University of Alberta

THE EXPERIENCE OF MAKING A MISTAKE IN CLINICAL PRACTICE FROM A NURSING STUDENT PERSPECTIVE

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Abstract

Background: Making a mistake in clinical practice is a difficult experience for seasoned practitioners as well as nursing students. Although there has been some research in examining the phenomenon of errors/mistakes in experienced practitioners there is nothing that examines nursing students. This issue is important from both a patient safety perspective as well as an educational perspective.

Purpose: The purpose of this study was to examine how undergraduate nursing students experience the process of making a mistake in their clinical practice.

Design: A Glaserian grounded theory approach was the initial method utilized although a constructivist approach evolved as the analysis progressed. The following research questions guided this study:

1. What is the experience of making a mistake in clinical practice from a nursing student perspective?
2. What factors and conditions contribute to student error?
3. What recommendations do nursing students have for faculty/staff when dealing with student error in clinical practice?

Sample: A purposive sampling technique was used. The sample consisted of second, third, and fourth year nursing students in two institutions. Inclusion criteria were that participants would

have made at least one mistake in their clinical practice. The sample consisted of sixteen participants: seven from a large Canadian university and nine from a small Canadian university.

Data Collection and Analysis: The process of sampling and concurrent data collection transpired as advocated by the principle of constant comparison. Analysis was accomplished by the dynamic process of open, selective and theoretical coding.

Findings: 'Living the mistake experience' was the core variable identified in the theoretical model of making a mistake. The theoretical model captures the process that participants experienced during and after they made a mistake.

Keywords: Clinical nursing education, Clinical practice mistakes, Mistake experience, and grounded theory.

Preface – Ethical clearance

This thesis is an original work by Mark Pijl Zieber. Ethical clearance from the University of Alberta (#PRO 00020084) was received on February 25, 2011, and ethical clearance for Mount Royal University (#2011–83) was received on October 25, 2011. Completion reports were submitted to MRU on September 16, 2013 and to U of A on January 6, 2014.

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Table of contents

APPENDICES

List of figures

THE EXPERIENCE OF MAKING A MISTAKE IN CLINICAL PRACTICE FROM A NURSING STUDENT PERSPECTIVE

CHAPTER I

Introduction

In this study I conducted an in-depth examination of the processes and realities that surround nursing student errors in clinical practice. There is clear evidence that patient safety is compromised by errors in nursing practice (IOM, 2000; Canadian Nursing Association [CNA], 2003), but little research has been done to understand this process within nursing education (Gregory, Guse, Dick, & Russell, 2007). In particular, no one has attempted to understand the basic psychosocial process of making an error within the context of being a nursing student. Using a grounded theory approach, I explored the process of making an error, including factors that influence and contribute to the error, from the perspective of the nursing student.

The Research Problem

Interest in this topic was inspired by an incident that occurred while I was teaching a clinical practice course on a busy surgical floor. One day I was approached by a terrified looking nursing student. Tearfully, she admitted that she had made a medication error by giving a once-per-day blood pressure medication approximately 45 minutes later than the pharmacy prescribed time for administration. Although a medication error had technically happened, the most compelling part of the incident was that the student was under the impression that the consequence of her making this error would be a clinical practice failure. Despite this perception, the student had the ethical courage and professionalism to admit to the error and suggested a plan to rectify the error. This incident was troublesome to me as an educator and prompted me to explore how students experience the process of making an error in their clinical

practice. The patient safety implications underscore the urgency of the topic but there is currently negligible evidence about what it is like to make a clinical error from the perspective of the student.

The described student incident suggests that numerous competing tensions are involved when errors are made by students in nursing practice. There is the obvious concern that errors have a significant and frequently negative effect on patient health (IOM, 2000). Unfortunately, making errors is often accompanied by a prevailing culture of fear (J. G. Anderson, Ramanujam, Hensel, Anderson, & Sirio, 2006; Benner, 2001) particularly related to the possibility of a punitive response (Gregory et al., 2007; IOM, 2000) directed towards both nursing practitioners and students. This culture of fear has resulted in a clearly documented level of high anxiety about errors (Lehmann et al., 2007; Melo, Williams, & Ross, 2010; Soleimani, 2006). Although there is a limited amount of information about the error experience of practicing nurses, there is a virtual nonexistence of evidence pertaining to the error experience of nursing students. An investigation into the experience of making errors, within clinical nursing education, is essential to not only assist in understanding the experience from the student perspective but also to assist in generating possible solutions to decrease error frequency among nursing students. The focus of this study is the process of making an error in the clinical practice setting from a nursing student perspective.

The terms ‘error’ and ‘mistake’ are often used interchangeably within the literature (Fetter, 2001; Graves, 2005; Halstad, 2007; Hoefel, Lautert, Schmitt, Soares, & Jordan, 2008). There is some evidence that the terms should not be interchanged without more specific consideration (Reason, 1990). According to the Canadian Patient Safety Institute [CPSI] (2009) the definition of error is: “An act (plan, decision, choice, action or inaction) that when viewed in

retrospect was not correct and resulted in an adverse event or close call." The nursing literature reflects a predominant use of the word 'error'. Therefore, the term 'error' will be utilized throughout the discussion of the current state of knowledge. To avoid some of the stigmatization and shame associated with the word 'error', the term 'mistake' was used in the recruitment and interview process. This follows the lead of the CPSI (2011) which strategically avoids using the term 'error' due to the individualistic blame connotations of the word. Although the similarities and differences between the terms error and mistake can be debated, it will be assumed that participants utilize both terms equally to represent the phenomenon under study.

It is clear that numerous research questions still exist pertaining to error in healthcare and more specifically, nursing student error. There is a need to quantitatively measure the incidence and frequency of nursing student error (Gregory et al., 2007). There also is a need to understand how nursing students understand the concept of error, react to the reality of error, and live with the consequences of error. These questions suggest an interpretive framework of inquiry and use of qualitative methods (Creswell, 2007). With an understanding that myriad research opportunities exist, my choice as a starting point was an examination of the basic process of experiencing errors by nursing students. I believe that an examination of the process of experiencing error by nursing students, who are future nursing practitioners, is critical to understanding and intervening generally in the phenomenon of healthcare error. Since the grounded theory method is clearly targeted towards psychosocial processes it represented the best choice for examining the process of experiencing errors by nursing students in clinical practice.

Purpose of the Study

The purpose of this study was to examine how nursing students experience the process of making an error in clinical practice.

Research Questions

The following research questions guided this study:

1. What is the experience of making a mistake in clinical practice from a nursing student perspective?
2. What factors and conditions contribute to student error?
3. What recommendations do nursing students have for faculty/staff when dealing with student error in clinical practice?

Significance of the Study

In this study I explored the basic psychosocial process of making errors. This is significant because the nursing education literature is clear that a change in how student error is conceptualized is necessary and overdue (Dick, Weisbrod, Gregory, Dyck, & Neudorf, 2006). The results of this study have the potential to influence the ways in which nursing programs and pra agencies conceptualize student error and the manner in which they react to student error. There is clear evidence that a change in perspective, using a systems theory approach, has led to a significant reduction in the incidence of error in the practice sector of healthcare (Begun, 2008). Is such a change possible in nursing education? I believe that a basic understanding of the psychosocial process is the first step in any conversation about reducing nursing student error using a systems approach. Understanding nursing student error also has the benefit of influencing the future practice of the nursing profession. In addition, patient safety is a critical

responsibility of all healthcare providers. Educating new nurses who have both the skills and knowledge to manage errors will have an undeniable and enhancing influence on patient safety.

Researcher's Assumptions

Qualitative researchers bring their worldviews and assumptions into the research process (Creswell, 2007) and these assumptions have to be acknowledged as they could influence the research process (Charmaz, 2006). I came to this study with 23 years as a registered nurse and 20 years of teaching experience. I have seen students make errors and have seen patient harm occur as a result. I have also seen a variety of responses, both positive and negative, from instructors and administrators in several nursing programs. I believe that a better understanding of nursing student practice errors is necessary from a patient safety and pedagogical perspective. Therefore, my assumptions are as follows: (a) patient safety is a critical concern in nursing education, (b) students experience considerable fear and lack of support from instructors and educational systems when they make a mistake, and (c) better evidence is needed to help students minimize mistakes and manage the reality of error.

Summary

In this chapter I have examined the background to the issue as well as the conceptual approach and assumption for the study. Chapter two will examine the current state of knowledge pertaining to the question of the process of nursing student error in clinical practice.

CHAPTER II

Current State of Knowledge

> "*Learning to deal with prospective and actual errors is part of learning the practice of nursing" (Rodriguez, 2007, p. 14).*

The issue of clinical practice errors is well documented in the literature (J. G. Anderson et al., 2006; Espin et al., 2007; Friedman, Provan, Moore, & Hanneman, 2008; Hoefel et al., 2008). The literature provides a compelling description of the problem and solutions and interventions are complex. The well-supported assertion from cognitive psychology that humans are inherently error-prone is ultimately at the heart of the issue but very little can be done to improve the raw cognitive processing power of the human brain (Reason, 1990). While the historical and current theories of human error will be examined in this literature review, the prevailing view of errors in nursing practice and education will dominate the discussion. The growing body of literature pertaining to systems theory, and its implementation in practice, support the effectiveness of this theoretical approach. Although there is significant room for additional research and testing of systems based approaches, healthcare practice has substantively adopted the systems view of errors. This is not the case within nursing education. The topic of nursing student errors in clinical practice is only just beginning to receive attention within the nursing education and practice literature. The literature is still silent with respect to addressing student errors and preparing developing practitioners to meet the realities of errors in practice. A number of assumptions about the nature of nursing student errors have not been explored. The current state of knowledge pertaining to student errors in healthcare will be explored to reveal the gaps in the literature.

General Error in Healthcare

There is a clear and growing body of evidence that suggests that practitioner error is a significant concern within healthcare (D. J. Anderson & Webster, 2001; Baker et al., 2004; Dennison, 2005; Simpson, 2000). The Institute of Medicine ([IOM], 2000) estimates that the number of deaths in the United States attributed to errors in healthcare could be between 44,000 and 98,000 individuals every year. If this figure is accurate it means that healthcare errors are ranked as the eighth-leading cause of death in the United States, ahead of motor vehicle accidents (43,458) and breast cancer (42,297). Financial cost estimates associated with clinical practice errors are in the multiple billions of dollars. There is no comparable body of evidence in Canada (CPSI, 2002) but estimates of the problem are fairly similar per capita with around 5,000 preventable healthcare deaths per year (Gregory et al., 2007). In the United States, the Quality Inter-Agency Coordination Task Force (QICT) Report (2000) describes healthcare errors as an epidemic and recommends a substantial change in the way that healthcare errors are conceptualized and addressed. The QICT suggests that the problem of errors in healthcare is equivalent to two aircraft crashes per day at every major airport in the United States.

There is also significant evidence that supports the immense personal cost to patients when healthcare errors occur. Often the effects of healthcare errors can be lingering and catastrophic for patients and their families (Crawford, 2005; Hofmann, 2006; Hughes & Edgerton, 2005; Sparkman, 2005). In addition to myriad possible physical effects, patients experience feelings of anger, betrayal and frustration following healthcare errors and these lead to an erosion of the trust that society has in the effectiveness and safety of the healthcare system (Mason, 2005; Sparkman, 2005). Tactics such as prompt apologies and clear post-incident investigations have been found to minimize the long term psychological consequences of errors

for patients but have done little to remove what several authors describe as a prevailing fear of errors among people who access the healthcare system (Hofmann, 2006; Iedema, Jorm, Wakefield, Ryan, & Dunn, 2009; Manser & Staender, 2005; Sparkman, 2005).

Healthcare Practitioner Error

Health systems are naturally prone to error and failure due to their complexity and reliance on human performance (CNA, 2003). The issue of errors in healthcare is especially relevant for nursing for several reasons. It is an established fact that medication errors comprise the bulk of reportable errors (IOM, 2000). Since most medication related errors occur or are detected at "patient care transition points" (Burke, Mason, Alexander, Barnsteiner, & Rich, 2005, p. 4) members of the nursing profession tend to be intrinsically linked to most medication errors, even when the error might originate within the prescription and initial transcription process (Burke et al., 2005). Dennison (2005) describes how errors made in the ordering phase by physicians have a 48% to 70% chance of being discovered by either a pharmacist in the dispensing phase or by a nurse in the preparation and administration phases. Errors made by pharmacists are frequently discovered by nurses, giving the erroneous perception of greater accuracy and stronger performance by pharmacists (Burke, et al., 2005). Errors by nurses, within the administration phase, have almost no chance of correction since errors are often only discovered after administration to the patient. Since the nurse is the last healthcare professional to handle a medication before it is given to the patient, there is a much higher chance of harm occurring to patients with nursing errors than those errors originating within other professions. Although errors in healthcare is a concern for all health professions, the central position of the nursing profession and the frequency of interactions with patients inevitably result in healthcare errors being a central nursing issue.

Aside from the clear danger to patients, the effects of errors can also be catastrophic for the healthcare practitioners involved. Serembus, Z. R. Wolf and Youngblood (2001) suggest that practitioners often experience strong feelings of guilt, fear and depression following an error that results in patient harm. In addition, participants receive little support from their peers and often face retaliation from embarrassed administrators and the upset families of the patient. Loss of reputation is also a significant fear when errors occur (Z. R. Wolf, Serembus, Smetzer, Cohen, & Cohen, 2000). Nurses indicate that their confidence is shaken and feelings of shock and fear predominate. When they make an error nurses often fear being held liable for errors including the possibility of being sued by patients or their family (Sparkman, 2005). The occurrence of an error initiates a complicated cognitive and ethical process of deciding whether an error has actually occurred, anticipating the severity of the consequences of the error, and deciding on an appropriate response to the error (Z. R. Wolf et al., 2000). Z. R. Wolf et al. (2000) report that since healthcare providers take on a burden of pursuing perfection, the process of admitting error and responding quickly is very difficult. This tension is identified by a number of authors as a significant contributing factor to moral distress among registered nurses (Pauly, Varcoe, Storch, & Newton, 2009; Zuzelo, 2007).

Nursing Student Error

As active participants within the healthcare system, students are naturally going to make errors, but there is a lack of research that effectively examines the contribution of students to the overall incidence of error in healthcare (Gregory, Guse, Dick, Davis, & Russell, 2009). When Konkloski, Wright and Hammert (2001) compared the incidence of error, among 27 students, to the national medication error average (> 5.4%), they reported only one actual medication error and 13 potential errors for an actual error percentage of .00028%. This led the authors to

conclude that students comprise a very small percentage of the total clinical practice errors. Z. R. Wolf, Hicks & Serembus (2006) examined a large national database (MEDMARX) to determine the incidence and type of errors committed by nursing students during medication administration. Although there was no definitive empirical percentage given for student error the authors theorized that the problem of student error may be larger than anticipated. Both of these studies provide a measure of understanding related to the phenomena of student errors, but the widely divergent opinions suggest a lack of firm evidence.

Although nursing education enlists numerous ways of educating students in patient safety and error avoidance, there is no clear evidence that current education is successful. A consideration of patient safety has always been an acknowledged assumption in nursing curricula but the approach to the issue has been a generic promotion of good practice and prevention of poor practice at the level of the individual student. An examination of two top books on clinical teaching reveals only a couple of pages addressing patient safety (Emerson, 2007; Gaberson, 2007). There is a clear message that patient safety is vital but strategies for actually achieving patient safety in the clinical education setting are not clearly delineated (Ilan & Fowler, 2005). There are mechanisms in place in pre-registration nursing education to promote safe practice through learning the correct procedures for safe medication administration. In addition preventive measures such as ensuring clinical practice instructors double check medications and monitor student progression to competent practice are also the norm. However, clinical nursing education, in which nursing students are novice practitioners in real clinical practice sites such as hospital units, creates a unique situation that is distinct from that of the practice setting. While practicing nurses are members of the healthcare system, students are in fact not truly a part of that system. They are members of the academic system

and are temporary visitors to the healthcare system (Paterson, 1997). This creates a nebulous set of circumstances in which students practice to develop competence, and sometimes, during the process, make errors.

A number of significant issues exist in the knowledge base about nursing student practice errors. Although students are practicing in a similar environment to practitioners they face a unique set of problems. First, there is a long-standing and unproductive divide between the nursing practice sector and the education programs that supply that sector. Gregory et al. (2007) postulate that nursing education has largely viewed errors as a phenomenon confined to the practice domain which could result in inaction and barriers to collaboration. Another influential source, the 2000 report from the Institute of Medicine (IOM), also recognizes the practice/education divide as one of the principal impediments in promoting a patient safety revolution within healthcare. This report strongly advocates for a robust and compelling evidence base for the links between education and practice. Another strong recommendation of this particular report is the centrality of an interdisciplinary approach, the adoption of quality improvement approaches, and the sophisticated use of informatics in both education and clinical practice environments. Unfortunately, strategies and pragmatic directions to close the practice/education divide have not been clearly delineated. It is clear that both practice and education need to work together to address the issue of practice errors.

Second, nursing programs experience considerable difficulty in utilizing data from the practice sector. Not only are there a lack of specific indicators for the incidence of student error within the aggregated error data (Gregory et al., 2007), the way in which error data is gathered and reported results in very little usable information to support curricular change (Neudorf,

Dyck, Scott, & Dick, 2008). What is clearly needed is a unified mechanism to track and disseminate error data between the practice and education sectors of the profession.

Third, and also related to the education-practice divide, is the fact that students are not always acknowledged or included in practice sector patient safety initiatives. Students frequently do not have access to computer databases and decision support tools that staff practitioners take for granted (Dennison, 2005). In addition, many of the changes in the organizational culture (Benner, 2001; Brady et al., 2009) and initiatives to track and mitigate errors (D. J. Anderson & Webster, 2001; Barnard, Dumkee, Bains, & Gallivan, 2006) simply do not acknowledge the presence of students in the practice areas. Students might have access to the environmental design improvements that practitioners benefit from (Marck et al., 2007) but they clearly do not have the same level of access as practitioners within the organizational structure.

What is clear is that many of the same realities that influence practice sector errors also influence nursing student errors. Gregory et al.'s (2009) examination of unsafe patient events, by nursing students, found an almost identical ratio of total events, near misses, and actual patient harm events as was reported in the practice sector (Grant & Larsen, 2007). These results support the conclusion that students faced many of the similar conditions and influences that experienced practitioners face, but often with additional pressures (such as the perception that an error can end their pursuit of a nursing career) and without the same supports. The existence of the problem of practice errors is clear but what constitutes an error and the way that errors are interpreted and reported is fraught with complexity and resists definition.

Difficulties in defining, identifying and reporting error in healthcare.

At a basic level an error can be defined as an action that "violates one or more system tolerance limits" (Ootim, 2002, p. 24). An all-encompassing definition of an error, as well as a usable measure of the extent of an error, however, is virtually impossible given the number of variables and individual perspectives involved (Hobgood, Eaton, & Weiner, 2005). An error can result in a wide spectrum of consequences, ranging from an unexpected positive benefit to the patient, to the worst case scenario of patient mortality. Some authors further break down the phenomena of error based on the level of harm to patients. Johnson and Young (2011) found that most errors do not result in harm to patients. Dennison (2005) clarifies the terms further using 'adverse events' to describe all unexpected processes, while identifying 'errors' as incidents with actual harm to patients. The term 'near miss' is also utilized frequently in the literature to describe errors that are caught before harm occurs to patients (Currie et al., 2009; Helmer, 2008; Henneman & Gawlinski, 2004). This variability in terminology makes it difficult to define error for the purpose of in-depth exploration. For the purpose of the current study, however, error is defined as: an incident in which the intention and/or action and/or consequence turns out to be contrary to what is either expected or desired (Reason, 1990). The reader should bear in mind, however, that a definition is only one aspect of the phenomenon. The perceptions and actions of the key players in healthcare errors reveal numerous layers of complexity to this issue.

It is evident that the incidence of errors in healthcare is possible to track but depends on practitioners actually reporting their errors (QICT, 2000). It is often very difficult to get practitioners to identify and then report that an error has occurred (Espin, Levinson, Regehr, Baker, & Lingard, 2006). Espin et al. (2006) suggest that errors were reported if a well known

practice standard was broken or if actual harm occurred to a patient, but otherwise errors frequently went unreported. They also found that healthcare practitioners had a much narrower definition of practice error than a representative group of patients. In a parallel study by Espin et al. (2007) nurses were found to be very reluctant to identify and report an error if the error was incurred by a physician or another health professional. Nurses discussed the error amongst themselves, but in general did not utilize the formal error reporting mechanisms. The problem of defining and identifying an error is clearly quite complex.

Z. R. Wolf et al. (2000) describes a complicated process that healthcare providers undergo to assess whether or not an error has occurred. The researchers found that most practitioners utilize an estimation of harm to the patient as the defining criteria about whether an error has occurred. Practitioners realize that errors are a constant possibility but expressed significant surprise when actual adverse incidents occurred. The socialization process of healthcare providers, as well as the flawed definition of what constitutes an error, resulted in very few errors actually being identified and reported.

Numerous authors also suggest that even when an error is identified, practitioners are frequently reluctant to report the error to patients and other administrative agencies (Dennison, 2005; Madegowda, Hill, & Anderson, 2007; Moody, Pesut, & Harrington, 2006). Lawton and Parker (2002) relate several reasons for this reluctance to report including: emphasis on professional medical autonomy, a tendency of nurses to blame individuals, and the growing litigious emphasis of the public. Richman et al. (2009) report that although nurses tend to be more self-critical, they still follow the normal human nature to protect one’s ego, which results in a difficulty in even recognizing that an error has occurred. Richman et al. found that nurses

only reported error when efforts to rectify the error had failed, and enough harm had occurred to a patient that the error was impossible to ignore.

Humble (2008) found that medical students also struggled with the process of error identification and experienced significant moral dilemma and complexity surrounding the disclosure of errors. Humble provides an example in which a senior medical staff physician prevented a medical resident from disclosing an error to a patient and advised the resident to change a healthcare record to conceal the error. In nursing education there is a clear assumption that students have a moral and ethical responsibility to report errors (Beck, 1993; Brown, Neudorf, Poitras, & Rodger, 2007; Killam, Montgomery, Luhanga, Adamic, & Carter, 2010) but the unique realities that students face when defining and identifying errors has not been explored.

Another compounding concern is the incidence of near misses. A near miss is defined as an incident that develops as the result of a technical, system or human error but that is caught and rectified before harm to a patient ensues (Henneman & Gawlinski, 2004). Numerous recent studies demonstrate that significantly more near misses occur than actual errors (Currie et al., 2009; Friedman et al., 2008; Helmer, 2008; Tourgeman-Bashkin, Shinar, & Zmora, 2008). These errors are either caught before the patient is affected or if the patient is affected, no noticeable negative impacts occur (Baker et al., 2004; Barnard et al., 2006). These near misses occur up to 300 times more frequently than the IOM's estimations of errors with identifiable harm to patients (Grant & Larsen, 2007). The principal problem with near misses is the false perception of safety. Since no harm occurs to patients, the reality of the error process has been historically overlooked (Helmer, 2008). Richman et al. (2009) report that physicians have traditionally marginalized the incidence of near misses by only reporting events in which actual

harm occurred to patients and by separating cases into individual and unrelated events. E. Henneman, Blank, Gawlinski and Henneman (2006) also studied near misses among nurses and describe the way nurses identify, interrupt and then recover from the error process. The nurses in the study described numerous strategies they used to mitigate the effects of errors including surveillance, anticipation, double checking, and big picture awareness.

As much as the work of E. Henneman et al. (2006) provides a number of worthy insights into preventing harm to patients, the incidence of near misses illustrates that an understanding of the process of error within healthcare is broader and of even more import than the current retrospective investigations of the incidence of harm to patients (Milligan & Dennis, 2004). The harm to patients, whether actual or potential, is a secondary result of an error process that has not been recognized or followed up. An understanding of the initial error process that began the cascade towards patient harm is actually more important than the often shocking but retrospective statistics on actual harm to patients (IOM, 2000).

The end result of this confusion in identifying and defining errors is that many errors are simply not reported. This lack of consistent reporting makes the problem of errors potentially worse than the already significant statistics on healthcare errors. The most comprehensive source of knowledge pertaining to the way that humans make errors originates from psychology and is most fully developed using a systems theory perspective.

Perspectives on Human Error

Any discussion pertaining to errors within healthcare delivery fundamentally involves a discussion of human performance limitations. There have been numerous theories since the 1930s explaining the cognitive mechanisms of human error. In this section the two dominant theories of errors from psychology and systems theory are explored.

Psychology and human cognition.

Psychology has provided a wealth of theoretical understanding about human error. Much of the prevailing research of the 1950s and 1960s focused on theories of the limits of human cognitive capacity (Broadbent, 1958) and human cognitive processing (Long, 1975; Norman, 1968). Research in the 1970s and 1980s explored the notion that human cognition involves multiple channels of information processing with prescribed limits within the role of working memory (Evans, 1983). By the early 1990s, however, there emerged a reasonably developed consensus on the nature of human cognition (Reason, 1990).

Reason (1990) describes human cognition as an amazing, yet fundamentally flawed, machine. He indicates that studies in artificial intelligence have demonstrated that one of two information processing schemes are possible: either rapid and highly accurate information retrieval from a database (i.e. most computer systems), or, slow yet immensely complicated cognitive processing based on long-term memory recall, current environmental stimuli, and a host of interrelated factors (i.e. human cognition). The common idiom ‘to err is human’ is descriptive of the reality of the ways in which humans perform. Errors are the compromise that allows humans to process information relatively quickly but with immense problem solving and cognitive power. Reason suggests that errors are the result of humans’ unique ability to problem solve through complex issues rather than just crash like a computer.

Another significant contribution of Reason (1990) was the development of the differentiation between active and latent errors. Active errors are those with an immediately identifiable consequence and a clearly identified person or circumstance attached to the error. An example of an active error is the classic situation of a nurse who gives the wrong medication

to a patient. In this example the wrong medication carries a consequence to the patient and the nurse is the clearly identified person associated with the error.

Latent errors, on the other hand, are errors and practices that lay dormant within an organizational system, often becoming part of the normal operational culture. Using the previous example, a latent error could be the fact that both the correct medication and the medication given in error look almost identical and are physically located close together. Frequently, until an incident occurs, latent errors are so ingrained as a natural part of the environment that they are not considered or rectified. Reason (1990) considers latent errors to be much more significant and insidious than the more obvious active errors. When a latent error is hidden or normalized within an organization, then even a reasonably minor active error can result in an out-of-proportion catastrophic incident.

In the past, the typical response of most healthcare organizations was to view practice errors as an essentially active error process representative of an identifiable flaw of an individual practitioner (Armitage, 2009; IOM, 2000). Within this perspective, individuals who were identified as “bad apples” (IOM, 2000, p. 49) were ‘weeded out’ of organizational systems. This behaviour resulted in a misplaced perception that systems were safe and relatively free of error. Reason, Carthy and De Laval (2001) describe how large organizational systems can develop “vulnerable system syndrome” (p. 1). In these systems a number of psychological pathologies contribute to errors and the propagation of denial and covering up errors. Reason et al. identify that humans have an innate psychological tendency to tenaciously hold on to the notion that errors are the result of personal rather than systemic factors. Also contributing to the problem is the illusion that all errors are a result of personal choices rather than systemic influences. These psychological assumptions tend to result in a repeated series of similar errors or in

disproportionally amplified catastrophic incidents. In situations in which an individual blame and personal choice perspective dominates there is also a concomitant prevalence of critical latent errors of design or organizational culture (Clancy, Effken, & Pesut, 2008; Reason, Carthey, & DeLeval, 2001).

Lin and Salvendy (Lin & Salvendy, 1999, 2000) who added to the work of Reason (1990) concluded that systems and environments have a significant impact on human performance. Their studies examined the effects that instruction and warning processes have upon human cognitive performance. In both studies the more that the work environment provided feedback, through either instruction or warnings, the fewer errors were made. Lin and Salvendy (2000) also examined the effect that warnings had on human performance of recognizing errors. One of the primary findings was that high-knowledge individuals perform significantly better than low-knowledge individuals when the environment is confusing and full of interference. Both studies reveal the influence that confusing environments can have on human cognitive processing ability. Lane, Stanton and Harrison (2006) and Stanton and Baber (2005) make the point that within complex working environments, such as found in healthcare, cognitive performance can be improved by increasing the quality of the systems that surround the humans. This growing link between human cognitive performance and complex systems led to the development of the systems theory perspective on error.

Systems theory perspective on error.

The other dominant perspective on human error derives from systems theory, which builds on the work of psychology and proposes that large, highly connected and related networks of people, technologies, and places form complex and dynamic systems that are somewhat predictable but highly variable (Clancy et al., 2008). P. Anderson (1999) discusses

how complex organizational systems approach the edge of chaos but eventually find equilibrium in the state where uncontrolled variability is limited. This uncontrolled variability is the primary cause of most errors.

One of the first practical applications of systems theory had its implementation in the aviation industry (Doucette, 2006; Sexton & Helmreich, 2000). Wiegmann and Shappell (2001) suggest that as aircraft mechanical systems have continued to evolve and maintenance procedures have been standardized, the incidence of catastrophic mechanical failure in aircraft has almost vanished. In almost 80% of all modern aviation incidents human error has been determined to be causative (Shappell & Wiegmann, 2003). Despite this fact a continuing series of very similar airplane incidents and crashes suggested the need to look just beyond the dominant 'bad pilot' theory. Wiegmann and Shappell (2001) suggest that "the human is rarely, if ever, the sole cause of an error or accident. Rather, human performance (both good and bad) involves a complex interaction of several factors" (p. 345) including: (a) the 'software,' which includes computer software, policies, and the rules and regulations that govern operations, (b) the 'hardware,' which includes equipment, materials, and other physical resources, (c) the environmental conditions, and (d) the 'liveware' or the humans. Most errors occur when there is a mismatch among these factors and the addition of other stressors that interfere with the human decision making process.

Human error is deemed to have been responsible for a number of very prominent disasters within the last quarter century. The Challenger disaster, the Three Mile Island nuclear incident and the Chernobyl nuclear plant explosion are all examples of errors in human performance that resulted in catastrophic failures with significant loss, damage of property, and loss of human life (Reason, 1990). Post-accident investigations often revealed latent errors

embedded within system design which had a far more critical impact on the disaster than any erroneous human decisions. In these situations post-accident analysis revealed a repeated series of small incidents and problems in organizational culture that eventually combined to create an unanticipated highly catastrophic event. Reason (1990) provides an example from the Challenger disaster, in which the post-accident report concluded that a major incident was inevitable given the organizational and systemic conditions within the organization. These major incidents and a host of minor accidents and tragedies led to a greater acknowledgment of the impact that systemic factors have on human performance and the incidence of human error.

Systems theory in the healthcare practice sector.

In the late 1990s and early 21st century the systems theory of error was acknowledged and utilized within healthcare systems in North America. The prevailing viewpoint prior to this point in time was that errors were the result of individual practitioners who either lacked competence or who lacked ethical integrity (Biordi, 1993). The common reaction from organizations was a punitive response to the behavior. It was found over time, however, that the same errors were being repeated by a variety of individuals where the only common theme was the system in which the individuals operated. This realization revolutionized the way that errors were conceptualized in practice environments and changed error identification from an individual to a system focus (Maddox, Wakefield, & Bull, 2001).

A healthcare system, even at the individual hospital level, involves hundreds to thousands of people, thousands of physical locations, and countless ever-changing technologies, including medication technologies. The myriad interactions possible within such a complex system are too numerous to compute (Begun, 2008; Clancy et al., 2008). Complexity science relates that what develops over time is a system of operation that ties these diverse pieces into a

functional operation. Despite the functionality inherent within such complex organizational systems, these organizations also have a tendency to propagate inherent flaws and to manifest significant deviations from expected results (P. Anderson, 1999; Plsek & Greenhalgh, 2001). Individual people working within these complex environments are subjected to immense variability that frequently results in the propagation of both active and latent errors (J. G. Anderson et al.). The IOM (2000) reports that upwards of 85% of all preventable incidents within healthcare can be attributed to human error. The IOM goes on to assert that these human errors, however, are more strongly influenced by systemic and organizational factors than a purely cognitive processing flaw. Kennedy (2004) advocates for a shift away from an individual perspective of errors and towards a realization that the human members of the healthcare team are inherently flawed. Therefore, the incidence of errors has less to do with human performance and more to do with the antecedents of a fallible decision-making process, conditions of work, and multiple competing demands. Even in situations with perfectly executed healthcare practice, the patients' understanding of prescription labels and their health literacy are significant contributing factors to healthcare errors (Bailey, Shrank, Parker, Davis, & Wolf, 2009; T. C. Davis et al., 2006; M. Wolf et al., 2007). Wilson and M. Wolf (2009) utilized a systems perspective and found that text format, syntax and the effective use of images made a significant difference in the capability of patients' working memory and their ability to make accurate medication choices. There is a growing realization among all the health professions that a systems perspective offers the most comprehensive perspective for dealing with and mitigating the growing threat of errors (Jones & Treiber, 2010; Manser & Staender, 2005; Reamer, 2008; Scheirton, Mu, & Lohman, 2003; Scheirton, Mu, Lohman, & Cochran, 2007; Seiden, Galvan, & Lamm, 2006). Munro (2004) describes how a systems approach has changed the way that the

British National Health Service deals with adverse events involving mental health cases. For example, rather than immediately blaming the individual practitioner involved, the system surrounding the practitioner is analyzed for weaknesses and contributors to the error. Munroe reports that as a result of this systems based approach, the incidence of error reporting is significantly higher and the long-term outcomes significantly better. A study by E. Henneman, Blank, Gawlinski and P. Henneman (2006) also provides preliminary evidence of how systems theory-based interventions, such as collaborative or team practice, rewarding error reporting, and technological solutions, can have a significant impact on nurses' ability to recover from superficial errors and prevent more serious errors with adverse patient effects.

Despite the successes made in the practice sector by implementing a systems theory perspective, Storey and Buchanan (2008) suggest that numerous problems still hinder a truly evidence based approach to practice errors. Storey and Buchannan describe the complexity inherent within the healthcare environment and identify many of the social and structural factors that are likely to be involved. Their conclusions reveal several systems-level problems within the healthcare environment that contribute to the incidence of errors. First, when the system is geared towards high performance the most common trade-off is patient safety. Second, the healthcare system tends to promote professional uniqueness and autonomy. Story and Buchannan suggest that this tends to degrade the inter-professional connectivity that is so necessary in a systems perspective. Third, the mindset that each profession is master of its own professional status and artistic craft tends to limit standardization and hinder system flexibility. Fourth, there is an inherent lack of transparency and public scrutiny of the healthcare system. Lastly, they note that there is a complacency and complexity in existing safety systems and procedures. Despite these difficulties, there is a remarkable level of consensus that a systems

theory perspective offers the best chance to make an impact on the problem of errors within healthcare practice and education (D. J. Anderson & Webster, 2001; Barnard et al., 2006; Brown et al., 2007; Dick et al., 2006). This growing acknowledgment of a systems perspective within healthcare has resulted in three significant propositions about errors in healthcare: (a) that individuals are rarely the primary cause of errors, (b) a punitive free response to errors is more effective, (c) and that environmental factors have a significant impact on errors. These propositions are now explored.

Individuals are rarely the primary cause of errors.

The first proposition, from a systems perspective, is that individual persons are rarely the primary cause of errors. The prevailing attitude, prior to the emergence of a systems perspective, was that individual practitioners were the prime source of the incidence of errors. A good example of this thinking is revealed in an article from 1982 (N. M. Davis & Cohen) that gives 20 tips for avoiding medication errors. Some tips include: “Be suspicious of abrupt and excessive increases in medications” (p. 67), “Always consider possible drug interactions” (p. 68), and “Don't accept drug nicknames” (p. 71). Although this article represents a number of very practical suggestions, the article clearly articulates that the failure of individual practitioner performance is the prime source of error. Even articles that prescribe a ‘back to basics approach’ assume that better individual performance is the key to error reduction (Blank et al., 2011). Gandhi et al. (2003) examined the incidence of adverse drug incidents in 661 patient records. Of the respondents, 25% reported some type of adverse drug event with 13% considered serious. Unfortunately, the primary recommendations are focused on individual physicians and only stress the need for improving communication and monitoring.

Early literature on errors tends to ascribe the error process to an individual moral and ethical failure. Biordi (1993) links nursing error to a “progressive carelessness or remorselessness in work or concern for others” (p. 40). Biordi goes so far as suggesting that an inherent lack of caring necessitates the erring nurse’s “removal from the clinical area, the nurse’s base of work and identity” (p. 43). This article demonstrates the intense confusion and fear that nurses exhibit towards the professional and administrative response to errors. Unfortunately, Biordi’s carelessness conceptualization reinforces the unsubstantiated idea that errors are a result of an individual nurse’s moral failure.

Arndt (1994) also perpetuates the prevailing individualistic blame attitude towards nursing errors. Arndt found that nurses take their duty and responsibility towards the welfare of patients very seriously. Nurses were genuinely willing to “own to mistakes, even at the cost of submitting themselves as well as colleagues to the disciplinary consequences” (p. 523). Arndt found that this honesty and integrity was severely undermined, however, by numerous experiences of harsh and unjust application of consequences by both colleagues and administrative personnel. This led nurses to a complex and convoluted conceptualization of the severity of an error. If an error was conceptualized as being minor or less hazardous to patients, nurses felt they had a moral license to cover up an error or to not report it.

There is strong evidence from systems theory research that factors such as environmental design, lack of decision-making support, and confusing or contradictory processes have a much greater impact on errors than does individual cognitive performance (J. G. Anderson et al., 2006; Benner et al., 2002; Dennison, 2005). Faced with the overwhelming challenges presented by the system, individual practitioners simply lack the cognitive capacity to avoid errors (Reason, 1990). A systems theory perspective alleges that organizational systems that surround

the individual practitioner may have a more significant impact on errors than the individual factors of competence or some form of moral or ethical failure.

An anonymous error reporting mechanism is another important consideration in shifting the focus of blame from individuals towards a consideration of systems factors. Conlon and Gardner (2006) report the implementation of a successful anonymous error reporting system in which any practitioner can report errors, near misses, and the potential for errors. These incidents are analyzed using a systems perspective and system changes are suggested and implemented. Conlon and Gardner relate the example of a group of nurses who reported that physicians were not answering their pages. This was not only frustrating for the nurses but was identified as a potential hazard for patient care. The incident was investigated and it was discovered that a dead zone existed in the hospital where physicians could not receive pages. All of the identified incidents were linked to this problem. It was not until the nurses felt comfortable reporting this issue that the systemic problem was identified. A simple change in the addition of a pager system antenna rectified the situation. Currie et al. (2009) also describe a very similar success with a web-based hazard and near miss reporting system. This system strongly encouraged participating healthcare providers to regularly enter hazards into the reporting system. Participants were also rewarded for their activity. Geller et al. (2010) describe an anonymous, electronic, near miss and hazard reporting system that resulted in 3492 incidents being reported over a three year period.

An anonymous error reporting mechanism and a no-fault approach presents the clearest resolution of the moral/ethical process faced by nurses and has resulted in significantly higher rates of reporting (Espin et al., 2007; Soleimani, 2006). Such approaches avoid the intense individual fear and anxiety involved in reporting an error and can be used to identify the more

important latent systems factors involved in the error. Grant and Larsen (2007) report that the implementation of an anonymous error reporting system resulted in twice the reported numbers of medication errors and four times the number of laboratory errors. Many of the reported errors were classified as latent in nature. This anonymous error reporting system resulted in numerous systemic changes. Curry et al. (2009) describe an anonymous web-based hazard near miss reporting system set up for nursing students in clinical practice. Although there was a significant incidence of medication events reported, there were also significantly more other hazards identified using the system. Equipment and environmental hazards constituted the largest group of reported errors/problems and incidents of infections were the second-largest reported hazard. Curry et al.'s study demonstrates the overwhelmingly positive results in decreasing the level of fear surrounding errors and near misses. Friedman, Provan, Moore, and Hanneman (2008) created an initiative in which they asked patients and their families to identify adverse events in the emergency department. Their study demonstrated that patients and their families are very capable of recognizing potential hazards that are often missed by the healthcare providers. Innovative programs that reward healthcare practitioners for reporting near misses allow administrators to make systems changes that have reduced errors (such as reducing the number of look-alike medications) and has proven far more valuable than punishing individual practitioners (Barnard, Dumkee, Bains and Gallivan, 2006).

Despite the perceived benefits of an anonymous error reporting mechanism, barriers still exist. Lehman et al. (2007) reports that one of the most difficult barriers was from nursing management, who wanted to use individual error incident as part of employee evaluations and disciplinary proceedings. Initially, the nursing union also resisted the idea but quickly changed their perspective to one of support once the benefit to patients became apparent. Lehman et al.'s

study covers an 18-month period that bridged the implementation of the program. The non-punitive and anonymous error reporting system resulted in a jump from 19 to 102 reported errors within the first month of the program and went on to a peak value of almost 350 reported errors per month. Reported errors were analyzed for systems issues and key improvements were identified. Faced with the overwhelming evidence for the effectiveness of a non-punitive reporting system, nursing management eventually wholeheartedly adopted the program.

A recent incident, although with tragic outcomes, demonstrates the kind of conclusions that a systems perspective generates. In this well-publicized Alberta incident, a registered nurse (RN) administered an incorrect medication to a patient resulting in the eventual death of the patient. The RN was devastated but the post incident analysis found that numerous systemic factors were critical to the eventual outcome: the medication preparation area was noisy and full of numerous distracting elements, the incorrect medication was almost identical in name and appearance to the correct medication, and once the error occurred there was not a mechanism to find the patient and correct the problem (ISMPC, 2004). Although the individual performance of the RN was mentioned as a contributing factor it became clear that a catastrophic medication incident was simply inevitable based on the latent systemic issues within the environment. This incident demonstrates that healthcare practice environments are beginning the process of applying a systems theory approach to errors.

A punitive free response is more effective.

Another proposition, from a systems perspective, is that errors are reduced when the reporting system is free of punitive responses. D. J. Anderson and Webster (2001) relate that following an error there is a natural tendency for organizational systems to put the blame on a clearly identifiable object, usually a person. This tendency ascribes all errors as individual in

origin while ignoring the contributing systems factors. The typical response to errors by nursing administration is individually focused punishment, reprimands and dismissals (Ootim, 2002; Sokol & Cummins, 2002). Arndt (1994) reports that nurses in her study felt a strong ethical responsibility to own up to errors, but this responsibility was tempered by "negative experiences with harsh or even unjust application of the consequences, that is, with having to go through the procedures of disciplinary action in a hardline manner" (p. 523). Nurses who went through this disciplinary action relate a strong reluctance to inform administrative personnel of errors unless they knew that they would receive a level of support. Z. R. Wolf et al. (2000) also found that healthcare practitioners experience significant fear of negative personal and professional repercussions following medication errors. This fear of reprisals, legal action and punitive professional response is not unique to nursing and is described in medicine (Leape, 2009), radiation therapy literature (Belinsky & Tataronis, 2007), social work (Reamer, 2008), and rehabilitation medicine (Scheirton et al., 2003; Scheirton et al., 2007). It is clear that a fear of errors and punitive professional response crosses all professional boundaries. The specific types of errors may differ slightly but it is uncanny how similar the stories are across professions. This punitive professional response creates a culture in which there is significant fear of making errors and also of admitting errors (Hewitt, 2010; Serembus et al., 2001). Thurman, Sullivan, Williams, and Gaffney (2004) describe a safety system to prevent intravenous medication errors. Despite the relevance of the article the authors unfortunately focus on the fear of career ending errors in the title of the article. Practitioners are quite aware that the consequences of making and also admitting errors can be very severe.

One suggested way to move away from the punitive approach is to adopt a clinical practice risk management (CRM) process (Johnstone & Kanitsaki, 2007). Clinical practice risk

management is “an approach to improving quality in healthcare which places special emphasis on identifying circumstances which put patients at risk of harm, and then acting to prevent or control these risks” (Johnstone & Kanitsaki, 2007, p. 186). Some recommendations given for instituting a CRM process include: the implementation of an up-stream thinking and blame free systems approach, recognizing the inevitability of human error, enabling the skill of risk discovery, and emphasizing the importance of reporting as a means of safety rather than punishment. Kyrkjebo and Hanestad (2003) and Kyrkjebo (2006) advocate a very similar process but they term it ‘continuous quality improvement’ (CQI). CQI is a mechanism for healthcare professionals to improve “the safety, effectiveness, patient centeredness, timeliness, efficiency, and the quality of care” (Kyrkjebo, 2006, p. 109). Such a process is advocated as essential to the quality problem in healthcare represented by errors and adverse events. The unique approach of Kyrkjebo is in the mechanisms by which CQI is taught and implemented within an undergraduate nursing program. Students in the study describe an improved view of nursing care from the patient’s perspective and a greater cognizance of the quality of their care. Another interesting detail documented by Kyrkjebo is the lack of support from other faculty as well as staff within the agencies.

There is significant literature support for the idea that learning from errors can be one of the most significant learning tools available (Lehmann et al., 2007; Papastrat & Wallace, 2003; Schoemaker & Gunther, 2006; Soleimani, 2006; Yerushalmi & Polingher, 2006) and a significant part of a systems theory approach to errors (Reason, 1990). Within an education theory context, Yerushalmi and Polingher (2006) discuss how teachers typically respond to student errors with some form of punishment. This is only effective, however, if students have a clear idea of how their error occurred and what influenced the error to happen. Yerushalmi and

Polingher's conclusions also parallel the deduction of systems theory literature that minimizing the level of punishment and reinforcing the constructive nature of errors can make a significant difference in how students engage in learning from their errors.

The literature from business also advocates that the most successful businesses are the ones that are willing to take frequent risks, who tolerate error, and who treat errors as an opportunity to learn (Schoemaker & Gunther, 2006). Schoemaker and Gunther (2006) make a strong case for the connection between error and innovation. Although it is not ethically acceptable to knowingly proceed into error when working with patients, a learning environment such as simulation can often use errors as an opportunity to learn (Sears, Goldsworthy, & Goodman, 2010). Ziv, Ben- David and Ziv (2005) go as far as creating deliberate errors within a clinical practice simulation environment to help students work through the process of making errors and then learning from the errors. Kyrkjebos, Brattebo and Smith-Strom (2006) describe an interdisciplinary clinical practice simulation program in which students not only had to work together collaboratively but also had to reflect on how their collaborative practice enhanced patient safety. Students found the increased emphasis on quality care and interdisciplinary care helpful to understanding the progression of the error process. When given the chance to be actively involved in the error identification process, Wusthoff (2001) found that when students were educated to recognize and acknowledge error, they became very proficient and effective at avoiding errors.

Within healthcare there are a number of initiatives to expose practitioners and students to errors, particularly through the use of clinical practice simulation (Soleimani, 2006; Turnberg, 2001). Maddox, Wakefield and Bull (2001) suggest the importance of exposing nurses and students to situations that simulate the day-to-day realities in which system failures and

emergencies occur. This not only prepares students for the inevitable reality of the practice environment but also empowers students to be actively vigilant for system based threats to patient safety.

Environmental factors are significant.

The third significant proposition of a systems approach is that changes to the working environment are of greater remedial benefit than changes in individual practitioners (Maddox et al., 2001). Tourgeman-Bashkin, Shinar and Zmora (2008) found that mental/physical workload was the most commonly given system factor in 'potentially adverse events.' Confusing and intense work environments rapidly increased the incidence of errors. Shappell and Wiegmann (2003) analyzed the incidence of what is called 'controlled flight into terrain.' This is where a fully functional aircraft, under full control by the pilots, is unintentionally flown into the ground. This phenomenon accounts for almost 25% of all airline crashes and points to the effect that the environment surrounding the pilots has on their cognitive performance. Some of the most significant recommendations of the authors involve simplification of the environmental workspace and the inclusion of technologies to help pilots process information coming from the environment. This reality was also confirmed in a health context by Tourgeman-Bashkin, Shinar and Zmora who found that a complex and confusing work environment had a marked influence on practitioner errors.

Marck (2005) uses the analogy of a damaged natural ecosystem to describe the realities of current healthcare. Marck identifies a conflict-ridden healthcare environment, an overtaxed workforce, and limited resource and database support as significant contributors to patient safety issues. This conclusion mirrors the previously discussed literature coming out of aviation safety There is clear evidence, from the systems theory perspective, that humans need to be assumed to

be error prone within organizational systems (Fogarty, 2005; Helmreich, 1997; Shappell & Wiegmann, 1997; Wiegmann & Shappell, 2001).

The effective use of error reduction technologies is also an acknowledged environmental systems approach. Z. R. Wolf (2007) acknowledges that no human or technological solution will ever be perfect but, within a systems-based approach, error reduction technology is an important step. Computerized decision support systems, moving charting closer to the bedside, and technologies that move sophisticated drug information closer to the nurse, can have a marked impact on error reduction, especially medication errors (Mahoney, Berard-Collins, Coleman, Amaral, & Cotter, 2007). There have been several technology-based error reduction studies and initiatives including the use of bedside personal digital assistants (PDAs) for medication information (Greenfield, 2007). Greenfield found that the experimental group that utilized PDAs was more efficient and more accurate in administering medication than the non-PDA control group. While several authors advocate for the use of intelligent medication delivery systems (Crawford, 2005; Mullan, 2005; Vanderveen, 2005), Nicholas and Agius (2005) point out the opposing perspective that intelligent medication systems are also vulnerable to input and control errors. If human reasoning is taken out of the control process there also is the danger of latent errors, such as incorrectly programmed protocols not being discerned or being perceived as normal operation. Thus, it seems that relying on technology exclusively is an overly simplistic solution. Although intelligent systems clearly have a role to play in error reduction, both Reason (1990) and Weigmann and Shappell (2001) point out that even with the best designed equipment humans will continue to make errors.

Another significant way of changing the healthcare environment is to develop a culture of safety (Benner, 2001; Christiansen, Robson, & Griffith-Evans, 2010; Dennison, 2005; IOM,

2000; Milligan & Dennis, 2005; Zboril-Benson & Magee, 2005). Research demonstrates that individual and group values, perceptions and behaviors have a significant impact on how safety is viewed and enacted within a work environment (Smith & Forster, 2000). Frequently the organizational culture within healthcare is characterized by poor collegial support, flawed teamwork, disrespect and abuse by authority (Moody et al., 2006; Sanders, Pattison, & Hurwitz, 2011). This in turn leads to hesitation in admitting errors due to the fear of a punitive response (Dennison, 2005; Graves, 2005). Benner describes a "culture of blame and shame" (2001, p. 283) that results in errors being hidden, a breakdown in moralism, and punitive responses from individuals in power positions. Benner advocates that a culture of safety is only possible when practitioners can acknowledge their own fallibility and the complexity of the system in which they work. This requires a systemic change in the environment in which practitioners work (Crigger, 2005). Denison (2005) relates that healthcare practitioners cannot change the fact that they are fallible organisms. It is possible, however, to change the systems and environments that either contributes to the propagation of errors or that support practitioners to deliver safe, effective, and ethical care to the patients in their care.

One of the most focused studies on practitioner mistakes is from Crigger and Meek (2007). Crigger and Meeks relate that health practitioners who have made mistakes are prone to feelings of guilt, loss of self-esteem, regret, and loss of integrity. They describe a four stage process through which practitioners reconcile the fact that a mistake has occurred. Crigger and Meeks acknowledge that an unhealthy mistake reconciliation can result in dissatisfaction and burnout but a positive reconciliation can potentially bring healing and positive growth. Crigger and Meek's study recommends that nursing lose some of its perfectionist attitudes and also

provide systems-based supports to nurses as they journey through the inevitable reality of mistakes.

A systems theory perspective in nursing education.

Despite some calls for changes in nursing education, it is clear that the practice sector of nursing is well ahead in its conceptualization of and approach to practice errors. Numerous authors have begun to advocate for the implementation of a systems perspective within nursing education (Brown et al., 2007; Gregory et al., 2007; Lehmann et al., 2007; Page & McKinney, 2007) but the scarcity of reports suggests that this change is occurring very slowly. Milligan (2007) advocates for the building of a safety culture within nursing education through teaching students to understand human factors theory. Human factors theory acknowledges that errors are a natural part of being human and that complex systems have a significant impact on humans (Norris, 2009). Milligan reports that their program encourages students to critically examine organizational systems and to look for potentially unsafe acts. Wakefield et al. (2005) raise the question of whether nursing and medical curricula adequately address patient safety. They point to the lack of systems theory integration and the lack of patient safety theory within both disciplines. Wakefield et al. assert that both medical and nursing educators need to be actively involved in creating comprehensive error reporting systems. In addition, they suggest that nursing and medical educators must avoid the name, blame and shame approach that was so unproductive and damaging in the practice sector. Instead, they advocate for a systems theory-based approach in which errors are acknowledged and anticipated rather than merely reacted to.

Despite the benefits of using a systems theory approach in nursing education, there exists only one clear example of a nursing program that has implemented curriculum changes to address the issue of student errors from a systems perspective (Dick et al., 2006). Some of the

innovations described by Dick et al. are: a systems approach to patient safety, acknowledgment of near misses, definitions of patient safety, and acknowledgment of the impact of power on student errors. Neudorf, Dyck, Scott and Dick (2008) also report the results of the integration of patient safety principles within the same nursing curriculum. Their study examines the results of a student-focused anonymous error reporting system within a nursing program. Students reported actual errors as well as potential errors and the systems and environmental factors that contributed to either. Neudorf et al. found that students were remarkably effective at identifying environmental and systems issues within the practice environment. What was missing, however, was an effective mechanism for students to have a voice in quality improvement procedures. Neudorf et al. strongly advocate for a change in the culture of quality care within nursing curricula, which they deem essential to addressing the issue of patient safety.

Nursing education has largely ascribed to an individual performance perspective on student error. For instance, Polifroni, McNulty and Allchin (2003) suggest that “individual (students) need to be held accountable for the basic skills necessary for minimum safe practice” (p. 456). Even a recent article relates unsafe student behavior to the individualistic dimensions of “compromised professional accountability, incomplete praxis and clinical disengagement” (L. A. Killam, P. Montgomery, F. L. Luhanga, P. Adamic, & L. M. Carter, 2010). This is despite the overwhelming evidence from a systems perspective that individuals are rarely the sole cause of errors (IOM, 2000). The prototypical response when errors occur is one of blaming and reacting against individual students using remedial measures such as learning contracts, clinical practice probation, and even clinical practice failure (Gregory et al., 2007). In general, nursing programs seek to promote safe practice and prevent poor practice and errors primarily in three

ways: pharmacology courses, math skill development, and level of supervision in the clinical practice setting.

Since medication delivery is the largest source of nursing error (IOM, 2000), considerable effort has been put into teaching safe medication delivery and the math skills that are required for safe nursing practice (Craig & Sellers, 1995). Despite this effort Flynn and Moore (1990) report that nursing students will make math calculation errors at least once in every twelve instants. In a simulated environment Henneman et al. (2010) also found that nursing students had a high a rate of math error, but the most telling conclusion was that when error did occur students lacked the capacity to recognize and recover from the error. Z. R. Wolf, Ambrose and Dreher (1996) and Z. R. Wolf, Serembus and Beitz (2001) found that clinical inference and the ability to recognize error did improve from first year to fourth year, but not by a large margin.

Since math calculation is an obvious source of error, several publications have correlated entrance grade point average (GPA) with the incidence of medication error. Flynn and Moore (1990) found that students who enter nursing school with a lower high school math score perform significantly worse in drug calculation exams. Their conclusion was that math proficiency has a large predictive effect on the incidence of medication error. Bindler and Bayne (1984) found that as high as 38% of their tested student group were unable to attain a 70% score on a medication calculation examination. Bindler and Bayne also found a significant link between entrance GPA and math calculation ability but the main point of their study was the importance of basic math skills to medication calculation process. A more recent study by Greenfield, Whelan and Cohn (2006), however, found no significant link between student GPA and error occurrence. Their view was that the use of dimensional analysis, a simplified

medication calculation technique, resulted in a significant reduction in the incidence of medication error. This seems to imply that the teaching approach is more predictive of error than factors such as entrance GPA. Contrary to this finding, however, Connor and Tillman (1990) investigated whether teacher directed instruction of medication dosage calculation or algorithm-based medication calculation was more effective in avoiding error. The study found that there was no significant difference between the two study groups. The Connor and Tillman study confirms that although math skills are important, the mechanism by which the students learn the math skills may not be significant. Dyjur, Rankin and Lane (2011) also challenge the assumption that math examination skill actually results in better administration performance.

Papastrat and Wallace (2003) utilize a problem-based learning approach to addressing student medication errors. Papastrat and Wallace incorporate a series of case scenarios in which RNs and/or nursing students must respond to and deal with errors. They report that students were overwhelmingly positive in their evaluation of the case scenario learning approach in this application. Although there was no follow-up within actual clinical practice experiences, Papastrat and Wallace surmise that the enhanced student clinical reasoning abilities would have an impact on students' clinical practice performance and their ability to avoid errors.

Another perspective on student error is the perceived lack of pharmacology content within many nursing programs (Page & McKinney, 2007). Page and McKinney (2007) suggest that since nurses spend as much as 40% of their time involved in medication administration that the amount of pharmacology content needs to be significantly higher. Manias (2009) and Bullock and Manias (2002) also make a strong case for a greater predominance of pharmacology content within nursing education. Both of these articles provide a considerable review of the literature on the types and causes of general healthcare errors. However, the

assertion that more pharmacology content will minimize student clinical practice errors is largely unsubstantiated.

The role of the clinical practice instructor has also been a pivotal element in the prevention of student errors and the promotion of good error avoidance behaviours. Nursing instructors have a professional mandate to protect patients from harm and incompetent practice (College and Association of Registered Nurses of Alberta., 2005) but they also have to consider their educational responsibility to provide students with excellent learning experiences (Orchard, 1991). Orchard relates that many instructors compensate for perceived weaknesses in the student, or weaknesses within their own clinical practice competence, by observing and supervising in a more rigorous and direct manner. Rutkowski (2007) and Reid-Searl and Happell (2012) point out that closer supervision does not guarantee student learning and is fraught with subjective interpretation. It is plausible that closer supervision will prevent certain errors, but the question of the correlation between level of supervision and incidence of errors has not been explored or demonstrated. Despite the current high levels of supervision involved in clinical practice teaching, the existing evidence suggests that error incidence rates among students are actually increasing (Dick et al., 2006; Gregory et al., 2009; Gregory et al., 2007).

Students are new to the profession of nursing and to the healthcare environment. Successful student nursing practice involves myriad cognitive, analytical and behavioural practices. Benner (1982) considers the novice to expert framework to be particularly relevant to nursing education. Her work describes some of the forces that influence both experienced practitioners and nursing students in the clinical practice area. Benner's novice level describes an individual that has "no experience with the situations in which they are expected to perform tasks" (p. 403). Benner goes on to say that since novices have no experience with the situations

they face, they lack the capacity to make discretionary judgments. Although more advanced level students could arguably fall within Benner's 'advanced beginner' categorization, it becomes clear that students are faced with an immense challenge in being able to make the judgments and decisions necessary to practice in a manner that minimizes and mitigates error. Ebright, Urden, Patterson and Chalko (2004) notes that novice practitioners often lack the capacity to make complex decisions pertaining to errors. Students are novices in an environment that demands perfection (Benner & Sutphen, 2007).

Educators generally view student errors from an assumption that students are prone to make more frequent and more serious errors than practicing nurses (Rodriguez, 2007). This assumption has not been conclusively tested or verified. In fact, Rodriguez's research, although acknowledged as not conclusive, suggests that experienced practitioners have a similar incidence rate of errors. If this is the case, then perhaps the problem is not exclusively the domain of incompetent or error prone students but also rests within the education systems. Harding and Petrick (2008) suggest that the "emphasis on individual performance and punitive responses" (p. 44) is a significant influencing factor in student errors. They theorize that educational programs are encouraging students to think in a narrow, rote manner about clinical performance which could lead to a higher incidence of errors, accompanied by a significant perception of fear of errors among students.

Harding and Petrick (2008) suggest that the punitive individual perspective dominates the way that nursing educators track and respond to student clinical practice errors. This results in the underreporting of student errors, again leading to the same false perception of safety noted in the systems theory literature (IOM, 2000). Harding and Petrick retrospectively examined 77 medication errors made by students and found that the majority of these errors resulted from an

interplay between student knowledge and other system factors. One of the most significant of the system factors was student fear of reprisal and a disproportionate punitive response. McGregor (2007) reinforces this assertion and states that “for nursing students, threats of failure and high stress levels have been regarded as endemic in the process of becoming a nurse” (p. 504). This leads to significant fear among students about the possibility of making errors in clinical practice.

Students are similar to experienced healthcare practitioners in that they also experience significant anxiety and fear about making errors in their clinical practice (Beck, 1993; Begley & White, 2003; Kleehammer, Hart, & Keck, 1990; Pagana, 1988). In fact, Pagana (1988) found that the fear of errors is one of the most significant threats perceived by nursing students. Students feared errors and “the act of making an error, no matter how minor, caught students off-guard and often resulted in a physical response” (Rodriguez, 2007, p. 25). They feel that their inexperience and perceived inherent incompetence predisposes them to significant clinical practice errors and the potential to harm patients (Begley & White, 2003). Students also have the additional burden of fearing the personal and educational consequences attributed to errors (Begley & White, 2003; Kleehammer et al., 1990; Pagana, 1988). They are in a vulnerable position and recognize that their future depends on the quality of their performance and the avoidance of errors (Harding & Petrick, 2008; McGregor, 2007). Students have a legitimately reinforced fear of punitive repercussion, including the possibility of clinical practice failure or even expulsion from the nursing program (Gregory et al., 2007; Koohestani & Baghcheghi, 2009). Punitive responses from instructors and program administrators reinforce the notion that errors will be dealt with in a swift and consequential manner (J. G. Anderson et al., 2006). It is probably safe to say that the majority of nursing students adhere to strong ethical principles but

are under tremendous pressure to perform at a high level and to avoid any incident or behaviour that would indicate poor professional performance.

McGregor (2007) relates the intense power that this pervasive threat of failure has upon students' conceptualization of error. This threat causes students to focus primarily on avoiding errors, rather than concentrating on learning or even providing comprehensive care. Students quickly realize that the standard for errors, especially for medication errors, truly is perfection. This creates confusion for students in determining whether an error has occurred and the correct course of remediation (Z. R. Wolf et al., 1996). Although there is no evidence in the literature to suggest that students struggle with hiding error, the evidence from the practice sector (Z. R. Wolf et al., 2000) would extrapolate that students also face this pressure. Although educators expect students to uphold the highest ethical standards, they also propagate the culture of fear and institute policies that make the ethical process of acknowledging errors difficult and risk-laden for students. The messages to nursing students is simply to just not make errors, and if students are going to make an error then not with a medication or there will be clinical practice and academic consequences.

Students are also vulnerable to the syndrome that Meissner (1986) describes as nurses "eating our young" (p. 52). Meissner discusses how the practice sector often views students and new graduates as inconvenient, overly idealistic and prone to errors. Despite the fact that the Meissner article is from 1986, Thomas and Burk (2009) found that many of the same behaviors and attitudes remain prevalent today. Thomas uses the term 'vertical violence' to describe the behavior of experienced RNs towards less experienced RNs and students. Thomas found that nursing students were systematically unwanted and ignored, their assessments were distrusted

and disbelieved, and they were unfairly blamed for errors and frequently publicly humiliated. This is the reality that students face in clinical practice education.

The very limited body of research that explores nursing student errors needs to be enhanced. There are a reasonable number of publications regarding student errors, but the majority fall into three categories: literature reviews or theoretical discourse based on the experience of instructors rather than a research process (Manias, 2009; Milligan, 2007; Milligan & Dennis, 2005; Page & McKinney, 2007; Spencer & Jordan, 2001); reports of descriptive or survey research (Harding & Petrick, 2008; Humble, 2008; Papastrat & Wallace, 2003); or secondary analysis (Rodriguez, 2007). There is a need for quality research and a need for change in the way that nursing education programs understand student error (Gregory et al., 2007).

Another significant gap in the literature is the absence of research that includes students in the sample. Of the very limited number of articles that actually examine student errors, an even smaller number explicitly included student generated data within the analysis. Humble's (2008) interviews of medical students regarding medical errors revealed significant moral distress, including feelings of guilt, shame and worthlessness. Attree et al. (2008) conducted focus groups with 15 students and explored their perceptions about patient safety within the nursing curriculum. Very recently, and within nursing, Killam et al. (2010) produced a study that captured nursing student views on unsafe practice. Although these studies include students in their data and capture some of the stigma surrounding errors in practice, the process of how the errors actually occurred was not explored.

The most focused and student driven research so far comes from the work of Rodriguez (2007) who specifically explored the lived experiences of nursing students and nursing faculty

in response to practice break down and errors in nursing school. Rodriguez reports that “errors made by students were minor (possibly because of the limits placed on what they can do) but plentiful” (p. 25). Rodriguez explains that students need to know how to recognize, report and respond to errors. Rodriguez strongly advocates that errors can be an integral part of student learning. Although making errors is not viewed as ideal, the learning that is possible through errors is acknowledged as one of the most influential and formative parts of the students’ professional identity. Rodriguez also advocates for the use of the term ‘breakdowns in practice,’ since the word *error* has such a strong association with the punitive approaches of the past.

Rodriguez (2007) also examined the responsibilities of nursing curricula and educational delivery systems in the phenomenon of error. On one hand, students need the supervision, expertise and potential intervention of the clinical practice nursing instructor as a safety net and mechanism for learning. On the other hand, if this level of supervision is too controlling and interventionist, then students only work to satisfy the instructor and do not exercise the autonomous decision-making necessary for practice. Rodriguez stresses that open communication about errors must be fostered between students and instructors.

The third recommendation advocates for system repair and redesign. Rodriguez (2007) is critical of the prevailing individualism that only rewards heroic performance. She suggests that nursing instructors should model self-disclosure and humility as it pertains to errors. She suggests that an open forum of sharing errors creates a narrative pedagogy in which students can learn about errors without experiencing them firsthand. Rodriguez also found that if instructors shared their stories of errors that students were more likely to share incidents of their own errors.

Rodriguez's work is the best example of student focused research on the process of making errors and hers was the only example from the literature. Since her study was part of a much larger data set she acknowledges that the results might not be completely trustworthy. Rodriguez suggests that a more focused study on just student error would be valuable. This is the focus of this proposed study.

Conclusion

Based on a review of the literature there is clear evidence that not enough is known about the process of how errors occur within nursing education. Little is known about the unique forces that impact nursing students' performance and the ways in which educational activities and clinical practice intersect within the healthcare system. The wealth of literature from psychology and systems theory demonstrates that any examination of individual student performance without a consideration of the broader systemic influences will not be effective. An investigation of error that does not acknowledge latent system factors will not present a comprehensive picture and will not result in comprehensive improvements in patient safety (IOM, 2000). Nursing education programs have largely ascribed to an individualistic view of student performance, utilizing a punitive response to student error, and not acknowledging the impact of environmental factors on student performance. If nursing education can impact students, and ultimately graduates, who are able to understand and manage the plethora of factors that influence errors, then there is good evidence that the incidence and severity of errors can be significantly reduced in practice. It is clear, however, that nursing education does not operate from a solid evidence base in this area and that the wealth of research pertaining to systems theory is not being utilized. A clearer understanding of the basic psychosocial processes of error, using student data as the primary source of knowledge, is necessary to understand the

phenomenon of nursing student error and this will allow a more thorough system based response to error.

CHAPTER III

Research Method

The principal experts in this study are the students who have made errors in their basic clinical practice. Educators often theorize about why students make errors in clinical practice. The literature reflects a focus almost exclusively on individual student performance factors rather than on larger systemic processes that might contribute to the error. The social, institutional and organizational conditions that existed before the error, the temporal process about how the error unfolded, and the effects and consequences on the student following the error are all facets that were explored in this study. The entire process of student errors from the perspective of those who have actually experienced the error process are the focus. Because of the stigma attached to the word *error*, within the process of the study I used the term *mistake* to be synonymous to the word *error*.

Theoretical Underpinnings of the Method

A grounded theory approach was the methodological approach for this study. This method was chosen because the research question seeks to explore a basic psychosocial process of how nursing students construct the reality of clinical practice errors. Central to grounded theory are the tenets of pragmatism, symbolic interactionism and constructivism (Charmaz 2006).

Pragmatism originated in the work of George Herbert Mead who believed that truth is evolutionary, subjective and is based on an individual's interpretation of their environment (Benzies & Allen, 2001). Pragmatism is based on the assumption that humans are strongly influenced by and adapt to the social influences and environment around them (Jeon, 2004). Reality is constructed based on social, psychological, historical, and contextual influences

(Creswell, 2007). The purpose of research conducted from a pragmatic perspective is to explicate meaning (Cherryholmes, 1994) and provide solutions to problems rather than the generation of pure knowledge (Creswell, 2007). A pragmatic approach is a good fit for this study in that it provides a structure to understand the complex meaning within the phenomena of student mistakes. Pragmatism is also a natural fit with the origins of a grounded theory method (Charmaz, 2006).

Blumer expanded on Mead's work with the addition of what he called 'symbolic interactionism' (Charon & Cahill, 1992). The theory of symbolic interactionism includes the notions that human reality is both objective and highly symbolic. The human ability to use language, to write, and create a history and culture is a result of the way that humans symbolically interpret meaning as objective reality. These meanings are created through the way humans interact and socialize with others, and are constantly being transformed and renegotiated over time (Plummer, 1996). Symbolic interactionism has had a significant influence on social science research in that it has the potential to change the way that the researcher views the process of humans creating meaning about their social situation. Traditional psychological and social science research utilizes a biological and empirical standpoint to view human interaction. With symbolic interactionism human interaction is as much a result of the social and symbolic context as any biological or cognitive predisposition (Charon & Cahill, 1992). A researcher using symbolic interactionism will explore the participants' experience within a particular context while acknowledging the social circumstances of the participants' everyday life (Reed & Runquist, 2007). Research conducted from the symbolic interactionism perspective reflects the notion that the state of current knowledge constitutes a 'gray box' of symbolic reality that forms a stable theoretical

understanding (Fujimura, 1992). Symbolic interactionism constitutes the epistemological and ontological foundation of grounded theory (Charmaz, 2006; Glaser, 1978). Symbolic interactionism was of particular significance to this study because it is assumed that students are highly influenced by the social situation and psychological context of the nursing learning environment, education system, and relationships within the environment. The process of student mistakes is strongly influenced by the way students make sense of their emerging professional selves and associated roles.

Another important underpinning of this study is the concept of a constructed theory of knowledge or constructivism. Constructivism suggests that ideas of objective truth and rationality are not relevant when much of human experience is socially defined and constructed (Gergen, 1999). It is assumed that each student's error experience is a construction of psychosocial influences and expectations. The relationship between students and the systems that surround them is important to the conceptualization of error. A constructivist approach lends itself to an exploration of the interrelations between nursing student and the systems that surround them. A constructivist approach also lends itself well to the use of a grounded theory approach to the question (Charmaz, 2006).

Grounded Theory

The method of grounded theory originated in the work of Glaser and Strauss in 1967. Glaser and Strauss challenged the dominant empirical worldview of the time and articulated a series of systematic strategies for qualitative research (Charmaz, 2006). The original intent of grounded theory was to establish a flexible set of principles that challenged the positivist assumptions of the time and provided a mechanism to understand the basic psychosocial processes that surround us. Charmaz (2006) suggests that grounded theory is most useful in that

it allows a researcher to create a practical explanation of a process at a particular time rather than idealizing what should be occurring. This process, the creation of a grounded theory, results in a pragmatic understanding of a phenomenon and a theoretical understanding that is grounded in empirical reality (McCallin, 2003).

Much has been made of the well-publicized methodological divide between Glaser and Strauss. The approach of Glaser emphasizes the open and emergent process of theory construction without a defined preconception or process (McCallin, 2003). The work of Strauss (1987) as well as Corbin and Strauss (1997) has generally been characterized as having more prescribed procedures and structures with an unambiguous framework (Charmaz, 2006). Charmaz describes Glaser's approach as focusing on the artistic side of grounded theory while describing Strauss and Corbin's focus as a scientific approach to grounded theory. More recently, a number of authors have tended to minimize the methodological split by capturing the essential foundations of both theorists (Charmaz, 2006), viewing the divide as an evolutionary, but not critical, step in the development of grounded theory (Spenceley, 2007). The most current interpretations regard the development of grounded theory as a process of development, as opposed to a binary debate (Heath & Cowley, 2004; Mills, Chapman, Bonner, & Francis, 2007). Glaser has remained a stalwart and often vitriolic defender of the original principles and methods of grounded theory, but the astounding success of grounded theory has led to a prolific development of conceptual interpretations of the process (Bryant, 2003).

Grounded theory is an intersection of both micro and macro analysis (Charmaz, 2006). Micro levels of analysis reveal the experiences of individuals (Kulkarni, 2004) while macro levels of analysis explicate the influence of structures and organizations on individuals (MacDonald, 2001). Macdonald asserts that grounded theory has been primarily used within

nursing to explicate micro level psychosocial phenomenon within the lives of specific individuals. She also asserts that grounded theory, as a reflection of social interactionism, has a poor record of capturing the macro concerns of how societal influences also influence individual processes. More recent discourse, within the study of social interactions (Kulkarni, 2004) and the grounded theory method itself (Weed, 2005), acknowledges that the end result of a grounded theory has relevance to both micro and macro level. In *Basics of Grounded Theory*, Glaser (1978) describes the end product of grounded theory as a micro level "substantive theory of limited scope" (p. 117), yet he also defends that grounded theory must be generalizable to a macro scale as well. The choice of grounded theory for this study acknowledges that the resulting substantive theory explicates both the micro perspective of the experiences of a limited sample of nursing students, but will also provide information about the macro context of nursing education and healthcare systems.

The initial intent of this study was to utilize a Glaserian grounded theory approach but as the study progressed, the realities of the way that participants constructed their conceptualization of mistakes lent itself to a more constructivist approach characterized by the style of Charmaz (2006). This did not change the recruitment, sampling, or initial analysis procedures but did slightly change the way that categories and themes were identified as well as the construction of the theoretical model. The critical principles of constant comparison, concurrent sampling and analysis, and the emergence of theory, advocated by Glazer (1998), were followed throughout the study process. The principle change was in acknowledging the role of both myself, as researcher, and the participants as creators of the description of the experience of making mistakes. There also was an increased emphasis on capturing the

perceived experience, or story, of the participants. What has resulted is a usable substantive theory of the experience of nursing students who make mistakes in clinical practice.

Theoretical sensitivity and constant comparison.

Two concepts central to grounded theory are theoretical sensitivity and the process of constant comparison. Glaser and Strauss (1967) describe theoretical sensitivity as the capabilities and knowledge that the researcher brings to the data analysis process, especially as it relates to the ability of the researcher to conceptualize and formulate theory as it emerges from the data. Glaser (1978) describes theoretical sensitivity as the researcher's ability to detect a significant theoretical idea without subjecting the happening to a preordained hypothesis. Charmaz (2006) further describes theoretical sensitivity as the process of taking an experience apart. Charmaz uses the rhetoric of 'theoretical playfulness,' in which the researcher's wonder and questioning allows new ideas to emerge from the data. The researcher wants to know the process of what is happening as well as what makes the process different or unique (Richards & Morse, 2007).

Throughout the process of the study theoretical sensitivity was maintained using the approaches described above by Glaser and Charmaz. Glaser (1992) suggests that grounded theory researchers must avoid their own 'pet' theories and be willing to let the data speak of its own accord. I realize that I come into the process of examining student error with both teaching experience as well as an understanding of the literature. Glaser (1992) does not see personal and professional experience in the area of study to be a detriment to the research process. He acknowledges that experience may help a researcher generate categories as long as they maintain a conceptual approach. It was my practice, as advocated by Glaser (1998) and Charmaz (2006), to enhance my theoretical sensitivity by continuing to read both related and

unrelated topics. This reading process helped me to allow the grounded theory to emerge (Glaser, 1998). I utilized the process of memoing to capture my preconceptions, biases and emotions connected with the codes and the emerging categories within the analysis. I also used memoing to capture why I was leaning towards particular conceptualizations. These memos became the foundation of the conceptual diagram.

The process of constant comparison is the mechanism by which data and emerging themes are reflectively compared, challenged and theorized (Charmaz, 2006). This involves a process of questioning and comparing of the data through coding towards greater abstraction and theory development (Jeon, 2004). These reflective-based comparisons continue until the emergence of the theoretical reality (Glaser, 1978). As interviews progressed the process of analysis began. The accumulating data and the process of constant comparison led to the addition of two additional questions in my interview guideline as well as several modifications to the core questions. These changes helped elucidate the participants' mistake experience. The new questions pertained to how the participants program influenced the mistake experience. These questions were influential in subsequent conceptualizations. There also were numerous times that emerging concepts were compared to the participants' words. Through this process of comparison some conceptualizations were withdrawn while others were substantiated and then became part of future abstractions.

The choice of grounded theory.

The infancy of knowledge pertaining to student mistakes makes the highly emergent style of grounded theory, a good fit for the current research question. The requirements of this study necessitate that: (a) the realities and psychosocial processes of the principal sources of knowledge (the students who have experienced errors in their clinical practice) be captured and

examined; (b) a theory be proposed for understanding student mistakes and proposing direction for changing in the way that errors are managed in nursing education; and (c) the knowledge generated reflects a constructivist view of knowledge (Jeon, 2004). Based on these requirements a grounded theory approach worked well. As time went on the analysis style began to be more influenced by a constructivist approach. Charmaz (2006) sees a good fit between a Glaserian and a constructivist style.

The key elements of grounded theory are: (a) sampling for quality not for population representativeness; (b) simultaneous involvement in data collection and analysis through constant comparison; (c) utilizing the conceptual knowledge and skill of the researcher to generate concepts from the data (theoretical sensitivity); (d) memo writing to specify the context of the data, elaborate categories, define the relationships between categories, and identify gaps; (f) constructing analytic codes and categories through both deductive and inductive reasoning approaches; and (g) revisiting the literature following independent analysis of data (Charmaz, 2006; Glaser, 1978; Glaser, 1992).These foundational components formed the basis of the method for the current study.

Although Glaser (1978) warned against an extensive literature review prior to a study, a cursory examination of the current state of knowledge on the topic is prudent. Heath and Cowley (2004) raise the legitimate concern that a pre-existing knowledge base can compromise objectivity. They argue that a pre-existing data analysis process can bias the literature review. It was my intention, based on the advice of Charmaz (2006), to strike a balance between having an exhaustive knowledge of the state of information on this topic and maintaining an open mind and not forcing the data into a preconceived conception, either on my own or based on pre-existing literature (Kelle, 2005). I continued to collect and read literature throughout the data

collection and analysis process and utilized the ideas, to guide and clarify my emerging concepts and themes. I was always careful, however, to not let the literature dictate what the data was revealing.

Ethical Considerations and Processes

Ethical considerations are clearly important and represent a starting point in any current nursing research endeavour (Storch, 2004). This proposal was submitted for ethical review by the University of Alberta Health Research Ethics Board as well as the Mt. Royal University research ethics committee. The study followed the ethical policies outlined in the Tri-Council Policy Statement for ethical conduct for research involving humans. Permissions were received from both the Dean of the University of Alberta Faculty of Nursing as well as the director of the Mount Royal School of Nursing.

Since participants were legal adults and undergraduate nursing students, it was assumed that participants brought a basic knowledge of the nursing education process. Although power differences are a reality with student participants (Livsey, 2009), any detrimental effects were mitigated with careful interviewing, confidentiality processes, and by avoiding sampling from the researcher's nursing program. Participants from the University of Lethbridge were not solicited since the researcher holds a faculty position there. It would have been difficult or impossible to guarantee that participants would never have the researcher as their instructor.

Student participation was voluntary since they had the opportunity to determine their own willingness to participate or not. Interviews were scheduled at a mutually agreeable time and location. The interview locations on both campuses were negotiated with each participant. Following each interview the participant was given a ten dollar gift card from either Starbucks or Tim Horton's in gratitude for their participation. I also explained to students that the results

of this study may bring positive changes to the clinical practice teaching environment. Participants were enthusiastic about this possibility.

Medication errors by students carry a significant stigma within nursing education (Kleehammer et al., 1990). Strict confidentiality was maintained to protect participants' identities. All information was held in confidence. There were no incidents where the nursing professional code of ethics or the law required reporting (i.e. child abuse). Participants were assigned pseudonyms which were used in the data analysis process and will be used in all resulting presentations and publications. The list of pseudonyms was kept separate from the actual interview data. Participants were assured that any information divulged in the process of the study would be confidential and would not be used against them in any academic or clinical practice proceedings. Digital recordings and transcripts were kept in a locked file cabinet in the Faculty of Nursing at the University of Lethbridge. Consent forms were stored in a separate file location from the transcripts and coded data.

An option was presented to participants indicating that they could bring another nursing student colleague to the interview as a support, but this option was not exercised by any participant. Following each interview participants were given a chance to debrief with the researcher without being recorded. These debrief sessions were very helpful in allowing participants to recover their emotions. In one case I asked a participant for permission to restart the recorder since the participant indicated the willingness to talk more about their experience. I made it clear to participants that they could withdraw consent at any point in the process and could end the interview at any time without repercussion. No participants exercised this right to end the interview early. Participants were encouraged to ask questions and raise any concerns at

any point during the interview. Participants were given the opportunity to request a copy of their transcript and two of the participants made this request.

During the preparation phase of the study, especially through the ethical review process, the personal and psychological risk to participants was assessed as being minimal. This assessment was reviewed throughout the data collection period. During the data collection process it became evident that for several students, recalling their mistake experience proved to be quite emotional. The depth of the emotion expressed and the existential angst related by participants was a surprise. There were many tears shed and many long pauses during the interview process. The level of emotional trauma recollected by participants was significant. I did not have to stop the audiotape but gave participants time to regain their composure. At the end of each interview, once the recorder was off, I checked with each participant about any need for follow-up. My contact number and e-mail were provided and the participants were made aware of the contact information for their respective University student counseling service. Although the emotional trauma of the mistake was significant to participants, they were adamant that their story must be told. Several participants mentioned that their participation was part of their healing process. These statements by participants, as well as the provisions for support offered, gave me confidence that participants ethical rights were not being infringed upon.

Participants were asked to refrain from specifically identifying student colleagues, instructors, patients or other practitioners by name. Participants were also asked to avoid specifically identifying the location of the described incident. Participants were informed on the study information sheet that confidentiality would be upheld unless where required by professional code of ethics or the law.

Sampling

Glaser and Strauss (1967) describe the classic sampling approach for grounded theory as theoretical sampling. Charmaz (2006) further describes this sampling approach as recruiting individuals with the capacity to speak to the phenomenon in question. This in essence constitutes a purposive approach (Scott, 2004), but Charmaz goes on to suggest that in grounded theory the newly emerging categories, revealed through the constant comparison analytical technique, leads the researcher towards participants who are able to speak to the questions and dominant emerging concepts. In other research so called 'negative cases' are avoided and cleaned out of the data set. Within grounded theory, however, such cases have the potential to provide greater variation to the sample as well as preventing the researcher from claiming saturation too quickly (Glaser, 1998; Glaser & Strauss, 1967). Due to the sensitive nature of the research topic and the difficulties in coordinating student schedules, the pool of potential participants was limited. This limited the capability to theoretically sample. This limitation was overcome by modifying the guiding questions as the analysis progressed to follow the changing direction revealed in the data.

The sampling process began with an open invitation to nursing students in years 2, 3 and 4 of the basic and after degree undergraduate nursing program at the University of Alberta. It was specified that participants must be at least 18 years or older and have had at least one clinical practice rotation and have experienced a mistake in the clinical practice setting. The same sampling process was followed at Mount Royal University. Students in their first year of the nursing program were excluded since they likely would not have had a clinical practice experience or have not had the opportunity to commit an error since they are so closely supervised. The sample consisted of 14 women and two men. Participants were evenly

distributed between general baccalaureate programs and after degree nursing programs in both institutions. Participants were also evenly spread across years 2, 3, and 4. There were no apparent differences based upon participant's year of the program, age or gender.

Recruitment

Following ethical approval and receipt of permission from the appropriate administrative channels, the recruitment of students began. I arranged with the University of Alberta nursing program year coordinators to attend several scheduled classes to discuss my research and provide contact information so that all interested students could contact me. At each session I introduced myself and indicated that I was a PhD student in the University of Alberta Faculty of Nursing. I described my interest in finding out more about what happens when nursing students make mistakes. I also received permission to post my recruitment poster (Appendix B) on the undergraduate student e-mail listserv. This mechanism turned out to be the most effective recruitment tool. In addition, I posted recruitment posters throughout classroom areas in the Clinical Sciences Building.

When a potential participant contacted the researcher a more detailed letter of invitation and study information sheet (Appendices C & D) was forwarded. When participants still wished to be involved in the study, an interview time and place was negotiated. At the interview the participant demographic form (Appendix E) and official consent form (Appendix F) was provided and explained. Following the participants' signing both forms the interview commenced. Once the interview was complete participants were given a choice of either a Starbucks or Tim Horton's $10 gift card in appreciation of their time.

As time progressed it became evident that I was not going to be able to attain a sufficient sample size at the University of Alberta. Despite several recruitment efforts I had only received

six participants. At that point I initiated contact with the Mount Royal University School of Nursing as well as the Mount Royal research ethics committee seeking permission to sample at Mount Royal University; this process provided me with 10 more participants.

Data Collection

Using a grounded theory method, the researcher sees the research process as a theoretically sensitive researcher construction of the emergent psychosocial reality of the participants (Glaser, 1978, 1992). A variety of strategies for data generation are used in the grounded theory method including one-on-one interviews, focus group interviews, online interviews, and telephone interviews (Creswell, 2007). The primary methods used for data collection for this study was single person, semi-structured interviews. This interview format allowed for fairly specific trigger questions and the intervention of the researcher in keeping participants on track (Richards & Morse, 2007). The trigger questions were generated based on the information and questions coming from the literature review and were modified as the data collection and analysis process proceeded. Charmaz (2006), who uses the term “intensive interview” (p. 25), suggests that a grounded theory data-gathering should be an intensively directed conversation. The literature clearly indicates that making an error is a traumatic experience for students (Begley & White, 2003; Gregory et al., 2007; Seiden et al., 2006) and participants demonstrated a strong willingness to explore and debrief the experience including antecedents and consequences. I was always cautious to strike a balance between allowing participants to freely express their experiences while occasionally directing the conversation to focus on how the error occurred and the subsequent events. My role as a nursing instructor may have influenced the dynamics of the interview as I represented the power from which much of the fear and anxiety surrounding errors flows, but participants were willing and eager to talk to

me about their mistake process and were vocally supportive of the research goal to improve clinical nursing education. I always endeavoured to use the ideas of Nunkoosing (2005) of reciprocity and balance within the interview relationship. I attempted to negotiate this balance with participants in an ongoing manner. I approached the interview process with the stance of humility and a posture of being a learner. During the interview I tried not to put on my 'instructor or clinical expert hat' and just be a participant in a conversation. I respected that students were sharing a traumatic experience and attempted be sensitive in striking a balance between probing for complete meaning and being invasive in a painful experience.

As the researcher, when I met with a participant for an interview, each participant was given the opportunity to ask any questions before recording began. The interviews were electronically recorded for transcribing purposes. I utilized an interview guide to ensure that all procedural concerns are addressed before the interview proceeded (Appendix G).

Data management was accomplished using the NVIVO software package provided by the researcher's university. Although using NVIVO involved a significant learning curve it was useful, especially in the later phases of analysis, in capturing and retaining insights during the coding procedure. It also made comparing and collapsing categories less complex.

Interview Process and Protocol

Interviews were arranged by e-mail and telephone, to meet at a mutually agreeable time and place, in a designated quiet room on the respective University campuses. The process of the interview was explained and the participant signed the consent to participate. Before the interview began I reinforced that information shared would become part of a larger data base and that confidentiality would be stringently maintained.

Participants were eager to share their experiences so very little prompting was required. I occasionally shared my own experience with making mistakes in my clinical practice as a mechanism to encourage participant self-disclosure. Participants frequently expressed various emotional responses including anger, frustration, and crying. I always encouraged participants to express their emotions and gave them time to collect their thoughts.

Interviews averaged between 50 to 60 minutes each. One interview was shorter and one interview was closer to 90 minutes. A high quality digital recorder, as well as a backup digital recorder, was utilized. At the end of each interview the recorders were turned off to allow for a period of debriefing. During the debriefing process each participant was asked to reconfirm that they will allow the data to be used. The demographic form was checked for completion and a pseudonym was assigned. Participants were informed that during the later phases of the analysis process the emerging theory would be sent to them for reaction and response.

Following each interview I utilized a journal format to capture my reflective thinking as field notes (Appendix H). To improve the auditability of the research process, I documented factors such as the interview location, state of mind of both the participant and researcher, methodological decisions, and contextual information (Morse & Field, 1995). Personal thoughts, feelings, and preconceived notions were captured as well. These field notes and journaling became part of the data that informed the emerging theory. Prior to each subsequent interview, data from previous interviews and notes were reviewed.

The digitally recorded interviews were transcribed and both the written and electronic documents were protected within a locked office. A transcriptionist transcribed the interviews and transcripts were checked for transcription accuracy and corrected if necessary.

Negative case

There was one interview that represented a negative case. A negative case represents a variation or departure from the established conceptualization or pattern within the data (Corbin, 2004). The case of the participant Belita represented a negative case in that she had very little emotional response or investment in her mistake process. The fact that she was an experienced healthcare practitioner from a third world country may have had a significant impact on her conceptualization of mistakes. Despite the fact that she was a nursing student her familiarity with health care delivery would make her case more similar to an experienced nursing practitioner.

Analysis

The first step in the analysis process was the transcription of the first interview. The interview transcript was imported into the NVIVO software program for data management and coding. Analysis continued following the process of constant comparison as more interview transcripts were added.

Open coding.

Analysis began with open coding. The purpose of this first stage of coding is to identify the principle language and concepts directly stated by the participant (Glaser, 1978;Charmaz, 2006). Open coding results in “an emergent set of categories and their properties which fit, work and are relevant for integrating into a theory” (Glaser, 1978, p. 56). Open coding ‘fractures’ the data and allows the researcher to modify the interview questions and the theoretical sampling process (Glaser, 1978). Glaser uses the phrase “running the data open” (p. 56) to indicate going beyond an empirical or face-value analysis of what is unknown. Both Glaser (1992) and Charmaz (2006) strongly advocate letting the data speak without a high degree of researcher

abstraction at this early point in the analysis process. The point of open coding is to focus the researcher towards identification of “the basic social psychological problem(s) faced by the participants in the action scene” (Glaser, 1978, p. 57).

In vivo coding is an important process in the open coding phase. In vivo codes are those in which participants use specific language and phrasing with particular meaning. In vivo codes do not capture or formulate theory but are merely one building block of the initial analysis process (Charmaz, 2006). The first few transcripts were analyzed for the keywords and phrasing of participants. Following this process, the data was examined line-by-line and incident-to-incident for implied meanings and phrases in which the participant described the phenomena (Charmaz, 2006; Glaser, 1978, 1992). Incident-to-incident coding examines the transcript for discrete and identifiable incidents and then codes these subsequently. Charmaz (2006) suggests moving quickly to the data, limiting the size of codes, paying particular attention to actions, and staying close to the data. In this current study incident-to-incident coding was found to be the most useful format. Participants frequently were struggling to articulate their perspectives, limiting the value of line-by-line coding. Incident-to-incident coding captured the nature of this data more successfully. Since this coding occurred during an early phase an effort was made to conceptually capture the meanings and actions of student participants while avoiding abstraction to a more theoretical level.

At frequent junctions I asked the three questions ascribed by Glaser (1978): (a) “What is this data a study of?”; (b) “What category does this incident indicate?”; and (c) “What is actually happening in the data?” (p. 57). These three questions were printed off and kept on my monitor screen to remind me of the principal purpose of the study and the limits of this phase of the coding process. Glaser suggests that asking these questions has the result of broadening the

analysis process and helping the researcher avoid getting lost in what is already known about the data. Following this approach I started to generate a list of categories within NVIVO and attempt to code into as many of the new categories as possible. I utilized memos, entered into NVIVO, to capture my thinking process but put them aside until the theoretical coding phase.

Selective coding.

Once the results of the initial coding procedures were established the selective coding procedure was initiated (Glaser, 1978). The initial codes and the data were theoretically examined for similarities and patterns, and core variables were generated and moved forward. Selective coding differs from initial coding in that it is more conceptual than the line-by-line, incident-to-incident and in vivo codes of the initial phase. Selective coding focuses on the newly identified core categories. The core categories becomes the principal focus of analysis to which future codes and categories are compared. Coding and analysis is limited to only the concepts that directly relate to the identified core variables (Glaser, 1978). In the current study there was a distinct moment when there was a switch from directly processing the actual words of the participants to a more conceptual interpretation of the data. This is when I believe that the selective coding process began. The timing of this coding process was unique to each transcript but once the selective coding process began it rapidly became the principal coding activity.

Modifying the guiding questions and the gathering of new interview data continued and added new material to the analysis. A continual review of the literature was also a component of the selective coding phase. As the initial codes were transferred into core variables both the old and new data were re-examined, utilizing the process of constant comparison, to compare the core variables to the new information coming from the data collection procedure (Charmaz, 2006; Glaser, 1978).

As I progressed through my selective coding process certain families of categories and category properties began to emerge as dominant and strongly supported my conceptual ideas. These reinforced conceptual ideas were identified as core categories (Charmaz, 2006). As the process of analysis continued some core variables were reinforced by the data and some faded into obscurity. One example of an early category that initially looked promising was called 'the social analysis.' This category captured the way that participants analyzed the changes that happened in their social relationships following the mistake. Participants seemed to analyze the event based on how various members of their social circle reacted to them. As time went on it became evident that this category was not well supported across multiple participants. Another category called 'assigning meaning to mistakes' began to become more prominent. Eventually this category was changed as it became evident that there were both positive and negative meanings that were assigned to mistakes. This then evolved into two separate categories called 'a negative social construction of mistakes' and 'positive social construction of mistakes.' These two last categories were an example of the transition into theoretical coding.

Theoretical coding.

Theoretical coding represents the most sophisticated level of abstraction. In this phase of analysis the words of the participants, implied meanings, relationships and environmental conditions are woven together to create a representable grounded theory of the phenomenon. The actual data is left behind and the analysis process becomes a synthesis of the theoretically generated categories, memos generated throughout the research process and literature that pertains to the topic. The researcher leaves the empirical world behind and allows the abstracted essence of the selective codes to emerge and dominate the analysis process (Glaser, 1978). The codes generated in the selective coding process are analyzed and decisions are made about which codes have the best fit and which codes relate most closely with what emerging

categories. This process lends strength and depth to certain conceptual categories and demonstrates weakness and irrelevance to other categories (Charmaz, 2006).

In theoretical coding the literature forms an object of comparison. Pre-existing knowledge from the literature and the researcher's experience is fed into the constant comparison analysis process as it relates to the broader context of the emerging theory (Glaser, 1978). Both Glaser as well as Morse (1994) suggest that care must be taken so that pre-existing conceptualizations do not dominate the analysis. Throughout this phase of the analysis process I continued to look for new literature relating to student mistakes to provide more perspectives on my data analysis process. A reasonable number of salient articles were found and integrated into the literature review. My analysis still predominated, but other authors' perspectives augmented the broader perspective of student mistakes.

One of the most helpful pieces of literature found in this phase of my study was by Crigger and Meek (2007) and was titled *Towards a Theory of Self Reconciliation Following Mistakes in Nursing Practice*. In this article the authors report a grounded theory project looking at the experience of practicing registered nurses who make mistakes. The core theory of this project was the process by which practicing nurses self-reconcile and resolve their feelings about their practice following a mistake. The study by Crigger and Meeks shared some similarities with this study and also exhibited a number of differences. Their study very helpful in situating the knowledge from this study and helped me expand on their work.

In the theoretical phase of coding Charmaz (2006) stresses the importance of both a reflective sensitivity as well as a logical attention to detail. Theoretical coding is characterized by a combing, sorting, abstracting and distilling of theoretical categories generated earlier, memos generated throughout the research process and the literature reviewed during the analysis

(Glaser, 1978, 1998; Charmaz, 2006). The emerging psychosocial process begins to take shape and a describable phenomenon is identified and articulated (Glaser, 1978). The fracturing of data, described earlier in the open and selective coding processes, is woven back together into a whole story (Glaser, 1998) resulting in a dense and complex theory. The ideal is to have, by the end of theoretical coding, a "theoretical completeness—accounting for as much variation in a pattern of behavior with as few concepts is possible" (Glaser, 1978, p. 93). The resulting theory is therefore said to demonstrate strong parsimony and scope.

During the theoretical coding process data collection continues. Coding in grounded theory is not a linear process with prescribed phases and a linear progression (Charmaz, 2006). The more distilled theoretical constructs emerging, from the process of theoretical coding, challenge and re-shape the questions and responses of the subsequent interviews. Participants are asked questions for the purpose of strengthening and minimizing the emerging category properties and relationships. The new data emerging from the new questions are cycled back into the analysis cascade, thus reinforcing and testing the theoretical categories and conceptualizations (Glaser, 1978).

In this study I took the concepts, which were generated through the dialectic process of constant comparison, and brought the analytical conversation back to the reality of nursing education practice. I endeavored to distill a representable theory without falling back on what Glaser (1978) calls the 'pet' or 'popular' theories. I believe that the use of a theoretical coding model, in which the relationships between generated categories and theories are captured graphically (Glaser, 1978), was a useful technique in this study. The emergent nature of grounded theory means that the results of this study were not entirely predictable or certain.

Reasonably early in this study I formulated a rudimentary conceptual map and as analysis continued I modified and updated the theoretical model. I used the graphical capabilities of PowerPoint to construct and then to edit the model. I went through approximately 15 iterations of the model before the new data did not result in changes to the model.

Memoing.

Throughout the various phases of coding, memo writing is the process of analyzing and thinking about the codes as they emerge (Charmaz, 2006). Memoing forces the researcher to engage with the data throughout the collection and coding process. Charmaz (2006) describes memoing as the questions and comparisons that start to arise in the researcher's mind. The memoing process was central to how I constantly compared and sorted the transcribed data, my perceptions as a researcher and any emerging theoretical conceptualizations. One perception that clearly evolved over time was my assumption that the relationship between the student and their instructor would be central to the whole mistake experience. Although the relationship with their instructor was significant, the data indicated that there were numerous relationships that had a significant impact on participant's experience with making mistakes. The real power of the mistake experience was an internal process that then had a secondary effect on participants relationship with their instructor. This change was captured through both the memoing process and through my conceptualization of the principal categories.

NVIVO has immense capacity to capture and associate memos with coded data. This function was very useful to capture and categorize memos as they arose once I began analyzing the data. I attempted to utilize the four goals of memoing outlined by Glaser (1978): enthusiastic capturing of ideas, freedom to memo in raw form, creating a memo fund, and focus on a highly sortable memo collection. First of all, my process was to capture any and all ideas into a pool of

memos set up in NVIVO to be sorted later. Secondly, I utilized Dragon NaturallySpeaking voice dictation as a mechanism for capturing memos. Using this technology enabled me the freedom of capturing memos in raw conversational language without the usual processing that goes into typical scholarly script. Memos included insights from the data, context from the literature, and methodological insights.

The process of sorting memos is characterized as essential by Glaser (1978) and Charmaz (2006). He describes this process as folding the thinking of the researcher back into the emerging theory. It is the sorting of ideas rather than sorting the data. The sorting of memos constitutes a parallel analytical process in that it creates connections between categories, category properties, the literature and other newly formed memos. The theoretical sorting of memos is one of the final processes in grounded theory in that it forces the already well developed theory into the density of a coherent basic psychosocial process (Glaser, 1978). The final sorting process results in conceptual ideas that are "aching to be written up" (Glaser, 1998, p. 192).

Saturation.

The point in the analysis in which the constant comparative process begins to result in diminishing levels of variation is considered saturation of the data (Glaser, 1978). Despite the inclusion of new interview data, the same analytical conclusions result. Glaser describes saturation as the point when the joy of newfound insights fades and the initial energy is lost. Repetition dominates the analysis and fatigue begins to set in. Glaser and Strauss (1967) relate that it is almost impossible to delineate a set rule for when saturation occurs. The point of saturation of the data is a judgment call made by the researcher.

I continued with sampling until repetitive categorical results from a variety of data sources resulted (Morse, 1994). As coding and analysis continued it became evident that all of the new codes that I was generating already fit into my developing categories. At that point I stopped recruiting participants and continued with analysis with the understanding that if new themes emerged that I may have to gather more data. New themes did not emerge but the existing categories were strengthened while some diminished in importance. This is when I determined that saturation had been reached.

Strategies to Ensure Rigor

Although the concept of rigor does not have the same meaning in grounded theory as in a quantitative project, Morse (1999) asserts that rigor remains an important concept in any qualitative study. The central criteria, according to Glaser and Strauss (1967), for rigor in a grounded theory study is fit, work, relevance, and modifiability. These criteria are central to any grounded theory study but constitute post-hoc evaluation strategies. In this study both the criteria for rigor proposed by Glaser and Strauss (1967), as well as the process oriented verification strategies, proposed by Morse, Barrett, Mayan, Olson and Spiers (2002) of methodological coherence, appropriate sample, concurrent data collection and analysis, thinking theoretically, and theory development, were utilized. The Glaser and Strauss and Morse et.al. criteria and how they were enacted in this study are outlined.

Glaser and Strauss (1967) describe ‘fit’ as the ability of a grounded theory to mesh with the reality of the participants and the substantive arena in which the theory will be used. The grounded theory should emerge from participants rather than being forced from the data or used to confirm or disprove an existing hypothesis (Glaser, 1978). The property of fit begins with the generation of the research question and the methodological coherence between the research

question and the method components. Since the purpose of this study is to illuminate a psychosocial process grounded theory was a natural fit.

'Fit' also relates to the sampling process and relies on the researcher's ability to sample for appropriate participants who will be able to speak to the question (Glaser, 1978; Morse et.al., 2002). A strong fit results from a constant evaluation of the appropriateness of the sample. This process ensures a strong level of confidence that the categories generated from the data will reflect the actual experiences and core processes of participants (Glaser and Strauss, 1967). In this study I was careful to ensure that students had a legitimate experience with the reality of making a mistake in their clinical practice. In all cases participants had a wealth of information pertaining to the experience of making a mistake in their clinical practice. In addition the emerging theoretical conceptualization was checked with participants to confirm the fit of the emerging theory. This member checking was done in the spring of 2013 using email and positive feedback from two participants was received. Both participants confirmed that the emerging conceptualization represented their viewpoint.

'Work' refers to the ability of the grounded theory to explain, predict and interpret the variation in behavior and realities of the participants (Glaser & Strauss, 1967). A grounded theory must 'work' in explaining the basic psychosocial process under consideration (Glaser, 1978). To work, the emerging theory must have a good fit with the categories, which in turn, must have a good fit with the data. Morse et.al. (2002) suggest that the constant comparison process of collecting and analyzing data concurrently as well as the process of thinking theoretically is central to letting the building ideas slowly inch forward without making vast conceptual leaps. By checking and rechecking the current and new data a solid and rigorous theoretical foundation is built. Glaser and Strauss (1967) postulate that the theory draws its

strength from the emergent process rather than it ‘feels right.’ This emergent process gives a confidence that the emerging theory has a clear and parsimonious fit all the way back through the analysis process. In the current study, the extended timeframe of the analysis was a benefit in improving the way that the theoretical model worked to explain the realities of the participants. The developing theoretical model underwent numerous iterations in which categories were brought forward, minimized, and some even deleted. The place that certain categories occupied within the model was also modified and updated. I used the verification strategies, proposed by Morse et.al. (2003) and the criteria of rigor from Glaser and Strauss (1967), to end up with the theory that ultimately worked.

Lastly, I made a clear distinction, using memos, when I switched from the substantive process of open and selective coding to the theoretical coding process described by both Glaser (1978) and Morse et.al. (2002). Glaser describes it as leaving the empirical reality of the data behind and Morse et.al. describes this departure as the process of theory development. I changed the title of my memos from category memos to theoretical memos to document the change from selective to theoretical coding. This change made it easy to refer back to my memos when constructing my theoretical model.

If a grounded theory both fits and works then it is said to have relevance (Glaser, 1978). Throughout the analytical process the relevance of the emerging core processes was evaluated (Glaser & Strauss, 1967). The question of ‘Does the core process fit and work within the appropriate context?’ was repeatedly asked. As the core process clearly emerged from the data I was confident that the criteria of relevance was achieved (Glaser, 1978). This aspect of relevance was strengthened through the process of verification by the participants in the study (Morse, 1994). Participants were given the choice to review a written copy of the emerging

grounded theory for accuracy and relevance. The feedback received was overwhelmingly positive.

Lastly, a grounded theory should demonstrate 'modifiability' as new data emerges. Modifiability suggests that basic psychosocial processes are always undergoing modification and redefinition. Glaser (1978) relates that although grounded theorists should be confident in their research conclusions, they also should exercise a level of humility towards the ongoing process of human reality. I attempted to maintain openness to new concepts and variations during the interviews and data analysis. The interview process naturally required a modifiability into the analysis process as assumptions and concepts were challenged and confirmed. I used open ended questions and allowed for tangents and variation to surprise me which happened frequently. The process of capturing thoughts as memos also encouraged modifiability in my perspective. Memos were particularly helpful to track my assumptions and document how my thoughts both changed and solidified over time.

Glaser's criteria for rigor also includes the criteria of parsimony and scope (Glaser, 1978; Glaser, 1992) which refer to a grounded theory's ability to predict and explain. Although the predictive and explanatory focus of grounded theory has been accused of being positivistic (Charmaz, 2006), it is clear that in a practice discipline such as nursing, a measure of predictability and clarity is of value.

The relationship of the researcher and the participants was critical in this study. The literature as well as my own experience has clearly demonstrated that making errors is a traumatic and painful experience for students. My position as a nursing instructor may not have been helpful as I may have inadvertently represented the system that was responsible for participants' pain, although I did not notice any signs that indicated participants were hesitant or

fearful of me. I did my best as a researcher to establish a positive relationship with participants both to make the research experience a positive one for the participant as well as to increase the reliability and validity of the study. I acknowledged what Hall and Callery (2001) call the connection that exists between the researcher and the participant. I also believe that establishing a trusting relationship with students was important to help them freely discuss the process of errors. I would share some examples from my own practice where I made a mistake. I also tried to sensitively push participants to really disclose details of the meanings and experiences of making a mistake without aggravating the trauma.

All written and e-mail communication was saved in a separate file along with the study data. This record-keeping enabled an audit trail outlining the chronological process of the study and outside influencing factors on the data. Any factor that was suspected of influencing the data was captured in memos which became part of the theoretical coding process.

Finally, in keeping with the reflective and relational process as described by Hall and Callery (2001), as well as theoretical sensitivity described by Glaser (1992), my own thoughts about the experience of student error were recorded before any participants were interviewed. Throughout the data collection process I utilized memoing to capture changes in my perspective resulting from the information flowing from the data analysis. These memos were recorded and utilized as data. As well, NVIVO date stamps when changes to categories were made thus allowing the possibility to see the development timeline. Changes in my conceptual model were saved based on chronology.

Although the debate continues over the ability of grounded theory to adequately capture a reality that is constructed (Hall & Callery, 2001), I believe that I have produced a grounded theory that is useful and relevant to the practice of nursing education. Since the purpose of this

study is to ultimately encourage a change in perspective towards errors, I look forward to the ways that this study provides new perspectives and meanings to the process of errors. Although all of the strategies outlined above will be utilized in ultimately being able to say that this study represents the meaning and experience of the participants, I also wish to avoid what Janesick (1994) describes as *methodolatry,* in which the rigor and process of the method becomes more dominant than the actual story of the participants. I endeavored to keep the story and experience of students making errors the central driving force in this study.

Conclusion

It is clear that grounded theory was a great fit for this study. The phenomenon in question is the psychosocial process of students making errors, and the pragmatic underpinnings of grounded theory allowed the researcher to recommend practical solutions to the problem of student errors (Cherryholmes, 1994). The number of sampled participants as well as the evolution of the guiding questions allowed the researcher to clearly understand the phenomenon of student mistakes. It was an interesting journey.

CHAPTER IV

Findings

The results section represents the heart of the research process, as it is here that the voices of the participants are heard. I was humbled to hear the stories of participants and to have access to the narrative of their journey through the process of making a mistake in the clinical practice setting. In this chapter I will present the major findings that constitute the core category and theoretical modeling of the current study. What emerged from the data was a social process and a pathway of how participants experienced making a mistake in clinical practice. I will present the social process chronologically for clarity's sake but in reality the process is not linear. Pseudonyms are used for all references to participants.

Conceptual Overview

The core variable that emerged from the data is 'living through the mistake experience.' While at first glance this phrase may seem like an oversimplification, it captures the ups and downs of the process through which participants lived through their mistake experience. The reality of 'living through the mistake experience' is a complex dance of perceptions, influences, environments and systems that make up the experience of nursing students who have made a mistake in the clinical practice setting. The flow of the conceptual diagram is iterative, capturing how participants move through the experience in individual ways as well as some of the commonalities across the experiences (see Figure 1).

The process begins with the precursors to the mistake experience. These precursors are factors that predate the mistake experience but that have a significant impact on what transpires. They influence and shape the mistake experience for participants. The two precursors that emerged from the data were 'program perceptions' and 'being measured.'

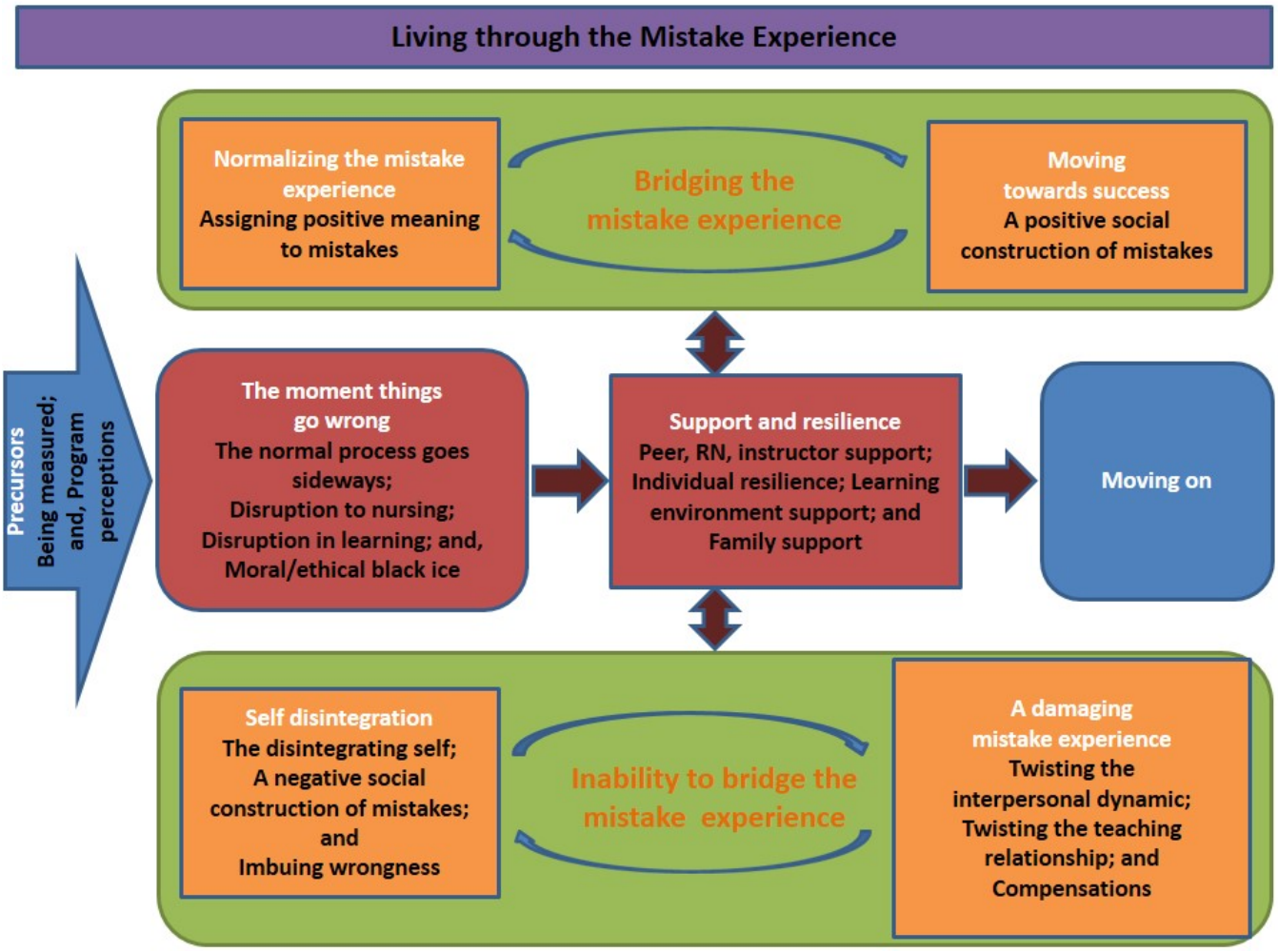

Figure 1

The second component of the process was 'the moment when things go wrong,' representing the realization that the mistake is transpiring or has occurred. On some occasions, there was a time delay between the actual incident and the time at which participants discovered their mistake; however, this did not seem to change the nature of the experience. Participants described being conscientious about their clinical practice performance and aware of both when things were going well and when their performance was less than satisfactory. Participants uniformly recognized that they were learning and attributed value to stable and predictable performance. When a mistake occurred, participants inferred that it was as if this normal/stable

learning process and performance suddenly ‘went sideways.’ During this phase, the seeds of the disruption to the normal nursing and learning processes are sown. In this theme, the primary ethical and moral decision-making occurs.

The next part of the mistake experience is termed ‘support and resilience.’ This theme describes the attributes that enabled participants to either successfully bridge the mistake experience or not. If participants were able to bridge the mistake experience successfully, they demonstrated the ability to move toward success and normalize the mistake experience. If participants were unable to bridge the mistake experience, the result was often self-disintegration and a damaging mistake experience. In some cases, respondents traversed both diversions before finally ‘moving on.’ In one case a participant did eventually move on but still was unable to bridge the mistake experience successfully, leaving a residue of self-doubt and inability to provide care effectively.

Other participants had an ability to quickly move towards a more successful mistake experience. Exactly what these abilities were is a subject for future research but I termed these abilities as resilience. Resilience has been studied in the literature and Taylor and Reyes (2012) describe it as a state or trait of being invulnerable or resistant to adverse life circumstances. With adequate support and internal resilience participants were able to ‘live through the mistake’ in a more constructive and successful manner, ultimately allowing them to move on.

Living through the Mistake Experience

The core variable and central theme of the current study is termed ‘living through the mistake’ experience. The phrase ‘living through’ has been used because it captures the twists and turns, ups and downs, and often random progression that is characteristic of human life and human experience. Living through the mistake experience was a definable moment in time for

each of the participants. It was the concept that encompassed all the other themes and categories within the study. It also describes a phenomenon that is beyond the experience of the participants in the study and that can be applied in other situations. Over the years I have had numerous conversations with students as well as experienced registered nurses and all of them remember in extraordinary detail their experience of making a mistake in clinical practice as a student. It is as if the mistake experience has become a living part of their history and experience. This experience, as described by the participants, will now be examined in detail.

Precursors

There are two factors that predated or informed participants' experience of making mistakes. These precursors are the reality of 'being measured' and 'program perceptions.'

Being measured.

Being measured and evaluated is a part of any university school of nursing and participants were aware of this fact upon beginning their studies. The reality of being measured, although an expected part of the university program, was also linked to the way participants processed the mistake experience. Participants understood that their clinical practice performance had tangible expectations and consequences, and they admitted frequently having unrealistic expectations of themselves. Danlynn relayed that she had

> higher expectations than maybe our learning is at that time…maybe the expectations are just in our heads, but to work at the same level as an RN, who's been there for however many years, I think that we do strive to be like that, but when we can't meet the same standard like they are, then we are really disappointed.

Anxiety about how instructors viewed their performance featured prominently in the data. These performance expectations, especially as they related to mistakes, were rarely

delineated by instructors. Participants expressed anxiety before they had even met their clinical practice instructor and throughout the clinical practice experience. Participants had both positive and negative experiences with their clinical practice instructors. That some instructors were difficult to deal with, and that some instructors were more personable, was already known to the participants prior to entering the clinical practice rotation. Participants ascribed some merit to having an instructor who was perceived as personable, but they put greater emphasis on how those personality factors would influence the way that they would be measured. One participant, Kathryn, described the pressure she felt when being evaluated by the instructor: “and then there’s the whole emotional pressure between the instructor and you, you know the pressure you put on yourself and the pressure other people put on you.” Another participant, Marci, stated that “she [the instructor] was a little intimidating when I first started because she had a really high standard, but she was very supportive of me. She really pushed my learning a lot, but it was a really painful process.” Marci went on to say that “before that [the mistake], I was more intimidated by her than anything, but when it actually happened I realized how supportive she was of us.” Having a personable instructor was viewed as being advantageous but what was considered even more important was the behavior of instructors when mistakes occurred. The fear that a mistake might occur, combined with the fear of how the clinical practice instructor would react, was a significant precursor to the mistake experience.

The fear that is manifested by the perception of being measured was a unique attribute of students’ experiences of making mistakes. Crigger and Meeks (2007) examined the experience of practicing registered nurses who have made a mistakes in the clinical practice setting. Although Crigger and Meeks found that experienced practitioners have fears about mistakes, there was not the same level of precognition of fear and anticipatory anxiety that is so evident

with nursing students. Several authors identify that students bring a persistent fear of mistakes to their clinical practice rotations (Beck, 1993; Begley & White, 2003) but the root cause of this fear has not been explored in any depth. Although there was no definitive answer to the nature of this fear, in the current study, the reality that students face an evaluation and measurement of their performance was a significant source of fear and anxiety. Further research is needed to better understand how students pre-emptively construct their fear of making mistakes in clinical practice.

One strategy identified by participants to lessen this fear of being measured was a better orientation to the mistake process. Clinical practice instructors often failed to orientate participants concerning what would happen if a mistake occurred. As a result, participants described the ways in which they imagined what the process would be, and what the consequences would be. This unguided pre-contemplation caused even more anxiety among participants. Participants described how, in clinical practice, conversations about mistakes only happened after a mistake had actually occurred. Emily tearfully relayed that "I haven't felt, really felt nurtured and taught so much as judged and told when I've done things wrong." Participants did not mind having instructors who were "tough" or rigorous as long as they knew what to expect, what would happen, and how supported they would be, when things went wrong. One participant described how her instructor pre-emptively talked about the mistake process; unfortunately the experience was a negative one, as the instructor was harsh and threatening rather than supportive:

> It was like 'don't do it [make mistakes] or it's going to be not very pretty.' And so I don't think that really helped the whole situation because…most of us were terrified of

her because of that. That was how she explained it to us. She explained [if a mistake occurred] you're going to hear from me about it.

This approach was not helpful for the participant and it significantly increased her anxiety about the mistake experience. Fortunately, most of the instructors were far less threatening than this particular one, but this was the only instructor that clearly described what would happen if a mistake occurred.

This identified lack of orientation to the mistake process is a significant flaw in the way that we currently prepare nursing students for clinical practice. Neudorf, Dyck, Scott and Dick (2008) found that when students were adequately prepared to think about and anticipate the mistake process they were incredibly efficient at finding potential errors within a healthcare environment. When students were unprepared, as was the case with all participants in the current study, the resulting experience was negative and unproductive. With a more focused orientation to the mistake process the fear and anxiety that precedes the experience could be minimized and there might be significant clinical practice performance gains as well.

Program perceptions.

The perceptions that students had about their educational program were also a significant precursor to how participants progressed through the mistake experience. This theme was one that I did not initially anticipate. After the first few interviews, however, it became clear that the way in which participants thought about their program was a significant part of the mistake experience. A question pertaining to this theme was added to the interview questions. What participants described were factors such as: how respected their program was by the agency; whether their program was viewed as being supportive; and whether they thought they were receiving a quality education. Program perceptions seems to be an important foundation for how

students progress through the mistake experience. Priscilla, for example, anxiously indicated her disappointment in her clinical practice rotation in that she felt that they "had no experience, we don't have a clue what we're doing half the time, like we teach each other." This perception caused this participant to feel that she was going to be unable to provide good care during her clinical practice rotation. Belita stated that "I do love the program but I don't think the faculty necessarily takes the time to listen to students. When you have 400 [students] a year I understand that it's hard." Marci relayed that,

> There's just a very high standard and I think it wears on you, and that stress starts to come out in many different ways, whether it's fear about medication, anxiety about medications especially because they put such a high standard… it does really cause a lot of anxiety, and I think it ends up being deferred to actual medication administration.

Melo, Williams and Ross (2010) identified that students bring significant stress, fear and anxiety to their clinical practice. These fears and anxieties significantly impact the capability of students to succeed in clinical practice. The authors also raise the question about whether curriculum design has an impact on the kinds of fear and anxiety that students manifest. Although the study was not able to conclusively confirm that one curriculum approach was more effective than another, it does raise the poignant psychological questions as to the origins of this fear and anxiety.

Pagana (1998) suggests that students feel that they are in a vulnerable position since their future depends on the quality of their performance and the avoidance of errors. Students are also aware that their lack of accuracy and performance has numerous negative physical and educational consequences (Begley & White, 2003; Kleehammer et al., 1990; Pagana, 1988). I was remarkably impressed, as an educator, how seriously the participants took their role as

budding healthcare practitioners. One participant, Marne, relayed a story from practice in which she experienced difficulties with the medication calculation for a pediatric intravenous medication dose. As she struggled to learn the calculation, she recalled an overwhelming sense of horror, that if she did not get the intravenous calculation correct that she was going to hurt a one-year-old girl. Despite having the support of her instructor throughout this process the student was unable to adequately process these powerful emotions.

The results of the current study indicate that nursing curricula need to include the psychological orientation for faculty and students in how to manage stressful situations. This orientation would help to release some of the power of the experience of making mistakes, and would also enhance students' perceptions of support from the nursing program.

The Moment Things Go Wrong

'The moment things go wrong' was one of the major themes and it describes the part of the mistake experience process when the mistake is actually occurring. There were four sub-themes within this theme that describe what transpires from the exact moment when the mistake occurred or when the mistake was discovered. This theme was particularly significant to the growing body of knowledge on this topic, as there is no other research that has examined this moment. While there are a wealth of studies that have retrospectively examined clinical practice mistakes (Konkloski et al., 2001; Z. R. Wolf, Hicks, Altmiller, & Bicknell, 2009; Yerushalmi & Polingher, 2006), how students process through the exact moment when things go wrong is absent from the extant literature.

The normal nursing process 'goes sideways.'

Participants described how over time, they became increasingly familiar with the routines and processes of providing nursing care. They described developing and implementing

skills and routines for delivering the best possible care in an efficient manner. There was a strong perception that mistakes were a disruption to this normal process of providing nursing care. Karl reflected that,

> I had done my research the night before and got ready. I had done my assessment…and went to prep and administer my medications. I told him [the patient] what everything was as I gave them to him. I got back to the med room and my heart sank…because I realized I had given him the whole dose rather than half a dose.

This particular participant was trying to follow what he thought was the usual or typical nursing routine. The incident of the mistake clearly disrupted what the participant perceived as the normal process of nursing. Jasmine described how her mistake interrupted what she perceived as the normal process of providing their nursing care: "I gave the medication to the patient, so he drank the whole thing and when I went to go sign it off, I realized it wasn't on his chart, so immediately I realized what I had done." It was as if what the participants perceived as being a routine and normal part of their care has suddenly 'gone sideways.' Emily talked about how she,

> Like[s] to do each of them [the medication pour] separately, like fully separate, where I take them out and have done the whole administration for one patient. Ideally that would be nice to do every time…but I couldn't do that, that day.

The perception of this participant was that her best laid plans had suddenly 'gone sideways' and a mistake had occurred. This irritated Emily and contributed to her lack of self-confidence.

Working within systems is what nurses and nursing students do. Much has been written about the complexity of healthcare systems (Norris, 2009). One of the findings of the current study is that participants really struggled to cope with the changeability and diversity that is a part of the healthcare environment. This finding confirms what Ebright, Urden, Patterson and

Chalko (2004) as well as Benner and Stuphen (2007) found. Participants tried to learn new skills and incorporate themselves into the healthcare environment but they found it very difficult to flex with the ever-changing situation. Rodriguez (2007) reported that no matter how minor the mistake it usually caught students off-guard and usually was a significant source of fear and anxiety. Nursing students seek to enter the system of healthcare, and want to get a feel for the flow of nursing practice. As such, all of the participants confirmed feeling surprised and shocked following their mistake. It was as if the usual or routine processes were suddenly knocked off track and out of control. This finding seems to indicate that students have difficulty in thinking flexibly. There's been numerous curriculum and program efforts to help students become more flexible within the healthcare system (Brown et al., 2007; Dyjur et al., 2011; Neudorf et al., 2008) but participants still expressed significant difficulties in anticipating and preventing the kinds of actions that lead to mistakes. Benner (2001) describes this lack of flexibility as part of the novice stage of practice, in which students are focused on tasks and rules are viewed (errantly) as context-free.

The one nursing program described in the literature that made mistake prevention a core part of its curriculum seems to report a higher success rate in helping students prepare for the reality of clinical practice mistakes (Dick et al., 2006). Rodriguez (2007) also advocates that there must be a fine balance in nursing curricula between adequate supervision and support of students while allowing them the freedom to develop autonomous decision-making skills. Part of this freedom, according to Rodriguez, is the freedom to make mistakes and then to communicate openly with instructors or supervisors. The results of the current study also confirms that more practice in pre-contemplating and managing mistake experiences is essential and that this activity must be an active component of pre-licensure nursing curricula.

Disruption in learning.

Another significant component of living through the mistake, in addition to disrupting nursing care, was the disruption that the mistake caused in the participants' learning. Participants were clear that they learned best when they were able to smoothly work through their assigned duties and accomplish the various problem-solving and decisions involved in learning skills and competencies. Participants acknowledged that mistakes were an opportunity to learn but they more frequently viewed mistakes as a disruption in their learning. Amanda talked about the stigma of mistakes and how this stigma negatively affected her learning. She stated that "it doesn't necessarily do the individual nursing student any good to keep the mistake to themselves because it prevents it from being a learning experience which it should be." For Amanda, the potential learning in the mistake was disrupted by the experience of living through the mistake. Amanda went on to say that "this process of making errors in practice could prevent people from going on with the program, or having a positive opinion of themselves as becoming a nurse."

Priscilla described a fairly negative interaction with her clinical practice instructor: "She called me stupid in front of my patient, basically just like called me down right in front of my patient, and it's like well how am I supposed to learn?" This negative experience was very traumatic for Priscilla and created a long period of time during which she struggled with her self-confidence, particularly in the clinical practice setting. Several other participants described feeling a vague sense of dread or "wrongness" as they went through the business of delivering care in clinical practice. Participants were unclear about from where these feelings originated but relayed that these feelings made them feel tentative and insecure in their role as student

nurses. These feelings were frequently identified before the mistake occurred but were significantly intensified after the participants had made a mistake.

Participants felt that mistakes had the potential to be good learning experiences but as they currently occurred, they were not beneficial. Julie mentioned that

> If there was an error you have to fill out this form, but I've never seen it before this incident. That actually could be a good learning experience for nursing students to see the form beforehand and know what you have to fill out.

Belita articulated an example in which her instructor treated a mistake as a learning experience. In her example, Belita mistakenly removed an intravenous saline lock. Although the end result was no harm to the patient, Belita conceptualized the incident as a mistake and a black mark on her learning. Fortunately, Belita's instructor was able to help her reconceptualise the incident as a learning experience. Her instructor talked with her about what criteria to use to define a mistake. Her instructor's advice was to use the experience as an opportunity to reflect on her practice but to avoid defining the experience as a mistake.

Although participants admitted that they learned from their mistakes, all of them described their mistake experience as unpleasant. Schoemaker and Gunther (2006) make a case that using errors as a positive learning experience is one of the strongest ways to gain skill and to promote innovation. Other authors such as Ziv, Ben- David and Ziv (2005) suggest deliberately exposing students to making errors to both enable them to learn and desensitize the negative feelings associated with the mistake experience. These authors were in education, not healthcare, and I'm not aware of any nursing program that strategically exposes students to the mistake experience as a learning activity. Clearly, actual healthcare environments may not be suitable for exposing students to errors; however, simulation may offer a venue for this type of

learning. One study by Rockstraw (2007) examined the influence of simulation on the self efficacy of nursing students that the findings were unfortunately inconclusive. The effectiveness of simulation on student confidence in the mistake experience is a topic for future exploration and research.

Moral/ethical black ice.

The next theme portrayed the moral and ethical components of what students experienced in the mistake process. This personal process occurred within each participant and involved a complex set of influences and results. I have chosen the term 'moral/ethical black ice' to capture the uncertainty, loss of control, surprise and fear that participants experienced while sorting out the moral and ethical components of the mistake experience. This term also captures the perception of mistakes coming 'out of the blue' and without prior warning.

Participants struggled to define and conceptualize the moral and ethical reality of the mistake experience. Amanda relayed that after the mistake "I didn't realize why it was wrong, it was definitely like a slow process. Starting from when the incident actually happened. More of a feeling than an actual identification of what was wrong." This feeling of being wrong was fairly common among several participants but all participants expressed the difficulty in elucidating why a particular incident was wrong. Arndt (1994) and Crigger (2005) both discuss some of the factors why determining the extent of mistakes is so difficult, including: the duality of right and wrong; the idea of errors of commission and omission; and the criteria of harm versus no harm. Unfortunately very little, other than what has been described above, has been written about defining errors. Participants were not unusual in that they had great difficulty in determining whether a mistake happened or not. Some mistakes were very obvious but other mistakes were much more subtle.

Some participants struggled over moral/ethical issues that were relatively concrete. Emily described an immense struggle to even disclose her mistake to her clinical practice instructor. Emily's instructor had previously made it clear that mistakes would not be tolerated. The participant stated that

> I've never been afraid of people, or things like that before, but my fear totally overruled my ability and my desire to be an ethical person. Just out of fear I didn't say anything and did my best to take care of the patient as well as possible. I'm trying to let it [the mistake] inform me to do better practice, but yeah, to my shame I didn't really do anything about it. It was always very theoretical beforehand obviously, because until the rubber hits the road, you just keep like, thinking of it as an idea or whatnot. I guess how I feel about it now is that it is easy to talk about ethics, but there's more to ethics than just the idea of what's the right thing to do.

Jaymee had a more positive experience but still had a great deal of confusion about the ethical ramifications of her mistake experience. It appears that the instructor and staff, although trying to demonstrate support, created confusion for Jaymee. She stated:

> Everyone like talked to me then and they said, it's okay that you made a mistake, it's not okay for you to cover it up and it's not okay for you to pretend it didn't happen. It's not okay for you to worry so much either.

Jaymee went on to describe how there seemed to be considerable diversity in the interpretation of mistakes. For some practitioners and instructors, mistakes were viewed as catastrophic, yet often the participant's nurse mentors and supervisor minimized the ramifications of the mistake. This seeming incongruence was very confusing to some participants. Julie pointed out how mistakes were often determined by policies and procedures that are specific to units. She stated

that “sometimes an error is dependent on your unit and especially a timeframe. If you give a medication an hour late on some units that’s not considered an error versus another unit would say that it is.” This ethical ambiguity was confusing to many of the participants and made them unsure how to conceptualize the mistake experience. Benner (2001) describes the novice stage as characterized by a focus on tasks and rules, and an inability to interpret rules in their clinical practice context. A greater application of Benner’s novice characteristics in the area of pre-contemplating student errors may be helpful in designing the orientation to clinical practice.

Participants often referred to an ethical reasoning process. They stated that they knew something was ‘wrong’ but it was difficult for them to ascertain why it was wrong. Amanda stated:

> I did realize why it was wrong, but it was kind of…definitely like a slow process, starting from when the incident actually happened. It was more of a feeling, but not an actual identification of what was wrong…. I found that definitely a challenge.

Emily talked about how she pre-contemplated what she would do if she ever made a mistake. She said:

> So when I thought about clinical, and heaven forbid I ever made a mistake, I just assumed I would do the right thing…so that everything would be dealt with on the up and up basically. I had every intention of being really ethically competent in that sense but I surprised myself with being kind of ruled by my fear.

Bryan indicated a conversation he had with a student colleague who had made a medication error:

> When she told me I was like, you should have told [your instructor]. You’ve got to do that. Like I’m more supportive now [following my own error] and now I totally

> understand why she didn't tell, it's really weird…. My tutor never said, okay if you do a med error you will tell me ABC and I will do XYZ. I wish I would have known.

It is very clear that participants were having significant difficulties in conceptualizing the ethical reasoning of the mistake experience. They described knowing that something was wrong, but the path towards a correct reaction was difficult, unclear or clouded in fear.

Participants also divulged that clinical instructors were not proactively helping students to use a sophisticated ethical reasoning process. The most prevalent response from instructors was to tell participants to "take ownership"," be accountable", or simply to "be honest about everything." Danlynn mentioned that during a large group theory session an instructor talked about making mistakes in clinical practice. This particular instructor told a number of stories that insinuated that when students admitted their mistakes that the process went well, while the ones who tried to hide the mistake were in "big trouble." Despite good intentions, these types of instructions were not helpful to Danlynn and left her with considerable confusion concerning the decision-making process involved with mistakes in clinical practice. Danlynn expressed that she wished through her entire program that "there would've been more education about mistakes, more support, and maybe more light shone on different types of mistakes." Several of the participants expressed similar sentiments.

Expecting students to "take ownership", "be accountable", and to "be honest about everything," however, is overly simplistic. To begin with, students' perceived consequences of making a mistake as catastrophic enough to cause them to perceive it from a moral/ethical perspective rather than a learning or systems perspective as they contemplate their management of the error. Whether the actual consequences of mistakes are as severe as students perceive is irrelevant, since it is the perception that drives student behavior and decision-making.

Three participants revealed that they had actively suppressed knowledge of their errors from their clinical practice instructor. In all three cases the students considered this to be a "wrong" way to approach the problem, and went to considerable length to ensure that their patients were not affected by their mistake. Some perspectives from the literature would question whether the students actually followed a moral/ethical approach in this type of scenario. While these participants did not follow the prescribed chain of communication, they did actively engage in a process to mitigate the effects of their mistake. These actions suggest that students did have an active moral/ethical reasoning process in play, albeit not the reasoning that led them to notify the appropriate people about the mistake. A systems perspective advocates that errors are reduced and human performance is enhanced when the reporting and auditing process is free of a punitive response (D. J. Anderson & Webster, 2001; Lehmann et al., 2007; M. Wolf et al., 2007; Z. R. Wolf et al., 2006). There is clear evidence from the current study that students perceive that mistakes will result in catastrophic consequences. What was missing in their experiences was a system, both educational and in specific agencies, that encouraged and allowed students to experience and manage mistakes without the dominating threat of catastrophic consequence. This threat, regardless of what particular programs claim, was confirmed by the participants in the study. If mistakes were viewed from a systems perspective instead of being viewed as a moral/ethical issue, there is clear evidence that mistakes are reduced and human performance is enhanced (D. J. Anderson & Webster, 2001; Lehmann et al., 2007; M. Wolf et al., 2007; Z. R. Wolf et al., 2006). Because participants viewed their error as a personal failure, to the degree that some even concealed it altogether, they dealt with it in isolation and without support. A systems perspective assumes that the person making the mistake is but one piece of a much larger puzzle.

Anonymous and consequence-free error reporting systems have been tried in both practice and education contexts (Grant & Larsen, 2007; Soleimani, 2006) but are not without problems and questions. If a nursing program were to adopt a consequence free mistake reporting system, it would change the way instructors manage student progression. It would also complicate the case of students who are clearly not successfully meeting the criteria to pass clinical practice courses. These questions are beyond the scope of the current study but what is clear, both from the literature (Gregory et al., 2007) and the current study, is that measures need to be taken to improve the efficiency and reliability of communication between students and instructors as it relates to clinical practice mistakes. The decision to report a clinical practice mistake needs to be taken out of the moral/ethical realm and needs to be viewed as a decision-making process within a complex system.

Support and Resilience

The next theme of the mistake experience is support and resilience. Whether participants were able to bridge the mistake experience or not was largely dependent on the support the participant received from family, peers, their instructors and the clinical practice learning environment. In addition to support, the individual resilience of some of the participants emerged as a significant factor. Support and resilience became the dividing place in the process between whether a participant was able to bridge the mistake experience successfully or not.

Support.

The support that participants received from their clinical practice instructors was critical to their learning and mistake experiences. When participants experienced a clear lack of support the mistake experience invariably became part of a negative journey. Priscilla indicated a story in which she changed an intravenous tubing set for the first time. The tubing was due to be

changed but the intravenous solution had just been changed a few minutes before. Priscilla made the mistake of re-priming the new intravenous line with the old, but virtually brand-new, solution. She expressed her experience as:

> so then I was so proud of myself, like the first line I set up all by myself and I did it all right. I thought I did it perfect anyhow. So I showed my tutor, it's all ready, and now I'm ready to hang my meds. She said 'did you change the bag too?' I said, 'I um… No it's a new bag.' And she said, 'You know you're supposed to change everything. You guys are so stupid, you don't know how to use your heads.' And here I'm thinking I did a good job and apparently I missed the important stuff. She didn't tell me why it was wrong; she was just like 'you're supposed to know this, you'd better go home and study.' Okay, so I don't even know what my mistake was, while I mean I did but it wasn't exactly sure of the reason.

Priscilla expressed that this experience was devastating to her confidence. She eventually understood the rationale for changing the bag at the same time as the tubing but the lack of support through the mistake negatively impacted the experience.

Fortunately in many of the mistake experiences described by participants the clinical practice instructor was supportive. This support invariably led to a very different experience. For example, after Amanda made a mistake with a pediatric medication reconstitution, the instructor utilized the teachable moment to instruct the student on a better way to reconstitute. She stated "my instructor showed it [the reconstitution skill] in a way that it made so much sense…. I was like, that helped me so much, like she showed me a nice trick and after that I felt so much better." Another participant, Jasmine, was emotionally distraught after mistakenly not giving a potassium supplement. She said,

> I found my instructor was very helpful. She could tell I was clearly upset and I was crying on the unit but she talked me through the mistake and what it would do to the patient. It actually ended up not being super severe, so you know, we just ordered some bananas and stuff to come up with his food. She helped me fill out an incident report and she was very calm and also very like direct.

If the instructor was calm, supportive and utilized the mistake as a teachable moment participants described actually learning from the mistake experience, rather than the mistake being completely traumatic.

The evidence reveals that students rely on their clinical practice environment to define and facilitate the mistake experience. Ebright, Urden, Patterson and Chalko (2004) made the point that students as well as novice practitioners actually lack the capacity to make complex decisions related to errors. This is why the role of the instructor is so important. In the current study instructors were essential in helping students understand the context and judgments pertaining to mistakes. When this type of support was missing participants struggled to accurately define and construct the mistake experience; when this support was provided the mistake experience was invariably more constructive. Harding and Petrick (2008) affirmed the importance of instructors in helping students think constructively about their mistakes. They suggest that when errors are viewed from a punitive/performance failure perspective that students fear errors more and the incidence of errors actually increases.

While some mistake occurrences entailed an interaction between the participant and their clinical practice instructor, others involved participants looking to their peers for feedback and support. Participants were careful in whom they confided, however, choosing only to share their mistake experience with peers with whom they were very close. Emily stated “I’ve talked to a

few nursing students, but only depending on how comfortable I'm feeling. I give a little more or a little less detail." Kathryn felt that the way students in clinical practice groups differ each term was detrimental to how much they would share of their mistake experience. They described how their 'friends' were always in other clinical practice groups. Belita described wanting to talk about the mistake experience with her peers but she was also afraid that they would not understand. She stated:

> With any mistake or anything that is really impacting you emotionally, you want to talk about it. You want to say I made this mistake and I feel terrible and this is how I am feeling and this is what I'm worried about, but people don't always want to listen to it. They are like, oh don't worry. You know better and you won't make the same mistake… I have four main friends, we talk about everything. They do encourage you a bit but they don't actually listen to your experience with it.

Participants valued the support and encouragement that registered nurses on the unit provided to them as students. Even a small comment from a registered nurse, such as that the student was "doing good" or that "they are where they should be," was very important to participants. Karl related how, immediately after making a medication mistake

> I could barely catch my breath, I was just scared, I felt like I had no color in my face. The RN was a young nurse and she said it's okay, breathe, it'll be okay. And yet just essentially told me to calm down and not worry about it.

The following day the charge nurse on the same unit talked to this participant and asked him how he was doing and made sure that he was not too overwhelmed. This kindness and support resulted in a positive experience for this participant.

At the time of their errors, participants had been keen to debrief their mistake experience. Debriefing did not always happen, however. Several participants described trying to utilize a reflective approach to process the mistake experience. They did not indicate any kind of a formally established reflective or debriefing process following the mistake but there was invariably an informal process through which each progressed. Participants consistently expressed that a more formal communication process would be ideal. Bryan relayed that

> I would have preferred if we would've talked about it more openly…even if some of our instructors had shared some of their stories of when they made a med error. We wanted to know like it was really just okay, you made a med error, this is what you need to do. It was never something that we could relate to because we never really talked about it in a story kind of way.

Another participant, Belita, relayed that since admitting a mistake can be embarrassing, she would likely not share the experience unless she was directly asked to do it. She stated that:

> if I feel ashamed and embarrassed about something, chances are I'm not going to come to you about it. It's the same with someone who's been abused. They don't always, they're not always open about it, they feel ashamed, they feel embarrassed, they feel that they could've done something…. They don't always realize that they are a victim until you ask them… It's like people have asked me [to share about my mistake] enough times that I think I should say something.

The last factor that was identified as a strong support mechanism through the mistake process was family members. Family members, and particularly participants' significant others, were consistently consulted by participants to discuss the mistake and process the associated feelings. Emily indicated that even though her husband did not understand all of the issues, he

was able to help give her a more positive perspective on the mistake. Emily described how, following the mistake, her husband clearly noticed that she was more fearful and had suffered a significant shock to her confidence. Her husband helped her process through her fears and issues and encouraged her to not be so hard on herself. Several other participants also described how instrumental family members were in processing their experience of making a mistake.

Resilience.

Another subtheme that defined the divergence between successfully or unsuccessfully bridging the mistake experience related to the personal resilience of participants. Some participants seemed to be able to recover and "move on" faster and more completely than other participants. There was a constellation of complexities with each case but some participants demonstrated personal attributes that allowed them process the experience more effectively than others. Amanda indicated that:

> I think my personality was able to handle it quite well overall, but I think maybe similar students, or a student in a similar situation, would have found it very intimidating… Whether I personalized it, I don't think so, not so much.

Jaymee stated "like I made mistakes, whatever had happened, so I'm just trying to forget about what happened and move on." This statement was not a denial that something significant happened, but was part of the process for Jaymee to try to get past her mistake experience.

Other participants had a much greater personal struggle to move on and to, if possible, make the mistake experience a constructive one. These participants seemed to quickly move towards an inability to bridge the mistake experience. One participant, Emily, went into a fairly pronounced depression and described having considerable moral anxiety about her capabilities to make effective decisions. Her mistake, which from a medical perspective was not particularly

serious, caused a significant crisis in her academic, personal, social, and even spiritual life. Emily relayed:

> I've never felt as unworthy as I had felt after this. [tearing up] Um…it changed how I spent time with God because of before it was very free and kind of father/daughter kind of relationship and this became a, I'm disappointed in my daughter kind of relationship and I'm projecting that onto God, and from my own feelings about myself. But ah…it really it's, I've…I distanced myself from God for quite some time afterwards, because I was so ashamed.

Emily also described how the mistake experience affected her relationship with her family:

> My husband noticed it for sure that I became a bit of a different person since then [the mistake]. A little more fearful and reluctant to try new things because I'm afraid. It makes me feel kind of anxious about what it's going to be like when I'm in my final preceptorship... I don't want it to rule my life, but I'm surprised at how much it's taken over my psyche in that sense.

Although not articulated as starkly as Emily, fear and lack of confidence seemed to be a common feeling in participants who struggled the most to move through the experience. This lack of confidence threatened the participants' resilience, but some participants were able to overcome their fears and move on. Samarra related feeling nervous about the possibility of going back to an acute care setting after making a mistake. She stated,

> I still had that caution and fear staying with me…when I eventually get into acute care, I'm going to be so scared again, and all this stuff. But then I kind of pushed myself and made myself go back into acute care for this year's rotation.

This participant, who initially had an inability to bridge the mistake experience, eventually was able to succeed and normalize the experience. It was as if the participant was initially unable to bridge the mistake experience, but then her resilience enabled her to shift the mistake experience toward success and eventually to being able to bridge the mistake experience and move on.

Crigger and Meek (2007) describe experienced practitioners who have made mistakes. One of the central themes of their study was the process of self-reconciliation that practitioners go through to regain their confidence. Although Crigger and Meek do not specifically identify the concept of resilience, they give a number of examples in which participants demonstrated a more proficient capability of moving past errors and rationalizing their sense of self. Jackson et al. (2011) and Stevens (2013) specifically identified the concept of resilience in their studies that examined how nursing students manage challenging situations in the clinical practice environment. Although both studies encompassed challenges beyond mistakes, both authors noticed that some students demonstrated explicit resilience that enabled them to negotiate the environment more successfully. What factors influence certain students to develop resilience is still unknown. Of the studies that specifically examine nursing student resilience, none actually provide a definitive answer for the origins of resilience (Jackson et al., 2011; Stephens, 2013; Taylor & Reyes, 2012). The answer to this question is central to the process of nursing student mistakes and is a topic for future research.

Learning environment.

The other significant contributing factor to participants being able to successfully bridge the mistake experience was the support provided in the clinical practice learning environment. This factor refers specifically to the system support of the clinical practice placement, but also

has broader implications for the learning environment that is set up and managed by the education program.

Marci was particularly impressed by the "supportive nursing atmosphere" on the pediatric floor where she had one of her clinical practice rotations. She stated that,

> they really support each other on their breaks. You know, there's no dropping care in between. It's an extremely supportive nursing atmosphere. So for me, even more so than the population, I need a nursing atmosphere like that. I don't want to work in a place that doesn't have that atmosphere…. When I'm a professional I will be looking for a place where they really work together as a team.

Danlynn wished that "on my unit they could be a bit more supportive, and that there should be someone there that I can ask questions to, and not feel bad about that… Someone who would not feel rushed." Samarra indicated how the busyness of the floor influenced her. She said "they [the patients on the floor] were very acute, like recently had surgery and they still had to be monitored for stuff, so lots of those nurses were very highly anxious too and so it kind of rubs off on you as a student." Participants really wanted to learn from their clinical practice placements but the atmosphere was frequently less than supportive.

Participants described the importance of the learning environment in how they learned and how they conceptualized the mistake experience. When the environment of the clinical practice unit was "tolerant" and "supportive," participants were able to bridge the mistake experience more successfully. When units were "stressed," "excessively busy," and "less supportive," participants had a more difficult time in bridging the mistake experience. Samarra described a very busy cardiac unit:

> There is a lot of units that you know like the nurses were high stressed and everything was very particular. The way the staff on the unit handle situations like giving medications can have an effect on us as a student, especially when you have never been in that environment before… Yeah, it was very much a mental thing for me in terms of getting both the fear of giving meds and making an error and stuff like that… The unit you know is cardiac and so much can go wrong but really like I said before I'm giving the same meds now on the unit that isn't called the cardiac unit, but for some reason my anxiety is much lower than before.

This anecdote highlights how the work environment in particular clinical practice areas can have an effect on how students learn and the perceptions and presuppositions they bring to the mistake experience.

Participants also identified ways that their education program either did or did not provide a supportive learning environment. Emily lamented the fact that she didn't feel

> like I have the opportunity to learn in the presence of my instructors… I haven't really felt nurtured and taught so much as judged and told when I've done things wrong, and where to work on and that sort of thing. Even then sometimes you have to kind of force it out of them, by asking like what I can do better.

The relationship between participants and their instructor was clearly central to the experience of making mistakes. Numerous authors identify the critical importance of the relationship between students and their clinical practice instructor (Kelly, 2007; Lee, 2009; Zieber & Hagen, 2009), but the effect of this relationship on the incidence of mistakes has yet to be explored. Instructors are clearly in place to help prevent mistakes, but participants suggested

that there are times that the dynamics of the relationship are detrimental to the way that mistakes are managed.

Participants identified the psychosocial support provided by the learning environment but also described how concrete realities of the healthcare system also impact the mistake experience. The workplace environment has been identified as a significant factor in the incidence of errors (Marck, 2005; Shappell & Wiegmann, 2003; Tourgeman-Bashkin et al., 2008). Participants in the current study confirmed that when the clinical practice environment was confusing and unsupportive their capability to make clear and quick judgments was significantly hindered. One of the most significant environmental realities discussed by several participants was a particular computerized medication administration system. Some of the difficulties that students encountered with the computerized medication systems were: inability to access the computerized system due to a limited number of terminals/machines; contradictions between paper medication records and the computerized system; an incorrect assumption that the computer system will be perfect; and incorrect dosages in the computerized machines. In one case, with the participant Karl, the dose the patient was to receive was 22.5 mg. The tablet only came in 15 mg tablets. The computerized system delivered the one 15 mg tablet but then it was the responsibility of the student to go to another medication source and manually cut the other 7.5 mg. This process was very confusing for the student and subverted the advantage of a computerized medication system.

Priscilla accidentally opened the wrong medication drawer on the computerized medication administration system. Since she was unfamiliar with the system she just closed the drawer. Unfortunately, according to the computer system, she had just given the medication at the wrong time, initiating a confusing and anxiety producing incident.

These three incidents were the most dramatic but several of the other participants related how they did not trust the computerized medication system. Based on the participants' stories it appears that computerized medication delivery systems are an environmental factor that adds a complexity to the medication delivery system that may negate some of its perceived benefits. There is evidence that with experienced practitioners computerized medication systems can be an effective error reduction tool (Mahoney et al., 2007; Z. R. Wolf, 2007). The evidence presented by participants in the current study suggests that this system may not be as beneficial with students or novice practitioners.

Self Disintegration

If participants lacked the support and resilience to enable them to succeed and move on, they tended to spiral down into a destructive mistake experience. This destructive mistake experience was influenced by a hazardous climate in the healthcare system or in the learning environment. The destructive experience was characterized by two predominant subthemes of self-disintegration and a destructive social construction of mistakes.

The disintegrating self

When participants experienced a destructive mistake experience there was initially a process of self-disintegration. More than just feelings of fear, anxiety or regret, self-disintegration is an assault on how the participants felt about themselves as persons. Participants described feeling overwhelmed and increasingly anxious, feelings that were triggered by: being new to a clinical practice environment; being uncertain of routine clinical practice procedures; feeling intimidated by the complexity of patients or by the pace of the healthcare unit; and experiencing communication issues. Participants were acutely aware of their novice status in a clinical practice world that demands competence and expertise, if not perfection itself. A

perceived gulf between current and required abilities weighed heavily on participants' minds. Belita described:

> I am so fresh in my theory and nurses who've been there 20 years, they have routine, they do things there in a certain way and I think when that routine gets disrupted… they become a little more impatient with me. I'm just learning this, so I take everything I'm supposed to do fairly serious. The first couple weeks are always do it by the book and then you're like okay that's not working, how else can I do this.

Marci suggested the following advice to faculty:

> When starting a new skill, don't overwhelm your students with them. Really keep it simple for the first day for administration. I should not have had six different mini-bags to hang, that was too much for me and it made me start the day feeling overwhelmed before it even started….

Participants struggled with feeling confident in their clinical practice skills, especially with medication administration. Samarra described the fear she had prior to even giving a medication:

> I guess there are lots of potential things to be missed…especially being a second-year student and not really knowing your own potential and your own skills… It was very much a mental thing for me in terms of, you know, getting over the fear of giving meds and making an error and stuff like that… There is definitely that pressure you felt, always give them on time, give them right, and you know give everything you need perfect. It was a little bit overwhelming.

The pace of the clinical practice setting was also a big factor and an anxiety trigger for participants. Julie stated:

> I had more than one patient so of course you have assessments you need to complete, and I think sometimes when it's time to give medications you're in that kind of thought process to give the medications, and when it doesn't always go smoothly it kind of throws you off.

Marci indicated:

> I was feeling a little overwhelmed and a little disorganized and rushed. I was really trying hard to stay on top of them [medications] and I think I just became so nervous. I was checking so often and it was trying to make sure I was on top of everything I needed to do.

As participants gradually became overwhelmed, their confidence eroded, resulting in the disintegration of self. Disintegration of self is characterized by the squeezing and chipping away of a participant's confidence and sense of self by an overwhelming assault of pressures and circumstances. Kathryn talked about this when she said

> it's like the emotional personal stuff, the damage to your ego…the whole pressure you put on yourself. After a while you feel more confident and then you make a mistake and you confidence just crumbles. It's sort of fragile.

Participants mentioned that once their sense of self started to disintegrate it became very difficult to regain their confidence. Participants confirmed that they felt inexperienced and, as described by Begley and White (2003), that their inherent incompetence predisposed them to significant clinical practice errors and the potential to harm patients. This potential for errors and resultant patient harm was very distressing to participants. When a mistake happened they very quickly viewed it as a personal fault. This disintegration of self invariably led to a lack of confidence. Reid-Serl, Moxham, Walker and Happell (2010) make the case that this lack of self-

confidence can result in students being reticent to seek assistance and support from appropriate people. This behaviour has clear implications for both student learning and patient safety. This disintegrating confidence then creates a downward spiral of avoiding supervision and potentially a greater chance of further errors.

It is clear from the data that this downward spiral is very difficult to arrest. The most common technique of participants was to try to forget the mistake and let time take care of the negative feelings. Christiansen, Robson, and Griffith-Evans (2010) suggest that a more positive and constructive way to combat this disintegrating confidence in nursing students is to get them involved in medication safety and service improvement initiatives. These authors found that students readily engaged in initiatives that improved their own safety competence and reported much stronger levels of confidence.

A negative social construction of mistakes.

The view that mistakes are morally wrong and indicate some type of personal moral failure did not originate in the participants' nursing programs but rather, long before the participants became nursing students. Julie mentioned that this view of mistakes is "something that we grow up with… I think that even as a child we grow up thinking that people that make mistakes generally do not do well. You are judged." Once participants got to their clinical practice rotations they refined their construction of mistakes based on information from instructors and staff as well as living through actual mistakes. One of the strongest contributors to a negative social construction of mistakes was when several participants witnessed a seasoned practitioner covering up their mistakes. These observations caused confusion and moral distress in the participants. Emily stated "I had been present when a med error was made by staff nurse, a younger staff nurse, and the other nurse just casually brushed it off. She said, 'oh we all do it,

no big deal.'" Jaymee stated "I think she was trying to cover it up. While I don't want to accuse her but I think she was trying to do it." Danlynn suggested that "I don't think even a SLR [report form] was filled out or anything like that. I guess it happened in the night and two other nurses had missed it also." These type of incidents were disturbing to participants and demonstrate how much students look to practitioners to model behaviors. Not only were these examples of poor practice, they also demonstrated to participants the prevailing view that mistakes are unacceptable and something to be hidden. This concealment of error was damaging to participants' view of the mistake experience and further entrenched their fear and confusion.

The perspective that mistakes are a manifestation of moral failure or a lack of caring is unfortunately common within the nursing profession (Arndt, 1994; Biordi, 1993; Thomas & Burk, 2009). Nursing has followed the perspective that mistakes are the result of breakdowns in the performance of specific individuals (Blank et al., 2011). This individual blame perspective has been strongly refuted by the systems theory perspective from psychology and from systems theory proponents within nursing (J. G. Anderson et al., 2006; Clancy et al., 2008; Gregory et al., 2007; Reason et al., 2001). It is unfortunate that participants in the current study confirmed that the idea of mistakes being a moral failure is still prevalent.

Another social construction of mistakes pertained to how students perceived the seriousness of various types of mistakes. Opinions varied concerning what even constitutes a mistake and whether a mistake was significant. Four of the participants used the phrase "a major mistake" to try to describe the perceived seriousness of the incident. Medication mistakes were perceived as the pinnacle of mistakes, and other (not medication related) types of clinical practice mistakes did not carry the same weight or gravity as medication mistakes. Belita relayed that "it was still very crushing [to make a mistake] you know. This could have been

something huge, this could have been a blood pressure medication that she needed." She went on to say that,

> In my opinion a mistake is when you know that something isn't right in your practice… Obviously med errors, like I didn't do this, or I did this inappropriately, or not properly– that's what I consider a mistake.

Bryan struggled to try to define what he considered to be a 'bad error.' His definition suggested that

> any kind of error that puts a patient health in a different way or compromises the patient health then it is bad, but I think if the patient's health, stays relatively the same after you make the error, not that I would consider it a good error, but not as serious as an error that would compromise the patient's health.

Arndt (1994) found that experienced nurses had great difficulty in conceptualizing the severity of mistakes. In Arndt's study nurses reported using the perceived impact on patients as the measuring standard for mistakes severity. Arndt strongly questions the effectiveness of this standard for defining mistakes. Participants in the current study confirmed that they have an ongoing struggle to determine the severity of mistakes and the correct process for responding to mistakes. There is the example of Emily, whose mistake was almost negligible in patient harm and clinical practice significance, and yet her mistake experience was by far the most catastrophic of all the participants. A couple of the other participants had made mistakes with much higher potential for patient harm yet they had difficulty describing why their mistake was significant. This implies that students need more help in conceptualizing mistakes and the correct responses to performance issues and mistakes. For example, the correct response to forgetting to bring certain dressing supplies is quite different to forgetting to plug a chest suction

back on to drainage. Both are mistakes, but both have very different potentials for harm to patients. The current study demonstrates that students have poorer abilities in how they construct the meaning and significance of mistakes.

Imbuing wrongness

Another subtheme under 'the disintegrating self' was termed 'imbuing wrongness.' Participants experienced an increasing sense of *wrongness* associated with mistakes and clinical practice performance issues. It was not a socially constructed conceptualization of mistakes but rather was a psychological expression of being wrong, deficient, and a failure. It was as if someone was painting this sense of wrongness on to the participants and that this wrongness was being added layer upon layer. Participants perceived medication delivery or any other activity prone to mistakes to be permeated with a negative moral essence that transferred a feeling of wrongness to themselves. This feeling of wrongness began to develop even before students actually made a mistake but it was strongly reinforced when a mistake occurred. Jasmine expressed this as:

> I think generally the idea of a medication error was like really scary, like as a student. And then I knew potassium had to do with the heart, how your heart works. I thought [the patient's heart rate] was going to drop super bad, and like if nobody knew about it, I was thinking that it could be a very serious concern. I'm just happy that my mistake wasn't as bad as I thought it was going to be [tearing up].

Jasmine went on to say

> before I had done it [made my error] I'd never heard of a nursing student making a med error. I really felt during second-year [tearing up] when we learned about medications, I really felt like they hammered home like how bad it was. I think it was to get us to

> understand the seriousness of giving medications and it shouldn't be taken lightly… But I almost felt like maybe they took it a bit too far and it was like a scare tactic because I think it really increases our fear.

Emily went as far as pre-contemplating the fear and worry associated with the potential of making a mistake in the future. She relayed:

> When other people [students] had made mistakes and they had let her [the instructor] know, it was a scary ordeal for them. They felt sick and they couldn't sleep. I was already having those same feelings without having made a mistake.

Samarra stated that "you carried those little horror stories in your back pocket and sometimes you think about them and you hope that [a mistake] doesn't happen to me." From very early in their programs, students were pre-contemplating the experience of making a mistake and were ascribing a sense of wrongness to their clinical practice performance and sense of self. This slowly advancing perception of wrongness became something that began to significantly impact participants' confidence. This perception led to greater hesitancy and decreased efficiency which in turn led participants to fall behind. In the ensuing rush to catch up, further poor judgments and mistakes resulted. Priscilla described this overwhelming sense of dread and wrongness when she said that

> I'm afraid to do anything to make a mistake. I'm afraid that when I did make a mistake to come to you and tell you. And so I guess it's just, lack of compassion maybe, I don't know where the fear comes from.

This feeling that participants described was powerful, hard for them to describe, and seemed to originate from a very core part of their psyche. These feelings were more than just the disappointment of failure, they were a raw feeling that almost everything that they were doing

was wrong. When participants were in this frame of mind it was very difficult to convince them that perhaps their perspective was incorrect.

There have been a number of authors that have begun to explore the stresses and anxieties that nursing students go through in their clinical practice experiences. The stresses and anxieties go beyond what would be the typical experiences of higher education. This phenomena of extreme student anxiety has been studied and discussed for many years. Kleehammer et al. (1990) and Beck (1993) were among the first to explore this issue yet more recent explorations of the same topic, including the current study, have found no change or improvement (Melo et al., 2010). It is my hope with the current study that a better description of the fear and anxiety, and by using the term 'imbuing wrongness' to describe the depths of the feeling, that nursing education can be spurred to be more proactive in managing the experience of students.

A Damaging Mistake Experience

The next major theme was a 'damaging mistake experience.' In this aspect of the mistake experience, the behaviors of students and in particular, the normal or typical relationships between the student and others, begins to get "twisted".

Twisting the interpersonal dynamic.

When a mistake is made, one of the significant disruptions is in the interpersonal dynamics of the participant and other members in the healthcare environment. It is as if the normal smooth relational processes suddenly get twisted and bent. Participants reported that patients were generally sympathetic to students. Although there was a natural anxiety about any effects on their health, patients frequently were very encouraging to students. One patient sympathetically told a student that she looked like a "deer in headlights" when she realized her error. Jaymee relayed how she disclosed to the patient the nature of the mistake she had made.

Since there were no overt harmful effects to the patient in this case, the participant relayed that the patient had said, “No harm, no foul.” Marci described another interaction with her patient. She said that when she went to talk to the patient about the error

> I was terrified, like terrified, and she was so nice. She apologized to me. I said don’t apologize it’s my fault, like I’m so sorry. And she said it’s okay, it’s okay, don’t worry. I made the mistake and I felt I should be doing something for her, and she was comforting me.

There was a wide variety of reactions from practitioners on the clinical practice floors. Students recognized that the clinical practice areas were challenging environments and that this affected nurses’ moods and reactions to events on the unit. Most participants described practitioners as supportive of the students who made the mistakes. However, there were some staff who felt considerable stress regarding students’ presence on the nursing unit and this stress was apparent to the students. Marne related an experience in which her clinical practice instructor had gone to supervise a student on another unit. One of the nurses felt that she had to oversee everything that Marne did and make sure that she didn’t make any mistakes. This close supervision made the participant nervous and she recalled how “she [the RN] would not leave me alone. She was just very angry and very cold…. It was very frustrating that she wouldn’t leave me alone.” Although this interaction did not result in a mistake, Marne related that it made the job of administering her medications much more challenging.

Jaymee had an unfortunate interaction with a registered nurse when she made a mistake of not noticing a patient’s low prothrombin lab value in the chart. When the registered nurse discovered the mistake she confronted the student in the patient’s room. This interaction was devastating to Jaymee and embarrassing to the patient. Julie admitted that on the nursing units,

"they're not always the nicest to us and make us feel bad about being a student, but we still have to learn." Each practitioner's reaction to a student's mistake was unique but what was consistent was the way that mistakes change the relational dynamic between the practitioners and the student who makes the mistake. Participants were generally at a loss to describe why this change occurs but Belita recognized that "nurses who've been there for 20 years, they have a routine, they do things there a certain way. I think that when that routine gets disrupted…they become a little more impatient." Marne surmises that the high number of inexperienced practitioners on a particular unit was contributing to the way that the floor dealt with student mistakes. She suggested that when registered nurses are inexperienced in their own skills and competencies they pass their anxieties and insecurities on to students. Similarly to Marne, Samarra noticed that some clinical practice units seemed to exude a very high level of stress:

> everything was very particular, especially how the staff on the unit handles situations like giving medications… It can have an effect on you as a student, especially when you have never been in that environment before. It was very much a mental thing for me in terms of getting over the fear of giving meds and making an error… I'm giving the same meds now on the unit that isn't called the cardiac unit, but for some reason my anxiety is much lower than it was on that floor.

Samarra felt that the climate established by the registered nurses was very influential on her fears about her performance and on her fear of making a mistake.

Even though students face the same environmental pressures and conditions of practicing nurses on the floors (Grant & Larsen, 2007; Gregory et al., 2009), the results in the present study imply that students are still very much outsiders. Participants struggled to articulate why they had such difficulties on certain clinical practice floors but what became

evident was the way that participants were vulnerable to the twists and turns of the environmental culture in particular practice locations. Practitioners perceived students as being more prone to mistakes and participants implied that it was very difficult to gain the trust of the practitioners. It is conceivable that the fears and anxieties that the practitioners have pertaining to mistakes (Burke et al., 2005; Ebright et al., 2004; Espin et al., 2007) are being projected onto students on the floor. Participants were at a bit of a loss to really clearly articulate what was causing this twist in the relationship with practitioners, but there was clear evidence from the participants' conversations that an unhealthy relationship dynamic was present.

Twisting the teaching relationship dynamic.

The relationship between participants and their instructors emerged from the data as pivotal to the mistake experience. There were three subthemes that manifested in the student/instructor relationship in the mistake experience. The first result was a breakdown in the normal process of student supervision. When each participant made a mistake they frequently struggled with how to incorporate instructor supervision into the process. Karl phrased this struggle as "it was difficult to be honest about it, because I could've easily not told anyone when I realized the mistake I had made. I could've just monitored the patient without letting anyone know." Although this participant did in fact involve the instructor, the cognitive process of determining whether supervisory support was necessary and appropriate was difficult. Some participants opted to step away from the normal supervisory process and to try to rectify the situation independently. The reasons for choosing not to involve the instructor usually related to the quality of relationship the participant had with the instructor. Bryan stated that,

> I didn't want to tell my tutor, and I don't know why… She was really busy and I found out she was in a bad mood. Actually the week previous she failed a girl and so of course,

> when you don't know what's going to happen as a nursing student, you put the worst-case scenario in your head… I thought, you know, if I do report this, we will probably do the exact same thing that I did [to rectify the situation], and then my tutor will be on me and be harsher on me the rest of my clinical practice and I might fail. At that point it seems like a better decision just to keep it to myself.

Another significant attribute was the variety of responses regarding the mistake from instructors, in their role as the student supervisor. The majority of times, participants indicated that instructors were generally supportive in that they utilized the mistake as a learning experience for the participant. However, participants also described a number of relatively unproductive responses to mistakes. For example, Marne articulated how she had difficulties with a calculation for medication dilution. She related that

> He [her instructor] was pretty upset with me and from that point on he watched all of my medications. He would watch them or he would have one of the other students watch me, which is kind of embarrassing. After that the students looked at me differently and thought I was stupid.

This participant also described feeling uncomfortable about her instructor's supervisory approach, which made her very uncomfortable in her relationship with her instructor and made her very hesitant to share performance struggles. Priscilla relayed a story in which she made a mistake in interpreting the type of intravenous solution she was to hang. When she confided the mistake to her instructor she was "marched" to the patient's room and the instructor initiated a very negative interaction in front of the patient. Priscilla's view of the situation was, as a result, very negative

> I think the way she [the instructor] handled the term was horrible. It was the worst term of my life, it was terrible, everyone had a terrible time with her… She told us all the time, 'You should already know this, I'm not going to teach you, that it's not my job to teach you.' You can't even ask her before you go do something, and then she calls you stupid. I can try to ask my nurse but she's busy as well, and isn't that my teacher's job to help me.

It is no wonder that Priscilla struggled to trust this instructor for the rest of the term.

Fortunately, some of the other participants had a much more positive interaction with their instructors. Karl stated that

> I was fortunate to have an amazing instructor. You could tell she cared about our learning and cared about us as individuals, just, you know, a positive instructor… I think it has a lot to do with the rapport of the instructor with the student, or even how the instructor is in general.

Jasmine also relayed a very positive learning interaction between her and her instructor following a mistake

> It was scary to have to tell her. It was scary because what if it was a big deal you know [student tears up], but I was really happy with the result. I found that she was really supportive, so it made me feel a lot better…. She could tell that I was clearly upset and was crying on the unit, but she talked me through it and helped me fill out an incident report. She was very calm but also very direct.

In these cases the mistake process was positively supported by the instructor.

This theme reinforces how pivotal the relationship between the instructor and student is to the mistake experience. It really is unfortunate that although the relationship between clinical

practice instructors and students has been studied extensively for many years (Beck, 1993; Belinsky & Tataronis, 2007; Brown et al., 2007; Emerson, 2007) the results of the current study suggest that this relationship is still misunderstood, particularly by clinical practice educators themselves. There is no question that clinical practice instructors face a multitude of very complex problems in negotiating the relationship between the triad of the clinical agency, the educational institution, and the individual student (Paterson, 1997; Zieber & Hagen, 2009). What is required is not more blame, but a new vision for contextualizing the clinical practice experience in general and the mistake experience in particular.

Since practice professionals (Crigger & Meek, 2007; Reid-Searl & Happell, 2012), nursing educators (Gregory et al., 2007; Rutkowski, 2007), as well as participants in the current study struggle with a constructive conceptualization of errors, a systems approach provides a better way forward in understanding the issue of clinical practice errors with students. Potentially a systems approach would avoid the way that the mistake experience influences the relationship between instructors and students. Although there were no clinical practice instructors in the sample, it is clear from the words of the participants that the clinical practice instructors were also struggling with how to manage the student mistake experience effectively. This is understandable given that clinical practice instructors are monitoring both a group of students and a group of patients, as well as negotiating relationships with staff, while trying to protect patients. Adopting a systems approach that avoids viewing mistakes as an individual phenomenon (Lawton & Parker, 2002), that avoids a punitive approach (Lehmann et al., 2007; Zuzelo, 2007) and the culture of blame and shame (Benner, 2001; Benner et al., 2002), and that acknowledges the impact of environmental factors on student mistakes (Z. R. Wolf et al., 2006), is a much more effective mechanism to manage nursing student mistakes while enhancing the

quality of learning and preparation for professional practice. There is a need for a conversation among all stakeholders on how a systems approach might be implemented in nursing education but the results of the present study support the opinion of Dick et al. (2006) and Neudorf et al. (2008) that such a conversation is necessary.

Compensations.

The data revealed a unique set of behavioral compensations following a mistake. Participants engaged in rather elaborate and time-consuming compensations that went beyond the usual level of prudent mistake avoidance. Emily talked about checking her medications "hundreds of times" and checking her medication administration record numerous times per hour. Emily also used the term "hypervigilance" to describe her compensation for the mistake. Her view was that this level of compensation

> was not necessarily a bad thing, I probably should've been more vigilant before, but hypervigilant, like sometimes it's too an extreme where I'm like, I should calm down. I really did this right, this is the fifth time I checked it. By the end of clinical, after the error had been made, I was checking many, many, many more times than I normally do.

Marne stated that,

> after that [mistake] I was like, I don't know if I want to do nursing… [Tearing up] I don't want to kill, you know, a one-year-old girl. After that I just doubted myself and I still do. And that's why I'd like to be scared always, especially with like IV medications. I'm just very scared and very cautious.

Making a mistake in clinical practice undermined the confidence of many of the participants. All of the participants had experienced several clinical practice rotations by the time of the study, yet many of the participants still struggled with confidence issues. Samarra

relayed that “after that situation [the mistake] the rest of the whole semester was really hard to give meds and to trust myself that I did it right. I’m giving meds and kind of waiting for them to die.” Emily expressed an immense amount of guilt following making a mistake. She stated “I guess I really disappointed myself, it caused me to lose faith in who I am and what I believed in…. It really shattered a lot of my confidence, in a lot of ways.” These perceptions of diminished self-confidence and the resulting behaviors had a significant impact on participants’ abilities to go about the business of providing clinical practice care, especially the area of care in which the mistake (frequently a medication error) occurred.

McGregor (2007) relates how the threat of making mistakes causes students to switch from learning skills and capabilities to focusing all their energy on just avoiding errors. This shift in focus was clearly evident in the compensations that participants made following their mistake. There is no question that a process of checking is a valuable tool in avoiding mistakes (Reason, 1990), but the level of compensation that participants demonstrated was clearly beyond that which was necessary or efficient from either a learning or workload perspective. It becomes a question of how much checking is excessive and when does mistake prevention start to become a self-defeating exercise. Gonzalez et al. (2010) examined the symptom hypervigilance that is frequently characteristic of patients with fibromyalgia. These authors were able to make it clear link between hypervigilance behaviors and strong social anxiety. Gonzalez et al. suggest that it was important for this patient population to manage the destructive results of the social hypervigilance. Ng and Chow (2012) studied the Chinese population with inflammatory bowel disease. They found that symptom hypervigilance was positively correlated with patient efforts to seek treatment and find information. Although at first glance this seems like a positive finding the authors actually found that symptom hypervigilance had a positive correlation with negative

health measures and a negative correlation with positive health measures. Although the hypervigilance appeared to be a socially positive behavior, ultimately the fixation resulted in poor health outcomes and poor symptom management. While similar studies exploring hypervigilance in nursing students do not exist, it can be similarly hypothesized that hypervigilance and error avoidance, while appearing to be a positive trait in students, is in reality counterproductive, as participants in the current study described. Several of the participants related spending a significant amount of time with repeated self-checks. These self-checks and hypervigilant behaviors did not seem to result in any positive effects other than the effect of convincing the student's clinical practice instructor that they were trying harder. Kimble, Fleming and Bennion (2013) examined trauma survivors including soldiers who had returned from a war zone. Kimble, Fleming and Bennion found that their participants demonstrated a notable hypervigilance towards stimuli that was either threatening or ambiguous. The authors noted that soldiers are trained to be vigilant, a very positive trait in a war zone. This vigilance frequently turned pathological once the individuals returned home to a stable environment. Some of the hypervigilant behaviors included excessive planning of escape routes, excessive maintenance of weapons, and excessive physiological arousal. These symptoms were linked to an expression of anxiety and posttraumatic stress disorder (PTSD) in this population.

If students in the current study are exhibiting hypervigilant behaviors it begs the question about what precipitates this behaviour. Is the threat of making mistakes or even the mistake experience enough to trigger what can be termed a PTSD? This question is an interesting and troubling one that will need to be followed up with more research.

Normalizing the Mistake Experience

Eventually, most of the participants were able to begin to bridge the mistake experience successfully. This was a unique transition for each participant. There were two significant themes that emerged that described how students made this transition.

The first theme was called 'normalizing the mistake experience.' Participants were clear that mistakes are always going to be a significant event but they commented that the mistake experience does not have to be a terrifying or unusual event. When the question was posed to participants concerning what they thought education programs could do differently about mistakes, Karl simply and eloquently stated "normalize the experience." He went on to acknowledge that we need to "do everything to prevent a mistakes from happening, but we are human so, yeah it will happen." Despite the fact that Karl had a fairly traumatic mistake experience he was able to somehow move beyond all the negative manifestations of the experience and normalize the experience. Belita discussed her desire to talk through the mistake experience with someone she would trust. She relayed that what she wanted after she made a mistake was for someone to tell her that making mistakes is a normal part of nursing practice. She wanted someone to validate her thinking process without being patronizing or minimizing the seriousness of the mistake. Marci discussed how her instructor helped her deal with making a medication mistake:

> She encouraged me to go in and talk to the patient and let them know what happened and what that means for them, and to feel that safety of learning. For me doing that this normalized it. I realize it's not acceptable that it happened, but if it does happen it's not the end of the world you know. You just really need to evaluate your practice and find where that error happened.

Other participants talked about "getting over" their mistake. Jasmine described the experience of someone she knew in the program who made the mistake of giving the wrong medication to a child. In this case the patient and patient's family easily forgave the student but this student "could never get over making that mistake, and she ended up quitting nursing and not being able to continue. It [the mistake experience] became so impassable."

The other term that participants used was "moving past" the mistake experience. Samarra discussed how she was able to get past her mistake experience. She related that it was

> …really hard to kind of move on past that mistake for while…but then I kind of pushed myself and made myself go back into acute care for this year's rotation and I found that it was odd. Instead of looking at it [the mistake] from a bad perspective I looked at it in a more positive way…. I think it was an attitude adjustment this time that helped me.

Not all participants were able to normalize the experience of making a mistake. Emily related that since the mistake experience, "I've become a bit of a different person since then, a little more fearful to try new things because I'm afraid of making a mistake again." Even at the time of our interview, almost two years after the described event, Emily was still very traumatized by her mistake experience. She was able to successfully finish her rotation and was moving towards graduation, but this mistake still haunted her significantly.

Crigger and Meeks (2007) describe how experienced practitioners are able to come to a state of self-reconciliation and move past mistakes. Similar to the current study, Crigger and Meeks recognize that the mistake experience is not pleasant and creates significant stress and moral uncertainty. Crigger and Meeks suggest that "making it right or reconciling one's sense of self" (p. 180) was accomplished through either disclosure of mistakes and taking public responsibility or by "nondisclosure, denial, and rationalizing" (p. 180). Although the results of

the current study support Crigger and Meeks' finding that a process of self-reconciliation is an integral part of the mistake experience, the results do not support that self-reconciliation is merely a simple process of 'doing the right thing.' Participants suggested that the process of self-reconciliation following the mistake resists a simple explanation. Crigger and Meeks were able to clearly articulate, however, the anxiety and uncertainty that their participants felt and the long-lasting effects of the mistake experience.

Another component of normalizing the mistake experience is to change the individualistic blame perspective (D. J. Anderson & Webster, 2001; Brown et al., 2007) to one where mistakes are assigned a positive meaning. First and foremost, nursing education might explore ways to adopt an approach that views student mistakes as a natural eventuality of learners (Begun, 2008). Helping students to use tools to avoid errors is a worthy goal, but an equally important goal is helping students to manage mistakes when they occur. Participants uniformly stated that they were prepared for neither the psychological realities of making a mistake nor the practical processes involved with identifying mistakes, clarifying the severity of mistakes, and proceeding towards resolution and correction of the mistake. Nursing education needs to prepare students for the absolute eventuality of mistakes.

Moving toward success.

Many of the participants were eventually able to move past the negative influences of the mistake experience and were able to move toward success. None of the participants indicated that the mistake experience was an enjoyable situation, but when participants were able to make their mistake part of their learning process, they were able to move past what happened and move on towards success. Once this realization occurred participants began to discuss how

mistakes resulted in positive changes. Julie related that there were some positive results of making a mistake:

> I think I'm a bit more open to talk about making my mistakes…. You obviously don't want your friends to know about it or other instructors to note that you made one because you think they will judge you. I am more open to talk about mistakes now and I've even used it in a job interview. I'm able to share it more and that's really helped my confidence…. I'm able to help other students that might be going through the same thing knowing I'm going to be better off because of having gone through it.

Samarra had a fairly realistic and pragmatic perspective in that she admitted that "sometimes being too anxious can cause you to make a mistake…. Everyone can make a mistake." Samarra was only a month away from graduation and her maturity was obvious.

Another participant, Belita, just made up her mind to move on despite how she was feeling about herself. She relayed that

> of course we feel embarrassed and we feel sort of ashamed for making this mistake. I do not want to admit that I failed. I feel terrible about this… and so you want to put on this brave face and say it's like okay no big deal, and it's over with and I will move on, but it does replay a lot in your mind.

Despite several ways of moving past the mistake, all of the participants, with the exception of one case, were eventually able to bridge the mistake experience and were able to move toward success.

A positive social construction of mistakes.

Part of moving toward success was that participants were able to develop a positive social construction of what the mistake meant to them. A reflective process was a strong

commonality in this process. Some participants wrote down their reflective thoughts while others just contemplated their reflection internally. It is interesting to note that the participants who were able to define a self-reflective process tended to move through the mistake experience more successfully. Belita related that

> my self-reflection involves what I could have done and then what I will do if I'm in that situation again… The whole self-reflection piece in myself is very important for my practice. If I feel intimidated by the skill or whatever then I will use this reflective thinking to know whether I can do it alone or need to get the support of someone.

Madhu related that she used the formal clinical written reflective template to help her process her thoughts after her mistake. Others expressed a keen desire to talk about their mistakes with other students but often the mechanisms to facilitate this did not exist. Bryan shared that he would have preferred if students could have talked about their mistakes more openly with each other. He shared that some of his instructors had revealed some of their own stories of when they made a medication error. However, Bryan would have found it even more beneficial "to hear the stories of students who made their own med errors because it was something that was more relatable" at his stage of the learning process. Hearing the stories of others was important to him and other participants and helped them construct a more positive view of mistakes. All the participants admitted that having a positive view about mistakes was difficult.

The participant who had the easiest time moving on was Kathryn. It was not that she treated mistakes superficially; she just had an attitude that despite doing your best mistakes will happen. She relayed that

> earlier on [in the program] you put a lot of pressure on yourself, and then you make a mistake, and you think, oh my God. But as time goes on you sort of learn that you're

going to make mistakes at some point, and then you learn how to manage that and fix it, because that's probably just as important as being able to do it properly the first time.

The student who probably had the most difficulty with a positive social construction of mistakes was Emily. As discussed earlier, she had pre-contemplated a negative construction of the mistake process and so when she did make a mistake it was a catastrophic experience. Emily was the student who likely had the most difficulty moving on from the mistake experience. Meyer and Xu (2005) found that nursing students who exhibit a high degree of cognitive dissonance between the theoretical ideals of academia and clinical realities have a much higher chance of the trap of perfectionism with its invariable disillusionment. Emily is a classic example of how pre-existing idealisms, which were reinforced by the prevailing view on mistakes in her nursing program, caused her to have tremendous difficulty with the mistake experience and the process of moving on. Kathryn, on the other hand, did not have this cognitive dissonance and thus was able to more successfully exhibit a positive social construction of mistakes. It is clear, however that it was difficult for participants to develop a positive construction of mistakes.

A number of studies have examined various components of the student mistake experience and the common themes are fear of a punitive response (Harding & Petrick, 2008; McGregor, 2007), fear of consequences to their patient (Begley & White, 2003), and fear of academic consequences (Gregory et al., 2007; Koohestani & Baghcheghi, 2009). Unfortunately, these realities offer a possible explanation why a positive social construction of mistakes is so difficult for students. The current study highlights the gap between the reality of nursing education and the experience of the participants in this study. Participants were clear that they were highly motivated to learn; they also uniformly expressed a strong desire to avoid mistakes

and to learn the knowledge, skills and attitudes of nursing. What seem to be missing, however, was a clear mechanism to help students conceptualize mistakes in a positive light.

Moving On

The final step that participants described was when they were able to eventually move past the mistake experience and continue with their learning. Some participants started to lose some of the fear surrounding the experience while others would just move on despite the fear being reinforced. This process was easier for some participants than others. Samarra relayed that she

> was always worried for a long time… Maybe I thought I poured it right or maybe I didn't. It was really hard to move on past that mistake for a while. Since I had this fear with me I kind of pushed myself and made myself go back into acute care this year's rotation. I looked at it in a more positive way and tried to let go of some of the anxiety. I think it was an attitude adjustment this time around that helped me.

Kathryn suggested that the experience of going through a mistake has made it easier for her to know what would happen in the future with mistakes she might make. She stated that "I guess it doesn't make it less hard to make a mistakes in the future…but you know that there is a process you've gone through before so going through it again is not necessarily so bad." Julie described her process of moving on as both negative and positive. She said

> negatively of course… Sometimes I find myself second-guessing myself, especially with medications. I had, I guess, a bit of a naïve sense at the beginning that, I'm a student, nothing bad is going to happen and I had to realize that mistakes do happen.

She went on to say

> I think positively it's affected my confidence because I'm a bit more open to talk about making mistakes. I feel that it is still very much a hidden thing that you don't want your

friends to know about or you don't want other instructors to know because you think they judge you.

Julie was able to get to the point in her journey through the mistake process that she was able to talk about it to a number of her fellow students and other nurses. She was pleasantly surprised to find that that "all of a sudden there is a lot more people who have made mistakes and errors. I was not aware of that before since it's not really talked about. People see it [mistakes] as a negative thing." Moving on was difficult for all participants but they all expressed the desire to continue on with nursing and to be successful. For most of them, however, their mistake experience was a major incident in their educational progression.

Regardless of the twists and turns of each individual journey, each participant was able to move on and be successful in their clinical practice education. This did not mean that they were free from the scars of the mistake experience. Many participants related that they still recollect their mistake experience(s) on a frequent basis, but all participants had eventually been successful in their clinical practice education. Interviewing participants who had not been successful in clinical practice would likely have yielded different data. It seems logical that the negative manifestations of the mistake process would be magnified in the case of clinical practice failure.

For several of the participants, being involved with this study was a cathartic part of their process of moving on from their mistake. Emily was particularly clear that participation in this study was "part of her healing journey". Other participants were very clear that they wanted their story heard by nursing educators and the nursing education system as a whole. Participants did not want other nursing students going through the same mistake experience. Although the

mistake experience was a significant trauma to participants, I was encouraged that this research project was considered a positive component of moving on for many participants.

Lawson-Jonsson (2011) discuss some of the reasons why practitioners have such a hard time moving on from mistakes. Lawson-Jonsson muses that the mirror of personal perfection used by so many practitioner results in the response to mistakes being severely out of proportion to “the crime” (p. 72). The results of the current study demonstrate that nursing students must find a way to get past the feelings of shock and plummeting self-esteem following a mistake. Unfortunately the literature does not give much direction on how individuals can progress to the point of moving on. Nursing students in the current study also had great difficulty in conceptualizing the process of moving through the mistake process. Some participants were able to clearly move on but they were never able to clearly articulate how they managed to do it. More investigation into this issue is necessary. Perhaps nursing instructors need to be more proactive in helping students make the leaps through the mistake process with the explicit goal in mind of moving past the mistake experience.

Conclusion

This study represented an in depth examination of the processes involved in nursing student errors in clinical practice. To date, little research exists that explores the process of making errors within nursing education (Gregory et al., 2007). The findings of the present study contribute to the understanding of the psychosocial process of making an error within the context of being a nursing student, including factors that influence and contribute to the error and the impact of the event on nursing students.

Participants shared with me the narrative of their journey through the process of making a mistake in the clinical practice setting. The central theme that emerged from the data is ‘living

through the mistake experience,' a complex intermingling of perceptions, influences, environments and systems that make up the experience. Precursors to the mistake experience included 'program perceptions' and 'being measured;' each of these precursors influenced and shaped the mistake experience for participants. The perception of being measured is associated with performance anxiety and anticipatory anxiety. Further research is needed to understand the mechanisms by which students pre-emptively construct their fear of making mistakes in clinical practice.

In the next component of the process, 'the moment when things go wrong,' participants inferred that the learning process went askew and they experienced a disruption to the normal nursing and learning processes. Participants described this movement as that in which the normal nursing process 'goes sideway,' disrupting the student's nursing routine as well as the learning process. Participants also identified the moral/ethical components of their experience as akin to 'black ice'—reflecting their uncertainty, loss of control, and surprise as well as the perception of mistakes coming 'out of the blue' and without prior warning. Participants perceived the consequences of their mistake as catastrophic, which resulted in them perceiving the mistake from a moral/ethical perspective, some to the point of existential distress. 'Support and resilience' were themes that described the attributes that enabled participants to either successfully bridge the mistake experience or not and impacted their ability to 'move on' to success and normalize the mistake experience. Support from family, peers, their instructors and the clinical practice learning environment, as well as individual resilience of participants, emerged as a significant factor in determining whether a participant was able to bridge the mistake experience successfully or not. A destructive mistake experience was characterized by disintegration of self and the associated negative feelings of self, shattering of confidence,

imbuing wrongness to mistakes, and a destructive social construction of mistakes. The damaging mistake experience was characterized as a shift in a negative shift in the interpersonal dynamics of the participant and other members in the healthcare environment, including a shift in the dynamic within the instructor/student relationship. Students compensated with hypervigilance, and demonstrated heightened anxiety to avoid errors, which turned out to be counterproductive to good clinical practice performance. Resolution was characterized by normalizing and 'moving past' the mistake experience, and shifting the individual conceptualization of the mistake from blame perspective.

Part of participants' moving toward success was developing a positive social construction of what the mistake meant to them. In 'moving on,' participants started to lose some of the fear surrounding the experience and being able to talk about it with others.

Numerous strategies for pre-emptively dealing with anticipatory anxiety around clinical practice errors arose from the participants and were supported by the literature. Nursing programs can ensure students have an orientation to what would happen if they made a mistake, as well as prepare students for the unfortunate reality of clinical practice mistakes. Providing students with practice in pre-contemplating and managing mistakes would help develop in students' lifelong skills for clinical nursing practice. Clinical practice instructors can also provide strong student support to decrease anxiety that causes poor performance and even mistakes. Open communication and guided reflection activities with a seasoned, insightful and compassionate clinical practice instructor can help abate students' maladaptive responses to clinical practice experiences that are difficult. Fostering resilience in students is also important. Strong academic-healthcare partnerships should be characterized by ongoing collaboration,

strong communication, and developing support environments. Supportive healthcare environments benefit patients, healthcare staff, and students alike.

Adopting a systems approach may provide a better way forward in understanding the issue of clinical practice errors made by nursing students. Adopting a systems approach would mean that mistakes are no longer viewed as an individual phenomenon, but instead acknowledges the impact of myriad environmental factors on student mistakes. Such a supportive environment would enhance the quality of the learning experience and preparation for professional practice. A conversation among all stakeholders about how a systems approach might be implemented in nursing education is long overdue.

Living through a mistake experience is neither a pleasant nor desirable experience for nursing students. However, there is much that nursing education and practice partners can do to help students bridge this inevitable experience to enhance learning and foster lifelong professional responsibility.

CHAPTER V

Implications

Four key implications were revealed in this study. The first implication is that despite general efforts in nursing education to make programs more student-centered, the mistake experience is still highly traumatic and relatively unsupported. The experience produces significant anticipatory fear and has lasting detrimental effects both personally and academically.

Secondly, the mistake experience is a complex process with individual manifestations for each student. Flexibility is necessary in managing the mistake experience with students. The social support from nursing instructors, programs, healthcare practitioners, and others is critical to how students live through the mistake experience.

Thirdly, and probably most importantly, nursing students need to have more orientation and exposure to the potentialities and realities of mistakes before mistakes happen, not reactively when a mistake occurs. Students need to know more about how to prepare for inevitable mistakes, how to react when mistakes occur, how to minimize the harm that can result from mistakes, and how to successfully recover from mistakes.

Nursing education needs to abandon the perception that mistakes are solely symptoms of individual moral and performance deficits. A systems perspective about mistakes is essential for nursing education and the preparation of new nurses. Not only will a systems perspective help students manage the mistake experience, the evidence from psychology suggests that the incidence of mistakes will decrease significantly (Reason, 1990), thus improving patient safety.

Recommendations

Based on the literature as well as the findings of the current study there are a number of recommendations for nursing education as well as for future research:

1) Nurse educators needs to be aware that students need significant assistance to be prepared to encounter mistake experiences. This support may include reviewing the procedures associated with errors as well as normalizing the experience as an unfortunate professional reality.

2) Nurse educators need to be aware that students need significant support following mistakes. This support must go beyond efforts to make the student feel better about themselves to include support to walk through the logistical processes involved with mistakes. It would be ideal if nursing students got the opportunity, in a simulation environment, to practice the processes involved when a mistake occurs. This also would have the benefit of diminishing the existential power of the mistake experience.

3) Students need assistance in learning how to determine the severity of the patient safety implications for mistakes and evaluate mitigation strategies. Students do not possess a sophisticated schema for determining the most effective response to a mistake.

4) Nurse educators need to abandon the individualistic blame perspective related to mistakes. Students should be actively involved in looking for risks to patient safety and should always view mistakes as a combination of fallible human performance and system influences.

5) Both nurse educators and healthcare providers in practice areas need to promote a positive social construction of mistakes. As long as mistakes are viewed as moral and personal failures the experience of making mistakes will be traumatic and unproductive.

When mistakes are viewed as learning experiences and part of a risk management process there should be fewer mistakes.

Limitations

With any research study there will be limitations and this current study was no exception. A long-standing criticism of grounded theory has been its difficulty with the question of reflexivity and how categories are revealed (Dey, 1999). A constructivist grounded theory approach, as advocated by Charmaz (2006), avoids this criticism by explicitly acknowledging the place of the researcher in the construction of categories and ultimately of the final theory. Although I followed the processes prescribed by Glaser, I acknowledged in my categorizations that they were a combination of explicit and implicit meanings of participants in combination with my interpretations as researcher. This approach is consistent with the viewpoint of Charmaz on grounded theory. Whether I was able to do this successfully or not is a limitation of the study but one that was hopefully minimized by my attention to following the processes of grounded theory. These processes include the steps of constant comparison and the exercise of theoretical sensitivity. In addition this limitation was minimized by my attention to the role that my interpretation played in the construction of categories.

It became obvious to me as data collection and analysis transpired that the viewpoint of clinical practice instructors would be a useful addition to the phenomenon of study and therefore represents a limitation of this study. In an effort to keep the study manageable I did not pursue these participants but will leave this perspective for a future research project. I would not characterize the viewpoint of clinical practice instructors as crucial to the eventual

conceptualization of the experience of nursing students, but it would be a useful topic for a future study that examines a broader perspective of the experience of nursing students.

Another limitation of the study was the fact that I was not able to clearly follow a theoretical sampling path. Since this study examined a topic with significant existential weight, I essentially had to take whatever participants had the courage to come forward and talk. I was ethically restrained from actively seeking participants as this might be construed as pressuring participants to talk about a highly traumatic event. I attempted to demonstrate the reactivity, inherent in theoretical sampling, by the way that I changed the trigger questions for the study based on the data and lines of communication coming from participants.

Personal bias is a much discussed limitation within qualitative research and grounded theory in particular (Deady, 2011). Glaser (1978) attempted to address this issue by his process of theoretical sensitivity as well as avoiding preconceptions from the literature. I attempted to address this limitation by proactively memoing the rationale and influencing factors behind my identified categories and theories. Although it is impossible to unequivocally say I accomplished this goal, I believe I was able to complete this study following the guidelines of both Glaser, as one of the initial originators of the method, and Charmaz, arguably one of the most current influential thinkers and writers on grounded theory.

Knowledge Sharing Strategies

The results of the study will be presented at two or more nationally recognized conferences and the results published as soon as possible following the completion of the study. Due to the lack of literature pertaining to the topic, a publication that examines the existing knowledge base in the literature will be completed first. A second publication outlining the findings of the study will then be generated. A third publication that seeks to explicate and

promote potential changes in curriculum and program design will follow. This third publication will have a pragmatic orientation with suggestions for how faculty can better manage student mistakes and prepare their students for the realities of making errors.

Further research proposals will follow to continue the questions revealed in the current study. One future proposal would test the ‘support and resilience’ part of the model. The project would explore what support factors moved students from a negative to a positive social construction of mistakes. The project would also explore what internal resilience factors for influential in helping nursing students move on from mistakes.

In addition, a student and faculty seminar will be offered to the University of Alberta Faculty of Nursing, Mount Royal University School of Nursing, and the University of Lethbridge Faculty of Health Sciences to discuss practical implications of the study. This seminar will then be developed into a web-based module that will sensitize students, faculty and practice areas to error processes in nursing practice and ways that the learning experience of students can be enhanced. Finally, I will create a 5-minute video for dissemination on YouTube, aimed at nursing students that will summarize the findings of the study in a creative and relevant way. The purpose of this Internet dissemination is to enhance the accessibility of the findings to those who are impacted by the process of making an error in clinical nursing practice.

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APPENDIX A

Requests for Letters of Permission from University of Alberta

Mark Pijl Zieber PhD(c), RN
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Phone: 403-327-1650
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Dr. Anita Molzhan
Dean, Faculty of nursing
University of Alberta
Edmonton, AB T6G 2G3

Dear Dr. Molzhan,
My name is Mark Pijl Zieber and I am a doctoral candidate with the faculty of nursing. I'm requesting a letter of support to approach year coordinators/course leads to explain the purpose of my study and present the study to undergraduate nursing students to recruit them to be participants in my dissertation study. My PhD supervisor is Dr. Beverly Williams. A University of Alberta HREB ethics process has been completed.
Study title: The experience of making a mistake in clinical practice from a nursing student perspective.
Research purpose: There is very little known about the process of nursing students making mistakes in their clinical practica. Much of what is written in the literature about student error/mistakes has a limited evidence base. This research has significant patient safety implications as well as education design implications.
Research questions:

1. What is the experience of making a mistake in clinical practice from a nursing student perspective?
2. What factors and conditions contributed to the student making an error?
3. What recommendations do student nurses have for faculty/staff when dealing with student error in clinical practica?

Method: Qualitative - Glaserian grounded theory method
Sampling: 2nd, 3rd, and 4th year students in the basic and after degree nursing programs using a theoretical sampling technique.
Data collection: I anticipate doing 60 - 90 min. individual or two-participant interviews with 20 - 30 participants at your institution. Interviews will take place at a mutually negotiated location, preferably on campus.
Data analysis: Constant comparative analysis with the support of the NVIVO software package.

Intended results: I anticipate the development of a grounded theory inclusive of the experiences of nursing students who have made one or more mistakes in their clinical practica. I anticipate that I will learn more about the interface of systemic factors and student error. This research will be valuable in understanding nursing student errors, contributing factors to student errors, and will be useful in guiding course and practicum design.
Thank you in advance for your consideration of my request. I would be happy to meet to discuss any concerns and I look forward to your letter of support.

Sincerely,
Mark Pijl Zieber RN, MSN

Pijl Zieber, Mark

From: Joanne Profetto-McGrath [joanne.profetto-mcgrath@ualberta.ca]
Sent: March-16-11 8:54 PM
To: Pijl Zieber, Mark
Cc: Bev Williams
Subject: RE: PhD Research Proposal Request

Dear Mark, thank you for your response to my letter and for addressing my questions and requests. Based on your responses and the ethics approval form, you have administrative approval to access undergraduate students in the FON as identified in my letter (eclass and poster).

I wish to clarify that there is no current research studies involving students. Two research studies have been approved that will recruit nurse educators, therefore it was that group whose work I wanted to minimize as you had requested to contact them to access students.

If you have any further questions please let me know.

Best wishes as you proceed with your doctoral research. I look forward to your findings.

Sincerely,

Joanne

****

Joanne Profetto-McGrath PhD, RN
Professor & Vice Dean
Associate Faculty - KUSP
3rd Floor Clinical Science Building
Faculty of Nursing, University of Alberta
Edmonton, Alberta, Canada T6G 2G3
Phone:(780)492-1597 Fax:(780)492-6029
Executive assistant: Sue Crackston (780)492-6236
joanne.profetto-mcgrath@ualberta.ca
http://www.uofaweb.ualberta.ca/nursing/jprofetto-mcgrath.cfm

UNIVERSITY OF ALBERTA

Please consider the environment before printing this e-mail

MOUNT ROYAL
UNIVERSITY
1910

4825 Mount Royal Gate SW, Calgary, Alberta, T3E 6K6

Faculty of Health and Community Studies
School of Nursing
Office of the Director, Y368 *(403)440-6853*

October 10, 2011

Mark Pijl Zieber, PhD(c), RN
711 - 3 Street South
Lethbridge, AB T1J 1Z4

Dear Mr. Pijl Zieber:

RE: Request for letter of support for BN research

I received your request for a letter of support to conduct research with Mount Royal University Bachelor of Nursing students. Specifically, you wish to recruit second, third and fourth year nursing students in the MRU BN program to be participants in your dissertation study titled: "The experience of making a mistake in clinical practice from a nursing student perspective". To recruit these students you are seeking permission to liaise with an MRU staff member who would send a general e-mail to the target population and permission to post a recruitment poster at MRU. At this point, you do not foresee needing space to conduct your interviews or any additional administrative support. I also understand that you are seeking HREB approval at MRU, in addition to the University of Alberta.

By way of this letter I provide you permission to contact our Instructional Assistants (nursingia@mtroyal.ca), who will send your e-mail recruitment message to second, third and fourth year nursing students of the MRU BN program. You can also contact them for support in placing the recruitment poster. If you require any further administrative assistance please contact me directly.

Before you contact our students, I require a copy of the MRU Ethics certificate. Please send me an electronic copy.

I notice that your expiry date with the University of Alberta Ethics Review Board is February 24, 2012. I would therefore presume you intend to collect data this fall and your work at MRU will be completed prior to that date.

Best wishes as you undertake this research. I will be interested in hearing about its results.

Regards,

Pam Nordstrom, RN, PhD

cc. L. Judd, Chair, Department of Nursing

APPENDIX B

Recruitment Poster

APPENDIX C

Research Participant Information

My name is Mark Pijl Zieber and I'm a doctoral student at the University of Alberta in the Faculty of Nursing. I am also a Nurse Educator at an institution in southern Alberta

Dr Bev Williams is my study supervisor.

I'm interested in exploring what thoughts and feelings students have when they make a mistake in clinical. 2nd, 3rd and 4th year nursing students are invited to be part of this study. I am very interested in hearing your stories and experiences related to making mistakes in clinical.
Process:

If you agree to be in the study, I will interview you in an office in the Faculty of Nursing or a mutually negotiated location. Your interview will be about 90 minutes and will be scheduled at a mutually agreeable time. Because student mistakes are a sensitive issue you are invited to bring a supportive classmate. Your classmate is welcome to participate in the interview after signing a consent to maintain confidentiality of anything discussed in the interview. In this case the experience of both students will be recorded and included in the data analysis.

All information gathered within the interview will be kept strictly confidential. The only exception is where I am legally required by law or code of ethics to disclose (i. e. - child-abuse, suicide). The raw data will be kept in a locked office and only viewed by the researcher and supervisor.

The interview will be recorded and transcribed verbatim. A summary of the emerging theoretical conceptualizations can be e-mailed to you if you wish. If you would like more information please contact me.

Mark Pijl Zieber MSN, RN Doctoral student University of Alberta Faculty of Nursing	Contact information: **E-mail: studentmistakes@shaw.ca** **pijlzieb@ualberta.ca** **Phone: (403) 329-2659**
Dr. Bev Williams Doctoral supervisor University of Alberta Faculty of Nursing	Contact information: E-mail: beverly.williams@ualberta.ca Phone: (780) 492-8054

APPENDIX D

Participant Information for Informed Consent

Study Title: The experience of making a mistake in clinical practice from a nursing student perspective

Principal Investigator: Mark Pijl Zieber MSN , RN

Study Background: Nursing students, like all health care participants, will make mistakes. Very little is known about the experience when nursing students make a mistake. This study will explore the student perspective on clinical mistakes.

Study Purpose: you are being asked to participate in a research study that will examine student mistakes for the purpose of creating a stronger learning environment as well as enhancing patient safety.

Study Procedures: I would like to talk to you about your experience with making a mistake in clinical. Our conversation will take place in a private interview room in the Faculty of Nursing at the University of Alberta. Our conversation will last about 90 minutes.

I will audiotape all the conversation and our conversation will be transcribed verbatim. The typist, my supervisor and I will be the only ones to listen to the tape. The transcription may be only seen by my supervisor. To protect your identity I will ask you to choose a pseudonym which will be used to identify tapes and transcripts. In all reports, pseudonyms will be used The tapes, transcripts, and research notes will be kept in a locked filing cabinet at my home institution for a minimum of seven years. I will ask you to sign a consent and this form will also be kept in a locked filing cabinet separate from the tapes, transcripts and research notes. Data may be used for another study in the future, but I will receive ethical approval before doing any further data analysis. Information from the findings of this study will be published and presented at conferences but your name and any identifying information will not be used.

One the preliminary analysis is complete a summary of the emerging theory will be e-mailed to you for your voluntary response.

Benefits: The benefit of participation in this study is the opportunity to influence clinical nursing education. You may enjoy telling your story and experiences. In addition, upon completion of the interview, you will be given a $10 gift certificate in appreciation of your time.

Possible Risks: There are no known risks to being involved with this study.

Confidentiality: all information gathered will be kept strictly confidential except when professional codes of ethics or the law requires reporting. Security measures will be taken to guard confidential data. All personally identifiable information will be removed or converted to a pseudonym.

To help maintain confidentiality I would ask you to not mention the name of patients, instructors or the location of the incident.

Voluntary participation:
Participation in this research study is completely voluntary. You are free to withdraw from the research study at any time. You are under no obligation to answer any of the questions during the interview and you can ask to stop the recording at any point. Participation in this study will have no impact on the progress of your education. Nursing faculty will be aware that this study is happening but they will not know that you are a participant.

Contact Names and Telephone Numbers:

If you have concerns about your rights as a study participant, you may contact the University of Alberta Faculty of Graduate Studies, at (780) 482-1111.

Please contact any of the individuals identified below if you have any questions or concerns:

Mark Pijl Zieber PhD(c), RN Doctoral student University of Alberta Faculty of Nursing	Contact information: **E-mail: studentmistakes@shaw.ca** **pijlzieb@ualberta.ca** **Phone: (403) 329-2659**
Dr. Bev Williams Doctoral supervisor University of Alberta Faculty of Nursing	Contact information: E-mail: beverly.williams@ualberta.ca Phone: (780) 492-8054

Addendum for 2 participant interviews:

In the case where there are two participants in the interview, each participant must agree to keep the nature of the conversation confidential.

APPENDIX E

Study Participant Demographic Data

Name: _____

Date: _____

Telephone: **Home:** _____

Cell: _____

E-mail: _____

Gender: _____

Age: _____

Year of Program: _____

Researcher Use:

Pseudonym	

APPENDIX F

Study Consent Form

Title of Project: The experience of making a clinical practice mistake from a nursing student perspective.

Principle Investigator:
Dr. Bev Williams Faculty of Nursing 780-492-8054 beverly.williams@ualberta.ca
Co-investigator
Mark Pijl Zieber PhD(c), RN 403-329-2659 studentmistakes@shaw.ca
pijlzieb@ualberta.ca

(to be completed by the research subject):

	Yes	No
Do you understand that you have been asked to be in a research study?	☐	☐
Have you read and received a copy of the attached Information Sheet?	☐	☐
Do you understand the benefits and risks involved in taking part in this research study?	☐	☐
Have you had an opportunity to ask questions and discuss this study?	☐	☐
Do you understand that you are free to withdraw from the study at any time, without having to give a reason?	☐	☐
Has the issue of confidentiality been explained to you?	☐	☐
Do you want the investigator(s) to inform anyone that you are participating in this research study? If so, give his/her name _____	☐	☐

I agree to take part in this study: YES ☐ NO ☐

Signature of Research Subject _____

(Printed Name) _____ Date:_____

Signature of Witness _____

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

Signature of Investigator _____ Date _____

In the case of two participants being present in the interview, do you agree to not talk about anything said in this interview? Yes ☐ No ☐

APPENDIX G

Nursing Student Interview Guide

Name:

Introduction and check recorder is working:

Good morning/afternoon

Let me take a few minutes to explain the information letter and answer any questions you might have.

Before beginning interview: have participant read and sign consent form

Process:

As you know, I am interested in hearing about your experience with a mistake in clinical.

1. Tell me about the mistake that you have in mind.
2. How did you come to realize that you had made a mistake?
3. How did you feel about making a mistake?
4. What factors do you think contributed to the mistake being made?
5. What happened as a result of your mistake?
6. What is one thing you learned from the experience of making the mistake?

Conclusion:

Thank you for sharing your thoughts and ideas with me. If you want to change or add anything to the information you provided in the interview please do not hesitate to contact me by e-mail (m.pijlzieber@uleth.ca) or phone (403-329-2659).

APPENDIX H

Field Note Recording Form

Descriptive notes	Interpretive notes

APPENDIX I

Ethical Review Approvals

Approval Form University of Alberta

Date:	February 25, 2011
Principal Investigator:	Beverly Williams
Study ID:	Pro00020084

Study Title: The experience of making a mistake in clinical practice from a nursing student perspective

Approval Expiry Date: February 24, 2012

Thank you for submitting the above study to the Health Research Ethics Board - Health Panel. Your application, including revisions received February 24 & 25, 2011, has been reviewed and approved on behalf of the committee.

A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Health Research Ethics Board does not encompass authorization to access the patients, staff or resources of Alberta Health Services or other local health care institutions for the purposes of the research. Enquiries regarding Alberta Health Services administrative approval, and operational approval for areas impacted by the research, should be directed to the Alberta Health Services Regional Research Administration office, #1800 College Plaza, phone (780) 407-6041.

Sincerely,

Dr. Jana Rieger
Chair, Health Research Ethics Board - Health Panel

Note: This correspondence includes an electronic signature (validation and approval via an online system).

Approval Form Mount Royal University

MOUNT ROYAL
UNIVERSITY
1910

Research Services

t: 403.440.6069 | f: 403.440.6299
e: hreb@mtroyal.ca
research.mtroyal.ca

October 25th, 2011

Mark Pijl-Zieber
Nursing
University of Alberta

Dear Mark:

Re: **Application Number 2011-83**
The experience of making a mistake in clinical practice from a nursing student perspective.

The above-noted ethics application including the information for informed consent form, disclosure/consent form, initial letter of contact and research recruitment poster was submitted for Human Research Ethics Board (HREB) review and has been found to be ethically acceptable on **October 25th, 2011.** I am pleased to advise you that ethical clearance for this proposal has been granted to **October 2012.**

Please note that this clearance is contingent upon adherence to the submitted protocol **(revised October 11, 2011).** Prior permission must be obtained from the Board before implementing any modification(s) to the submitted documentation.

Researchers are required to notify the Mount Royal University HREB immediately if any untoward or adverse event occurs during their research or if data analysis or other review reveals undesirable outcomes for participants (including the researchers). HREB and Mount Royal University adhere to the Tri-Council Policy Statement, "Ethical Conduct for Research Involving Humans".

You are required to submit a progress report by **October 2012.** If this study is concluded before **October 2012,** a study completion report will be required by **October 2012.** A brief study completion report form is available on-line at research.mtroyal.ca/ethics.php

The study completion and progress reports will require the following information:

1. The number of subjects that have been/were recruited;
2. Any unusual and/or severe complications, adverse events or unanticipated problems involving risks to subjects or others, withdrawal of subjects from the research, or complaints about the research;
3. The status of the study, e.g., still collecting data, analyzing data, disseminating results;
4. The (expected) date of termination of this project.

Please accept the Board's best wishes for continued success in your research.

Yours sincerely,

Michelle Yeo, PhD
Chair, Human Research Ethics Board

MY/gm

c.c. Provost and Vice-President, Academic
Dean/Director
Department Chair
Sponsors (if any)

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