4103/ijnmr.IJNMR_46_19
- Shannon-Baker, P. (2016). Making paradigms meaningful in mixed methods research. *Journal of Mixed Methods Research*, *10*(4), 319-334. doi:10.1177/1558689815575861

- Sidhu, S., & Park, T. (2018). Nursing curriculum and bullying: An integrative literature review. *Nurse Education Today*, *65*, 169-176. doi:10.1016/j.nedt.2018.03.005
- Smith, S., Elias, B. L., & Baernholdt, M. (2019). The role of interdisciplinary faculty in nursing education: A national survey. *Journal of Professional Nursing*. Advance online publication. <https://doi.org/10.1016/j.profnurs.2019.03.001>
- Southwick, F. S., Cranley, N. M., & Hallisy, J. A. (2015). A patient-initiated voluntary online survey of adverse medical events: The perspective of 696 injured patients and families. *British Medical Journal Quality & Safety*, *24*(10), 620-629. doi:10.1136/bmjqs-2015-003980
- Soydemir, D., Intepeler, S. S., & Mert, H. (2017). Barriers to medical error reporting for physicians and nurses. *Western Journal of Nursing Research*, *39*(10), 1348-1363. doi:10.1177/0193945916671934
- Stolic, S. (2014). Educational strategies aimed at improving student nurse's medication calculation skills: A review of the research literature. *Nurse Education in Practice*, *14*(5), 491-503. doi:10.1016/j.nepr.2014.05.010
- Stump, L. S. (2000). Re-engineering the medication error-reporting process: Removing the blame and improving the system. *American Journal of Health-System Pharmacy*, *57*(Suppl 4), S10-S17. doi:10.1093/ajhp/57.suppl_4.S10
- Sulosaari, V., Huupponen, R., Hupli, M., Puuka, P., Torniainen, K., & Leino-Kilpi, H. (2015). Factors associated with nursing students' medication competence at the beginning and end of their education. *BMC Medical Education*, *15*(223). doi:10.1186/s12909-015-0513-0
- Sulosaari, V., Huupponen, R., Torniainen, K., Hupli, M., Puuka, P., & Leino-Kilpi, H. (2014, December). Medication education in nursing programs in Finland: Findings from a national survey. *Collegian*, *21*(4), 327-335. doi:10.1016/j.colegn.2013.08.003
- Sulosaari, V., Kajander, S., Hupli, M., Huupponen, R., & Leino-Kilpi, H. (2012). Nurse students' medication competence: An integrative review of the associated factors. *Nurse Education Today*, *32*(4), 399-405. doi:10.1016/j.nedt.2011.05.016
- Sword, W., Clark, A. M., Hegadoren, K., Brooks, S., & Kingston, D. (2012). The complexity of postpartum mental health and illness: A critical realist study. *Nursing Inquiry*, *19*(1), 51-62. doi:10.1111/j.1440-1800.2011.00560.x
- Tamuz, M., & Thomas, E. J. (2006). Classifying and interpreting threats to patient safety in hospitals: Insights from aviation. *Journal of Organizational Behavior*, *27*(7), 919-940. <https://doi.org/10.1002/job.419>
- Thorne, S. (2008). *Interpretive description*. Walnut Creek, CA: Left Coast Press, Inc.

- Thorne, S. (2013). Interpretive description. In C. T. Beck (Ed.), *Routledge international handbook of qualitative nursing research* (pp. 295-306). Oxon, UK: Routledge.
- Tigard, D. W. (2019). Taking the blame: Appropriate responses to medical error. *Journal of Medical Ethics, 45*(2), 101-105. doi:10.1136/medethics-2017-104687
- Trede, F., Sutton, K., & Bernoth, M. (2016, January). Conceptualisations and perceptions of the nurse preceptor's role: A scoping review. *Nurse Education Today, 36*, 268-274. <https://doi.org/10.1016/j.nedt.2015.07.032>
- Tregunno, D., Ginsburg, L., Clarke, B., & Norton, P. (2014). Integrating patient safety into health professionals' curricula: A qualitative study of medical, nursing and pharmacy faculty perspectives. *BMJ Quality & Safety, 23*(3), 257-264. doi:10.1136/bmjqs-2013-001900
- Treiber, L. A., & Jones, J. H. (2018). After the medication error: Recent nursing graduates' reflections on adequacy of education. *Journal of Nursing Education, 57*(5), 275-280. doi:10.3928/01484834-20180420-04
- Tsai, Y. (2011). Relationship between organizational culture, leadership behavior and job satisfaction. *BMC Health Services Research, 10*(1), 136-144. <https://doi.org/10.1186/1472-6963-11-98>
- Ulrich, B. T. (2011). The preceptor role. In B. Ulrich (Ed.), *Mastering precepting: A nurse's handbook for success*. Indianapolis, IN: Sigma Theta Tau International.
- Unal, A., & Seren, S. (2016). Medical error reporting attitudes of healthcare personnel, barriers and solutions: A literature review. *Journal of Nursing and Care, 5*(6), 377. doi:10.4172/2167-1168.1000377
- Vaismoradi, M. (2012). Nursing education curriculum for improving patient safety. *Journal of Nursing Education and Practice, 2*(1), 101-104. <http://dx.doi.org/10.5430/jnep.v2n1p101>
- Vaismoradi, M., & Parsa-Yekta, Z. (2011). Iranian nursing students' comprehension and experiences regarding evaluation process: A thematic analysis study. *Scandinavian Journal of Caring Sciences, 25*(1), 151-159. doi:10.1111/j.1471-6712.2010.00805.x
- Vaismoradi, M., Jordan, S., Turunen, H., & Bondas, T. (2014). Nursing students' perspectives of the cause of medication errors. *Nurse Education Today, 34*(3), 434-440. doi:10.1016/j.nedt.2013.04.015
- Valdez, L. P., de Guzman, A., & Escolar-Chua, R. (2013). A structural equation modeling of the factors affecting student nurses' medication errors. *Nurse Education Today, 33*(3), 222-228. doi:10.1016/j.nedt.2012.01.001
- Van der Schaaf, T. W., Lucas, D. A., & Hale, A. R. (2001). *Near miss reporting as a safety tool*. Oxford, UK: Butterworth-Heinemann Ltd.

- von Thaden, T., Hoppes, M., Li, Y., Johnson, N., & Schriver, A. (2006). The perception of just culture across disciplines in healthcare. *Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting*, 50(10), 964-968. doi:10.1177/154193120605001035
- Vrbnjak, D., Denieffe, S., O'Gorman, C., & Pajnkihar, M. (2016, November). Barriers to reporting medication errors and near misses among nurses: A systematic review. *International Journal of Nursing Studies*, 63, 162-178. <http://dx.doi.org/10.1016/j.ijnurstu.2016.08.019>
- Walsh, D., & Evans, K. (2014). Critical realism: An important theoretical perspective for midwifery research. *Midwifery*, 30(1), e1-e6. doi:10.1016/j.midw.2013.09.002
- Warner, S. L. (2016). Productive errors: Transforming learning experiences in healthcare. *Nursing 2016 Critical Care*, 11(4), 9-10. doi:10.1097/01.CCN.0000484634.95465.ae
- Weeks, K. W., Lyne, P., & Torrance, C. (2000). Written drug dosage errors made by students: The threat to clinical effectiveness and the need for a new approach. *Clinical Effectiveness in Nursing*, 4(1), 20-29. <https://doi.org/10.1054/cein.2000.0101>
- Weingart, S. N., Wilson, R. M., Gibberd, R. W., & Harrison, B. (2000). Epidemiology of medical error. *British Medical Journal*, 320(7237), 774-777. <https://doi.org/10.1136/bmj.320.7237.774>
- Weston, C., Gandell, T., Beauchamp, J., McAlpine, L., Wiseman, C., & Beauchamp, C. (2001). Analyzing interview data: The development and evolution of a coding system. *Qualitative Sociology*, 24(3), 381-400. Retrieved from <http://mintlinz.pbworks.com/w/file/attach/95618552/Weston%20Analysing%20interview%20data%202001.pdf>
- White, A. A., Waterman, A. D., McCotter, P., Boyle, D. J., & Gallagher, T. H. (2008). Supporting health care workers after medical error: Considerations for health care leaders. *Journal of Clinical Outcomes Management*, 15(5), 240-247. Retrieved from <https://pdfs.semanticscholar.org/e379/1f5e4dedc032904a8cf414e970f7a4bdc87b.pdf>
- Wilkins, K., & Shields, M. (2008). Correlates of medication error in hospitals. *Health Reports*, 19(2), 7-18.
- Williams, D. J. P. (2007). Medication errors. *Journal of Royal College of Physicians of Edinburgh*, 37(4), 343-346. Retrieved from https://www.rcpe.ac.uk/sites/default/files/williams_1.pdf
- Winter, G. F. (2019). Guilt, forgiveness and medical error. *British Journal of Midwifery*, 27(3), 145. <https://doi.org/10.12968/bjom.2019.27.3.145>
- Wittich, C. M., Burkle, C. M., & Lanier, W. L. (2014). Medication errors: An overview for clinicians. *Mayo Clinic Proceedings*, 89(8), 1116-1125. doi:10.1016/j.mayocp.2014.05.007

- Wolf, Z. R., Hicks, R., & Serembus, J. F. (2006). Characteristics of medication errors made by students during the administration phase: A descriptive study. *Journal of Professional Nursing, 22*(1), 39-51. doi:10.1016/j.profnurs.2005.12.008
- Wolfe, M. (2017, March 23). *An assessment of errors and near-misses from pre-licensure student nurses*. (Doctoral dissertation). Retrieved from https://hsrc.himmelfarb.gwu.edu/son_dnp/5
- World Health Organization. (2016). *Medication errors: Technical series on safer primary care*. Retrieved from <https://apps.who.int/iris/bitstream/10665/252274/1/9789241511643-eng.pdf>
- Wright, K. (2005). An exploration into the most effective way to teach drug calculation skills to nursing students. *Nurse Education Today, 25*(6), 430-436. doi:10.1016/j.nedt.2005.04.004
- Wright, K. (2007). Student nurses need more than maths to improve their drug calculating skills. *Nurse Education Today, 27*(4), 278-285. doi:10.1016/j.nedt.2006.05.007
- Wright, K. (2008). Can effective teaching and learning strategies help student nurses to retain drug calculation skills? *Nurse Education Today, 28*(7), 856-864. doi:10.1016/j.nedt.2008.01.002
- Yung, H.-P., Yu, S., Chu, C., Hou, I.-C., & Tang, F.-I. (2016). Nurses' attitudes and perceived barriers to the reporting of medication administration errors. *Journal of Nursing Management, 24*(5), 580-588. doi:10.1111/jonm.12360
- Zieber, M. P. (2014). *The experience of making a mistake in clinical practice from a nursing student perspective* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 10100703)
- Zieber, M. P., & Williams, B. (2015). The experience of nursing students who make mistakes in clinical. *International Journal of Nursing Education Scholarship, 12*(1), 1-9. doi:10.1515/ijnes-2014-0070

Appendix A**Characteristics of Five NHA Healthcare Facilities**

Facility Identifier	Characteristics
A	<ul style="list-style-type: none">• Level 5 (Regional Hospital)
B	<ul style="list-style-type: none">• Level 4 (Hospital with Limited Specialty Services)
C	<ul style="list-style-type: none">• Level 4 (Hospital with Limited Specialty Services)
D	<ul style="list-style-type: none">• Level 2 (Small Hospital with Capacity for Stable Patients)
E	<ul style="list-style-type: none">• Level 4 (Hospital with Limited Specialty Services)

Appendix B

Student Enrollment in UNBC Nursing Program *

School Year Program Year	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Year 1	151	144	139	155	150
Year 2	134	138	135	128	133
Year 3	116	125	112	117	106
Year 4	132	101	124	114	111

* Enrollment numbers are based on the end-of-term student enrollment numbers in required clinical courses of each program year. The numbers include part-time and out-of-sequence students. The numbers include those students who failed the clinical course but do *not* include students who either dropped the clinical course or administratively withdrew from it before the term ended.

Note: Each series of same-coloured cells moving diagonally across the table represent one cohort of students as they moved through the four years of the UNBC nursing program. For example, in 2010/2011, there were 151 students enrolled in the clinical course at the end of Year 1 of the nursing program; 114 students from that same cohort were enrolled in the Year 4 clinical courses at the end of 2013/2014.

Total Number of Students Eligible to be Participants, *Not Including Those Students Who Have Completed First Year Only*

School Year Program Year	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Year 1	--	--	--	--	--
Year 2	134	138	135	128	133
Year 3	116	--	--	--	--
Year 4	132	--	--	--	--

Appendix C

Inclusion and Exclusion Criteria for Participants

Inclusion and exclusion criteria for a *student nurse* participant:

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> • was, or is currently, enrolled in the UNBC four-year nursing baccalaureate program 	<ul style="list-style-type: none"> • has not been directly involved in a medication error within past five years while taking part in a clinical placement at a healthcare facility as part of course requirements
<ul style="list-style-type: none"> • was <i>directly</i> involved in (i.e. not merely a witness to) the commission of a medication error: <ul style="list-style-type: none"> • during a clinical placement at a healthcare facility as part of course requirements for the UNBC nursing program; and • that occurred sometime during the past five years 	
<ul style="list-style-type: none"> • able to converse in English 	

Inclusion and exclusion criteria for a *clinical instructor* participant:

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> • either currently acts, or has in the past five years acted, in the role of clinical instructor for students enrolled in any of years one through four of the UNBC nursing program 	<ul style="list-style-type: none"> • has not, within the past five years, been formally assigned as clinical instructor to a student nurse at the time that the student committed a medication error while at a healthcare facility covered under the NHA Agreement
<ul style="list-style-type: none"> • has, within the past five years, been formally assigned as clinical instructor to a student nurse at the time that the student committed a medication error during a clinical placement. The clinical placement must have occurred at a healthcare facility covered under the NHA Agreement. 	
<ul style="list-style-type: none"> • able to converse in English 	

Inclusion and exclusion criteria for a *preceptor* participant:

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> has, in the past five years, participated in a preceptor arrangement with UNBC, either as an individual or as part of a teaching team/group. 	<ul style="list-style-type: none"> has not been directly involved in the past five years as a preceptor to a student who committed a medication error during a clinical placement at a healthcare facility covered under the NHA Agreement.
<ul style="list-style-type: none"> has, in the past five years, been formally assigned as preceptor to a 3rd or 4th year UNBC student nurse who committed a medication error during a clinical placement. The clinical placement must have occurred at a healthcare facility covered under the NHA Agreement. 	
<ul style="list-style-type: none"> able to converse in English 	

Inclusion and exclusion criteria for a *healthcare facility administrator* participant:

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> is an employee of a healthcare facility that is covered under the NHA Agreement 	
<ul style="list-style-type: none"> as part of his/her role in the healthcare facility: <ul style="list-style-type: none"> is responsible for managing and/or addressing student-committed medication errors; is aware of general trends, policies, procedures, and processes related to student-committed medication errors; and/or is identified by the NHA Regional Director, Risk and Compliance as having knowledge related to student-committed medication errors. 	
<ul style="list-style-type: none"> able to converse in English 	

Inclusion and exclusion criteria for an *educational institution leader* participant:

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> • has in the past five years acted, or is currently acting, in an administrative role at the UNBC School of Nursing 	
<ul style="list-style-type: none"> • as part of his/her administrative role within the past five years in the UNBC School of Nursing: <ul style="list-style-type: none"> • was or is responsible for managing and/or addressing student-committed medication errors; • was or is aware of general trends, policies, procedures, and processes related to student-committed medication errors; and/or • is identified by the Chair of Nursing as having knowledge related to student-committed medication errors. 	
<ul style="list-style-type: none"> • able to converse in English 	

Appendix D

Study Approval Letter from UNBC REB

UNIVERSITY OF NORTHERN BRITISH COLUMBIA

RESEARCH ETHICS BOARD

MEMORANDUM

To: Catherine Schiller
CC: Cindy Hardy
Martha MacLeod

From: Henry Harder, Chair
Research Ethics Board

Date: March 24, 2016

Re: E2016.0212.014.00
Medication Errors Committed by Nursing Students: Allocating
Accountability and Responsibility

Thank you for submitting revisions to the Research Ethics Board (REB) regarding the above-noted proposal. Your revisions have been approved.

We are pleased to issue approval for the above named study for a period of 12 months from the date of this letter. Continuation beyond that date will require further review and renewal of REB approval. Any changes or amendments to the protocol or consent form must be approved by the REB.

Good luck with your research.

Sincerely,



Dr. Henry Harder
Chair, Research Ethics Board

Appendix E

Study Approval Letter from NHA REB: Phase 1



Northern Health Regional Office
600-299 Victoria Street, Prince George, BC V2L 5B8
Telephone: (250) 565-2649, Fax: (250) 565-2640
www.northernhealth.ca

March 30, 2016

Catharine Schiller
Assistant Professor
School of Nursing
3333 University Way
Prince George
V2N 4Z9

File # RRC 2016-0008

RE: Medication Errors Committed by Nursing Students: Allocating Accountability and Responsibility

On behalf of the Northern Health Research Review Committee, I would like to thank you for your submission titled "Medication Errors Committed by Nursing Students: Allocating Accountability and Responsibility." The Committee has reviewed your application and your study has met the requirements of the Northern Health Research Review Committee and you may proceed.

Enjoy your work! We look forward to hearing about your findings.

Please contact researchcommittee@northernhealth.ca addressing the above points.

Sincerely,

Tamara Checkley, Chair, NH Research Review Committee

Appendix F

Study Approval Letter from NHA REB: Phase 2



Northern Health Regional Office
600-299 Victoria Street, Prince George, BC V2L 5B8
Telephone: (250) 565-2649, Fax: (250) 565-2640
www.northernhealth.ca

June 24, 2016

Catharine Schiller
Assistant Professor
School of Nursing
3333 University Way
Prince George
V2N 4Z9

File # RRC 2016-0008

RE: Medication Errors Committed by Nursing Students: Allocating Accountability and Responsibility

On behalf of the Northern Health Research Review Committee, I would like to thank you for submitting your operational approval for Phase two of your study: "Medication Errors Committed by Nursing Students: Allocating Accountability and Responsibility."

Phase two of the study has been approved by the Northern Health Research Review Committee and you may proceed.

Enjoy your work! We look forward to hearing about your findings.

Sincerely,

Tamara Checkley, Chair, NH Research Review Committee

Appendix G

Characteristics of the Medication Errors of Interest from the Patient Safety and Learning System

Months in which the Medication Errors of Interest Occurred:

Year	Month	Number of Errors	Annual Total
2010	May	2	2
2011	June	1	1
2012	March	1	24
	April	1	
	May	2	
	June	4	
	July	4	
	August	2	
	September	1	
	October	2	
	November	7	
2013	January	1	38
	February	3	
	March	4	
	April	2	
	May	16	
	June	3	
	July	5	
	September	2	
	November	2	
2014	January	1	25
	March	2	
	April	1	
	May	11	
	June	1	
	July	5	
	October	1	
	November	3	

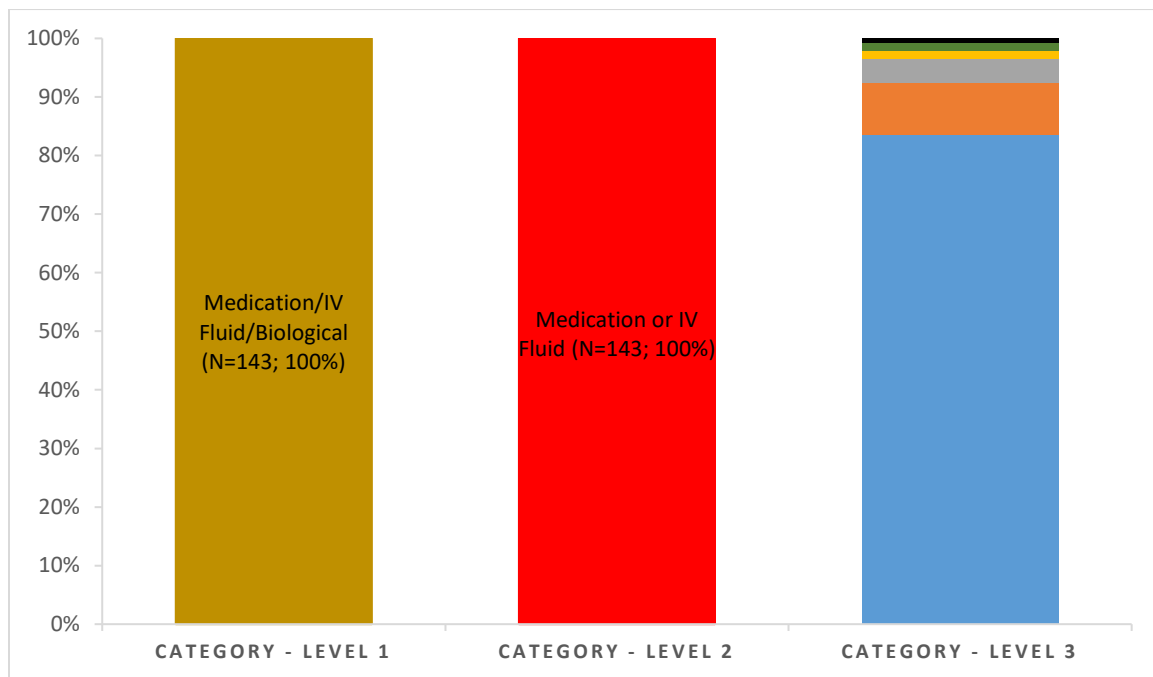
Year	Month	Number of Errors	Annual Total
2015	January	5	35
	February	4	
	March	7	
	April	3	
	May	5	
	June	1	
	July	4	
	October	2	
	November	2	
	December	2	
2016	January	3	18
	February	6	
	March	4	
	April	4	
	June	1	
TOTAL BETWEEN 2010 – 2016			143

Specific Locations within the Five Facilities where Medication Error of Interest Occurred:

Facility	Type of Unit	Specific Location	Number of Medication Errors of Interest	Number of Medication Errors of Interest for Type of Unit	Total Number of Medication Errors of Interest at Facility
A	Inpatient Ward/ Resident Unit	Surgery Units	37	76	77
		Inpatient Room	3		
		Family Medicine Unit	6		
		Rehabilitation Unit	4		
		Internal Medicine Unit	14		
		Pediatrics/PSCU	3		
		Mental Health Adult Inpatient	1		
		Maternity/Labour and Delivery	6		
		Dining Room	1		
		Not Identified	1		
	Emergency	Acute	1	1	
B	Perioperative Area	Holding Area	1	2	39
		Post-Anaesthetic Recovery	1		
	Critical Care	Intensive Care Unit	2	3	
		Not Identified	1		
	Inpatient Ward/ Resident Unit	Medication Room	18	32	
		Inpatient Room/Unit	14		
	Emergency	Stretcher Bay	1	1	
Outpatient Clinic	IV Therapy	1	1		
C	Inpatient Ward/ Resident Unit	Surgical Unit	5	7	9
		Medical Unit	1		
		Birthing Centre/ Labour and Delivery	1		
	Critical Care	Other	1	1	
	Emergency	Treatment Area	1	1	
D	Inpatient Ward/ Resident Unit	Acute/Complex Care	3	9	9
		Inpatient Room	4		
		Other	2		

E	Inpatient Ward/ Resident Unit	Adult Withdrawal Management Unit	9	9	9
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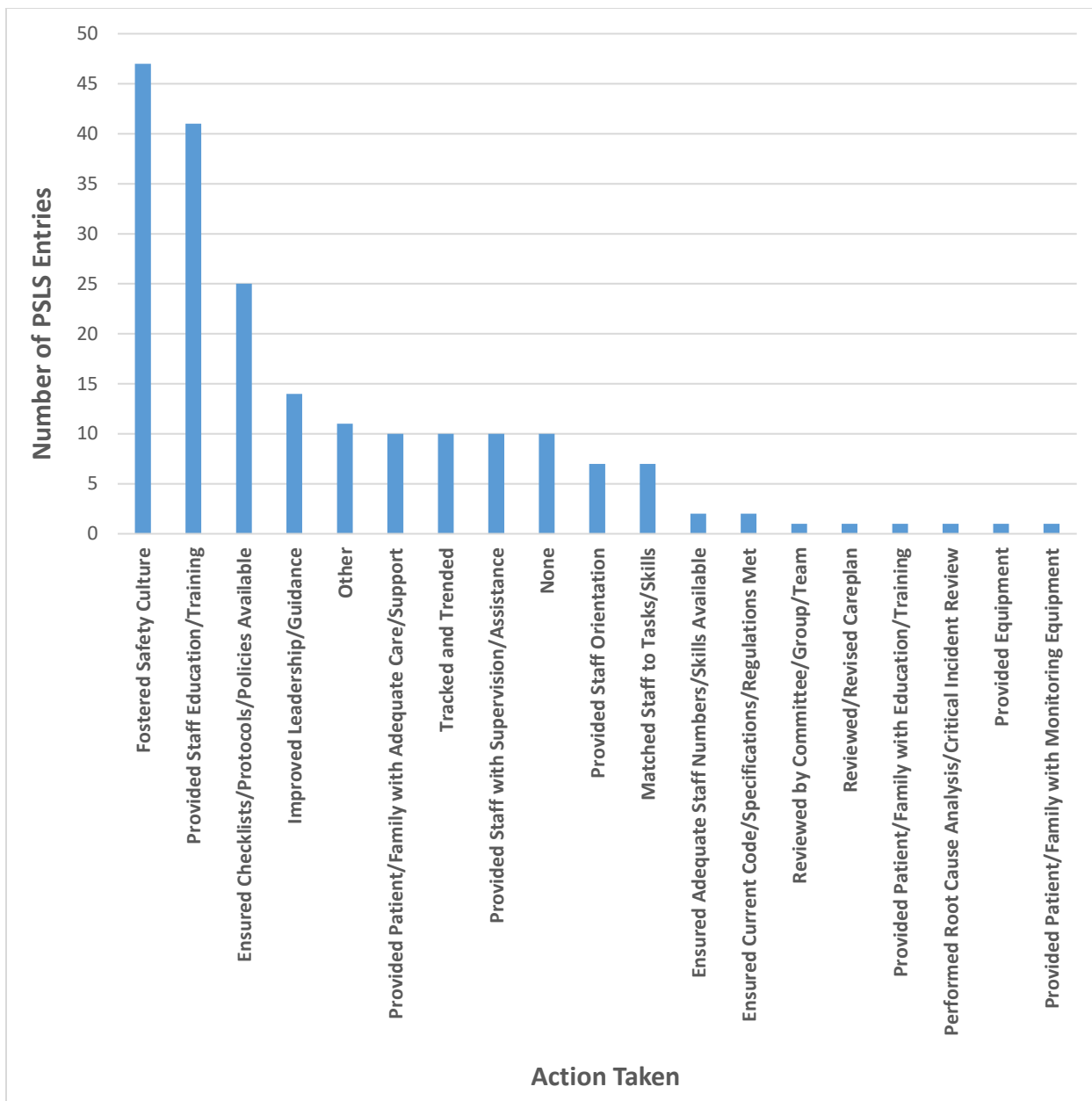
Type of Medication Error as Selected by PSLS Reporter:



Legend: Category – Level 3 (all selections are drawn from pull-down menus in the system and available options cannot be modified by the PSLS reporter)

- = Administration (N=120; 83.9%)
- = Preparing/Selecting/Dispensing (N=13; 8.8%)
- = Order Documentation (e.g. Transcription to MAR) (N=5; 3.5%)
- = Other (N=2; 1.4%)
- = Order Verification (Pre-Administration) (N=2; 1.4%)
- = Monitoring (Post-Administration) (N=1; 0.7%)

Actions Taken for Medication Error of Interest, as Selected by PSLs Reporter:



All selections are drawn from pull-down menus. Available options cannot be modified by the PSLs reporter.

The “Actions Taken” field was completed for only 104 of the 143 Medication Errors of Interest. Forty-eight of these 104 errors had more than one option selected for “Actions Taken”.