

HOW PERIOPERATIVE NURSES DEFINE, ATTRIBUTE CAUSES OF, AND
REACT TO INTRAOPERATIVE NURSING ERRORS

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Submitted to the Graduate Faculty of the School of Nursing in partial fulfillment
of the requirements for the degree of Doctor of Philosophy

Duquesne University

2006

This study was supported by a grant from the Association of periOperative
Registered Nurses (AORN)



**DUQUESNE
UNIVERSITY**
SCHOOL OF NURSING

PHD PROGRAM

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HOW PERIOPERATIVE NURSES DEFINE, ATTRIBUTE CAUSES OF, AND REACT TO INTRAOPERATIVE NURSING ERRORS

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Errors in nursing practice are a growing concern in healthcare posing a threat to patient safety. Practitioners have been hesitant to come forward and report errors because of negative ramifications in the workplace. Few studies have approached error management through the eyes of the clinician or have studied how nurses cope or change their practice after committing an error. Studies on nursing errors have traditionally used floor/unit nurses as the sample population. This study used an often unseen and highly specialized group known as perioperative or operating room registered nurses.

This study was a descriptive, correlational design using a survey to obtain information. Perioperative registered nurses (N=272) who were members of the Association of periOperative Registered Nurses (AORN) participated in the study. From this sample, 158 participants admitted to committing an intraoperative nursing error. The conceptual framework that guided this study was Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping.

Results showed that nurses who used accepting responsibility as a coping strategy after committing an error tended to experience high levels of emotional distress ($r = .55$, $p = .000$). Relationships were shown between the strategy of planful problem solving with constructive changes in practice ($r = .34$, $p = .000$), and the strategy of escape-avoidance with defensive changes in practice ($r = .52$, $p = .000$). Using multiple regression analysis, the strategies of accepting responsibility ($\beta = .34$, $p < .001$) and using

self-control ($\beta = .17, p < .05$) were found to be significant predictors of emotional distress. Seeking social support ($\beta = .20, p < .05$) and planful problem solving ($\beta = .29, p < .001$) emerged as significant predictors of constructive changes in practice. The most predictive of defensive changes was the strategy of escape-avoidance ($\beta = .35, p < .001$).

Outcomes that are identified from the process of error management should include measures intended to promote learning from the error and interventions designed to prevent future errors. This study provided evidence that perioperative nurses experienced a variety of emotions after committing an error which led to alterations in the way they practiced.

Dissertation Advisor: Linda Goodfellow, PhD, RN

ACKNOWLEDGEMENTS

My parents would be very proud of me. I have achieved a goal that at times I thought was out of reach. Completing my degree took perseverance, determination, and belief in myself. I wish to thank and acknowledge my dissertation committee. Dr. Linda Goodfellow, chair, who never wavered in her enthusiasm and support. She was brave, honest, and committed to me and my area of research. Her pride showed through during my dissertation defense. Dr. Kathleen Gaberson, my mentor and colleague, who was responsible for recruiting me to Duquesne University. Her expertise in perioperative nursing and manuscript editing was invaluable. Dr. Lynn Simko graciously agreed to join my committee after the proposal defense. Her calm demeanor and quiet approach in her support of me was very much appreciated. Dr. Suzanne Edgett-Collins was a member up to and including the proposal defense. I valued her knowledge in the area of nursing errors.

I want to recognize and thank Dr. Paulette Johnson and Kristen Nichols-Lopez for their statistical expertise and patience. Special thanks to the perioperative nursing experts who were members of the content validity panel. Their recommendations assisted me in constructing an instrument with content specific to perioperative nursing.

Thank you to the participants who willingly completed the questionnaire. They provided a small glimpse into their world of perioperative nursing.

Thank you to all of my friends and colleagues who continuously encouraged me especially during the dissertation process. Finally, a heartfelt thank you to my husband, Russ Chard. I am truly grateful for his never ending love and support.

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I. INTRODUCTION

Operating room nursing has been recognized as a specialty in hospitals since 1901. As early as 1860, Florence Nightingale described it as the cornerstone of basic nursing care (Nightingale, 1859/1946). Although a high percentage of operating room nurses work in the intraoperative setting, the specialty has sought to be more inclusive by referring to operating room nurses as perioperative nurses. Perioperative nurses generally possess well-developed critical thinking skills as well as competent, safe skill applications in caring for patients undergoing surgical intervention.

The care that perioperative nurses provide to patients is largely unknown to the general public since their care is rarely observed. This is due to the inaccessibility of the operating room suite in comparison to more traditional nursing units and departments. Often, patients are unable to remember their surgical experience because they are unconscious or anesthetized with medications that impose an amnesic effect. As a result, perioperative nurses remain somewhat anonymous to and seldom receive feedback from patients. These and other characteristics of perioperative nursing contribute to its identity as a specialty often described as hidden behind closed doors. This study seeks to encourage perioperative nurses to emerge from behind the closed doors, remove their surgical masks, and contribute to the growing body of knowledge on perioperative nursing errors and patient safety.

A. Background of the Study

Prior to publications by the Institute of Medicine (IOM) on medical errors, the American public was unaware of the concerns being generated in health care regarding patient-related complications and deaths from errors. Although data from the studies used in the IOM's first report were almost a decade old, the information presented was new and shocking to the general public (Leape, Berwick, & Bates, 2002). The public was in disbelief when it was calculated in *To Err is Human: Building a Safer Health System* that an estimated 44,000 to 98,000 deaths occurred annually in the United States as a result of medical errors (Corrigan, Kohn, & Donaldson, 2000). Adverse events specifically occurring in surgery were included in the overall statistics. This report was part of an initiative of the IOM to actively compile a comprehensive assessment of health care quality related to patient safety in the nation's health care system.

The second IOM report, *Crossing the Quality Chasm: A New Health System for the 21st Century* (IOM, 2001), focused upon improving the quality of care that currently exists in America's health care system. The IOM's more recent report, *Keeping Patients Safe: Transforming the Work Environment of Nurses* (IOM, 2004) attended to the effects that nurse work environments have on patient safety.

Prior to any of these reports, the American Medical Association (AMA), American Association for the Advancement of Science, and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) participated in the first conference on health care errors (Leape et al., 1998). In 1997, the AMA founded the National Patient Safety Foundation (NPSF); its mission is to promote safety within the health care system. It supports the theory that errors will occur due to the complex nature of the health care

system. Therefore, its focus is to identify risks inherent in the system as well as develop ways to prevent errors. According to the first IOM report (Corrigan, Kohn, & Donaldson, 2000), an error is defined as "the failure of a planned action to be completed as intended (i.e., error in execution) or the use of a wrong plan to achieve an aim (i.e., error in planning)" (p. 27). The Harvard Medical Practice Review I was one study that provided the data for the IOM report, and its method was a retrospective medical record review (Brennan et al., 1991). Leape (2000) concurred with the report, and found three reasons to support the results including (a) the adverse events found actually existed, (b) some adverse events were missed due to underreporting or concealment, and (c) many adverse events occurred after patient discharge. The IOM only reported medical errors in the hospital environment. Therefore, errors occurring in other practice contexts were not identified or reported (Wears & Leape, 1999).

As early as 1991, the Harvard Medical Practice Study I reported that 4% of hospitalized patients had incurred some type of injury from an error, in which 70% may have been preventable (Brennan et al., 1991). The results of this early study led to further research on adverse events outside the United States (Vincent, Neale, & Woloshynowych, 2001). Bovbjerg, Miller, and Shapiro (2001) showed that medical errors account for more injuries and deaths than occur from plane crashes and workplace accidents. In addition, 2 to 3% of hospitalized children, especially those with special needs, are affected by medical errors (Slonin, Ahmed, & Joseph, 2003).

Healthcare errors involve different health care professionals including nurses, pharmacists, and physicians. Because earlier research methods used retrospective reviews of medical charts, it proved difficult to accurately identify and categorize the numerous

variables contributing to errors. Much of the information presented in the reports was medical in nature, with data primarily from medical research. As the reports on medical errors evolved, the focus moved toward identifying what processes contribute to errors as opposed to only addressing statistical data on the numbers of errors. More studies are needed that address the actual context of how error occurs, which variables are attributable to its cause, and how the individual involved in the error perceives the experience. Aside from medicine, other practice disciplines, in particular nursing, need to be included in the mounting research on patient safety and errors.

Perioperative Nursing Context

The discipline of nursing has many practice specialties; however, perioperative nursing is contextually and theoretically distanced from more visible nursing specialties. Perioperative nursing often is considered technical, task-oriented, and medical-model driven. Perioperative nurses have been struggling to shed the label of “handmaiden to the surgeon”, as they were viewed in the early beginnings of perioperative nursing (Gruendemann, 1970). A main tenet of nursing in general is the communicative bond between nurse and patient, and a perceived lack of real-time involvement with the surgical patient has contributed to a professional insecurity pervading the specialty (Riley & Manias, 2002).

The perioperative therapeutic nurse-patient relationship begins in the preoperative phase. The relationship continues in the intraoperative phase even though oral communication is reduced. Patients have often remarked that the physical presence of the perioperative nurse provides them comfort during this stressful experience. However, pressure to reduce turnover time and improve performance limits time for the

perioperative nurse to nurture the relationship. Lack of public knowledge about perioperative nursing indicates a continued sense of invisibility. This invisibility may contribute to the lack of research in perioperative nursing especially in the area of nursing errors. Often, public interest and need drives research. If the public is unaware of the role that perioperative nurses play in their care, they may take for granted perioperative nurses' responsibilities in managing positive patient outcomes.

Clinical practice for perioperative nurses is specialized and quite different from nursing in traditional inpatient nursing units, further isolating nurses from their colleagues, both physically and experientially. Many undergraduate nursing curricula do not include discrete perioperative clinical learning activities, leaving students to pursue the perioperative nursing specialty only post-graduation. The pervasive feeling of detachment and disconnection may impart a feeling of powerlessness in managing an error, whether it is committed by a nurse or another team member. Fear of repercussions, ostracism, and other negative feelings may contribute to nurses' unwillingness to discuss or report errors, leading to speculation on the actual numbers and types. Learning about errors from the perspective of the nurse begins a working dialogue on how to manage these stressful experiences.

I have 20 years of perioperative nursing experience and have witnessed first-hand the uncertainty felt by perioperative nurses regarding errors. Questions have arisen as to who is responsible for errors in surgery even though specific job descriptions are provided and written policies and procedures delineate role responsibilities. Circumstances further clouding the issue of errors relate to intimidation by surgeons and lack of assertiveness on the part of the nurse. Nurses function within a team and are

encouraged to cultivate a team atmosphere, but they encounter problems such as miscommunication when time, resources, and conflicting personalities pose threats to patient safety. In addition to uncertainty as to role and responsibility, what constitutes intraoperative nursing errors has yet to be clearly defined by perioperative nurses. Because registered nurses are legally responsible for their own practice, what constitutes errors that may breach the standard of practice should be clear.

Perioperative nurses view themselves as advocates because patients are very vulnerable during the surgical experience. Patients literally put their lives into the hands of the surgical team and rely on it to provide safe, quality care. It is my intent to give voice to perioperative nurses so that their thoughts, actions, and feelings may be communicated to others on the critical issues of nursing errors and patient safety. Thus, I investigated the aftermath of error including how perioperative nurses cope with committing errors and how the experience influences practice.

Cultural Context

In an effort to reduce errors, the IOM recommended that mandatory reporting be required for hospitals, and encouraged voluntary reporting by health care professionals (Leape, 2002). In 1995, the Department of Veterans Affairs revised its risk management policies to require mandatory reporting of patient injuries caused by negligence or accidents (Kraman & Hamm, 1999). Patients wanted to know if an error was committed especially if harm was a result. Patients cited the severity of error, and honesty and admission by the physician as being related to whether or not they considered litigation (Gallagher, Waterman, Ebers, Frazier, & Levinson, 2003; Witman, Park, & Hardin,

1996). Wu (1999) recommended that physicians disclose errors as well as close calls to patients.

The pervading culture of a health care facility dictates its approach toward recognizing and mediating error in the workplace. Leape et al. (1998) reported that a culture characterized by anger, fear, distrust, and blame can be remodeled into one of safety, honesty, and fairness. Mustard (2002) proposed that culture is a product of social learning, and as people learn from one another through behavior and thought, they can meet the primary objective of patient safety.

In 1998, the United States Pharmacopeia (USP) established MedMARx, an internet-based system for reporting medication errors in an anonymous and confidential manner (Snowbeck, 2001). Healthcare facilities pay a yearly fee for access to the database. In 2002, the USP reported an increase in error reporting of 82% with a database growth of only 11% (Rubin, 2003). This increase may be related to changes that occurred over time in some organizations that encouraged voluntary reporting of errors. However, change is occurring gradually and many institutions have been slow to respond, thereby continuing to perpetuate a culture of silence and blame. Anonymity in reporting shifts the blame away from the reporter and provides vital information to the facility in combating errors through continuous quality improvement initiatives. Feeling comfortable in reporting errors and close calls informs the institutional leadership that members of the health care team are equally committed to reducing error. According to Anderson and Webster (2001), successful incident reporting mechanisms are anonymous.

Error investigation is rarely straight-forward and not specific to one professional domain. Approaches to managing error may focus on the person or system. A

paradigmatic shift in the cultural climate in healthcare regarding errors must occur in order to adequately deal with errors. A blame-discipline type of structure only drives error reporting underground and limits an institution's ability to address errors. Wolf and Serembus (2004) found that health-care professionals who committed medication errors experienced more non-supportive responses such as probation, verbal reprimand, and firing as compared to supportive actions. These actions on the part of administrative personnel impeded efforts to encourage error reporting.

A culture characterized by blame, guilt, and fear causes suppression and cover-up on the parts of practitioners and organizations (Leape et al., 1998). In addition, this type of culture reflects the assumption that most injuries are due to incompetence or negligence on the part of the practitioner. Healthcare practitioners face both personal and professional demands when involved in an error, and fear weighs heavily in their decision to report an error. Promotion of a supportive environment from both administration and co-workers is paramount toward managing error from a humanistic, problem-solving approach.

B. Purposes of the Study

The purposes of this study were to: 1) examine the definitions, circumstances, perceived causes, and reactions of perioperative nurses to intraoperative nursing error; and 2) examine the relationships among coping with intraoperative nursing errors, emotional distress, and changes in practice due to error.

The specific aims of the study were as follows:

1. Define intraoperative nursing errors.
2. Determine the occurrence of intraoperative nursing errors.

3. Identify the causes of intraoperative nursing errors as perceived by perioperative nurses.
4. Describe how nurses react to intraoperative nursing errors.
5. Describe how nurses cope with committing an intraoperative error.
6. Examine the relationship between coping with intraoperative nursing errors and changes in practice.
7. Examine the relationship between coping with intraoperative nursing errors and emotional distress.

C. Research Questions

The research questions for the study were as follows:

1. How do perioperative nurses define intraoperative nursing errors?
2. What are the circumstances of intraoperative errors?
3. What are the perceived causes of intraoperative nursing errors?
4. To what extent do perioperative nurses experience emotional distress after committing an intraoperative error?
5. How do perioperative nurses cope with committing an intraoperative error?
6. What is the relationship between coping with intraoperative nursing errors and changes in practice?
7. What is the relationship between coping with intraoperative nursing errors and emotional distress?

D. Definition of Terms

Circumstances of the error: Conditions under which the error occurred including timing, the nurse's years of perioperative nursing experience, patient age, type of

surgical procedure, patient level of function prior to the error, time of anesthesia, and effect of the error on the patient.

Coping : behavioral and cognitive strategies used by perioperative nurses in managing the aftermath of committing an intraoperative nursing error as measured by the subscales of accepting responsibility, seeking social support, distancing, self-control, planful problem solving, and escape/avoidance in the *Perioperative Nurse Questionnaire*.

Emotional distress: the reactions of perioperative nurses to committing an intraoperative error as indicated by their responses in the *Perioperative Nurse Questionnaire*.

Changes in practice: alterations in clinical nursing practice as measured by the variable subscales of defensive and constructive changes in the *Perioperative Nurse Questionnaire*.

Causes of error: explanations for the error as measured by the operating room atmosphere and the variable subscales of inexperience, job overload, lack of supervision, and faulty judgment in the *Perioperative Nurse Questionnaire*.

E. Assumptions

The following assumptions were made in this study:

1. Perioperative registered nurses possess the requisite knowledge, skills, and experience to respond to questions on intraoperative nursing errors.
2. Perioperative registered nurses are willing to provide information on nursing errors truthfully.

F. Limitations

A limitation of the study was that the sample of perioperative nurses reflected only those nurses who were members of AORN, not from the general population of perioperative nurses. Therefore, the results from this study may not be generalizable to all perioperative nurses.

G. Significance to Nursing

The significance of this nursing research study lies in improving professional nursing practice through the ability to identify errors and take the necessary steps to prevent reoccurrence. Identifying how perioperative registered nurses define intraoperative nursing errors may provide a beginning taxonomy on errors specific to the operating room context. This study provided insight into the circumstances surrounding intraoperative errors as well as perceived causes. Learning if perioperative nurses experience emotional distress and how they cope with errors enables other perioperative nurses and health care professionals to understand better the often painful and stressful implications that result from committing an error.

Studies such as this may lead to the development of cognitive-behavioral interventions based upon nurses' coping strategies. Being aware of others' experiences reveals a humanistic side to error while the error is analyzed through a formal process. Giving voice to clinicians empowers them to discuss and offer solutions for prevention of future error. In the pilot study for this project, one participant spoke knowingly of the distressful feelings incurred after committing an error and how the process of writing down the experience helped the healing process. The participant wrote the following:

Thank you for the opportunity to fill out the two questionnaires. I was able to heal from them. Since this incident I have lost many a [night's] sleep. I have realized that my supervisor really hates me. I pray daily for myself and for her and for the patient. Unforeseen events occur. We must go on and try to do better.

This narrative suggests that perioperative nurses need to talk about committing an error and learn how to lessen its impact upon the nurse and patient. Additional research may be stimulated in this understudied context and population, leading to further discovery into a subset of nurses often perceived as silent and reticent.

II. REVIEW OF LITERATURE

A. Introduction

Responding to a charge from the government, accrediting institutions, and the public to discover the reasons why errors occur in the health care system, the multidisciplinary health care community has begun to compile a body of evidence on patient safety and errors. The growing body of literature reflects a multitude of variables affecting patient safety. Approaches to error management represent a large portion of the existing literature on patient safety and will be discussed in this chapter. The review of the literature is a summary and analysis of research related to the cognitive theory of psychological stress and coping, and medical and nursing errors. Because there are few studies attending to intraoperative nursing errors specifically, studies of nursing errors in different contexts and specialties as well as other disciplines are also presented. Lastly, gaps in the literature will be identified and the chapter summarized.

B. Conceptual Framework

The conceptual framework that guided this study was the cognitive theory of psychological stress and coping (Lazarus & Folkman, 1984). The major concepts of the theory are stress, cognitive appraisal, and coping. The theory contends that people use various cognitive and behavioral strategies to manage the stress of daily life. Lazarus and Folkman proposed that stress is a transaction between person and environment, as

opposed to an isolated intrapsychic struggle. How a person perceives and manages stress depends upon an individual's ability to adapt and cognitively appraise the experience. Coping is a process by which a person makes physical or psychological adjustments when confronted with internal or external demands. Two major functions of coping, dealing with the problem causing the distress (problem-focused coping) and adjusting the emotion involved in the distress (emotion-focused coping), are thought to be used during stressful events. The functions serve to manage the stress process, which involves the person, the environment, and the relationship between them (Folkman & Moskowitz, 2004).

Cognitive appraisal is the process by which an individual examines the stressful experience, determines what the immediate impact is, and decides what options are available for mediating the outcome. Primary cognitive appraisal views what is at stake; secondary cognitive appraisal assesses what, if anything can be done. Individuals use cognitive appraisal of the environment to determine if a situation may cause disruption of their well-being, and if so, to what extent (Folkman, Lazarus, Gruen, & DeLongis, 1986).

Coping is dynamic and unfolds based upon an individual's assessment of the situational context. Forms of coping are not necessarily good or bad and are continuously being negotiated through cognitive reappraisal. Coping is contextual and often occurs in an emotional environment as individuals attend to an event they perceive may threaten existing resources of coping (Lazarus & Folkman, 1984).

For this study, the actual occurrence of error was the causal antecedent or stressor. Mediating the stressful occurrence depends upon the interaction of specific personality and environmental variables (e.g., values, beliefs, situational context). The variables in

this study were the definitions, circumstances, and causes of intraoperative nursing errors. Research questions 1 through 3 relating to these variables provided the foundation for the conceptual framework. Following the stressful event, subsequent cognitive primary and secondary appraisal by the perioperative nurse determined what problem- and emotion-focused coping strategies were utilized. The adaptational outcomes or effects from the experience were reflected in constructive or defensive changes in practice, and the extent of emotional distress following the error. The conceptual framework used to guide this study is depicted in Figure 1.

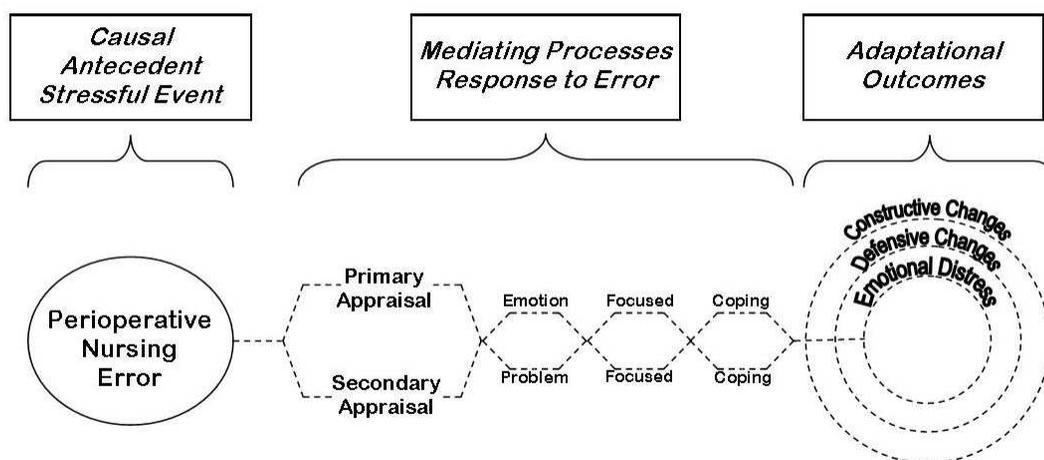


Figure 1. Stress, coping, and adaptation of perioperative nursing error.

Coping is process-oriented, requiring cognitive and behavioral efforts by an individual. Coping strategies may change over time as individuals continue to appraise and reappraise their shifting relationship with the environment (Lazarus & Folkman, 1984). Coping may be directed toward changing the environment or changing the meaning of the event. Coping with a stressful event may be resolved quickly or require a longer period of time.

The processes of appraisal and coping affect adaptational outcomes including physical, psychological, and social aspects of health (Lazarus & Folkman, 1984). How a person functions in work and society, manages life satisfaction, and maintains somatic health are quality indicators used to define mental and physical well-being. As previously stated, in this study committing an error is the stressor; subsequent appraisal of and coping with the error occur next, followed by the adaptational outcomes. The adaptational outcomes are reflected in the type of practice changes perioperative nurses make, either constructive or defensive. Extent of emotional distress is an adaptational outcome reflected as a consequence of coping with an error.

A perioperative nurse who commits an error must decide how potentially threatening the action becomes and what steps are needed to amend any damage. Coping is emotion- focused or problem-focused and its complexity warrants an individual's engagement in different strategies. This framework was used as a basis to determine which coping strategies perioperative nurses use after committing a nursing error, and which strategies led to constructive or defensive changes in nursing practice. In addition, emotional distress was measured as an outcome of coping.

Forms of Coping

Emotion-focused forms of coping are considered cognitive reappraisals by which the meaning of a situation may change without it being changed objectively (Lazarus & Folkman, 1984). Cognitive reappraisal may be defense oriented in relation to a distorted reality, or may be based upon a pragmatic adaptation of reality. Problem-focused forms of coping center on changes within the environment and individual that facilitate a

transition and objective analysis of a contextually based problem. Problem-focused forms of coping are chosen by individuals based upon a specific situation.

The concepts of stress, cognitive appraisal, and coping have been researched in numerous studies in the social sciences, medicine, and nursing. A major intent of investigators has been to account for why some people deal with stress in their lives better than others. According to Folkman and Moskowitz (2004), coping is an attractive concept to research since it may generate development of cognitive-behavioral interventions through a rich variety of responses to stress.

Coping Measurement

As a way to measure the concept of coping, Folkman and Lazarus (1980) developed the Ways of Coping Checklist. It was revised by the authors in 1985 and is in the public domain (see Appendix A). It has a wide range of coping and behavioral strategies thought to be used by individuals in managing stressful encounters (Folkman, Lazarus, Gruen, et al., 1986). Eight coping scales represent emotion-focused and problem-focused forms of coping. The scales measure the context-specific thoughts and actions that individuals experience through a self-report format.

Stress, Cognitive Appraisal, and Coping

The literature includes reports of several studies on the concepts of stress, cognitive appraisal, and coping. As a point of clarification, stress is conceptualized as a relationship between person and environment that may exceed a person's existing resources; cognitive appraisal and coping are the transactional variables within the relationship. Past research (Folkman & Lazarus, 1985a; Folkman, Lazarus, Dunkel-Schetter, et al., 1986) supported the theory in two studies on coping. The results from

both studies were the basis for the revised Ways of Coping (Folkman & Lazarus, 1985b). In addition to the finding that coping is strongly related to cognitive appraisal, various coping strategies were used based upon what the participants perceived was at stake as well as what options were available. Additional studies examined relationships among personality factors, cognitive appraisal, forms of coping, and the adaptational outcomes of somatic and psychological health status (DeLongis, Folkman, & Lazarus, 1988; Folkman, Bernstein, & Lazarus, 1987; Folkman, Lazarus, Gruen, et al., 1986; Folkman, Lazarus, Pimley, & Novacek, 1987). Newer research continues in further defining coping in the context of proactive management, social aspects, and emotions (Folkman & Moskowitz, 2004).

Stress and Coping with Error in Nursing and Medicine

It appears that little research has been reported on the subject of stress and coping related to committing an error from the perspective of registered nurses. Most researchers focused on physicians as a population. Physicians use problem-focused coping in managing mistakes as opposed to emotion-focused forms (Christensen, Levinson, & Dunn, 1992). Physicians may have a tendency to act defensively about their mistakes, a strategy learned early on in their medical careers. Mizrahi (1984) found that physicians used three negative types of coping mechanisms: (a) denial, (b) distancing, and (c) discounting in dealing with errors.

Wu, Folkman, McPhee, and Lo (1991) found that medical officers who coped by accepting responsibility for their mistakes reported constructive changes in practice but experienced high emotional distress. The emphasis of their questionnaire was to have house officers describe their most significant mistake, their response to it, and any events

that followed. Wu defined mistake as “an act or omission for which the house officer felt responsible that had serious or potentially serious consequences for the patient and that would have been judged wrong by knowledgeable peers at the time it occurred” (p. 2089).

The participants first were asked to describe their mistake in narrative form and then answer questions. A descriptive paragraph written by the participant uncovered rich information from the perspective of the medical officer who committed the mistake. Grouped concepts identified from the answers to specific items were causes, responsibility, physician response, institutional response, and changes in practice. The instrument was exposed to two stages of pre-testing before being distributed to 114 internal medicine house officers.

Wu used the Ways of Coping (Folkman & Lazarus, 1985b) to measure responsibility for the mistake. Two multiple linear regression analyses were done to test the independent variables found to be related to the dependent variables, constructive and defensive changes in practice. Results indicated that house officers who accepted responsibility for mistakes also reported constructive changes in practice. In addition, after controlling for cause, severity of outcome, gender, and perception that the institution was judgmental, analysis showed accepting responsibility as a coping mechanism led to higher emotional distress ($\beta = .58, p < .0001$). Participants described feelings of guilt, shame, nervousness, and loss of self-confidence. Further analysis found that a judgmental response on the part of the health care institution was a predictor of defensive changes in practice ($\beta = .37, p < .001$), accounting for 29% of the variance in defensive changes.

A secondary analysis was conducted on the above data. The coping strategies were categorized as predictor variables, and emotional distress, constructive changes in practice, and defensive changes in practice as criterion variables (Wu et al., 1991). After controlling for the same variables as above, using three multiple regression analyses, officers more likely reported emotional distress if they accepted responsibility for their mistake ($\beta = .67, p < .0001$). Officers were somewhat more likely to report distress if they coped by seeking social support ($\beta = .27, p < .05$) or controlling their feelings ($\beta = .28, p < .07$). The total R^2 for the emotional model was .47. None of the coping strategies, except accepting responsibility, were independently related to constructive changes in practice ($\beta = .69, p < .02$). Defensive changes in practice were more likely reported if the residents coped by escape-avoidance ($\beta = -.06, p < .34$). The total R^2 for constructive changes in practice was .49, and total R^2 for defensive changes in practice was .35.

One of the findings supported current thought that a supportive non-judgmental culture is necessary for successful handling of mistakes. Osborne, Blais, and Hayes, (1999) found that nurses also expressed the same feelings characterized by the medical officers after committing a medication error.

The tool used in the study on house officers was revised and administered to 129 British nurses after an initial pilot in a study on nursing practice errors (Meurier, Vincent, & Parmar, 1997). Through the tool, the authors sought to discover how nurses learn from their errors and what, if any, changes in practice occurred. In addition to answering 22 questions about errors, the nurses were asked to write about an error they had made. The descriptions were classified into four categories based upon the nursing process. As in the Wu et al. study (1991), taking responsibility for the error was correlated with constructive

changes in practice ($r = 0.43, p < 0.01$). Consequently, emotional distress also was related to constructive changes in practice ($r = 0.36, p < 0.01$). If the patient was severely affected by the error, there was a tendency not to report the error ($p < 0.05$) and be less trusting of others ($p < 0.01$). These defensive changes in practice were significantly related to fear of repercussions.

Coping and Health

In nursing, the cognitive theory of psychological stress and coping has been used in research on patients with renal disease (Mok, Lai, & Zhang, 2004), cancer (Wonghongkul, Moore, Musil, Schneider, & Deimling, 2000; Zabalegui, 1999), disabilities (DeSepulveda & Chang, 1994; Grooms & Leahy, 2002), premature labor (Lowenkron, 1999), and cardiac arrest (Cowan, Pike, Budzynski, & Kogan, 2001). Levesque, Ducharme, and Lachance (1999) studied coping patterns in caregivers of institutionalized elders, while Kammer (1994) studied stress and coping in individuals who placed an older adult in a nursing home. Several researchers conducted studies regarding children and their families in coping with illness and disease (Azar & Solomon, 2001; Hanton, 1998; Heaman, 1995; Yeh, 2001). I found no studies to date that related to perioperative nursing and the cognitive theory of psychological stress and coping.

Nursing Research and Patient Safety

The emergence of nursing research into improving patient safety has caught the attention of mainstream media (“Heavy Nurse Workload,” 2002; “Dying for Lack,” 2002). Investigating how certain variables, such as understaffing of registered nurses, affects patient outcomes has begun a body of knowledge specific to the nursing domain. Aiken, Clarke, Sloane, Sochalski, and Silber (2002) found that high nurse-to-patient

ratios affect surgical patient complications, nurse burnout, and job satisfaction. Results indicated that nurses who experienced higher nurse-to-patient ratios developed earlier burnout and dissatisfaction with the profession.

In addition, patient mortality and failure to rescue increased as nurses assumed a higher patient workload. Needleman, Buerhaus, Mattke, Stewart, and Zelevinsky (2002) found significant relationships among increases in urinary tract infections and proportion of RN hours ($p = .04$), and failure to rescue and number of RN hours per patient day ($p = .008$). Nurse-patient staffing ratios has become a primary focus of AORN, and one of its 2004 legislative priorities is to keep the RN in the operating room by focusing on state and federal laws that would require an RN in the circulator role (Beu, 2004).

In considering the educational preparation of the registered nurse, Aiken, Clarke, Cheung, Sloane, and Siber (2003) found that surgical patients had less serious complications and lower mortality rates when nurses were educated at the baccalaureate level or higher. These findings stood in contrast to current beliefs that years of experience are a more substantive predictor than type of educational preparation. The focus of the IOM's third report on patient safety was on variables in nurse work environments that may contribute or hinder safety initiatives (Page, 2004).

Coping and Nursing

Studies on coping and nursing, using the model of Lazarus and Folkman, surround a variety of variables and contexts. Hendel, Fish, and Aboudi (2000) explored nurses' coping strategies during a national crisis, and found that nurses coped primarily through direct action problem-focused strategies because they were unable to remove the environmental stressor. Managers used informational and emotion-focused coping

strategies such as social support in an effort to buffer the impact of the experience. Hertting, Nilsson, Theorell, and Larsson (2004) found social support to be a primary emotion-focused strategy of coping in a study of registered nurses' stress and coping against the backdrop of corporate restructuring. Santos et al. (2003) compared coping skills among baby boomer nurses, older registered nurses, and Generation Xers. Baby boomer nurses did not cope as well as the other groups in terms of self-care and social support. Lee (2003) found that direct-action types of coping strategies, such as being organized, and emotion-coping strategies, specifically escape-avoidance, were most commonly used by nurses.

Coping and Perioperative Nursing

No studies to date situated in the perioperative setting have been found to address coping strategies used by nurses in the event of an error. McGarvy, Chambers, and Boore (2004) found that perioperative nurses use a coping strategy termed role distance as a way to manage role strain. The researchers suggested that although role expectations of perioperative nurses involve interactions with patients, administrators, and surgeons, nurses tended to distance themselves if the responsibility became too burdensome. In a study on coping strategies of perioperative nurses and organ procurement procedures, Carter-Gentry and McCurren (2004) found major themes in coping with the procurement process throughout all three phases of the surgical experience. During the preoperative phase, nurses stayed focused on doing their job; this was accomplished by "numbing" themselves to the experience. Nurses used specific strategies of detachment and desensitization during the intraoperative phase. In all three phases, nurses used distancing and escape-avoidance forms of coping.

Cook, Green, and Topp (2001) identified coping strategies practiced by perioperative nurses during incidents of verbal abuse by physicians. Participants used the process of cognitive appraisal after the encounter of verbal abuse. Many responses revolved around the nurses feeling that they did nothing wrong and did not deserve the abusive treatment. After appraisal, adaptive problem- and emotion-focused behaviors were used frequently during abusive encounters. Several strategies were constructive, such as planful problem-solving and seeking social support.

The theory of psychological stress and coping is rooted in the transactional relationship between individuals and their environments. Individuals determine if a particular event, occurring within the relationship, is a form of stress and to what extent it becomes harmful to their well-being. Cognitive appraisal of the event and the subsequent adaptational outcome continue the process. Coping strategies may be problem-focused or emotion-focused interventions whereby individuals seek to remedy the impact on their physical and mental health (Folkman & Lazarus, 1985b). In this study, how perioperative nurses appraise and react to the stress of committing an error was explored. Which coping strategies used by perioperative nurses determined what type of practice changes occurred as well as the extent of emotional distress involved in the process.

Perioperative Nursing Error

Perioperative nursing error has been peripherally linked to patient safety research. Reavis, Sandidge, and Bauer (1998) studied the role of critical thinking in reducing patient injury. Findings indicated that behaviors reflective of critical thinking were primarily categorized as being important for patient safety. Data collection procedures consisted of participant observations and interviews. Findings of another study

demonstrated that perioperative nurses frequently used safety specific nursing diagnosis and interventions in caring for surgical patients (Killen, Kleinbeck, Golar, Schuchardt, & Uebele, 1997). Nursing diagnoses such as risk for infection and risk for perioperative injury were considered critical for positive patient outcomes. Communication has been identified as an important variable in patient safety and nursing error. The perioperative team consists of physicians, nurses, technologists, and ancillary personnel; therefore, communication is vital for successful patient outcomes. According to JCAHO, nearly 80% of wrong site surgery sentinel events between 1995 and 2003 occurred because of communication problems (JCAHO, n.d.). Bates and Gawande (2003) reported that improved communication through the use of information technology is one type of strategy that can assist in preventing errors and adverse events.

Communication failures were found to compromise patient safety (Lingard et al., 2004) by causing interruptions in routine and increasing tension among the team members. Silén-Lipponen, Tossavainen, Turunen, and Smith (2005) interviewed British, Finnish, and American nurses on topics related to sources of intraoperative nursing errors and prevention strategies. Results indicated that effective teamwork was the pervading theme and encompassed the main categories of shared teamwork responsibility, demanding teamwork practice, and organized teamwork. Inexperienced nurses, staff turnover, and the emotional distress associated with the operating room environment were identified as sources of potential error. Ways to reduce errors included maintaining competency, fostering cohesive teamwork, sharing responsibility for actions, and feeling supported by management.

C. Approaches to Error Management

Although the focus has been on error management after the fact, healthcare facilities are becoming more proactive in designing safe patient environments that may prevent error before it occurs. Through application of Reason's Organizational Accident Model (2000), methods of handling errors are supported through either a person-centered or system approach. Meurier (2000) stated that Reason undertook the etiology of accident causation and sought to focus on organizational factors as opposed to the individual who makes the error. Using the model in addressing errors has led to what Wears and Leape (1999) referred to as the "new look" in error management. This look is in contrast to the traditional methods of error analysis, which utilize criteria of personal responsibility and accountability while de-emphasizing the role of the system.

Ebright, Patterson, and Render (2002) described how a clinical nurse specialist (CNS) could incorporate the new look into practice. Four areas assisting in the transition include promoting a non-punitive culture, understanding systems, learning about resiliency in healthcare workers, and anticipating the complex nature of change. A systems approach to error management involves looking at internal and external influences that impact the organization's structural and functional ways of operation (Benner, Sheets, Uris, Malloch, Schwed, & Jamison, 2002).

Studies have identified that accidents occur in complex systems by way of multiple small factors as opposed to one main reason or root cause (Leape et al., 1995; Vincent, 2003). The model has been used in other areas including nursing curriculum. Faculty members at Thomas Jefferson University applied systems analysis as an operational approach to teaching medication administration to first-semester

baccalaureate nursing students (Papastrat & Wallace, 2003). This approach was intended to foster a safe, open climate regarding medication errors while assisting students to differentiate between the responsibility and accountability of the individual professional nurse versus the system itself. Reason (1990) classified types of errors according to three levels. Slips and lapses refer to those acts in which an individual performs a psychomotor skill without conscious control, for example, donning sterile gloves. Rule-based and knowledge-based mistakes require conscious response by an individual after a problem has been detected, for example, contaminating the sterile gloves. Reason (1990) stated, “skill-based slips generally *precede* the detection of a problem, while rule-based and knowledge-based mistakes arise during *subsequent* attempts to find a solution” (p. 56). The nature and context of error, mechanisms controlling human performance, and the nature of the individual are three factors that must be understood in the formulation of error.

In the context of complex systems and accident causation, Reason (1990) correlated the basic elements of production systems with the human elements of accident causation. Reason also made a clear distinction between two types of errors. Active errors are those committed on the sharp end of intentional, front-line action, while latent errors are embedded in the system and lie dormant until a string of events propels them to the surface. The trajectory of an accident develops from the breakdown of complex systems. From a healthcare perspective, active failures are those actions by practitioners on the sharp end of the system, such as nurses and physicians. Latent failures at the indirect end of the system are committed by persons not involved in direct patient care. The etiology of the failure begins at the latent end where faulty decisions are made. Complex systems

are built upon a series of defenses aimed at ensuring smooth, safe operations. For an accident or error to occur, each level of defense must be breached starting at the latent end of causation. All windows of opportunity must be in alignment for the accident or failure to reach the active end.

Gawande, Studdert, Orav, Brennan, and Zinner (2003) found that there was a greater risk of leaving foreign bodies behind after emergency surgery, unplanned changes in the surgical procedure, and patients with higher body-mass index. The researchers sought to identify human and system-related risk factors that contributed to surgical errors because previous studies had normally focused only on frequency and outcomes. Leape et al. (1995) found 16 major system failures that contributed to medication errors. Of those 16, the most common failures were drug knowledge dissemination (29%), dose and identity checking (40%), and patient information availability (37%).

Cook, Hoas, Guttmanova, and Joyner (2004) found that 46% of respondents participating in a multimethod study on definitions and approaches to solving patient safety issues disagreed strongly with the belief that mistakes often are the fault of one person instead of a faulty system. The study also suggested that healthcare providers adopt a conceptual framework constructed upon the belief that all team members share responsibility for safety in order to approach safety issues from a systems perspective. What needs to be conveyed and felt by the team is a sense of collective responsibility because placing the blame strictly on the individual is a deterrent approach to improving safety (Leape, 1998).

The person approach is the traditional method of looking for one answer as to why error occurs, thus limiting the investigation of error to one cause, that being the

individual responsible for committing the error. Error causation is very complex and involves more than one person's action (Pape, 2001). A focus on the exact point of contact between the individual and the actual error disconnects it from the system and prevents a more expanded investigation into finding the numerous factors that contribute to error. The traditional method is associated with blame, punishment, and fear, and is dominant in the health care system. Because disclosure of the error is essential in dissecting the causes, establishing a non-punitive culture enables individuals to be more forthright in reporting errors but does not relieve them of responsibility. Parker and Lawton (2003) proposed there is a tendency in healthcare to conclude that individual incompetence is at the core of an error, and focusing on the individual provides supervisory personnel a way to blame and weed out what they believe to be an accident-prone individual. Contrary to the systems approach, emphasis is placed on who made the error and what shortcomings on the part of the individual led him or her to commit the error.

Presently, state boards of nursing continue to utilize this approach by conducting disciplinary investigations on nurses reported to the board for breaches in standards of care (Benner et al., 2002). In two published stories, the Massachusetts Board of Registration in Nursing decided to take action against 18 nurses involved in chemotherapy overdoses at Dana-Farber Cancer Institute (Beardsley, 1999). The Colorado Board of Registration in Nursing disciplined two nurses after a medication error resulted in the death of an infant (Plum, 1997). Board decisions of this type could impact error reporting and perpetuate a blame culture.

Although the person approach is utilized throughout the health care system, there is little support in the literature for this method. According to Connor, Ponte, and Conway (2002), a focus on systems approach as it relates to error causation does not dismiss individual accountability. An opinion piece by Hall (2002) stated that “systems don’t make errors, people do” (p. 5).

In a study on how nurses’ self esteem was affected after being disciplined for a medication error, Arndt (1994b) found that nurses were labeled as having a lack of knowledge about the medication while discounting other causes such as heavy workload, illness, or personal problems. This qualitative study focused on the practitioner’s perception of the experience, as well as projected decisions and imagined actions conducted after the error occurred. According to Leape and Berwick (2000), errors are not primarily due to a lack of knowledge but an interweaving of numerous factors.

Aside from the system and person approaches, a third variable, practice responsibility, may be considered an integral part of error occurrence. The nursing profession has its own set of professional and ethical standards to guide practice. Under provision four of the American Nurses’ Association (ANA) Code of Ethics *with Interpretive Statements*, accountability and responsibility in practice are framed within a code of ethical conduct directed by the moral principles of fidelity and respect for the self-determination, worth, and dignity of all patients (ANA, n.d.). It is suggested that the ANA Code of Ethics is formulated upon a deontologic theory of ethics, whereby the nurse has a moral duty to uphold the code of the profession in all circumstances (Kelley, 2002). The duties, as outlined in the code, are upheld regardless of consequence with an emphasis on process, not outcome. A codified set of rights or wrongs defines duty of

care, and a breach in the duty resulting in patient harm has potential for claims of negligence in civil courts (Hughes, 2002).

Other theories emphasize ethical decision-making based upon the nurse-patient relationship as grounded in context and agreement (Husted & Husted, 2002). A nurse is viewed as a moral agent, orienting to each new relationship and defining ethical care through interactions with others. Self motivation, a sincere notion of good, and an inherent moral sense lead the nurse toward appropriate ethical decision-making if the patient's well being is compromised (Benner, Hooper-Kyriakidis, & Stannard, 1999). Errors may be decreased if nurses use critical thinking, professional standards guidance, and purposeful thought (Bennett & Dune, 2002).

A decision whether or not to report an error is inexplicably linked to how others view a nurse's moral sense of duty. According to Hall (2003), a new way of thinking has emerged in healthcare. Practitioners are now expected to report their errors to patients. Practicing veracity constitutes faithfulness to the patient. However, barriers to error reporting should be addressed if error reporting is a major factor in error management. The seriousness of the error, fear of disciplinary action, civil and criminal lawsuits, damaged reputation, and loss of confidence are reasons why nurses decide not to report errors (Wolf, Serembus, Smetzer, Cohen, & Cohen, 2000). Organizations accredited by JCAHO are encouraged to report sentinel events that meet certain criteria (JCAHO, 2005). The state of Florida has a statute requiring licensed health-care facilities to inform patients who have incurred serious harm from an adverse event (State of Florida, n.d.).

In a study on underreporting of medication administration errors committed by nurses, Wakefield, Wakefield, Uden-Holman, Borders, Blegen, and Vaughnet (1999)

identified 15 potential barriers to reporting. After factor analysis, the barriers combined into four subscales: (a) disagreement over error, (b) reporting effort, (c) fear, and (d) administrative response. Gladstone (1995) identified themes from comments made by nurses regarding error reporting, including hesitancy to report errors due to worry and fear of reaction by management staff. Osborne et al. (1999) found that 86% of nurses believed that medications errors were not reported due to fear. Rogers, Hwang, and Scott (2004) studied the relationship of break habits and nursing errors of hospital-based staff registered nurses for a period of 28 days. One of the notable findings indicated that 30% of the nurses self-reported committing errors, primarily medication, during the 28-day period. The authors did not indicate whether or not the errors were reported to management staff. Taylor et al. (2004) found that being uncertain about what is considered an error and concerns about implicating others were primary reasons cited by nurses and physicians for not reporting errors.

Perioperative nurses may not report errors for some of the same reasons but feelings of anonymity sensed by the nurses adds a distinct variable that sets perioperative nursing apart from other specialties. It is readily apparent that healthcare facilities should encourage an environment that supports nurses in the event of an error.

Practitioners have a responsibility to learn from their experiences and share these experiences with other nurses. The culture, however, must be one in which nurses feel supported and can share their experience that may have led to a negative patient outcome. Experiential learning in a practice discipline contributes to its research agenda and is unlike a culture that attributes error solely to individual responsibility (Woods & Doan-Johnson, 2002). As nurses build upon their experiences through knowledge and practice,

they contribute evidence as a result of progressive, collective learning. The evidence translates into best practices for nursing.

Benner (personal communication, April 16, 2003) proposed that practice responsibility requires agency, vigilance, and an internal notion of what is good for the patient. Benner et al. (2002) analyzed nursing errors that individuals reported to state boards of nursing. In addition to system and individual approaches, it was proposed that socially rooted shared nursing practices bear some responsibility for nursing error. Practice responsibility was derived from education, nurse practice acts, professional associations, regulatory agencies, and healthcare institutions. Goals for the study included development of a taxonomy of errors with future strategies aimed at error prevention. A major result from the study was the development of a taxonomy of nursing error survey instrument which classifies errors according to cause, patient outcome, and disciplinary action. The instrument provides a systematic way of coding types of error based upon each individual case. In the future the compiled data will be useful in minimizing and preventing errors. Meurier, Vincent, and Parmar (1997) found nurses who take responsibility for their error tend to make constructive changes in practice.

Practice responsibility in perioperative nursing involves interventions aimed toward keeping the patient safe from injury. Advocacy is a main tenet of perioperative practice responsibility, in part due to the vulnerable nature of the surgical patient. The scope of perioperative nursing interventions includes education, collaboration, coordination, management, support, and advocacy (AORN, 2001). Seifert (2002) stated that reporting error is part of the nurse's role as moral agent and patient advocate.

According to Schroeter (1999), perioperative nurses both perceive and identify certain ethical issues bound to practice responsibility.

D. Definitions of Error

While many private and public organizations such as JCAHO, IOM, AHRQ, and AMA define errors within the context of the medical domain, errors specifically addressing the domain of nursing, especially perioperative clinical practice, have not been clearly identified. Research related to type, definition, or taxonomy of error has been medical in nature (Dovey et al., 2002). Dunn (2003) stated that medical errors are often classified according to diagnosis, treatment, preventive, and miscellaneous. Additional classifications include four phases of medical decision making such as data gathering, integration or processing of data, confirmation of diagnosis, and treatment (Goldberg, Kuhn, Andrew, & Thomas 2002).

In regard to intraoperative errors, classifications tend to be generalized according to type of error and non-specific as to the process of how the error occurs and what or who is responsible for the event. For example, the National Quality Forum (NQF) considers death or serious injury from electrical shock, burns, falls, or hemolytic reaction from incompatible blood as one of its “never” events which it considers a preventable act (Pugliese & Bartley, 2004). The Institute for Health Care Improvement (IHI) lists the following goals for improving safety in the operating room: (a) reducing intraoperative injuries and complications by 50%; (b) decreasing the incidence of medication errors in the OR and postanesthesia care unit by 30%; (c) reducing equipment failures and equipment-use errors by 50%; and (d) eliminating wrong-patient surgery, wrong-site surgery, and use of incompatible blood products (Pugliese & Bartley, 2004). The

challenge is to define which perioperative nursing errors result in the above documented negative patient outcomes.

E. Gaps in the Literature

The existing literature revealed a significant gap in research on nursing errors, especially in perioperative nursing, offering only a small glimpse into this world. Surgical errors are often defined in the context of medicine; therefore, there was little information on how perioperative nurses define errors within their locus of control. Research on the context, including circumstances surrounding errors and causes of error, needs to be conducted. Gaps exist on how perioperative nurses cope with committing an error, whether or not practice changes result, and if there is emotional distress involved in the experience. No studies were found that used perioperative nurses as a population of study using the conceptual framework of Lazarus and Folkman's theory of cognitive psychological stress and coping.

Gaps in the literature may be due in part to errors in the operating room being dealt with internally due to its physical and cultural isolation from other department contexts. The physically restricted space of the operating room has literally kept perioperative nurses behind closed doors. The operating room culture often is described as secretive and different because the physical environment is confined and the staff wears specialty clothing and face masks. A feeling of anonymity exists because perioperative nurses rarely see their patients after the surgical experience. Depending upon the type of surgery, perioperative nurses may care for as few as one patient to several in one shift. Completing the operating room case schedule on time entails smooth, efficient room turnover time, leaving limited time for perioperative nurses to interact with

their patients. It seems apparent that perioperative nurses must be given a voice and be recognized in their practice specialty.

F. Summary

Research specific to the perioperative context has focused on a variety of topics. Physiological and psychological safety of patients has related to those variables that may lead to negative patient outcomes. Research on operating room errors have centered on physiological outcomes attributed to physician error such as wrong site, wrong side surgery, and retained foreign objects. In the general nursing domain, emphasis on patient safety issues such as medication errors, post-operative complications, and failure to rescue has dominated the literature.

A large amount of the literature has revealed several studies on identifying the system inadequacies involved in medical errors. Shifting the culture from a punitive one to one of safety and trust has been slow as health care professionals move toward feeling comfortable in reporting errors without fear of repercussions. Recognizing that humans make mistakes requires a paradigmatic shift.

Literature on the concepts of stress and coping has generated a wealth of information on how healthcare workers deal with the innate stress familiar to the many professionals practicing in various healthcare disciplines. With the current shortage of registered nurses, research should continue in the areas of assisting nurses to recognize and work through stressful encounters common in the profession. Repeated encounters with stressful events without the necessary tools to amend the experience leads to early burnout and dissatisfaction.

This study sought to provide information on definitions, circumstances, and causes of intraoperative nursing error from the perioperative nurse's own perspective. Additional gaps in the literature suggest a need to determine future interventions designed to limit the emotional impact of committing an error and discover which coping strategies lead to constructive and defensive changes in practice. Although demographic data on perioperative nurses exists, no studies have been reported that correlated the variables of age, gender, marital status, race, level of education, job position, and certification with intraoperative nursing errors

III. METHODS

A. Research Design

The research design for this study was a descriptive, correlational design using a survey to obtain information. Survey research has the advantage of being flexible, broad, and available to a large number of participants (Polit & Hungler, 2002).

B. Setting

The participants chose the setting for this study because the method of data collection was a self-administered questionnaire. One questionnaire was mailed to each participant.

C. Sample

The sample for this study was a randomized selection of perioperative registered nurses who are members of AORN. No other criteria were used for inclusion in the study. Students and associate members of AORN were excluded. A sample size of 180 achieved a 93% power to detect an r^2 of 10% attributed to six independent variables using an F-test with an alpha of 0.05. Power analysis was carried out using PASS 2004. Assuming a response rate of 27%, a total of 700 surveys were mailed. Members of AORN pay annual dues for membership and their membership records are part of a nationwide database. Permission to access the database was given by AORN (see Appendix B). Recruitment was facilitated through several mailings including an advance notice letter and follow-up

postcard. In addition, an announcement was made in the national newsletter, *AORN Connections*, to inform AORN members of the study (see Appendix C).

D. Measures

I used a demographic tool to collect data to describe the sample. These data included age, gender, race, marital status, level of education, and certification was ascertained (see Appendix D).

The major instrument used to answer the research questions in this study was the *Perioperative Nurse Questionnaire* (see Appendix E). I developed this version from two previous questionnaires used in studies on errors. Definitions, circumstances, and causes of intraoperative nursing error were measured. In addition, operating room atmosphere, interaction with management, institutional response, nurses' reactions to committing an error as defined by emotional distress, coping strategies used when confronted with an error, and what changes in practice occur post-error were measured. A shortened version of Folkman and Lazarus's (1985) Ways of Coping, included within the questionnaire, measured coping strategies. The Ways of Coping scale included six of the original eight scales representing emotion-focused and problem-focused forms of coping. The two coping strategy scales, positive reappraisal and confrontive, were not included in this study because the items for each scale did not appear related to error (Wu et al., 1991). The six scales were as follows:

1. Distancing (represented by three items)
2. Accepting responsibility (represented by three items)
3. Seeking social support (represented by three items)
4. Planful problem solving (representing two items)

5. Escape-avoidance (representing two items)
6. Self-controlling (representing three items)

In this study, stress referred to the actual occurrence of committing an error. Coping entailed the cognitive appraisal and coping strategies used by perioperative nurses in handling the aftermath. Defensive and constructive changes in practice and emotional distress were the adaptational outcomes resulting from the nurse's perception and management of the experience. In multiple regression analysis, the major predictor independent variables were the coping strategies, and changes in practice and emotional distress were the dependent variables.

The original questionnaire, *What Do We Learn From Our Mistakes?*, was developed to measure how physicians handle mistakes and identify what factors contribute to learning from the mistakes (Wu et al., 1991). Meurier et al., (1997) modified the original questionnaire in their study on British staff ward nurses. The authors reported how nurses learn from their errors and what, if any, changes in practice occurred. Efforts were made to remodel the tool to reflect nursing context and items related to medical practice were removed. Permission to use the entire instrument was provided by the originator of the questionnaire, *What Do We Learn From Our Mistakes?* (see Appendix F), as well as Meurier's revised version titled, *Inappropriate Nursing Decisions and Actions* (see Appendix G). The *Ways of Coping* instrument is in the public domain and no permission was needed by the originator of the tool (see Appendix H).

The *Perioperative Nurse Questionnaire* used in this study was formally known in a pilot study as *Nursing Decisions and Actions* (Meurier et al., 1997). I modified the questionnaire to reflect the population of perioperative registered nurses. The name of the

questionnaire was changed after I conducted the pilot study because I thought it would be more attractive to potential participants. It was a 29-item questionnaire measured on a 4-point Likert scale. In addition to demographic data, the questionnaire was constructed according to the following main categories: (a) definitions, (b) circumstances, (c) causes, (d) emotional distress, (e) coping, and (f) changes in practice. In this study, reactions were defined as emotional distress. The questionnaire began with a short paragraph regarding its intent, followed by a general definition of nursing error and close call. The researcher sought to answer the research questions posed in the study through analysis of the data provided in the questionnaire.

The *Perioperative Nurse Questionnaire* was limited in its ability to adequately measure the variables under study. Black (1999) stated that an action is the focus of attention in measuring attitudes, views, and perceptions as opposed to a written response. Self-reports ask the individual to use retrospective recall which calls into question the accuracy of remembering specific thoughts and behaviors (Folkman & Moskowitz 2004).

Content Validity

Because previous studies using the questionnaire focused on different populations, I modified the tool to be more reflective of the context of errors in the intraoperative environment. To establish content validity pertaining to those specific items addressing the intraoperative environment, I recruited a panel of six perioperative experts to conduct a content validity analysis (see Appendix I). In addition, the experts were encouraged to make further recommendations on the remaining items excluding the coping scale. I provided a content validity index (CVI) to each panel expert. The index was constructed in a 4-point Likert scale format with 1 equating to not relevant to 4 being

very relevant (see Appendix J). The final CVI score for the total instrument was the percentage of total items rated by the panel as either a 3 or 4. A score of .80 was recognized as having good content validity (Polit & Hungler, 2002).

All items related to definitions and causes of intraoperative nursing error that received a score of .80 or above were included in the tool for the pilot study. One item relating to definition of error with a score of .50 and one item relating to causes of error with a score of .66 were included after editing recommendations by the panel.

Reliability

Since no reliability data were available, I conducted a pilot study to establish reliability of the questionnaire, *Nursing Decisions and Actions*, by assessing its stability using a test-retest method. A test-retest method is considered a measure of reliability and the tool is administered to the same group on two separate occasions (Black, 1999).

After receiving Institutional Review Board (IRB) approval from Duquesne University (see Appendix K), I selected a randomized sample of 100 members from the South Florida Chapter of AORN with a total membership at the time of 240 members. The president of the chapter gave permission to use the sample. Of the 100 surveys in the first mailing, 21 were returned with one survey missing a code and one returned due to an incorrect address. The second mailing was done approximately 2 weeks later and 10 surveys were returned with 1 survey being returned that didn't match with the first survey. The total of matched surveys was nine. Ten surveys were ineligible due to the absence of a matched retest.

Because of the limited response, a second mailing was done using an additional random sample of 100 from the same database as above. One survey was returned due to

an incorrect address. An initial response on the first mailing was promising with 25 returns but only 13 second-mailing surveys were matched with the first mailing. The total sample for the pilot study was 22. Possible reasons for the low response rate was conducting the mailing during the summer months when people normally take vacation, the cover letter being unclear as to the directions for test-retest, and the threat of a hurricane during the mailing of the second sample.

Correlation coefficients using Spearman rank correlation coefficient (r_s) were conducted on all items in the survey using the statistical software package, SPSS 12.0. The Spearman rank correlation coefficient is a non-parametric test that may be used when variable pairs are measured on an ordinal scale (Black, 1999). Coefficients ranged from .29 to .97.

Categories

Correlation coefficients for definitions of error ranged from .29 to .69. The items having low scores remained in the questionnaire due to the nature of the question, the small sample, and the score assigned on the content validity index. Presently, no data exist on how perioperative nurses define types of intraoperative nursing errors. Table 1 represents Spearman rank correlation coefficient values for definitions of error measured in the pilot study.

Correlation coefficients for circumstances surrounding the error such as years of perioperative nursing experience, age of the patient, type of surgical procedure, patient overall level of functioning, timing of the error, and patient outcome ranged from .91 to .97. Causes of the error were measured by two questions containing several items each, and coefficient values ranged from .70 to .93.

Table 1

Definitions of Error (N=22)

Definitions of error	r_s
Was unclear about surgical site	.69*
Improperly placed ESU pad	.68**
Improper patient positioning	.60**
Miscalculated dose/strength of medication	.66**
Inaccurate, incomplete, or absent surgical count	.37
Break in sterile technique	.62**
Retained foreign object	.48*
Equipment misuse related to lack of knowledge	.43*
Lack of appropriate equipment	.62*
Blood or blood product transfusion reaction	.47*
Incorrect surgical prep	.29
Was unaware of patient allergy	.46*
Misidentified a patient	.56*

Note. Responses were made on 4-point scales (1 = strongly disagree, 4 = agree strongly).

* $p < .05$; ** $p < .01$.

Coefficient values for the operating room atmosphere defined as a cause of error ranged from .78 to .87. Because I was treading new ground in studying intraoperative nursing errors, I decided to keep all of the items including the ones with low coefficient values. Reactions to error represented emotional distress and coefficient values ranged

from .86 to .98. Coping with the error was represented by 16 items grouped into six scales. Coefficient results ranged from .81 to .94. Coefficient values ranged from .84 to .93 representing institutional response and how participants felt after discussion with management staff. Correlation coefficient ranges related to changes in practice were .81 to .93.

Tool Revisions

Several revisions were made to the questionnaire after the pilot study. The title was changed to alert participants that its content was specific to perioperative practice. A definition of “close call” was added because the participant is asked a question directly related to the term. Question 4 was narrative in nature and asked participants to remember a time when they committed an error in the care of a patient during the intraoperative period. The question was deleted for this study.

The Likert scale categories were revised to better represent the items. For example, strongly disagree was changed to disagree strongly in order to maintain uniformity throughout the questionnaire. For the question related to coping strategies, the scale was changed from strongly disagree, disagree somewhat, agree somewhat, and agree strongly to not used, used, used quite a bit, and used a great deal. The revised format was in line with the previous studies utilizing the coping strategies identified by Folkman and Lazarus. Two items were added to question 20 regarding institutional response. Other changes were grammatical in nature for clarification on certain items and to decrease the amount of missing data during analysis. Directions in the questionnaire related to the pilot study were deleted.

E. Procedures for Data Collection

Salant and Dillman (1994) recommended at least four separate mailings for a basic questionnaire. However, to assure anonymity, I used three mailings for this study. The first mailing was a short, personalized, advance-notice letter, informing AORN members that they were selected to participate in a study and would be receiving a questionnaire on perioperative nursing errors (see Appendix L). Approximately 1 week later, I made a second contact. The second mailing included a personalized cover letter (see Appendix M), the questionnaire, and a self-addressed return stamped envelope. I sent a third mail-out in the form of a follow-up postcard to all potential participants approximately 1 week after mailing of the second mail-out (see Appendix N). The entire data collection period was estimated to be 3-4 weeks. All data collection procedures were conducted to enhance the response rate. If the rate of response had been low, I would have sent a second round of mailings from the same AORN database to a new randomized sample excluding the first sample.

F. Procedures for Protection of Human Subjects

I sought approval for the protocol from the Duquesne University Institutional Review Board. Because the study dealt with sensitive subject matter, every effort was made to maintain strict confidentiality and anonymity of the participants. The participants were informed that by answering and returning the questionnaire, they were giving consent to participate. Participation was totally voluntary and there were no consequences for non-participation. There were no anticipated risks to participation and benefits included dissemination of findings to the larger health care audience. There was no

compensation for participation; however, participation in the project involved no monetary cost to the participants.

Confidentiality and Anonymity

No names appeared on the questionnaire and no identities were revealed in the data analysis. There were no identifying characteristics on the tool that allowed me to identify any of the participants. I stored all written materials in a locked file in my home. I reported only in statistical summaries to insure that participants and their employers were not identified. To further ensure confidentiality and anonymity, I instructed participants to not place a return address on the self-addressed stamped envelope being sent to me, and not place their names, names of any other persons or health care facilities, or any other identifying information anywhere on the document. These instructions were provided in the second mailing.

If any identifying characteristics appeared on the questionnaire or return envelope, the materials were shredded and discarded. Participants were instructed in the questionnaire that if they placed their name or return address on the envelope or any other identifying characteristics on the questionnaire, the data would not be used. If any participants contacted me after the study to discuss their experience with committing an error, I would have informed them that I was unable to speak with them in order to maintain confidentiality and anonymity. I was not contacted by any of the participants.

G. Procedures for Data Analysis

Preliminary Analysis of Data

I used descriptive statistics including means, standard deviations, frequencies, and percentages to summarize data for all participants on definitions and frequencies of error

and the categorical, independent sociodemographic variables of age, gender, race, marital status, level of education, job category, and certification. I constructed frequency distributions of values for each variable and examined them to check the accuracy and consistency of the data. I generated histograms for each major variable to assess whether or not the data was normally distributed.

In addition, I reported descriptive statistics on the categorical independent variables representing the circumstances of error for those participants who answer yes to question 4, *Have you committed an intraoperative nursing error?* I analyzed the continuous independent variables in the questionnaire, including causes of error, operating room atmosphere, coping strategies, interaction with management, and institutional response, using descriptive statistics. I produced histograms to depict visual differences in the variables and assess normal distribution of data. I examined consistency and accuracy of the data through frequency distributions. I reported descriptive statistics on research questions 1 through 5.

I grouped the items relating to the continuous independent variables into subscales. The subscales represented causes of error, types of coping strategies, and institutional response. For this study, causes of error were represented by four subscales: (a) inexperience, identified by six items; (b) lack of supervision, identified by six items; (c) job overload, identified by four items; and (d) faulty judgment, identified by seven items.

I measured the coping strategies were by 16 items. A shortened version of Ways of Coping by Folkman and Lazarus (1984) measured coping strategies and were represented by six scales: (a) accepting responsibility, identified by three items; (b)

seeking social support, identified by three items; (c) self-control, identified by three items; (d) escape-avoidance, identified by two items; (e) planful problem solving, identified by two items; and (f) distancing, identified by three items. I identified institutional response by two subscales: (a) judgmental, identified by six items; and (b) supportive, identified by three items.

I grouped the dependent variables of changes in practice into the subscales of constructive and defensive changes. Constructive changes were represented by nine items and defensive changes by six items. I used Cronbach's alpha to analyze the continuous independent variables of causes of error, operating room atmosphere, coping strategies, and institutional response, and the dependent variables of emotional distress in response to the error, and changes in practice for internal consistency.

Analysis of Data

I calculated Pearson's product moment correlation (r) to determine if a relationship existed between the dependent variables changes in practice and emotional distress, and the independent variable subscales representing causes of error, types of coping strategies, and managerial response. Key assumptions of correlation coefficients were as follows: (a) the correlation coefficient (r) is only applicable as a measure of the degree of relationship between linearly-related variables and (b) variables must be measured on either an interval or ratio scale (Kachigan, 1991). I constructed scatter diagrams to illustrate the relationships between the dependent and continuous independent variables. I calculated correlations on research questions 2 through 7.

After controlling for the independent variables, I used multiple regression analysis to predict emotional distress and constructive and defensive changes in practice from

coping strategy variables. This analysis considered all potential predictors, which when combined result in the most predictive power (Polit & Hungler, 2002). The assumptions of the regression model were that for each set of values of the predictor variables, the criterion variable was normally distributed and had equal variances, and the means of the criterion variable distributions fell on the regression line (Kachigan, 1991). I analyzed research questions 6 and 7 by multiple regression analysis.

I considered the results statistically significant at $p \leq .05$ and I used SPSS 13.0 to conduct the statistical data analysis.

IV. RESULTS, ANALYSIS, AND DISCUSSION

The chapter begins with a brief discussion related to the recruitment of subjects. A preliminary analysis of the data collected is then presented followed by an overall summary of the characteristics of the sample. The results and analyses of the responses to each research question follows. The chapter concludes with a discussion of the findings.

A. Recruitment of the Subjects

After receiving approval from the Duquesne University Institutional Review Board, I procured a randomized sample of 700 registered nurses was from AORN, the Association of periOperative Registered Nurses. AORN is an international organization with an approximate current membership of 41,000 (AORN, n.d.). The first mailing was an introduction letter in which I informed the participants that they would be receiving the *Perioperative Nurse Questionnaire*. I sent the second mailing approximately 1 week later and included a cover letter and questionnaire. Lastly, I sent a reminder postcard. A total of 272 completed questionnaires were returned resulting in a 39% response rate. Only one questionnaire was returned due to non-deliverability. Due to the nature of the study, confidentiality and anonymity were strictly enforced so that no link could be made between participants' names and other identifiers and their responses. The data entered into SPSS 13.0 were reviewed several times for accuracy and consistency of entry by me and the statistical assistant.

B. Preliminary Analysis

In the preliminary analysis, I generated histograms to assess data normality. It is assumed in multiple regression analysis that the residuals are distributed normally (Marascuilo & Serlin, 1988). I analyzed the standardized residuals of the major continuous independent variables related to causes of the error and coping with the error for skewness and kurtosis. Examination of univariate indices of skewness and kurtosis revealed no skewness greater than an absolute value of 0.45, or kurtosis values greater than an absolute value of 0.50. For psychometric purposes, a kurtosis and skewness value of +/-1 is considered acceptable (Illinois State University, n.d.).

I evaluated the data for the major continuous independent variables for multivariate outliers by examining leverage indices for each individual and defining an outlier as a leverage score four times greater than the mean leverage (Cook & Weisberg, 1986). Model-based outliers were evaluated by regressing all dependent variables onto the applicable predictor variables and the standardized DfBetas were examined for each individual. An influential outlier was defined as any individual with an absolute standardized DfBeta greater than 1 for a given coefficient. No outliers were evident.

I analyzed the Pearson-product moment correlations (r) for significant relationships among the continuous independent variables representing causes of the error, coping with the error, and managerial response to the error, and the dependent variables of changes in practice and emotional distress. In psychological and/or social research, an (r) of .50 to 1.00 or -.50 to -1.00 is considered a large correlation among variables (Cohen, 1988). An assumption of Pearson's r is that there is normal distribution of the variables (Nunnally & Bernstein, 1994).

I used scatter plots as an aid to assess the linear relationship between the independent and dependent variables. I also used scatter plots to assess the homogeneity of variances of the dependent variables. No pattern was observed between the standardized residuals versus the standardized predicted values. The assumptions were met for each particular statistical test, therefore I conducted multiple regression techniques for further data analysis.

C. Characteristics of the Sample

I calculated the means (M), standard deviations (SD), frequencies (f), and percentages (P) on the characteristics of the total number of respondents ($N = 272$). There were three nurses who did not record their age resulting in a total sample number of 269. Figure 1 shows the frequency distribution of the ages of the participants. The minimum age was 24 and the maximum age was 70. The mean age was 47 years ($SD = 9.65$).

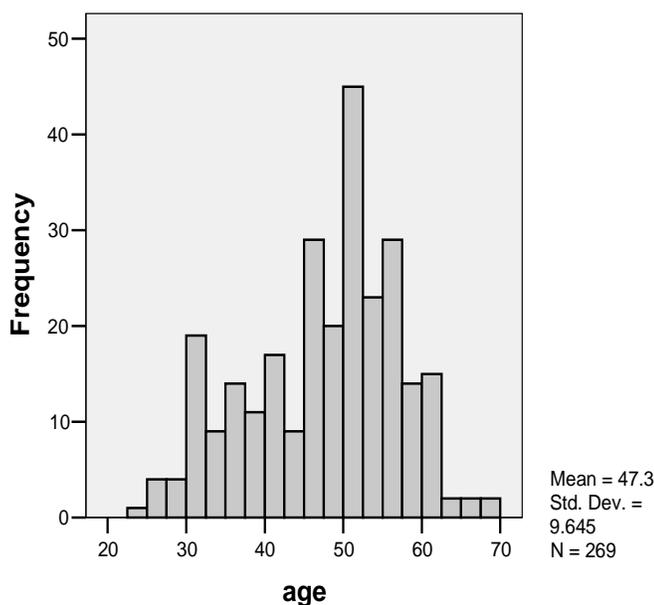


Figure 1. Age of participants in years.

Table 2 shows the results of the data collected on the demographic variables including age, gender, marital status, race/ethnicity, level of education, work position, and certification. There were two surveys with missing data for gender, two for marital status, three for race/ethnicity, five for work position, three for education, and two for certification. Participants were overwhelmingly female at 92% ($n = 247$). Eighty-nine percent ($n = 240$) were non-Hispanic Whites, 76% ($n = 204$) were married and 86% ($n = 230$) indicated that they worked as perioperative staff nurses. Other positions included educator (8%), supervisor (2%), and manager (1%). A bachelor's degree in nursing (BSN) was held by 39% of the participants ($n = 104$), while 27% ($n = 73$) held an associate degree in nursing, and 20% ($n = 53$) graduated with a diploma in nursing. The remaining educational levels were bachelor's degree in other field (8%), master's degree in nursing (3%), master's degree in other field (2%), and doctorate in other field (<1%). None of the participants claimed to have a doctorate in nursing. The mean age of this sample population is consistent with the national average. However, preliminary data published in the 2004 National Sample Survey of Registered Nurses indicated a rising trend of nurses educated at the associate degree rather than the baccalaureate degree level (United States Department of Health and Human Services, 2004). Specialty certification as a nurse in the operating room (CNOR) was held by 52% of the perioperative registered nurses. Nationally, there are over 29,000 perioperative registered nurses who hold the CNOR title (K. Nahulu, personal communication, April 10, 2006).

Table 2

Frequency Distribution of Demographic Variables (N = 272)

	<i>n</i>	<i>P</i>
Gender*		
Female	247	92
Male	23	9
Status*		
Single	25	9
Married	204	76
Living with significant other	10	4
Divorced	27	10
Widowed	4	2
Race/Ethnicity*		
Non-Hispanic White	240	89
Non-Hispanic Black	6	2
Hispanic/Latino	6	2
Asian/Pacific Islander	15	6
American Indian/Alaska Native	2	0.7
Level of Education*		
Diploma	53	20
Associate's degree	73	27
Bachelor's degree in nursing	104	39
Bachelor's degree in other field	22	8
Master's degree in nursing	9	3
Master's degree in other field	6	2
Doctorate in other field	2	0.7
Work Position*		
Staff	230	86
Educator	21	8
Supervisor	4	2
Director	2	0.7
Faculty	2	0.7
RNFA	2	0.7
Manager	3	1
Retired	2	0.7
Full-Time Student	1	0.4
Certification*		
Yes	141	52
No	129	48

Note. All items were not answered by the total sample ($N = 272$). *Indicates categories with missing data.

D. Results of the Findings

The *Perioperative Nurse Questionnaire* was the instrument I used to collect data on the responses of perioperative registered nurses in regard to intraoperative nursing errors. Definitions, causes, circumstances, reactions, coping, and changes in practices were the main topic areas from which I constructed items. The participants were willing to provide answers to the timely topic of errors in the surgical workplace. I presented the results of each research question according to the particular statistical method used for analysis.

Research Question 1: How do perioperative nurses define intraoperative nursing errors?

All participants ($N = 272$) rated definitions of error according to a 4-point Likert scale as shown in Table 3. Perioperative nurses agreed strongly to the following definitions of error: (a) was unclear about surgical site (56%); (b) improperly placed electro-surgical unit (ESU) pad (54%); (c) improper patient positioning (59%); (d) miscalculated dose/strength of medication (72%); (e) inaccurate, incomplete, or absent surgical count (73%); (f) break in sterile technique (55%); (g) retained foreign object (69%); (h) equipment misuse related to lack of knowledge (51%); (i) was unaware of patient allergy (54%); and (j) misidentified a patient (69%). Responses varied on whether or not the participants agreed strongly to the following items as representing definitions of intraoperative nursing errors: (a) lack of appropriate equipment (27%), (b) blood or blood product transfusion reactions (28%), and (c) incorrect surgical prep (45%). A majority of the perioperative nurses (45%) felt that a close call was the same as an error regardless of patient outcome. Twenty-six percent answered yes but only if there was direct patient harm, 18% chose no, regardless of the outcome, and 11% were unsure.

These findings suggested that the perioperative nurses believed a majority of the items represented errors for which they felt responsible, and could have resulted in distress or harm to a patient. The perioperative nurses felt that these errors would be within their locus of control and would have been judged wrong by knowledgeable peers. Although many of the participants considered a close call the same as an error regardless of patient outcome, other alternative definitions were also chosen implying confusion as to what constitutes a close call.

Table 3

Definitions of Intraoperative Nursing Error

Items ($N = 272$)	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Unclear about surgical site	35 (13%)	21 (8%)	61 (23%)	151 (56%)
Improperly placed ESU pad	33 (12%)	25 (9%)	65 (24%)	145 (54%)
Improper patient positioning	18 (7%)	25 (9%)	68 (25%)	157 (59%)
Miscalculated dose/strength of medication	24 (9%)	16 (6%)	35 (13%)	191 (72%)
Inaccurate, incomplete, or absent surgical count	23 (9%)	15 (6%)	35 (13%)	194 (73%)
Break in sterile technique	12 (5%)	26 (10%)	82 (31%)	148 (56%)
Retained foreign object	28 (10%)	17 (6%)	39 (15%)	184 (69%)
Equipment misuse related to lack of knowledge	9 (3%)	28 (11%)	92 (35%)	136 (51%)
Lack of appropriate equipment	18 (7%)	57 (22%)	118 (45%)	72 (27%)
Blood or blood product transfusion reaction	72 (27%)	60 (23%)	61 (23%)	74 (28%)
Incorrect surgical prep	36 (14%)	36 (14%)	75 (28%)	120 (45%)
Unaware of patient allergy	23 (9%)	32 (12%)	69 (26%)	144 (54%)
Misidentified patient	46 (17%)	13 (5%)	24 (9%)	185 (69%)

Note. All items were not answered by the total sample ($N = 272$). Percentages were rounded to the nearest whole number.

Research Question 2: What are the circumstances of intraoperative errors?

Of the total number of respondents ($N = 272$), 158 (58%) claimed they had committed errors. The time of the error occurred within the last 6 months for 26% of the

sample ($n = 40$), between 7 and 12 months for 9% ($n = 14$), more than 1 and up to 2 years for 12% ($n = 18$) and more than 2 and up to 4 years in 14% ($n = 22$). The majority of errors occurred more than 4 years prior to participation in the study (40%, $n = 62$). Table 4 summarizes the nursing and patient variables for this sample related to the circumstances of the error.

More than 38% of the respondents had greater than 10 years of perioperative nursing experience compared with 6 months to 2 years (28%), 3 to 6 years (26%), and 7 to 10 years (6%). Most of the patients were between the ages of 18 and 65 (72%). Five percent of the patients were less than 18 years old and 24% were over 65 years of age. Fully functioning was the level chosen by 70% of the sample in describing their patients prior to the error. Fourteen percent of the sample reported that their patient's functioning was mildly compromised prior to the error, 13% chose moderately compromised, and 3% reported severely compromised. The errors occurred primarily after the administration of anesthesia (64%). After the error, 59% of the perioperative nurses believed that their patients were not at all affected by the error while 15% of the patients were moderately affected, 20% were mildly affected, and 1% was severely affected. Five percent of the sample did not know how their patients were affected by the error.

The types of surgical procedures in which the errors occurred also varied. Errors were committed in the full spectrum of surgical specialties with the highest number of errors occurring during general surgical procedures, followed by orthopedic, gynecologic, ophthalmic, and urologic surgeries.

Table 4

Circumstances of Intraoperative Nursing Errors

	<i>n</i> = 158	<i>P</i>
Years of nursing experience*		
6 months-2 years	44	28
3-6 years	41	26
7-10 years	10	6
More than 10 years	60	39
Age of patient*		
<18 years old	7	5
18-64 years old	112	72
65 years or older	37	24
Patient level of functioning*		
Fully functioning	108	70
Mildly compromised	22	14
Moderately compromised	20	13
Severely compromised	5	3
Prior or after anesthesia*		
Prior	21	14
After	99	64
Not Applicable	36	23
Patient Affected*		
Not at all	92	59
Mildly	24	15
Moderately	31	20
Severely	2	1
Don't know	7	5

Note. All items were not answered by the total number of participants who committed an error ($n = 158$). Total study sample ($N = 272$). *Indicates categories with missing data. Percentages were rounded to the nearest whole number.

Research Question 3: What are the perceived causes of intraoperative nursing errors?

The items constructed for the causes of errors were reviewed as well as recommended by a panel of perioperative nursing experts and rated according to a content validity index (see Appendix J). Causes of the error were categorized according

to the participants' perceptions relating to occurrence and description of the error. Subscales were constructed from the items related to causes of error. The subscales were (a) inexperience, (b) lack of supervision, (c) job overload, and (d) faulty judgment. Participants primarily disagreed strongly on items pertaining to why the error occurred. However, 31% of respondents disagreed with the item, *I was distracted*, while 31% agreed somewhat and 28% agreed strongly. Forty-eight percent of the perioperative nurses disagreed strongly to the item, *I did not follow standard policy and procedure*, with 22% agreeing somewhat to the same item. Thirty-seven percent of the participants disagreed strongly to there being miscommunication among team members, but 36% agreed strongly to the same item. In addition, 33% disagreed strongly with feeling that they had too many things to do at once while 27% agreed somewhat and 27% agreed strongly. Sixty-seven percent disagreed strongly in the belief that the system in which they worked was defective.

It may be inferred from the findings that the participants negated both internal and external factors as causes of error. External reasons such as inadequate supervision, lack of appropriate equipment, and improper orientation were not supported as causes of error nor were the internal factors of unfamiliarity with the procedure, and being tired. Table 5 presents the perioperative nurses' responses to the question as to why the error occurred as measured on a 4-point Likert scale. Missing data for these questions were identified and coded in SPSS 13.0.

Description of the error was identified by nine items as shown in Table 6. The items representing description were included in the same subscales used for causes of error.

Table 5

Occurrences of Error

Statements (<i>n</i> = 158)	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
(I) I was unfamiliar with procedure	110 (71%)	19 (12%)	15 (10%)	11 (7%)
(LS) I was responsible but someone else made the mistake	80 (51%)	23 (15%)	29 (19%)	25 (16%)
(I) I did not have enough information	87 (56%)	18 (12%)	22 (14%)	28 (18%)
(FJ) I made up my mind too quickly	87 (56%)	15 (10%)	32 (21%)	22 (14%)
(JO) I was distracted	48 (31%)	16 (10%)	49 (31%)	43 (28%)
(LS) Inadequate supervision by managers	114 (73%)	18 (12%)	14 (9%)	10 (6%)
(LS) Inadequate staffing levels	99 (63%)	17 (11%)	19 (12%)	22 (14%)
(LS) Lack of appropriate equipment or supplies	120 (78%)	15 (10%)	9 (6%)	10 (7%)
(JO) I was tired	101 (65%)	25 (16%)	17 (11%)	12 (8%)
(LS) The system was defective	104 (67%)	19 (13%)	23 (15%)	9 (6%)
(FJ) I did not follow standard policy and procedure	75 (48%)	23 (15%)	34 (22%)	24 (15%)
(I) I was not properly oriented	116 (76%)	15 (10%)	9 (6%)	13 (9%)
(LS) Miscommunication among team members	57 (37%)	10 (6%)	33 (21%)	56 (36%)
(JO) I had too many things to do at once	51 (33%)	21 (14%)	42 (27%)	42 (27%)

Note. All items were not answered by the total number of participants who committed an error (*n* = 158). Total study sample (*N* = 272). Percentages were rounded to the nearest whole number. Subscales are identified as follows: (I) = inexperience; (LS) = lack of supervision; (FJ) = faulty judgment; and, (JO) = job overload.

A high percentage (82%) of perioperative nurses did not believe they acted beyond their competence, had a lapse of memory (74%), gave inaccurate or inadequate information (71%), or missed the warning signs (69%). *I missed the warning signs* and *I acted beyond my competence* were two items included in the subscale of inexperience. From the results it may be surmised that many of the perioperative nurses did not believe inexperience to be a factor in error causation. It was determined that 39% of the sample

had more than 10 years of experience. In regards to inadequate communication on the part of the perioperative nurses, 50% disagreed strongly, 12% disagreed somewhat, 21% agreed somewhat, and 18% agreed strongly. Over one half of the perioperative nurses in this study believed that a lack of communication on their part was not a cause of their error. Missing data for these questions were identified and coded in SPSS 13.0.

Table 6

Description of Error

Statements (<i>n</i> = 158)	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
(I) My attention wandered	85 (54%)	17 (11%)	37 (24%)	18 (12%)
(JO) I had a lapse of memory	116 (74%)	18 (12%)	14 (9%)	9 (6%)
(FJ) I made the wrong decision	80 (51%)	16 (10%)	38 (24%)	23 (15%)
(FJ) I assessed the situation wrongly	91 (59%)	19 (12%)	28 (18%)	17 (11%)
(I) I missed the warning signs	108 (69%)	19 (12%)	15 (10%)	14 (9%)
(FJ) I gave inaccurate or inadequate information	112 (71%)	16 (10%)	16 (10%)	13 (8%)
(FJ) I relied on someone else's judgment	72 (46%)	15 (10%)	27 (17%)	44 (28%)
(I) I acted beyond my competence	129 (82%)	13 (8%)	10 (6%)	5 (3%)
(FJ) I did not communicate enough	78 (50%)	18 (12%)	33 (21%)	28 (18%)

Note. All items were not answered by the total number of participants who committed an error (*n* = 158). Total study sample (*N* = 272). Percentages were rounded to the nearest whole number. Subscales are identified as follows. (I) = inexperience; (LS) = lack of supervision; (FJ) = faulty judgment; and, (JO) = job overload.

The items representing causes of the error were then grouped into the four subscales of inexperience, lack of supervision, job overload, and faulty judgment. The total mean scores were computed if each respondent answered 70% of the questions in each subscale. If the scale had only 2 questions as in the case of institutional response, the means were computed if both questions were answered. Cronbach's index of internal consistency (Cronbach's alpha) measures the extent to which the obtained score is a

measure of the true score. An acceptable measure of reliability for a psychometric instrument to be considered useful is at approximately .70 (Aron, & Aron, 1997).

Table 7 shows the means, standard deviations, and reliability coefficients (Cronbach's alpha) for the scales. Because of the low internal consistency value of .59, the items may not adequately represent job overload.

Table 7

Subscales Representing Causes of Error

Scales	Number of Items	<i>M</i>	<i>SD</i>	Cronbach's α
Causes of Error				
Inexperience	5	1.57	.648	.69
Lack of supervision	6	1.80	.669	.69
Job overload	4	2.11	.740	.59
Faulty judgment	7	1.96	.686	.70

Respondents were asked to rate items related to the operating room (OR) atmosphere at the time the error occurred. There were six items that described the atmosphere of the OR including staff conflict, a stressful environment, shortcut practices, communication, inadequate staffing, and non-supportive managers. The variables that represented the OR atmosphere that were most disagreed strongly to by the participants were (a) conflict among the staff (67%), (b) taking shortcuts was normal practice in the OR (60%), (c) managers' attitudes (56%), and (d) short staff practices (53%). Again, participants were split as to communication being a factor in error occurrence with 29% disagreeing strongly, 29% agreeing somewhat, and 28% agreeing strongly. Table 8 shows the participants' responses to questions about the operating room atmosphere. Missing data for these questions were identified and coded in SPSS 13.0.

Table 8

Operating Room Atmosphere

Statements (<i>n</i> = 158)	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
The environment in the OR was particularly stressful	39 (25%)	31 (20%)	49 (31%)	38 (24%)
There was conflict among the staff in the OR	105 (67%)	29 (18%)	16 (10%)	8 (5%)
Managers just expected you to get on with the work regardless	88 (56%)	17 (11%)	31 (20%)	20 (13%)
Taking “short cuts” was almost the norm	95 (60%)	30 (19%)	21 (13%)	12 (8%)
It was common practice to be short staffed	84 (53%)	23 (15%)	33 (21%)	18 (11%)
There was not enough communication among the staff in the OR	45 (29%)	22 (14%)	45 (29%)	44 (28%)

Note. All items were not answered by the total number of participants who committed an error (*n* = 158). Total study sample (*N* = 272). Percentages were rounded to the nearest whole number.

Research Question 4: To what extent do perioperative nurses experience emotional distress after committing an error?

Table 9 shows how the participants answered items on reactions to an error they may have made. A number of perioperative nurses agreed strongly (73%) that they were angry with themselves but not necessarily angry at other people (41%). Some perioperative nurses felt inadequate (42%), guilty (59%), or embarrassed (48%). Although it was previously identified that 59% of the perioperative nurses believed that their patients were unaffected by the error, 60% felt devastated that they may have hurt their patients in some way. The item related to being indifferent was strongly disagreed to by 87% of the perioperative nurses indicating that some level of emotional distress was felt by a sizeable number of participants. Missing data for these questions were identified and coded in SPSS 13.0.

Table 9

Reactions to the Error Denoted as Emotional Distress

Statements (<i>n</i> = 158)	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I was angry with myself	7 (5%)	5 (3%)	31 (20%)	114 (73%)
I was angry at other people	65 (41%)	32 (20%)	29 (19%)	31 (20%)
I felt inadequate	34 (22%)	20 (13%)	37 (24%)	66 (42%)
I was fearful of repercussions	43 (27%)	28 (18%)	39 (25%)	47 (30%)
I felt guilty	17 (11%)	7 (5%)	41 (26%)	92 (59%)
I was indifferent	135 (87%)	12 (8%)	6 (4%)	3 (2%)
I felt embarrassed	23 (15%)	14 (9%)	43 (28%)	75 (48%)
I felt devastated that I may have hurt someone	26 (17%)	12 (8%)	25 (16%)	93 (60%)
I believe that my actions were reasonable	56 (36%)	28 (18%)	49 (31%)	23 (15%)
I became depressed	74 (47%)	33 (21%)	30 (19%)	19 (12%)

Note. All items were not answered by the total number of participants who committed an error (*n* = 158). Total study sample (*N* = 272). Percentages were rounded to the nearest whole number.

Of the perioperative nurses who committed an error (*n* = 158), a large number of them (*n* = 149) talked with someone about the experience. Most talked with a nurse manager or supervisor (77%), a colleague (60%), or a physician (65%). Table 10 summarizes how often the perioperative nurses talked with someone about their error, and if they did not talk with anyone, what were the reasons chosen. Three of the participants spoke with a lawyer and two listed a therapist or employee assistance representative. These responses were listed in the “other” category.

Research Question 5: How do perioperative nurses cope with committing an intraoperative error?

A shortened version of the Ways of Coping Scale by Folkman and Lazarus (1984) was used to measure the coping strategies of the participants in this study (see Appendix A). There were a total of 16 items that represented the six subscales.

Table 10

Communication About the Error

	Frequency (<i>f</i>)	Percent (<i>P</i>)
Talked about error (<i>n</i> = 149)	149	94
Manager/Supervisor	115	77
Colleague	90	60
Physician	97	65
Non-nursing friend	19	13
Member of professional organization	8	5
Patient	8	5
Patient Relative	2	1
Spouse/Significant other	49	33
Did not talk about the error (<i>n</i> = 9)	9	6
I was worried what others might think	4	29
I was fearful of repercussions	1	7
I didn't think it was important	1	7
There was no harm to the patient	8	57

Note. Percentages were rounded to the nearest whole number.

The six subscales include accepting responsibility, seeking social support, self-controlling, distancing, escape-avoidance, and planful problem solving.

The items comprising the subscale *accepting responsibility* were (a) I criticized or lectured myself, (b) I promised to do things differently next time, and (c) I apologized or did something to make up. *Seeking social support* was represented by the following items: (a) I accepted sympathy and understanding from someone, (b) I asked a relative or friend I respected for advice, and (c) I talked to someone about how I was feeling. The items categorized into the subscale of *self-controlling* were (a) I tried to keep my feelings to myself, (b) I kept others from knowing how bad things were, and (c) I tried to keep my feelings from interfering with other things too much. The items representing *distancing* were (a) I went on as if nothing had happened, (b) I tried to forget the whole thing, and (c) I didn't let it get to me; I refused to think about it too much. I wished the situation

would go away or somehow be over, and I had fantasies about how things might turn out were the items representing *escape-avoidance*. All of the above subscales were classified as emotion-focused forms of coping. Distancing and escape/avoidance were considered negative forms of coping.

Problem-focused forms of coping were grouped into the subscale, *planful-problem solving*. The items comprising the scale were *I made a plan of action and followed it*, and *I knew what had to be done, so I doubled my efforts to make things work*. Only 5% of the sample indicated they did not use the problem-focused strategy of making and following a plan of action. This indicates an effort made on the part of the perioperative nurses to use problem solving techniques in managing the error.

Low internal consistency scores for the coping subscales of escape/avoidance (Cronbach's alpha = .59) and planful problem solving (Cronbach's alpha = .50) call into question the reliability of the items in measuring the constructs. Table 11 shows the frequencies of all of the identified coping strategies used by the sample according to a 4-point Likert scale. Table 12 provides the frequencies, means, standard deviations, and internal consistency values for the coping subscales of accepting responsibility, seeking social support, self-control, escape-avoidance, planful problem solving, and distancing. Missing data for these questions were identified and coded in SPSS 13.0.

There was interaction with management in 77% ($n = 121$) of the sample. Of those nurses who interacted with a manager, 61% ($n = 74$) discussed the error, 58% ($n = 69$) were counseled, and 40% ($n = 47$) were disciplined. The respondents appeared to be satisfied with how the error was handled and how they personally felt after discussion with a manager.

Table 11

Coping with the Error

Statements (<i>n</i> = 158)	Not Used	Used	Used quite a lot	Used a great deal
I criticized or lectured myself	24 (15%)	59 (38%)	34 (22%)	40 (26%)
I went on as if nothing had happened	124 (79%)	27 (17%)	4 (3%)	3 (2%)
I tried to keep my feelings to myself	68 (43%)	57 (36%)	20 (13%)	12 (8%)
I accepted sympathy and understanding from someone	77 (49%)	66 (42%)	10 (6%)	5 (3%)
I tried to forget the whole thing	118 (75%)	27 (17%)	7 (5%)	6 (4%)
I made a plan of action and followed it	14 (9%)	48 (31%)	40 (26%)	55 (35%)
I didn't let it get to me; I refused to think about it too much	95 (61%)	48 (31%)	8 (5%)	5 (3%)
I asked a relative or friend I respected for advice	120 (76%)	24 (15%)	10 (6%)	4 (3%)
I kept others from knowing how bad things were	115 (73%)	28 (18%)	8 (5%)	6 (4%)
I talked to someone about how I was feeling	56 (36%)	65 (41%)	18 (12%)	18 (12%)
I knew what had to be done, so I doubled my efforts to make thing work	37 (24%)	48 (31%)	35 (22%)	37 (24%)
I tried to keep my feelings from interfering with other things too much	25 (16%)	65 (42%)	41 (26%)	25 (16%)
I wished the situation would go away or somehow be over	91 (58%)	38 (24%)	15 (10%)	14 (9%)
I had fantasies about how things might turn out	105 (67%)	35 (22%)	11 (7%)	7 (4%)
I promised to do things differently next time	12 (8%)	40 (25%)	31 (20%)	75 (48%)
I apologized or did something to make up	61 (39%)	45 (29%)	20 (13%)	31 (20%)

Note. All items were not answered by the total number of participants who committed an error (*n* = 158). Total study sample (*N* = 272). Percentages were rounded to the nearest whole number.

The items were grouped into the subscales representing managerial responses as being either supportive or judgmental. Items representing supportive were (a) I felt supported for the way the case was handled; (b) I believed steps would be taken to prevent future, similar errors; and (c) I maintained my sense of competence.

Table 12

Coping Strategies Subscales

Subscale	Number of Items	<i>M</i>	<i>SD</i>	Cronbach's α
Coping Strategies				
Accepting responsibility	3	2.59	.79	.61
Seeking social support	3	1.38	.56	.73
Self-control	3	1.67	.62	.66
Escape/avoidance	2	1.60	.75	.59
Planful problem solving	2	2.67	.85	.50
Distancing	3	1.89	.71	.72

Judgmental items were (a) I lost professional respect, (b) I felt humiliated, (c) the real cause of the error was not tackled, (d) the action taken against me far outweighed the seriousness of the error, (e) I felt I was used as a scapegoat, and (f) overall, the administration was judgmental about my mistake. Table 13 shows the response frequencies to each item noting that missing data for these questions were identified and coded in SPSS 13.0. Table 14 reflects the means, standard deviations, and reliability coefficients for the managerial response subscales. Internal consistency was found to be low for the subscale representing managerial support (Cronbach's alpha = .38). Thus, the reliability of the participants' responses is questionable in regard to managerial support.

Participants were asked if they experienced any changes in practice as a consequence of having made the error. Changes in practice were divided into constructive and defensive categories. The nine items that reflected constructive changes in practice were (a) I asked my colleagues what they would have done in a similar situation, (b) I pay more attention to detail, (c) I try to read the patient's chart more carefully, (d) I am more likely to seek advice, (e) I keep better documentation on the

patients, (f) I do more observations on patients, (g) I follow policies and procedures more closely, and (h) I listen to patients more closely.

Table 13

Discussion with Manager After Committing an Error

Statements (<i>n</i> = 121)	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I lost professional respect	85 (70%)	15 (12%)	17 (14%)	4 (3%)
I felt supported for the way the case was handled	10 (8%)	12 (10%)	43 (36%)	56 (46%)
I felt humiliated	63 (52%)	20 (17%)	24 (20%)	14 (12%)
The real cause of the error was not tackled	67 (55%)	12 (10%)	27 (22%)	15 (12%)
The action taken against me far outweighed the seriousness of the error	104 (86%)	11 (9%)	3 (3%)	3 (3%)
I felt I was used as a scapegoat	95 (79%)	13 (11%)	7 (6%)	6 (5%)
I believed steps would be taken to prevent future, similar errors	18 (15%)	13 (11%)	46 (38%)	44 (36%)
Overall, the administration was judgmental about my mistake	81 (68%)	22 (18%)	13 (11%)	4 (3%)
I maintained my sense of competence	2 (2%)	7 (6%)	41 (34%)	70 (58%)

Note. All items were not answered by the total number of participants that discussed the error with a manager (*n* = 121). Percentages were rounded to the nearest whole number.

Table 14

Means, Standard Deviations, and Reliability Coefficients for Managerial Response Subscales

Subscale	Number of Items	<i>M</i>	<i>SD</i>	Cronbach's α
Managerial Response				
Judgmental	6	1.57	.65	.81
Supportive	3	3.21	.60	.38

Six items were used to measure defensive changes and included (a) I feel less confident in my work, (b) I get more worried, (c) I am less trusting of others' capability, and (d) I am more likely to keep an error to myself if at all possible. Eighty-one percent

($n = 127$), of the participants strongly agreed that they now pay more attention to detail when caring for their patients. More than 50% did not lose confidence in their work leading them to continue caring for similar patients. A majority of the sample, 75%, disagreed strongly with the item, *I thought about leaving nursing*. Sixty-seven percent were not likely to keep an error to themselves which relates to previous data on talking with someone about the error. Table 15 shows the responses to changes in practice according to the 4-point Likert scale noting that missing data for these questions were identified and coded in SPSS 13.0. Table 16 shows the means, standard deviations, and the reliability coefficients for the changes in practice subscales.

Research Question 6: What is the relationship between coping with intraoperative nursing errors and changes in practice?

Six subscales representing coping strategies including accepting responsibility, distancing, seeking social support, escape-avoidance, planful problem solving, and self-control were correlated with the two subscales representing constructive and defensive changes in practice. The items that compose constructive changes in practice were (a) I asked my colleagues what they would have done in a similar situation, (b) I pay more attention to detail, (c) I try to read the patient's chart more carefully, (d) I am more likely to seek advice, (e) I keep better documentation on the patients, (f) I do more observations on patients, (g) I follow policies and procedures more carefully, (h) I listen to patients more closely, and (i) I slow down more. The items that compose defensive changes in practice were (a) I feel less confident in my work, (b) I get more worried, (c) I am less trusting of others' capability, (d) I am more likely to keep an error to myself if at all possible, (e) I try to avoid similar patients or procedures or both, and (f) I thought about leaving nursing.

Table 15

Changes in Practice

Statements (<i>n</i> = 158)	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
(C) I asked my colleagues what they would have done in a similar situation	67 (44%)	24 (16%)	45 (29%)	18 (12%)
(C) I pay more attention to detail	0 (0%)	0 (0%)	29 (19%)	127 (81%)
(D) I feel less confident in my work	87 (56%)	35 (22%)	30 (19%)	4 (3%)
(C) I try to read the patient's chart more carefully	42 (28%)	18 (12%)	49 (33%)	41 (27%)
(D) I get more worried	72 (47%)	41 (27%)	31 (20%)	11 (7%)
(D) I am less trusting of others' capability	45 (29%)	27 (17%)	57 (37%)	26 (17%)
(C) I am more likely to seek advice	38 (25%)	23 (15%)	70 (46%)	23 (15%)
(C) I keep better documentation on the patients	44 (29%)	14 (9%)	44 (29%)	52 (34%)
(D) I am more likely to keep an error to myself if at all possible	103 (67%)	39 (25%)	8 (5%)	5 (3%)
(C) I do more observations on patients	34 (22%)	27 (18%)	57 (38%)	34 (22%)
(C) I follow policies and procedures more closely	18 (12%)	16 (11%)	52 (34%)	67 (44%)
(C) I listen to patients more closely	40 (27%)	22 (15%)	50 (33%)	38 (25%)
(D) I try to avoid similar patients or procedures or both	117 (77%)	20 (13%)	8 (5%)	7 (5%)
(C) I slow down more	29 (19%)	22 (15%)	69 (45%)	32 (21%)
(D) I thought about leaving nursing	116 (75%)	14 (9%)	20 (13%)	5 (3%)

Note. All items were not answered by the total number of participants who committed an error (*n* = 158). Total study sample (*N* = 272). Percentages were rounded to the nearest whole number. (C) = constructive changes in practice; (D) = defensive changes in practice.

Table 16

Means, Standard Deviations, and Reliability Coefficients for Changes in Practice Subscales

Subscale	Number of Items	<i>M</i>	<i>SD</i>	Cronbach's α
Changes in Practice				
Constructive	9	2.74	.67	.83
Defensive	6	1.70	.56	.69

A strong relationship was found between accepting responsibility and defensive changes in practice, $r = .35$, $p = .000$ as opposed to accepting responsibility and constructive changes in practice, $r = .18$, $p = .03$. The relationships between the coping strategy subscales and changes in practice are shown in Table 17.

Table 17

Relationships Between the Coping Strategy Subscales and Changes in Practice

	1	2	3	4	5	6	7	8
1. Accepting Responsibility	-							
2. Distancing	-.15	-						
3. Seeking Social Support	.29**	-.04	-					
4. Escape Avoidance	.39**	.17*	.31**	-				
5. Planful Problem Solving	.44**	.05	.20*	.20*	-			
6. Self Control	.30**	.30*	.02	.49**	.26**	-		
7. Constructive Changes	.18*	.03	.25**	.27**	.34**	.20*	-	
8. Defensive Changes	.35**	.12	.23**	.52**	.12	.37**	.32**	-

Note. * $p < .05$; ** $p < .01$. The coping strategy subscales include accepting responsibility, distancing, seeking social support, escape-avoidance, planful problem solving, and self-control.

After controlling for the independent variables, multiple regression analysis was also performed to answer research question 6 and to determine the relationship of coping

strategies used by the participants and changes in practice instituted by the nurses after committing an error. Table 18 shows the multiple regression analysis model used to depict the independent coping variables and constructive changes in practice.

As illustrated in Table 18, the coping strategies of seeking social support and planful problem solving were significant predictors of constructive changes in practice. The beta weights for seeking social support, $\beta = .20$, $*p < .05$ and planful problem solving, $\beta = .29$, $**p < .001$ showed the predictive importance of each separate independent variable to the model. The multiple correlation coefficient (R^2) in the model for constructive changes in practice was .20 accounting for 20% of the variance. This result demonstrated the joint contributions of all the coping strategy independent variables to the dependent variable of constructive changes in practice.

Table 18

Multiple Regression Analysis for Variables Predicting Constructive Changes in Practice (N = 158)

Variable	<i>B</i>	<i>SE B</i>	β (beta)
Accepting responsibility	-0.11	0.80	-.12
Distancing	0.03	0.10	.02
Seeking social support	0.21	0.09	.20*
Escape avoidance	0.11	0.08	.13
Planful problem solving	0.23	0.07	.29**
Self control	0.13	0.09	.14

Note. Multiple correlation coefficient ($R^2 = .20$); $*p < .05$; $**p < .001$

Table 19 presents a second multiple regression model designed to predict defensive changes in practice from the coping strategy variables. Analysis indicated that the positive coping strategies, accepting responsibility for the error, $\beta = .17$, $*p < .05$ and using self-control, $\beta = .17$, $*p < .05$ were significant predictors of defensive changes in

practice. In addition, escape-avoidance deemed a negative coping strategy was a significant predictor of defensive changes in practice, $\beta = .33$, $**p < .001$. The results demonstrated the unique contribution of each of these independent variables to the model. The total R^2 for this model was .33 which explained 33% of the variance, thus estimating the power of all the independent variables in predicting defensive changes in practice.

Table 19

Multiple Regression Analysis for Variables Predicting Defensive Changes in Practice (N = 158)

Variable	<i>B</i>	<i>SE B</i>	β (beta)
Accepting responsibility	0.12	0.06	.17*
Distancing	0.80	0.08	.08
Seeking social support	1.00	0.07	.11
Escape/avoidance	0.25	0.06	.34**
Planful problem solving	-0.05	0.05	-.08
Self control	0.13	0.07	.17*

Note. Multiple correlation coefficient ($R^2 = .33$); * $p < .05$; ** $p < .001$

Research Question 7: What is the relationship between coping with intraoperative nursing errors and emotional distress?

The coping strategy subscales as described in the previous section were also correlated with the ten items representing the dependent variable of emotional distress which were (a) I was angry with myself, (b) I was angry at other people, (c) I felt inadequate, (d) I was fearful of repercussions, (e) I felt guilty, (f) I was indifferent, (g) I felt embarrassed, (h) I felt devastated that I may have hurt someone, (i) I believe that my actions were reasonable, and (j) I became depressed. Statistically significant relationships were found between all of the variables with the exception of distancing. One subscale, accepting responsibility, was highly correlated with emotional distress, $r = .55$, $p = .000$.

A strong and statistically significant relationship was also found between the coping strategy of escape/avoidance and emotional distress, $r = .48, p = .000$. Table 20 summarizes the relationships using Pearson product-moment correlation (r) between the coping variable subscales and the dependent variable of emotional distress.

Table 20

Relationships Between the Coping Strategy Subscales and Emotional Distress

	1	2	3	4	5	6	7
1. Accepting responsibility	-						
2. Distancing	-.15	-					
3. Seeking social support	.29**	-.04	-				
4. Escape avoidance	.39**	.17*	.31**	-			
5. Planful problem solving	.44**	.05	.20*	.20*	-		
6. Self control	.30**	.30*	.02	.49**	.26**	-	
7. Emotional distress	.55**	-.05	.28**	.48**	.22**	.47**	-

Note. * $p < .05$; ** $p < .01$. The coping strategy subscales include accepting responsibility, distancing, seeking social support, escape-avoidance, planful problem solving, and self-control

Regression analysis was also used to answer research question 7. The third model predicted emotional distress from the coping strategy variables. Data presented in Table 20 indicates that accepting responsibility, $\beta = .34, **p < .001$ and using self-control $\beta = .38, **p < .001$ were significant predictors of emotional distress. This model explained 47% of the variance ($R^2 = .47$) in the dependent variable of emotional distress based upon all of the independent coping strategy variables combined.

Table 21

Multiple Regression Analysis for Variables Predicting Emotional Distress (N = 158)

Variable	<i>B</i>	<i>SE B</i>	β (beta)
Accepting responsibility	0.26	0.06	.34**
Distancing	-0.07	0.07	-.06
Seeking social support	0.14	0.07	.15
Escape/avoidance	0.11	0.06	.14
Planful problem solving	-0.07	0.05	-.01
Self control	0.32	0.06	.38**

Note. Multiple correlation coefficient ($R^2 = .47$); ** $p < .001$

Additional Correlation Procedures

Correlational procedures were conducted to determine any relationships that may have existed between the independent variable subscales of causes of error and managerial response and the dependent variables of constructive and defensive changes in practice and emotional distress. Causes of the error were grouped into the subscales represented by inexperience, lack of supervision, job overload, and faulty judgment. Table 22 summarizes the relationships using Pearson product-moment correlation (r) between the independent and dependent variables including causes of error, emotional distress, and constructive and defensive changes in practice. Statistically significant relationships were found between all of the variables with the exception of job overload. The Cronbach's index score for job overload was .59. The overall results suggest that those perioperative nurses who believed that their error occurred due to inexperience, lack of supervision, and faulty judgment encountered emotional distress and used both constructive and defensive changes in practice. Descriptive statistical analysis indicated that a majority of the perioperative nurses did not perceive inexperience as a factor in

error causation. Job overload was not correlated with any of the variables, thus it may be that the participants did not perceive job overload as a cause of error.

The subscales representing supportive and judgmental managerial responses were correlated with the dependent variables of emotional distress and changes in practice.

Table 22

Relationships Between Causes of Error Subscale, Emotional Distress, and Changes in Practice

Subscale (Causes of Error)	1	2	3	4	5	6	7
1. Inexperience	-						
2. Lack of supervision	.50**	-					
3. Job overload	-.005	.13	-				
4. Faulty judgment	.30**	.45**	.11	-			
5. Emotional distress	.29**	.42**	.13	.36**	-		
6. Constructive changes	.26**	.31**	.01	.25**	.27**	-	
7. Defensive changes	.27**	.45**	.12	.27**	.54**	.32**	-

Note. * $p < .05$; ** $p < .01$. The causes of error subscales include inexperience, lack of supervision, job overload, and faulty judgment.

Items representing the supportive subscale were (a) I felt supported for the way the case was handled, (b) I believed steps would be taken to prevent future, similar errors, and (c) I maintained my sense of competence. Items representing the judgmental subscale were (a) I lost professional respect, (b) I felt humiliated, (c) the real cause of the error was not tackled, (d) the action taken against me far outweighed the seriousness of the error, (e) I felt I was used as a scapegoat, and (f) overall, the administration was judgmental about my mistake. A strong and statistically significant relationship was shown between a judgmental response on the part of the manager and defensive changes in practice, $r = .56, p = .000$. A significant negative relationship between managerial support and defensive changes in practice was also shown. The relationships demonstrated that those participants who indicated a supportive environment tended to use less defensive changes

in practice, while those participants who felt that the management was judgmental used defensive changes in practice. Table 23 illustrates the relationships between the supportive and constructive managerial response subscales and the dependent variables of emotional distress and constructive and defensive changes in practice.

Table 23

Relationships Between the Managerial Response Subscales, Emotional Distress, and Changes in Practice

	1	2	3	4	5
1. Judgmental	-				
2. Supportive	.47**	-			
3. Emotional distress	.36**	-.14	-		
4. Constructive changes	.22*	.17	.27**	-	
5. Defensive changes	.56**	-.33**	.32**	.54**	-

Note. * $p < .05$; ** $p < .01$. The managerial response subscales are represented by the items judgmental and supportive.

D. Discussion of the Results

The results of the study are discussed in this section. The section is organized according to each research question. The conceptual framework that guided this study was derived from Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping. Important to this theory is that coping involves the use of both problem and emotion focused strategies. Problem-focused forms of coping are used whereby an individual has determined that the conditions precipitated by a stressful event are amenable to change. Emotion-focused forms of coping are utilized if an individual appraises the condition as too harmful or threatening, thereby reducing the probability of modifying the condition. Both forms of coping are used by individuals who are faced with real life stressful encounters.

For this study, an intraoperative nursing error represented the stressful event for the perioperative nurses. The mediating processes used by the perioperative nurses in response to committing an error were the emotion and problem focused forms of coping. The adaptational outcomes resulting from this process were levels of emotional distress, and constructive and defensive changes in practice. Application of the conceptual framework that guided this study (see Figure 1) is integrated throughout this section.

Research Question 1: How do Perioperative Nurses Define Intraoperative Nursing Errors?

The first research question, *how do perioperative nurses define intraoperative nursing errors*, was asked of all participants ($N = 272$) so that errors specific to the intraoperative phase could be categorized apart from the preoperative and postoperative phases of perioperative nursing. Because a majority of the perioperative nurses worked in a staff position within surgical services, ($n = 230$), it may be concluded that their responses were based on their own clinical experiences. There was generalized agreement on the definitions of intraoperative nursing errors with the exception of two responses. Interestingly, only 27% of the participants agreed strongly that a blood or blood product transfusion reaction was an intraoperative nursing error. This may be because administration of blood products in the operating room (OR) is primarily the responsibility of the anesthesia care provider. Also, the results from the question relating to OR equipment seemed to indicate that there was some confusion in regard to terminology. A higher percentage of respondents may have chosen the item related to equipment if equipment malfunction had been used instead of lack of appropriate equipment. According to AORN, the safe use of equipment and the administration of blood therapy products are considered standard perioperative competencies (2006).

The analysis of data in regard to the first research question supports previous research on intraoperative errors. For example, in a review of incident reports Chappy (2006) found that the most commonly reported errors were incorrect or omitted counts, equipment malfunction, and medication. In addition, agreement by the participants on a majority of the items identified as definitions of intraoperative nursing errors correlated well with the focused areas established by the AORN Presidential Commission on Patient Safety. The areas identified by the commission were correct site surgery, medication safety, patient positioning, counts, retained foreign objects, and blood transfusions (Watson, 2003).

To further support the findings relative to the first research question, I reviewed the perioperative nursing data set, which is a structured vocabulary specific to perioperative nursing (Beyea, 2002). The taxonomy is organized according to domains and safety is the first domain. It is concluded in the domain of safety that freedom from physical injury incurred during a surgical or invasive procedure is the desired patient outcome. Interventions are directed toward prevention of patient harm and reflected the areas represented in the questionnaire as definitions of intraoperative nursing errors. These included injury from equipment, instrumentation, sponges or sharps, thermal, mechanical, and electrical sources of injury, medication errors, and patient positioning.

Other findings from the first research questions were not supported in the literature. For example, 28% of the participants did not agree that an incorrect surgical prep was an intraoperative nursing error. Most startling of all was the fact that approximately 21% did not agree that not knowing the patient's allergies was an error, or that 22% did not choose the item, *misidentifying a patient*, as a nursing error. I may only

speculate that the items needed better clarification because these particular nursing actions are basic clinical competencies expected of all perioperative nurses.

Do you consider a close call the same as an error was the second question in the questionnaire. Several definitions exist for the term, *close call*, but one commonality among the definitions is that the patient becomes harmed if the close call results in an error. AORN, (n.d.) defines a close call as “events or situations that could have resulted in accident, injury or illness if left undetected” which suggests a delineation between error and close call. This definition, along with a definition for nursing error, was provided on the first page of the questionnaire. The respondents’ answers to this question indicated that many believed that a close call was the same as an error regardless of patient outcome (45%). It may be that education geared toward teaching nurses the correct terminology is needed to assist them in determining which events are clearly errors versus close calls, thus leading to proper recognition and reporting procedures.

Research Question 2: What are the circumstances of intraoperative errors?

The second research question, *What are the circumstances of intraoperative errors*, encompassed both patient and nurse variables. Thirty-nine percent of respondents had more than 10 years of experience, and 28% had only 6 months to 2 years. Presently, there are no data available on the average years of experience for a perioperative registered nurse (K. Keene, personal communication, July 3, 2006) thus it was not possible to compare and determine whether or not the results of this study in regard to experience are representative of those registered nurses working in the OR.

Most of the patients (72%) were 18-64 years old, suggesting that a majority of the perioperative nurses worked with an adult population. All were able to answer how the

patient was affected after the error except for 7 participants, indicating that the outcome was determined before the patient left the operating room suite.

Determining from the data collected in this study which errors were not detected until the postoperative period generates additional questions. For example, a negative outcome from improper positioning is the development of a pressure ulcer. Lindgren, Unosson, Krantz, and Ek, (2005) found that 14.3% of patients in their study ($n = 286$) developed pressure ulcers postoperatively. Generally, perioperative nurses do not follow their patients once they leave the operating room making it improbable that the nurses would be able to report any negative outcomes post surgery unless it was brought to their attention. Further analysis of the data indicated that the errors occurred in many different surgical procedures although most took place during general surgery. Although no discernible pattern could be identified from this information, many open general surgical procedures are conducted through a large incision. In a study on retained sponges and instruments, Gawande et al. (2003) found that 54% of foreign bodies were left in the abdomen or pelvis.

Research Question 3: What are the perceived causes of intraoperative nursing errors?

According to the cognitive theory of psychological stress and coping by Lazarus and Folkman (1984), individuals use the process of cognitive appraisal in assessing a stressful encounter. For this study, the perioperative nurses identified what they believed to be causes of intraoperative nursing errors by using the primary and secondary cognitive appraisal process before deciding which coping strategies would best manage the aftermath of committing an error. Perceived causes of intraoperative nursing errors included personal reasons and external variables such as the operating room atmosphere,

and suggested that the perioperative nurses may have felt personally responsible for committing the error and may not have attributed external factors such as lack of appropriate supplies, inadequate supervision, improper orientation, or a defective system under which they worked as potential causes. It also appeared from the data that the perioperative nurses did not attribute memory lapses or acting beyond one's competence as causes of their error.

These findings contradict the results of a study on causes of assessment omissions in the emergency room done by Meurier, Vincent, and Parmar (1998b) who found that the nurses tended to direct cause to external reasons such as stressful atmosphere, work overload, and too many nurses involved in the assessment. These findings support attribution theory which implies that individuals tend to blame others for failure (Meurier, et al., 1998a).

Differences in the findings of this study and the study by Meurier et al. (1998b) may be due to several factors. Meurier et al. suggested that the reasons the nurses directed cause to external factors may have been due to feelings of helplessness in conducting an accurate assessment and lack of control in regard to the patient's care. The findings also called into question whether or not the nurses perceived assessment omissions as actual errors. In a study on reporting of medication errors, Baker (1997) found that nurses tended to redefine institutional definitions of what constituted a medication error through their own tacit understanding of the rules.

Perioperative nurses direct their care to one surgical patient at a time where as emergency room nurses may be caring for several patients. Perioperative nurses have more control over their environment and assume the role of the "circulator". In this role,

they direct the care of the patient and meet the needs of the entire surgical team. Unlike the emergency room nurses who were not sure if assessment omissions were errors, the participants in this study were in agreement with the definitions of intraoperative nursing errors and as previously reported, directed the causes of error internally. The perioperative nurses took responsibility for their errors and did not project blame elsewhere.

The internal consistency scores were adequate for the subscales representing causes of error except for job overload (Cronbach's alpha = .59). The poor internal consistency of this variable calls into question the reliability of the scale in measuring job overload and whether or not the items were perceived by the participants as defining job overload. Sixty-five percent of the participants disagreed strongly with the item, *I was tired* and 74% disagreed strongly with the item, *I had a lapse of memory*. These two items were included in the subscale of job overload and may not have been understood by the participants as representing job overload. The remaining two items included in the job overload subscale were, *I was distracted*, and *I had too many things to do at once*. More participants agreed somewhat or agreed strongly with these items suggesting that the items may have been more representative of job overload.

Research Question 4: To what extent do perioperative nurses experience emotional distress after committing an intraoperative error?

I made no assumption as to the level of emotional distress, if any, felt by the participants after committing an error. One of the perioperative experts who reviewed the questionnaire for content validity suggested that the items reflect both socially desirable and undesirable responses. It was apparent from the data extracted from Question 4, *To what extent do perioperative nurses experience emotional distress after committing an*

intraoperative error, that the perioperative nurses felt a variety of emotions. A majority (87%) disagreed strongly to the item of feeling indifferent toward the experience, yet responses to the item, I believe that my actions were reasonable, were not as extreme. This finding suggested that most of the perioperative nurses experienced some level of emotional distress but may have considered their actions to be appropriate at the time considering the circumstances.

Seventy-three percent ($n = 114$) of the perioperative nurses were angry with themselves implying a strong tendency to internalize their feelings. Perioperative nurses tend to become angry with their self especially if they feel their level of expertise does not warrant making mistakes. This finding was similar to a study on errors in nursing practice in which 73% ($n = 94$) of the nurses felt angry with themselves (Meurier et al., 1997). In addition to feelings of anger, 59% of the perioperative nurses felt guilty as a result of committing an error. Because patient safety is continuously stressed as paramount to what constitutes a “good nurse”, nurses may feel that they may have let their patients down if they committed an error. This may lead to feelings of guilt and self-blame. In a study of nurses’ experiences with medication errors, Arndt (1994a) found that nurses felt guilty about causing patient harm as a result of their error. In addition, Meurier et al. (1998a) found in their study of causal attributions made by nurses after committing an error that nurses tended to blame themselves for an error especially if the error resulted in a serious negative patient outcome. Regardless, however, the nurses tended to take responsibility for their errors despite its severity. Nurses and other healthcare professionals are not expected to commit errors and this way of thinking becomes ingrained throughout the socialization process in many health professions (Leape, 1994).

An additional finding of particular interest for this study on intraoperative nursing errors was that 60% of the nurses felt devastated that they may have hurt someone. Studies on the emotional toll felt by healthcare professionals after committing an error has shown that there may be lasting consequences for the practitioner. Wu et al. (1991) found that some physicians rejected careers in subspecialties after missing a diagnosis, and one house officer reported feeling very worrisome and nervous about clinical medicine after the mistake resulted in a patient death. High levels of emotional distress led some physicians to remember in detail errors they had committed several years prior to their participation in a study by Christensen et al. (1992).

In a secondary analysis of data of Christensen's et al. (1992) study which examined the responses of healthcare providers on serious medication errors, Serembus, Wolf, and Youngblood (2001) sought additional insight into the consequences surrounding fatal medication errors. The participants were easily able to recall the experience and admitted to feelings of guilt and sadness. Committing the error had lasting lifestyle changes for the participants. The impact upon these participants included insomnia, job loss, and isolation from supportive co-workers and family members.

In this study, emotional distress was considered one of the adaptational outcomes as defined by the cognitive theory of psychological stress and coping (Lazarus & Folkman, 1984). As shown in this study, emotional distress was indeed a consequence of the coping process experienced by the perioperative nurses after they committed an error.

Research Question 5: How do perioperative nurses cope with committing an intraoperative error?

In analyzing the results from question 5, *How do perioperative nurses cope with committing an intraoperative error*, negative coping strategies identified by the subscale

of distancing were not used by the majority of the perioperative nurses. A negative strategy such as, I went on as if nothing had happened, were not used by 79% of the sample. In addition, 75% of the participants did not use the strategy, I tried to forget the whole thing. Other evidence supporting the willingness of the respondents to use positive coping strategies was indicated by 58% of the sample that did not use escape-avoidance as a coping strategy from one item, I wished the situation would go away or somehow be over. In addition, 67% of the participants did not use the strategy of having fantasies of how things might turn out.

The nurses were purposeful in their actions following the error which is apparent by 35% of the sample who claimed to use the strategy, *I made a plan of action and then followed it*. Accepting responsibility was used a great deal by a number of respondents as evidence by their choosing the strategies of (a) I criticized or lectured myself (26%), (b) I promised to do things differently next time (48%), and (c) I apologized or did something to make up (20%). Even though 94% of nurses who committed an error talked with someone afterwards, 76% did not ask for advice from a relative or friend and 49% did not accept sympathy and understanding. These strategies were identified as seeking social support. These results are in contrast to the Meurier et al. (1997) study in which 25% of the respondents talked to someone about how they were feeling, 25% accepted sympathy and understanding from someone, and 18% asked a relative or friend they respected for advice.

Questions were asked of the participants about their interaction with managers following the error. If they did interact, the questions asked were categorized into the subscales of supportive and judgmental managerial responses. One of the more striking

findings of this study was that the participants felt the management staff was supportive and not judgmental in their responses. A majority of the nurses did not lose professional respect (70%), were not humiliated (52%), did not feel they were used as a scapegoat (79%), and felt supported for the way the case was handled (46%).

In contrast, Wolf, Seremus, Smetzer, Cohen, and Cohen (2000) found from the responses of nurses, physicians, and pharmacists in their study on medication errors that fear of punishment and disciplinary action were highly ranked as participant responses. A new graduate admitted feeling humiliated by a nurse manager while another participant questioned whether or not it was best to disclose the error because of the negative management responses. Worried about management reactions and not reporting an error due to fear of management reactions were two themes Gladstone (1995) identified from interviews with nurses who committed a medication error while practicing in a general acute care hospital in southwest England. The findings from this study on intraoperative nursing errors are promising in lieu of the past research and literature that reports a current healthcare culture known as punitive and non-supportive toward health team members that commit errors (Leape et al., 1998; Wolf & Serembus, 2004).

Due to the lack of access to the OR, it may be difficult to compare the managerial responses with those of other nursing units. It may be surmised that the managerial approach to OR errors is quite different from other nursing specialties or that the relationship between staff and management is more intimate and confidential. This difference may be attributed to several reasons. Because of the physical isolation of the OR, members of the surgical team including management tend to associate more with each other than other healthcare professionals. Access to the OR is restricted and gained

through locks, key codes, and identification badge entries. Frequently, the surgical team remains within the confines of the OR for breaks, lunch, and dinner periods. The perioperative nurses' uniform is different from other nurses and wearing a mask and head cover contributes to a sense of anonymity and exclusivity.

Unlike other nursing specialties, OR nurses are required to take call, perform both scrub and circulating duties, operate sophisticated equipment, and use specialty instrumentation. Due to the nature of the specialty, perioperative nurses are not included in the general nurse population when it comes to annual clinical competencies, educational programs, and professional activities. These factors may contribute to self-imposed feelings of segregation. As a result, errors committed in the OR may be handled without knowledge and interference from other departments. The surgical team may adopt a "take care of their own" mentality relating to issues within the OR. Further research is needed to uncover the underlying reasons why perioperative nurses in this study felt differently about how they were treated by the operating room management as compared with registered nurses working in areas other than the OR.

Research Question 6: What is the relationship between coping with intraoperative nursing errors and changes in practice?

Multiple regression analysis was used to answer research question 6. Prior to this analysis, correlations were conducted on the independent variable subscales representing coping strategies with the dependent variables of constructive and defensive changes in practice. A moderate but significant relationship was shown between the coping strategy of planful problem solving with constructive changes in practice ($r = .34, p = .000$). In contrast, moderate and significant relationships were also shown between exercising the coping strategy of self-control with defensive changes in practice ($r = .37, p = .000$) and

accepting responsibility with defensive changes in practice ($r = .35, p = .000$). All three strategies were considered to be positive forms of coping.

A strong significant relationship was shown between the coping strategy known as escape-avoidance with defensive changes in practice ($r = .52, p = .000$). These results suggested that those perioperative nurses who used maladaptive ways of coping after committing an error changed their practice in more defensive ways. In addition, using coping strategies considered positive resulted in both constructive and defensive changes in practice. The remaining coping strategies showed somewhat weak relationships with constructive and defensive changes in practice. As a result of the correlation analyses, it cannot be inferred that using positive coping strategies led exclusively to constructive changes in practice.

Seeking social support, ($\beta = .20, p < .05$), and playful problem solving ($\beta = .29, p < .001$) were the only two coping strategies to emerge as significant predictors of constructive changes in practice. Collectively, all of the coping strategy variables accounted for 20% of the variance in the dependent variable of constructive changes in practice. Meurier et al. (1997) found in their study with British ward nurses that the coping strategy variables showed more power in predicting constructive changes in practice ($R^2 = .43$).

Additional analysis of this study indicated that the positive coping strategy, accepting responsibility for the error was a significant predictor for defensive changes in practice ($\beta = .17, p < .05$). This finding suggested that although the perioperative nurses held themselves accountable for the error, they adopted some defensive changes identified by the items in the questionnaire as (a) I feel less confident in my work, (b) I

get more worried, and (c) I am less trusting of others' capability. The coping strategy of self-control ($\beta = .17, p < .05$) was equally predictive of defensive changes in practice. The most predictive of defensive changes in practice was the coping strategy of escape-avoidance ($\beta = .35, p < .001$). The total R^2 for this model explained 33% of the variance in the dependent variable of defensive changes in practice. Interpretation of these findings indicates that both positive and negative coping strategies were predictors of defensive changes in practice. These are not in disagreement with other studies on coping. Folkman and Moskowitz (2004) stated that emotion- and problem-focused forms of coping have been associated with negative, or positive outcomes, or neither. One method of coping can have a positive effect on one outcome and a negative impact on another. The outcomes depend upon how the individual appraises the stressful encounter and the characteristics affiliated with the event.

Research Question 7: What is the relationship between coping with intraoperative nursing errors and emotional distress?

A strong significant relationship was shown between the coping strategy of accepting responsibility with emotional distress ($r = .55, p = .000$). Moderate, yet significant, relationships were found between emotional distress and the strategies of self-control ($r = .47, p = .000$) and escape-avoidance ($r = .48, p = .000$). Although statistically significant, less robust relationships occurred between emotional distress and seeking social support ($r = .28, p = .000$), and planful problem solving ($r = .22, p = .000$). It appears from the data that using both negative and positive forms of coping may influence some level of emotional distress. The relationship between accepting responsibility and emotional distress was also shown in two previous studies on errors (Meurier et al., 1997; Wu et al., 1991). The coping strategy of distancing was the lone

variable not shown to influence emotional distress in this study. Descriptive statistical analysis indicated that a large percentage of the perioperative nurses did not use the coping strategy of distancing. This implies that the perioperative nurses in this sample recognized the problem of committing an error and chose to deal with it head on as opposed to deliberately putting the experience out of their minds.

Determining whether or not a particular coping strategy is positive or negative depends upon the context of the situation. It may be inferred that the perioperative nurses chose to use both types of strategies according to their own interpretations of the stressful experience of committing an error. The type of stressful event and the circumstances surrounding it may determine whether or not one coping strategy is more effective than another at a given point in time.

Participants used the coping strategies of accepting responsibility ($\beta = .34, p < .001$), and using self control ($\beta = .17, p < .05$) which were found to be significant predictors of emotional distress. Wu et al. (1991) studied how house officers reacted to medical errors and also found accepting responsibility to be a significant predictor of emotional distress ($\beta = .67, p = .0001$). The findings suggest that while nurses may readily accept responsibility for errors and not blame others, the distress they encounter is real and needs to be recognized by managers and dealt with in a sensitive manner. The aftermath of the error may be as stressful as the error itself.

The results of the analysis of data relative to research questions 5, 6, and 7 supported the theory of psychological stress and coping and showed that coping strategies are used by individuals to mediate the relationship between stressful occurrences and adaptational outcomes (Folkman et al., 1986). A shortened version of Folkman and

Lazarus's (1985) Ways of Coping measured coping strategies used by the perioperative nurses after committing an error. The participants believed that committing an error was relevant to their well-being and needed to use problem-focused strategies such as planful problem solving coupled with emotion-focused strategies including accepting responsibility, escape-avoidance, and self-control as a way to manage the feelings associated with committing an error. Outcomes were diverse depending upon which strategies were used. For example, those perioperative nurses who used the coping strategy of accepting responsibility had emotional distress as well as constructive changes in practice.

Additional Analysis

Additional analyses of data were conducted to determine the relationships between the independent variable subscales representing causes of intraoperative nursing errors and managerial responses with the dependent variables of constructive and defensive changes in practice and emotional distress. Moderately strong significant relationships were found between a lack of supervision and defensive changes in practice ($r = .45, p = .000$) and a lack of supervision and emotional distress ($r = .41, p = .000$). Although the relationships were statistically significant at $<.001$, the magnitude of the relationships were weak between inexperience and faulty judgment on the part of the nurses and level of emotional distress and changes in practice. If the participants believed that inadequate supervision contributed to the error, they were more likely to report defensive changes in practice and higher levels of emotional distress.

No relationships were detected between job overload and the dependent variables including emotional distress and changes in practice. This finding is in contrast to the

study by Meurier et al. (1997) whereby nurses who chose inexperience and job overload as causes of error reported more constructive changes in practice and higher levels of emotional distress. A question arises as to whether or not the low internal consistency score for the job overload subscale (Chronbach's alpha = .59) had an effect on the correlation scores. This may have been due to two items in the subscale not being representative of job overload. It is suggested that the subscale be re-evaluated in terms of whether or not the items adequately represent the concept of job overload.

The strongest relationship was found between the cause of lack of supervision and defensive changes in practice and emotional distress. The participants who had less perioperative nursing experience may have felt inadequately supervised especially if they lacked sufficient training. Because of the current nursing shortage, many novice perioperative nurses are expected to practice independently after a limited orientation period. The remaining relationships were similar in regard to significance and Pearson product moment correlation (r) scores. The results signify multi-factorial causes of error.

Although a weak but significant relationship was found between judgmental managerial responses and constructive changes in practice ($r = .22, p = .02$) a strong significant relationship was shown between judgmental managerial responses and defensive changes in practice ($r = .56, p = .000$). A significant negative relationship was also found between supportive managerial responses and defensive changes in practice ($r = -.33, p = .000$). These findings indicate that the more supportive the nurses felt by management after committing an error, the less likely they were to adopt defensive changes in practice.

A negative relationship was also shown between supportive managerial responses and emotional distress but was not statistically significant. A statistically significant relationship did however exist between judgmental responses and emotional distress ($r = .36, p = .000$). These results are positive reminders that a non-punitive environment encourages healthcare professionals to learn from their errors and adopt constructive changes while reproachable methods do little to address the practice and/or the needs of the practitioner.

In summary, over half of the participants in this study (58%) identified themselves as having committed an intraoperative nursing error. Those who committed an error used a variety of coping strategies. Strong relationships were evident between certain coping strategies and the adaptational outcomes of changes in practice and emotional distress. In particular, those perioperative nurses who accepted responsibility for committing an error and exercised self-control experienced higher levels of emotional distress. The perioperative nurses who coped by using the escape and/or avoidance strategy were found to have more defensive changes in practice. Six of the eight original coping scales as identified by Lazarus and Folkman (1984) were used to evaluate the participants' reactions and responses to intraoperative nursing errors. The results illustrated the complex nature of coping whereby individuals who are faced with stressful events must be prepared to mediate its impact through various strategies. The participants' level of emotions reflected the psychological impact imposed upon them as they navigated through the public and private journey of committing an error.

V. SUMMARY AND RECOMMENDATIONS

This chapter begins with the summary and conclusions of this research study on intraoperative nursing errors. Limitations of the study are presented followed by recommendations for future research and implications for nursing practice and nursing research.

A. Summary and Conclusions

The aims of this study were specific to learning about how nurses defined intraoperative nursing errors, what they perceived to be causes of the errors, and how they coped after committing an error. The purposes of this study were to: 1) examine the definitions, circumstances, causes, and reactions of perioperative nurses to intraoperative nursing errors; and 2) examine the relationships among coping with intraoperative nursing errors, emotional distress, and changes in practice.

The conceptual framework that guided this study was the cognitive theory of psychological stress and coping (Lazarus & Folkman, 1984). The act of committing an intraoperative nursing error was the stressful event experienced by the perioperative nurses. Through primary and secondary cognitive appraisal processes, their responses to committing an error were grounded in both emotion and problem focused forms of coping. The adaptational outcomes resulting from the various coping processes were levels of emotional distress, and constructive and defensive changes in practice.

The research design for this study was a descriptive, correlational design. After receiving approval from the Duquesne University Institutional Review Board, the sample

participants were randomly chosen from a list of perioperative registered nurses who were members of AORN at the time of this study. Strict confidentiality and anonymity of the participants was maintained. Accounting for a 27% response rate, a total of 700 members were contacted three times via mail over the course of several weeks. A total of 272 questionnaires were returned resulting in a 39% response rate.

This research study was the first known to examine perioperative nurses in regards to how they defined intraoperative nursing errors. Descriptive statistics were reported on the entire study sample ($N = 272$) in the categories of demographics and responses to the question on definitions of intraoperative nursing errors and close call. Those that were found to have committed intraoperative nursing errors ($n = 158$) were asked further questions related to causes of the error, how the experience affected their ability to cope, and whether or not any particular types of coping strategies led to emotional distress and changes in clinical practice. In addition, this study was the first to use the conceptual framework of Lazarus and Folkman's theory of cognitive psychological stress and coping as a basis to research the impact of errors on perioperative nurses. Preliminary analysis was conducted on the data to meet the assumptions of the statistical tests. Analyses and major findings were categorized according to each research question.

Demographic findings supported the current information regarding the population of perioperative nurses except for level of education. In this study, a greater number of perioperative nurses were educated at the baccalaureate degree level rather than the associate degree level. Currently, statistical reports show that more nurses are educated at the associate degree level (United States Department of Health and Human Services,

2004). These findings may be attributed to an increase in professional incentives to pursue a baccalaureate degree such as scholarships, tuition reimbursements from hiring institutions, and clinical ladder models that require certain degrees for advancement. AORN, the professional organization of perioperative registered nurses, is proactive in promoting the baccalaureate degree and has a position statement on entry into practice (AORN, 2006). AORN members reaffirmed this statement in the 2005 House of Delegates during the annual AORN Congress. Support from the organization and its membership may have been an additional catalyst for several nurses pursuing a baccalaureate degree. The average age of the perioperative nurse was 47 years supporting the sobering fact of a “graying” workforce of practicing nurses in the United States. Additional demographic data was gathered such as gender, marital status, race/ethnicity, work position and certification, thus adding to the profile of the perioperative nurse.

The tool for this study, *Perioperative Nurse Questionnaire*, was a revised version of a questionnaire used in two previous studies with different populations (Meurier et al., 1997; Wu et al., 1991) that examined the relationships among coping strategies, emotional distress, and changes in practice due to an error. Prior to this study on intraoperative nursing errors, a pilot study was conducted to assess the stability of the questionnaire using a test-retest method. Spearman rank correlation coefficient analysis was conducted on the items relating to definitions, circumstances, causes, reactions, coping, managerial responses, and changes in practices associated with errors. Coefficient values ranged from .29 to .98 across all items. Upon completion of the pilot study, several revisions were made to the questionnaire including a change in title. The

instrument was renamed, *Perioperative Nurse Questionnaire*, to better reflect the content and the target population.

Similar findings were found with the two previous studies that used the same tool, as well as new information specific to the perioperative nurse population. For example, a strong, statistically significant relationship was found in all three studies between high levels of emotional distress and the coping strategy known as accepting responsibility. Through the use of multiple regression techniques used in this study, the coping strategy subscales were found to be significant predictors of emotional distress accounting for 47% of the variance in the dependent variable. These results suggested that the emotional toil of committing an error crosses all boundaries of distinct healthcare professions, therefore the solutions developed for managing healthcare errors should address the needs of the practitioner as well as the patient. Although patient outcomes are the focus of nursing practice, the health of the practitioner cannot be ignored. It is important for healthcare leaders to be responsive to the needs of the practitioner in the aftermath of committing an error. This insight may prove beneficial by sensitizing the leaders to the problems faced by practitioners. Programs may be developed such as debriefing or crisis counseling sessions where learning from the error is more educative than disciplinary.

One of the more striking findings of this study was that the participants found the managerial response to be very supportive as opposed to reactions characterized in the literature as punishing, humiliating, and demeaning. Because of a lack of research in the perioperative specialty, the current literature reflects studies on nurses who practice outside of the OR. It may be that OR management personnel are beginning to take note of the continuing research into the actions of healthcare institutions and how those actions

translate into either curtailing error rates with supportive actions or driving error reporting further underground with punitive actions. Within the specific perioperative context relative to this study, it may be that the closed environment of the operating room where the management and staff work closer together and are more aware of each other's challenges and responsibilities accounted for this finding. All intraoperative activities are conducted behind closed doors away from the scrutiny of other healthcare workers and visitors. Surgical specialties such as cardiac, orthopedic, and neurosurgery routinely have specific teams that work with specific surgeons. This close knit group of perioperative nurses has been known to band together and support one another through difficult experiences.

Multiple regression analysis was conducted on the independent coping variables with the dependent variables of constructive and defensive changes in practice. The coping variables accounted for 20% of the variance in constructive changes in practice and 33% of the variance in defensive changes in practice. The findings demonstrated that perioperative nurses react to committing an error similarly to other healthcare professionals. The error changed the way they practiced based upon which coping strategies were used to manage the stressful event.

Additional correlational analysis was done on the data to assess the relationships between reactions by the management and emotional distress and changes in practices. A strong and statistically significant relationship was shown between a judgmental response on the part of the manager and defensive changes in practice and emotional distress. A significant negative relationship between managerial support and defensive changes in practice was also shown. The findings indicate the need to educate managers as to the

best approach when discussing errors with staff members. How nurses perceive the reaction by management will have an effect on their learning from the error as well as how to prevent future errors.

In conclusion, this study provided valuable and important information in regard to intraoperative errors from the nurses' perspective. A main tenet of research is that answers provide a path toward more questions. In the review of the literature, it was apparent that a significant gap continues to exist in research of nursing errors specific to the surgical context. Little research has been conducted on how the impact of committing an error affects a perioperative nurse's future practice and emotional well-being. This research on intraoperative nursing errors should be considered one small step in cracking open the door to the hidden world of perioperative nursing. This research study added to the body of nursing literature on the exposed topic of healthcare errors and revealed the hidden thoughts and beliefs of a mostly unknown specialty nurse population.

B. Limitations of the Study

Only those perioperative nurses who were members of AORN were contacted to participate. This restriction limited the access to other perioperative nurses who were not members of AORN at the time of the study. Although AORN has a large membership, there are perioperative nurses in practice who are not members, therefore, the results of this study can not be generalized to all perioperative nurses but rather those perioperative nurses who are also members of AORN.

Reliability and content validity of the instrument, *Perioperative Nurse Questionnaire*, was evaluated in this study as well as the pilot study. A panel of six perioperative experts was contacted to evaluate the items in the questionnaire specifically

related to the intraoperative environment. The stability of the questionnaire in the pilot study was established by using Spearman rank correlation coefficient analysis. Reliability for the questionnaire used in this study was conducted on the variable subscales identified as causes of error, coping strategies, managerial responses, and constructive and defensive changes in practice. Internal consistency scores for the subscales were evaluated and measured by Cronbach's alpha. The range of scores for the coping strategy subscales ranged from .50 to .73. Scores for the managerial response subscales ranged from .31 to .81, and the causes of error subscales ranged from .59 to .70. The relative lack of internal consistency for the causes of error subscales identified as job overload, and the coping strategy subscales identified as escape/avoidance and planful problem solving led to a reduced sense of confidence in the reliability of the items representing the subscales.

I believe that an additional question should have been asked of the participants in regard to the actual type of nursing error committed. This information may have proved valuable and the data would have added another dimension to the results. The first question in the survey asked the participants to rate items that were identified as definitions of nursing errors by the researcher. It would have been interesting to have compared and contrasted the definitions chosen by the researcher with actual errors committed by the participants.

C. Recommendations

Recommendations for Future Research

It would be beneficial to replicate this study in the hope of increasing the reliability and validity of the tool while further analyzing the data of a different sample from the same population. Revisions to the tool are needed before replication can occur.

The subscales with low internal consistency scores should be reviewed to determine if the items represented the concepts in a meaningful way. Expanding the sample to include perioperative nurses who are not members of AORN may increase the ability to generalize the results to the larger population. Incorporating errors from the preoperative as well as the intraoperative phases of perioperative nursing may provide additional information and expose errors outside the actual surgical suite. The perioperative nursing assessment begins in the preoperative phase and includes identifying the patient, verifying the surgical procedure, and checking that all pertinent information is in the patient's chart. The atmosphere in the preoperative area is hurried especially during the beginning of the surgery schedule. The area is often crowded with healthcare professionals and visitors. Time is a major factor in the smooth operation of surgical services, and surgical start times are a major benchmark utilized by managers related to efficiency. These variables may contribute to an environment that is vulnerable to errors.

Because of the nature of the topics studied, further research in the area of perioperative nursing errors may be approached from a qualitative perspective to explore a more personalized account of the experience. Qualitative data is gathered through interviews, field notes, and self-reports. Providing a less structured format may encourage perioperative nurses to tell their stories in a more detailed manner.

The process as outlined by Salant and Dillman (1994) for survey development was followed in order to attract as many participants as possible, reduce the amount of missing data, and facilitate ease by which the participants could complete the questionnaire. This method uses the traditional form of regular mail to contact the participants. As more individuals use the internet as a primary form of communication, it

may be worthwhile to consider recruiting subjects via the internet and allow the participants to complete the questionnaire online. This method may increase the sample size and give access to perioperative nurses who are not members of AORN.

I recommend that future research on this topic focus on interventions designed to support the practitioner through the various phases of error management. In addition, further research should explore the connections between team functionality in the operating room and errors.

Implications for Nursing Practice and Nursing Research

It was apparent from the results that the participants experienced a variety of emotions after committing an error which led to alterations in the way they practiced. The errors were not easily forgotten and many of the perioperative nurses harbored feelings of guilt, anger with themselves, and fear associated with causing harm to their patients. It is recommended that policies and procedures be designed to ensure that all nurses, regardless of specialty, be given clear guidelines on what constitutes a nursing error as well as the process for reporting an error. Nurses should feel comfortable in reporting errors and believe that their well-being will be considered during the process of the error investigation. It is recommended that the lingering emotional aspects felt by healthcare professionals be recognized and given proper attention by those who are responsible for dissecting the reasons behind the error. Further recommendations include establishing a debriefing team similar to those used in emergency nursing. Practitioners who commit errors should be able to discuss the experience in sessions led by specially trained professionals.

The results of this study seemed to indicate that perioperative nurses are not clear on the definitions of intraoperative nursing errors. It is imperative that perioperative nurses have a precise understanding of what constitutes an error, if indeed management, expects errors to be reported. Thus, this research has many implications for nursing practice and nursing research. Continued research into perioperative nursing errors is needed to develop a taxonomy that defines nursing errors. The classification of what constitutes an error will provide a systemized and coded data base that practitioners, administrators, and researchers can use as a resource. It is difficult to find a solution for an error if the error has not been identified as such. The taxonomy could be incorporated into the perioperative nursing data set which is a structured vocabulary specific to perioperative nursing (Beyea, 2002).

In today's healthcare environment, errors are a reality. To recognize and accept the fact that nurses and other healthcare professionals commit errors is a difficult task for everyone involved including practitioners, patients, and the general public. Admitting that errors exist in healthcare is the first step in carving the way for investigations and solutions into this disturbing trend. The inadequacies of the system, individual practitioner responsibility, and standardized practices are three areas that need to be addressed in order to reduce error incidence and improve the quality of patient care.

Appendix A

Ways of Coping Scales

SET #1 (Community Sample)

From: Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. (1986). The dynamics of a stressful encounter: Cognitive appraisal, coping and encounter outcomes. *Journal of Personality and Social Psychology*, 50, 992-1003.

Seventy-five married couples were interviewed in their homes once a month for five months. Husbands and wives were interviewed separately by different interviewers. Subjects were asked to describe the most stressful encounter they had experienced in the previous week and then fill out the revised Ways of Coping. The instructions were: "Please read each item below and indicate, by circling the appropriate category, to what extent you used it in the situation you have just described."

Observations from the five interviews were pooled. The Ways of Coping items were analyzed using alpha and principal factoring with oblique rotation. Oblique rotation was chosen because, from a theoretical perspective, we expect people to choose from a vast array of coping strategies rather than to use one set of strategies to the exclusion of others. Past research on coping supports this model (Folkman & Lazarus, 1980). Three separate factor analyses were completed using different strategies for combining person-occasions, or observations. First, analyses were conducted on the entire 750 observations, 5 from each 150 subjects, where each of the five concerned a different stressful encounter. Second, 150 stressful encounters (one per subject) were randomly selected from the 750, equally representing each of the 5 occasions. An additional sample of 150 stressful encounters was also randomly selected from the 750 total encounters without replacement of the prior 150 encounters, again, equally representing each of the five occasions.

The three factor analyses yielded very similar factor patterns. Thirty-seven items consistently loaded high on the same factor across all 3 analyses. Twenty-two items loaded on the same factor fairly consistently; 9 of these were eliminated on the basis of marginal factor loadings or lack of conceptual coherence with their scale. Seven items did not consistently load on any factor and were therefore eliminated. Because multiple factorings had been conducted, we had several estimates of each item's factor loading. A final principle factor analysis, calling for eight factors, was therefore performed on the 750 observations with the final 50 items in order to get an estimate of each item's factor loading.

The coping scales derived from the factor analytic procedures described above, their alphas, and factor loadings for the items are shown in Table 1. The eight scales accounted for 46.2% of the variance.

Table 1

Empirically constructed Scales from the WAYS OF COPING (Revised)
 (Community Sample)

<u>To score the scales, sum ratings for each scale.</u>	Factor Loading
<u>Scale 1: Confrontive coping (alpha = .70)</u>	
46. Stood my ground and fought for what I wanted.	.70
7. Tried to get the person responsible to change his or her mind.	.62
17. I expressed anger to the person(s) who caused the problem	.61
28. I let my feelings out somehow.	.58
34. Took a big chance or did something very risky.	.32
6. I did something which I didn't think would work, but at least I was doing something	.30
<u>Scale 2: Distancing (alpha = .61)</u>	
44. Made light of the situation; refused to get too serious about it.	.55
13. Went on as if nothing had happened.	.54
41. Didn't let it get to me; refused to think too much about it.	.50
21. Tried to forget the whole thing.	.49
15. Looked for the silver lining, so to speak; tried to look on the bright side of things.	.34
12. Went along with fate; sometimes I just have bad luck.	.25
<u>Scale 3: Self-controlling (alpha = .70)</u>	
14. I tried to keep my feelings to myself.	.55
43. Kept others from knowing how bad things were.	.46
10. Tried not to burn my bridges, but leave things open somewhat.	.40
35. I tried not to act too hastily or follow my first hunch.	.40
54. I tried to keep my feelings from interfering with other things too much.	.37
63. I thought about how a person I admire would handle this situation and used that as a model.	.37
64. I tried to see things from the other person's point of view.	.28
<u>Scale 4: Seeking social support (alpha = .76)</u>	
8. Talked to someone to find out more about the situation.	.73
31. Talked to someone who could do something concrete about the problem.	.68
42. I asked a relative or friend I respected for advice.	.58
45. Talked to someone about how I was feeling.	.57
18. Accepted sympathy and understanding from someone.	.56

22. I got professional help. .45

Scale 5: Accepting responsibility (alpha = .66)

9. Criticized or lectured myself. .71
 29. Realized I brought the problem on myself. .68
 51. I made a promise to myself that things would be different next time. .49
 25. I apologized or did something to make up. .39

Scale 6: Escape-Avoidance (alpha = .72)

58. Wished that the situation would go away or somehow be over with. .66
 11. Hoped a miracle would happen. .55
 59. Had fantasies or wishes about how things might turn out. .54
 33. Tried to make myself feel better by eating, drinking, smoking, using
 drugs or medication, etc. .49
 40. Avoided being with people in general. .46
 50. Refused to believe that it had happened. .42
 47. Took it out on other people. .40
 16. Slept more than usual. .36

Scale 7: Planful problem-solving (alpha = .68)

49. I knew what had to be done, so I doubled my efforts to make things work. .71
 26. I made a plan of action and followed it. .61
 1. Just concentrated on what I had to do next – the next step. .45
 39. Changed something so things would turn out all right. .44
 48. Drew on my past experiences; I was in a similar situation before. .40
 52. Came up with a couple of different solutions to the problem. .38

Scale 8: Positive reappraisal (alpha = .79)

23. Changed or grew as a person in a good way. .79
 30. I came out of the experience better than when I went in. .67
 36. Found new faith. .64
 38. Rediscovered what is important in life. .64
 60. I prayed. .56
 56. I changed something about myself. .55
 20. I was inspired to do something creative. .43

The inter-correlations among the coping scales averaged over 5 occasions are shown in Table 2.

WAYS OF COPING SCALES

SET #2 (Student Sample)

From: Folkman, S. & Lazarus, R. S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. Journal of Personality and Social Psychology, 48, 150-170.

Data were gathered from 108 undergraduates who completed the Ways of Coping (Folkman & Lazarus, 1985) three times as part of a study of examination stress. Observations from the three occasions were pooled. Nine items were eliminated from analysis because they showed high skewness and restricted variance. The remaining 57 items were submitted to common factor analysis with oblique rotation. A six factor solution yielded the most conceptually interpretable set of factors. Fifteen items that did not load clearly on any one factor were deleted. One of the six factors contained three distinguishable groups of items. The three groups were rationally assigned to three factors to provide greater theoretical clarity. The procedure produced eight scales, including one problem-focused and six emotion focused scales, and an eighth scale containing both problem and emotion focused items. The scales and the factor loadings for the five empirically constructed scales, and alphas for all eight scales, are shown in Table 3. The inter-correlations among the scales averaged over three occasions are shown in Table 4.

Table 3

Empirically and Rationally Constructed Scales from the WAYS OF COPING (Revised)* (Student Sample)

Empirically Constructed Scales

To score the scales, sum ratings for each scale.

Factor
Loading

Scale 1: Problem-focused coping (alpha = .88)

62. I go over in my mind what I will say or do.	.72
46. Stand my ground and fight for what I want.	.62
49. I know what has to be done, so I am doubling my efforts to make things work.	.67
52. Come up with a couple of different solutions to the problem.	.67
35. I try not to act too hastily or follow my first hunch.	.66
26. I'm making a plan of action and following it.	.64
64. I try to see things from the other person's point of view.	.61
54. I try to keep my feelings from interfering with other things too much.	.60
39. Change something so things will turn out all right.	.59
2. I try to analyze the problem in order to understand it better.	.54
48. Draw on my past experiences; I was in a similar situation before.	.52

• NOTE: IN THIS STUDY ITEMS WERE DELIBERATELY PUT IN THE PRESENT TENSE

Scale 2: Wishful thinking (alpha = .86)

- | | |
|--|-----|
| 55. Wish that I can change what is happening or how I feel. | .78 |
| 58. Wish that the situation would go away or somehow be over with. | .70 |
| 57. I daydream or imagine a better time or place than the one I am in. | .67 |
| 59. Have fantasies or wishes about how things might turn out. | .65 |
| 11. Hope a miracle will happen. | .61 |

Scale 3: Detachment (alpha = .74)

- | | |
|---|-----|
| 21. Try to forget the whole thing. | .61 |
| 13. Go on as if nothing is happening. | .58 |
| 24. I'm waiting to see what will happen before doing anything. | .54 |
| 12. Go along with fate; sometimes I just have bad luck. | .52 |
| 4. I feel that time will make a difference – the only thing to do is to wait. | .51 |
| 53. Accept it, since nothing can be done. | .51 |

Scale 4: Seeking social support (alpha = .82)

- | | |
|--|-----|
| 45. Talk to someone about how I'm feeling. | .71 |
| 18. Accept sympathy and understanding from someone. | .67 |
| 28. I let my feelings out somehow. | .62 |
| 31. Talk to someone who can do something concrete about the problem. | .58 |
| 8. Talk to someone to find out more about the situation. | .54 |
| 42. Ask a relative or friend I respect for advice. | .53 |
| 60. I pray. | .49 |

Scale 5: Focusing on the positive (alpha = .70)

23. I'm changing or growing as a person in a good way.	.72
38. Rediscover what is important in life.	.59
20. I am inspired to do something creative.	.48
15. Look for the silver lining, so to speak; try to look on the bright side of things.	.47

Rationally Created Scales

Scale 6: Self blame (alpha = .76)

- 9. Criticize or lecture myself.
- 29. Realize I brought the problem on myself.
- 51. Make a promise to myself that things will be different next time.

Scale 7: Tension reduction (alpha = .59)

- 32. Got away from it for a while; tried to rest or take a vacation.
- 33. Try to make myself feel better by eating, drinking, smoking, using drugs or medication, etc.
- 66. I jog or exercise.

Scale 8: Keep to self (alpha = .65)

- 14. I try to keep my feelings to myself.
- 40. Avoid being with people in general.
- 43. Keep others from knowing how bad things are.

Table 4

Eight Coping Scales:
Intercorrelations Averaged Over Three Occasions

	Scale 1	2	3	4	5	6	7	8
1. Problem focused coping		.41	.20	.64	.58	.46	.38	.31
2. Wishful thinking			.51	.42	.29	.63	.50	.54
3. Distancing				.24	.13	.34	.34	.41
4. Seeking social support					.54	.39	.42	.18

5. Emphasizing the positive	.42	.36	.23
6. Self blame		.31	.53
7. Tension reduction			.37
8. Self isolation			---

WAYS OF COPING (Revised)

Please read each item below and indicate, by using the following rating scale, to what extent you used it in the situation you have just described.

	Not Used	Used Somewhat	Used Quite A Bit	Used A great deal
	0	1	2	3
_____ 1. Just concentrated on what I had to do next – the next step.				
_____ 2. I tried to analyze the problem in order to understand it better.				
_____ 3. Turned to work or substitute activity to take my mind off things.				
_____ 4. I felt that time would make a difference – the only thing to do was to wait.				
_____ 5. Bargained or compromised to get something positive from the situation.				
_____ 6. I did something which I didn't think would work, but at least I was doing something.				
_____ 7. Tried to get the person responsible to change his or her mind.				
_____ 8. Talked to someone to find out more about the situation.				
_____ 9. Criticized or lectured myself.				
_____ 10. Tried not to burn my bridges, but leave things open somewhat.				
_____ 11. Hoped a miracle would happen.				
_____ 12. Went along with fate; sometimes I just have bad luck.				
_____ 13. Went on as if nothing had happened.				
_____ 14. I tried to keep my feelings to myself.				

- _____ 15. Looked for the silver lining, so to speak; tried to look on the bright side of things.
- _____ 16. Slept more than usual.
- _____ 17. I expressed anger to the person(s) who caused the problem.

Not Used	Used Somewhat	Used Quite A Bit	Used A great deal
0	1	2	3

- _____ 18. Accepted sympathy and understanding from someone.
- _____ 19. I told myself things that helped me to feel better.
- _____ 20. I was inspired to do something creative.
- _____ 21. Tried to forget the whole thing.
- _____ 22. I got professional help.
- _____ 23. Changed or grew as a person in a good way.
- _____ 24. I waited to see what would happen before doing anything.
- _____ 25. I apologized or did something to make up.
- _____ 26. I made a plan of action and followed it.
- _____ 27. I accepted the next best thing to what I wanted.
- _____ 28. I let my feelings out somehow.
- _____ 29. Realized I brought the problem on myself.
- _____ 30. I came out of the experience better than when I went in.
- _____ 31. Talked to someone who could do something concrete about the problem.
- _____ 32. Got away from it for a while; tried to rest or take a vacation.
- _____ 33. Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, etc.

_____ 34. Took a big chance or did something very risky.

_____ 35. I tried not to act too hastily or follow my first hunch.

_____ 36. Found new faith.

_____ 37. Maintained my pride and kept a stiff upper lip.

**Not
Used**

**Used
Somewhat**

**Used
Quite A Bit**

**Used
A great deal**

0

1

2

3

_____ 38. Rediscovered what is important in life.

_____ 39. Changed something so things would turn out all right.

_____ 40. Avoided being with people in general.

_____ 41. Didn't let it get to me; refused to think too much about it.

_____ 42. I asked a relative or friend I respected for advice.

_____ 43. Kept others from knowing how bad things were.

_____ 44. Made light of the situation; refused to get too serious about it.

_____ 45. Talked to someone about how I was feeling.

_____ 46. Stood my ground and fought for what I wanted.

_____ 47. Took it out on other people.

_____ 48. Drew on my past experiences; I was in a similar situation before.

_____ 49. I knew what had to be done, so I doubled my efforts to make things work.

_____ 50. Refused to believe that it had happened.

_____ 51. I made a promise to myself that things would be different next time.

_____ 52. Came up with a couple of different solutions to the problem.

_____ 53. Accepted it, since nothing could be done.

_____ 54. I tried to keep my feelings from interfering with other things too much.

- _____ 55. Wished that I could change what had happened or how I felt.
- _____ 56. I changed something about myself.
- _____ 57. I daydreamed or imagined a better time or place than the one I was in.
- _____ 58. Wished that the situation would go away or somehow be over with.

Not Used	Used Somewhat	Used Quite A Bit	Used A great deal
0	1	2	3

- _____ 59. Had fantasies or wishes about how things might turn out.
- _____ 60. I prayed.
- _____ 61. I prepared myself for the worst.
- _____ 62. I went over in my mind what I would say or do.
- _____ 63. I thought about how a person I admire would handle this situation and used that as a model.
- _____ 64. I tried to see things from the other person's point of view.
- _____ 65. I reminded myself how much worse things could be.
- _____ 66. I jogged or exercised.

Appendix B

Permission to Access AORN Database

From: Garth Jordan [REDACTED]
Sent: Friday, May 20, 2005 12:35 PM
To: Robin Chard, MSN, RN, CNOR
Cc: Amy Hughes
Subject: RE:

Importance: High

Hi Robin -

This should not be a problem. You will work directly with Amy Hughes to get a FREE random sample of our list - 700 nurses total (with the potential for another 700, if necessary). All I ask in return is that you send us a sample of the mailing that will be going out. Please call Amy directly next week (she's out of the office today) at [REDACTED].

You may consider this e-mail AORN's written permission for use of the described data. Please let me know if I can be of any further assistance as you work on this project.

Garth Jordan, MBA
Association of periOperative Registered Nurses Vice President, Product Marketing and Sales [REDACTED], extension [REDACTED]

Appendix C

Newsletter Announcement

Some periop nurses to receive survey in mail as part of AORN member's study — AORN member Robin Chard, RN, MSN, CNOR, of Hollywood, Fl. and doctoral candidate at Duquesne University School of Nursing, is conducting a survey to find the definitions, causes and reactions to nursing errors. This is Chard's dissertation study on nursing errors in the perioperative environment. The survey will be mailed to some AORN members for their input. Chard received a research grant from the AORN Foundation to complete the study, which she said is the first to seek answers on nursing errors from perioperative nurses themselves. As part of her study, randomly selected AORN members will receive a letter from Chard in the coming weeks, informing them that they have been selected to participate in a study and will be receiving a questionnaire on perioperative nursing errors. About a week later, the same nurses will receive the questionnaire and a self-addressed, stamped return envelope. Chard estimates that the survey will take 20 to 30 minutes to complete. The survey is completely confidential and all participants will remain anonymous. Chard plans to have results from the study in spring 2006, and she plans to submit an article on the study to the *AORN Journal* for publication.

Appendix D

Demographic Sheet

1. Age in Years on Last Birthday

2. Gender
 - a. Female
 - b. Male
3. Race
 - a. Non-Hispanic White
 - b. Non-Hispanic Black
 - c. Hispanic/Latino
 - d. Asian & Pacific Islander
 - e. American Indian & Alaska Native
4. Marital Status
 - a. Single
 - b. Married
 - c. Living with a significant other
 - d. Divorced
 - e. Widowed
5. Level of Education
 - a. Diploma
 - b. Associate degree
 - c. Bachelor degree in nursing
 - d. Bachelor degree in other field
 - e. Master's degree in nursing
 - f. Master's degree in other field
 - g. Doctorate in nursing
 - h. Doctorate in other field
6. Present Position

7. Certified Perioperative Nurse (CNOR)
 - a. Yes
 - b. No

Appendix E

Perioperative Nurse Questionnaire

PERIOPERATIVE NURSE QUESTIONNAIRE

We know that some errors are made (very often unintentionally) in the delivery of nursing care in the perioperative environment. We can learn from them and improve the quality of nursing care. This study is designed to define intraoperative nursing errors, find out the types of errors that registered nurses make, identify who or what is responsible for causing the errors, and determine the most constructive way to deal with them.

I. What do we mean by nursing errors?

Nursing errors may be defined as **decisions, omissions, or acts:**

1. for which you felt responsible;
2. which caused or could have caused distress to the patient;
3. which had adverse or potentially adverse consequences for the patient;
4. which would have been judged wrong by knowledgeable peers at the time they occurred.

II. What do we mean by “close call”?

A “close call” is an event or situation that could have resulted in a patient’s accident or injury, but didn’t, either by chance or by timely intervention.

Definitions of Error

- Q1. How well does each of the following define types of intraoperative nursing errors?** (For each item, please select the response that best applies by placing a check in the corresponding box)

	<i>Disagree Strongly</i>	<i>Disagree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a. Was unclear about surgical site				
b. Improperly placed ESU pad				
c. Improper patient positioning				
d. Miscalculated dose or strength of medication				
e. Inaccurate, incomplete, or absent surgical count				
f. Break in sterile technique				

g. Retained foreign object				
h. Equipment misuse related to lack of knowledge				
i. Lack of appropriate equipment				
j. Blood or blood product transfusion reaction				
k. Incorrect surgical prep				
l. Was unaware of patient allergy				
m. Misidentified a patient				

n. Any other (Please specify).....

Q2. **Do you consider a “close call” the same as an error?** (Circle the number of your answer.)

- 1 Yes, but only if there is direct patient harm
- 2 Yes, regardless of patient outcome
- 3 No, regardless of patient outcome
- 4 Not sure

Q3 (a) **Have you committed an intraoperative nursing error?** (Circle number.)

- 1 have not committed an intraoperative nursing error (skip to Q-22) →
- 2 committed an intraoperative nursing error



(b) **When did the error occur?** (Circle number.)

- 1 In last 6 months
- 2 7-12 months
- 3 more than 1 and up to 2 years ago
- 4 more than 2 and up to 4 years ago
- 5 more than 4 years ago

Circumstances of the Error

Q4 How many years of perioperative nursing experience did you have when the error was made? (Circle number.)

- 1 6 months to 2 years
- 2 3-6 years
- 3 7-10 years
- 4 more than 10 years

Q5 How old was the patient (Circle number.)

- 1 Less than 18 years old
- 2 18-64 years old
- 3 65 or older

Q6 In which surgical procedure did the error occur:

.....

Q7 What was the patient's overall level of functioning prior to the error (Circle number.)

- 1 Fully functioning
- 2 Mildly compromised functioning
- 3 Moderately compromised functioning
- 4 Severely compromised functioning

Q8. Did the error occur immediately prior to or after administration of an anesthetic?

- 1 Prior
- 2 After
- 3 Not applicable

Q9. How was the patient affected by the error? (Circle number.)

- 1 Not at all
- 2 Mildly
- 3 Moderately
- 4 Severely
- 5 Very severely
- 6 Don't know

Causes of the Error

The next group of questions is about perceived causes of the error
(For each item, please select the response that best applies)

Q10 The error occurred because:

	<i>Disagree Strongly</i>	<i>Disagree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a. I was unfamiliar with the procedure at that time				
b. Though I was responsible, someone else made the mistake				
c. I didn't have the information I should have known				
d. I made up my mind too quickly in deciding what to do				
e. I was distracted				
f. The supervision by the managers was inadequate				
g. Staffing levels were inadequate				
h. There was a lack of appropriate equipment or supplies				
i. I was tired				
j. The system I worked under was defective				
k. I did not follow standard policy and procedure				
l. I was not properly oriented				
m. There was miscommunication among team members				
n. I had too many things to do at once				

o. Any other (Please specify).....

Q11 How well does each of the following describe your error:

(For each item, please select the response that best applies)

	<i>Disagree Strongly</i>	<i>Disagree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a. My attention wandered				
b. I had a lapse of memory				

c. I made the wrong decision				
d. I assessed the situation wrongly				
e. I missed the warning signs				
f. I gave inaccurate or inadequate information				
g. I relied on someone else's judgment				
h. I acted beyond my competence				
i. I did not communicate well enough				

j. Other (Please specify)

Q12 How well does each of the following describe the atmosphere in the operating room (OR) at the time of the error?

(For each item, select the response that best applies)

	<i>Disagree Strongly</i>	<i>Disagree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a. The environment in the OR was particularly stressful				
b. There was conflict among the staff in the OR				
c. Managers just expected you to get on with the work regardless				
d. Taking "short cuts" was almost the norm in the OR				
e. It was common practice to be short staffed				
f. There was not enough communication among the staff in the OR				

g. Other (Please specify)

Reactions to the Error:

Q13 As a result of the error:

(For each item, select the response that best applies)

	<i>Disagree Strongly</i>	<i>Disagree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a. I was angry with myself				

b. I was angry at other people				
c. I felt inadequate				
d. I was fearful of repercussions				
e. I felt guilty				
f. I was indifferent				
g. I felt embarrassed				
h. I felt devastated that I may have hurt someone				
i. I believe that my actions were reasonable				
j. I became depressed				

k. Others (please specify)

Q14 Did you talk to anyone about the error?

- 1 Did not talk with anyone (Skip to Q-16) →
- 2 Did talk with someone



Q15 To whom did you talk about the error? (Circle number.)
(Select all responses that apply)

- 1 Nurse manager/supervisor
- 2 One of your colleagues
- 3 Physician
- 4 Non-nursing friend
- 5 Member of your professional organization
- 6 The patient
- 7 The patient's relative
- 8 Your spouse or significant other
- 9 Other (Please specify)

Q16. If NO, why not? (Circle number.)

- 1 I was worried what others might think
- 2 I was fearful of repercussions

- 3 I didn't think it was important
- 4 There was no harm to the patient

Coping with the Error:

Q17. When you made the error, what strategies did you use to cope?
 (For each item, please select the appropriate response)

	<i>Disagree Strongly</i>	<i>Disagree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a. I criticized or lectured myself				
b. I went on as if nothing had happened				
c. I tried to keep my feelings to myself				
d. I accepted sympathy and understanding from someone				
e. I tried to forget the whole thing				
f. I made a plan of action and followed it				
g. I didn't let it get to me; I refused to think about it too much				
h. I asked a relative or friend I respected for advice				
i. I kept others from knowing how bad things were				
j. I talked to someone about how I was feeling				
k. I knew what had to be done, so I doubled my efforts to make things work				
l. I tried to keep my feelings from interfering with other things too much				
m. I wished the situation would go away or somehow be over				
n. I had fantasies about how things might turn out				
o. I promised to do things differently next time				
p. I apologized or did something to make up				

q. Any other coping strategies used (please specify).....

.....

Q18. Interaction with management staff (Circle number.)

- 1 No interaction with management staff (Skip to Q-20) 
- 2 Interaction with management staff
- 

(a) Did you discuss the error with management staff?

- 1 YES
2 NO

(b) Were you counseled for the error?

- 1 YES
2 NO

(c) Were you disciplined for the error?

- 1 YES
2 NO

Q19. After discussion of the error with a manager
(Please select all responses that apply)

	<i>Disagree Strongly</i>	<i>Disagree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a. I lost professional respect				
b. I felt supported for the way the case was handled				
c. I felt humiliated				
d. The <i>real</i> cause of the error was not tackled				
e. The action taken against me far outweighed the seriousness of the error				
f. I felt I was used as a scapegoat				
g. I believed that steps would be taken to prevent future, similar errors				
h. Overall, the administration was judgmental about my mistake				
i. I maintained my sense of competence				

j. Any other responses (please specify)_____

Changes in practice due to the error:

Sometimes an error may change the way you practice. To what extent do the following statements reflect how you reacted to the error? (For each item, select the response that best applies)

Q20. As a direct consequence of having made the error:

		<i>Strongly Disagree</i>	<i>Agree Somewhat</i>	<i>Agree Somewhat</i>	<i>Agree Strongly</i>
a.	I asked my colleagues what they would have done in a similar situation				
b.	I pay more attention to detail				
c.	I feel less confident in my work				
d.	I tried to read the patient's chart more carefully				
e.	I got more worried				
f.	I am less trusting of others' capability				
g.	I am more likely to seek advice				
h.	I keep better documentation on the patients				
i.	I am more likely to keep an error to myself if at all possible				
j.	I do more observations on patients				
k.	I follow policies and procedures more carefully				
l.	I listen to patients more closely				
m.	I try to avoid similar patients or procedures or both				
n.	I slow down more				
o.	I thought about leaving nursing				

p. Made some other changes in my practice (please specify).....

Q21. Overall, thinking about this error, to what extent would you say it has had an effect on your practice: (Please select one)

<i>Not at all</i>	<i>A little</i>	<i>Quite a bit</i>	<i>A great deal</i>

Demographics

Q22. What is your marital status? (Circle number.)

- 1 Single
- 2 Married
- 3 Living with a significant other
- 4 Divorced
- 5 Widowed

Q23. What is your age in years as of your last birthday?

Q24. What is your gender? (Circle number.)

- 1 Female
- 2 Male

Q25. What is your race?

- 1 Non-Hispanic White
- 2 Non-Hispanic Black
- 3 Hispanic/Latino
- 4 Asian & Pacific Islander
- 5 American Indian & Alaska Native

Q26. What is your present position? (no names please)

.....

Q27. What is your highest level of education? (Circle number.)

- 1 Diploma
- 2 Associate degree
- 3 Bachelor's degree in nursing
- 4 Bachelor's degree in other field
- 5 Master's degree in nursing
- 6 Master's degree in other field
- 7 Doctorate in nursing
- 8 Doctorate in other field

Q28. Are you a certified perioperative nurse (CNOR)? (Circle number.)

- 1 YES
- 2 NO

Q29. **I would welcome any additional comments you might have.**

(Please use the space below or additional paper if required to write your comments)

Thank you for completing and returning this questionnaire. Please place the questionnaire in the self-addressed return envelope.

PLEASE Do NOT place your own name or return address on the envelope. All data will have to be discarded if there are any identifying characteristics on the questionnaire and/or return envelope.

Once again, thank you for your assistance.

Appendix F

Permission to Use Instrument, *What Do We Learn From Our Mistakes?*

From: Jewel Crum-Freeman [REDACTED]
Sent: Friday, January 09, 2004 2:08 PM
To: [REDACTED]
Subject: Permission to use instrument

last month you requested from Dr. Albert Wu use of his instrument for your dissertation research. please find attached a "pdf" version of the instrument.

if you are unable to open it, please provide me with a fax number and i can fax it to you. thanks.

Jewel Crum-Freeman (for Dr. Albert Wu)

Jewel Crum-Freeman

Administrative Assistant
Johns Hopkins University
Dept of Health Policy & Management
Health Services Research & Dev Center

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
Smile - Someone Loves You!

Appendix G

Permission to Use Instrument, *Inappropriate Nursing Decisions and Actions*

From: Meurier Clency [REDACTED]
Sent: Tuesday, December 16, 2003 5:10 AM
To: 'Robin Chard, MSN, RN, CNOR'
Subject: RE: Nursing error tool

Dear Robin,

I am happy for you to make the necessary revisions of the questionnaire I used for my 'Learning from errors in nursing practice study'. I wish you the best of luck in your research.

I do not know whether this e-mail response will be satisfactory. I can write a letter if necessary.

Dr C. Meurier
Yelvertoft 208
Centre for Healthcare Education
University College Northampton
Northampton NN2 7AL
England

Appendix H

Permission to Use Instrument, *Ways of Coping*

Dear Colleague:

The Ways of Coping that was revised in 1985 is in the public domain and you do not need special permission to use it. In 1988 the Consulting Psychologists Press made minor modifications to a few items. Their version is copyrighted, and has since been purchased by Mind Garden. If you wish to use their version and/or their scoring service, you'll need permission from Mind Garden. You can reach them at <http://www.mindgarden.com/> or Mind Garden, Inc., [REDACTED] [REDACTED]). You might also want the manual for the Ways of Coping. It is available through the same publisher.

Sincerely,

Susan Folkman, Ph.D.
Professor of Medicine
Director, Osher Center for Integrative Medicine at UCSF

Appendix I

Content Validity Request

Robin Chard, MSN, RN, CNOR



October 24, 2003

Dear:

Thank you again for agreeing to review the tool and providing feedback relating to its content validity. As I previously mentioned in my e-mail, the tool was originally used in 1991 by Wu et al. on internal house medical officers and was redesigned in 1997 by Meurier & Parmar for a sample of British ward nurses. Meurier sent me his revised version of the tool but he did not have any reliability/validity data since his data from the study was lost in a computer crash. Reliability data from the original tool is available on the items related to coping with the error (items 15-17).

My intent is for the tool to provide data relating to the following research questions:

1. how do nurses define intraoperative nursing errors
2. how do nurses assign responsibility for intraoperative nursing errors
3. how do nurses respond to committing errors
4. do nurses change their practice after committing errors

I ask that you rate the items using the content validity index except for the ways of coping items. Please review the entire tool and rate those areas specific to perioperative nursing, in particular, items under #7, #8, and #9. The items under #7 are from AORN's Commission on Patient Safety. The items under #9 were constructed to reflect research question #2-how do nurses assign responsibility for intraoperative errors. Of course, I would welcome any feedback related to any and all items since this is my first experience. If you wish, please feel free to rate those items not particular to perioperative nursing and add any items you feel would be relevant. My goal is to provide a tool that will adequately reflect an ability to measure the dimensions of the construct. Please let me know if you have any questions or comments. Thank you.

Robin Chard

Appendix J

Content Validity Index

Content Validity IndexName of Reviewer:

Please rate items on a 4-point scale (from 1 = not relevant to 4 = very relevant)

Definitions of error

7. How well does each of the following define types of intraoperative nursing errors?

	1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
Wrong site surgery				
Patient burn				
Improper patient positioning				
Medication error				
Incorrect surgical count				
Break in sterile technique				
Retained foreign object				
Equipment malfunction related to lack of knowledge				
Lack of appropriate equipment				
Blood or blood product transfusion error				
Incorrect surgical prep				
Incorrect surgical consent				
Lack of appropriate surgical consents				
Incorrect patient identification				

Causes of the error

The next group of questions are about perceived causes of the error
(For each item, please select the response that best applies)

9. The error occurred because:

	1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
I was unfamiliar with the procedure at that time				
Though I was responsible, someone else made the mistake				
I didn't have the information I should have known				
I made up my mind too quickly in deciding what to do				
I was distracted by having too many things to do at once				
The supervision by the managers was inadequate				
Staffing levels were inadequate				
There was a lack of appropriate equipment or supplies				
I was tired				
The system let me down				
I did not follow standard policy and procedure				
I was not properly oriented				

10. How well does each of the following describe your error:

	1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
My attention wandered				
I had a lapse of memory				
I made the wrong decision				
I assessed the situation wrongly				
I missed the warning signs				
I gave inaccurate or inadequate information				

	I relied on someone else's judgment				
	I acted beyond my competence				

11. How well does each of the following describe the atmosphere in the operating room (OR) at the time of the error?

		1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
	The environment in the OR was particularly stressful				
	There was bad feeling between the staff in the OR				
	Managers staff just expected you to get on with the work regardless				
	Taking "short cuts" was almost the norm in the OR				
	It was common practice to be short-staffed				

Reactions to the error:

		1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
	I was angry with myself				
	I was angry at other people				
	I felt inadequate				
	I was fearful of repercussions				
	I felt guilty				

(For each item, select the response that best applies)

12. As a result of the error:

Coping with the error:

15. When you made the error, what strategies did you use to cope?
(For each item, please select the appropriate response)

	1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
I criticized or lectured myself				
I went on as if nothing had happened				
I tried to keep my feelings to myself				
I accepted sympathy and understanding from someone				
I tried to forget the whole thing				
I made a plan of action and followed it				
I didn't let it get to me; I refused to think about it too much				
I asked a relative or friend I respected for advice				
I kept others from knowing how bad things were				
I talked to someone about how I was feeling				
I knew what had to be done, so I doubled my efforts to make things work				
I tried to keep my feelings from interfering with other things too much				
I wished the situation would go away or somehow be over				
I had fantasies about how things might turn out				

17. After discussion of the error with a manager. (Please select all responses that apply)

	1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
I lost professional respect				
I felt supported for the way the case was handled				
I felt humiliated				
The <i>real</i> cause of the error was not tackled				
The action taken against me far outweighed the seriousness of the error				

	I felt I was used as a scapegoat				
--	----------------------------------	--	--	--	--

Changes in practice due to the error:

Sometimes an error may change the way you practice. To what extent do the following statements reflect how you reacted to the error.

(For each item, select the response that best applies)

18. As a direct consequence of having made the error:

		1 = not relevant	2 = somewhat relevant	3 = relevant	4 = very relevant
	I asked my colleagues what they would have done in a similar situation				
	I pay more attention to detail				
	I feel less confident in my work				
	I try to read the patient's chart more carefully				
	I get more worried				
	I am less trusting of others' capability				
	I am more likely to seek advice				
	I keep better documentation on the patients				
	I am more likely to keep an error to myself if at all possible				
	I do more observations on patients				
	I follow policies and procedures more carefully				

Appendix K

Institutional Review Board Approval



DUQUESNE UNIVERSITY

INSTITUTIONAL REVIEW BOARD

403 ADMINISTRATION BUILDING ♦ PITTSBURGH, PA 15282-0202

Dr. Paul Richer


May 28, 2004

Ms. Robin Chard


Re: "Determining reliability of the instrument, Nursing Decisions and Actions, utilizing a test-retest method" Protocol #04/42

Dear Ms. Chard:

Thank you for submitting your research proposal.

Based upon the recommendation of IRB member, Dr. Kathleen Sekula, along with my own review, I have determined that your research proposal is consistent with the requirements of the appropriate sections of the 45-Code of Federal Regulations-46, known as the federal Common Rule. The intended research poses no greater than minimal risk to human subjects. Consequently, under rules 46.101 and 46.110, your proposed research is approved on an expedited basis.

Given the sensitive nature of your study, asking about nurses' admitted mistakes in hospital settings, I want to remind you that anonymity is extremely important. Your solicitation and data collection process is well constructed to protect anonymity of subjects. But as I advised you in an earlier email, you cannot fully ensure that some subjects won't inadvertently identify themselves, other people, or institutions in answers to open-ended survey questions, even though you will directly advise them not to. If any subjects do submit data with direct or indirect identifiers, you should destroy those data immediately and not hold the data in any form or utilize the data in any way.

Enclosed with this letter are the two solicitation/instruction letters stamped with IRB approval and a one year expiration date. If you are still using those letters in a year, you will need to renew the approvals. The stamped letters should be the master from which you make copies to send potential subjects.

In addition, the study approval must be renewed in one year as part of the IRB's continuing review. You will need to submit a progress report to the IRB in response to a questionnaire that we will send.

If, prior to the annual review, you propose any changes in your procedure or consent process, you must inform the IRB of those changes and wait for approval before implementing them. Also, if any complications arise in relation to anonymity, or if any other adverse procedural effects are discovered before the annual review, they immediately must be reported to the IRB before proceeding with the study.

When the study is complete, please provide us with a summary, approximately one page. Often the completed study's Abstract suffices. Please keep a copy of your research records, other than those you have agreed to destroy for confidentiality, over a period of three years after the study's completion.

Thank you for contributing to Duquesne's research endeavors.

If you have any questions, feel free to contact me at any time.

Sincerely yours,

A black rectangular redaction box covering the signature of Paul Richer.

Paul Richer, Ph.D.
Chair, IRB

C: Dr. Kathleen Sekula
Dr. Linda Goodfellow
IRB Records

Appendix L

First Mailing



SCHOOL OF NURSING
COLLEGE HALL
TELEPHONE 412-396-6550
FAX 412-396-6346

DUQUESNE UNIVERSITY
600 FORBES AVENUE • PITTSBURGH, PA • 15282

Date

Dear Perioperative Nursing Colleague:

My name is Robin Chard and as a doctoral student in nursing as well as a member of AORN, I am asking for your participation in a research study titled, *Definitions, Causes, and Reactions to Intraoperative Nursing Errors*. Your name was randomly chosen from the national AORN database. Within the next few days, you will receive a request to complete a questionnaire.

Because patient safety is a major concern to perioperative nursing, this study is being conducted to learn more about how perioperative nurses like you answer questions related to the definitions, causes, and reactions to nursing errors. I am very interested in gaining information from the perspective of you, the perioperative nurse.

I would greatly appreciate your taking the time to complete and return your questionnaire.

Thank you in advance for your help.

Sincerely,

Robin Chard, MSN, RN, CNOR
Doctoral Candidate
Duquesne University School of Nursing

Education for the Mind, the Heart, and the Soul

Appendix M

Second Mailing



SCHOOL OF NURSING
COLLEGE HALL
TELEPHONE 412-396-6550
FAX 412-396-6346

DUQUESNE UNIVERSITY
600 FORBES AVENUE • PITTSBURGH, PA • 15282

Date

Dear Perioperative Nursing Colleague:

Patient safety and reducing error in the workplace have always been primary concerns for perioperative nurses. In an effort to collect information on how perioperative nurses, such as yourself, view nursing errors, you are being asked to participate in a research study by responding to the enclosed questionnaire, *Perioperative Nurse Questionnaire*. Your name was randomly selected from the national membership of AORN.

By answering and returning the questionnaire, you are giving consent to participate. Please note that participation is totally voluntary and there are no consequences for non-participation. There are no anticipated risks to participation. There is no compensation for participation; however, participation in the research study will require no monetary cost to you.

In order that the results of the study represent you, the perioperative nurse, it is important that each questionnaire be completed in its entirety and returned in the envelope provided. It should take approximately 30 minutes of your time to complete the questionnaire. Care has been taken to assure that the information you provide will be kept strictly confidential and anonymous. In order to assure confidentiality and anonymity, please follow the instructions below.

1. Do not write your name or any identifying information anywhere on the questionnaire.
2. Do not place a return address on the enclosed stamped envelope that you will use to return the completed questionnaire.

Thank you very much for your participation in this research study.

Sincerely,

Robin Chard, MSN, RN, CNOR
Doctoral Candidate
Duquesne University School of Nursing

Education for the Mind, the Heart, and the Soul

Appendix N

Postcard

Dear Perioperative Nursing Colleague:

Recently, you received a questionnaire about intraoperative nursing errors. Your name was randomly selected from the national membership of AORN.

If you have already completed and returned the *Perioperative Nurse Questionnaire*, please accept my sincere thanks. If not, please do so today. I am very grateful for your help because I believe your response is critical in addressing the issues of patient safety.

Sincerely,

Robin Chard, MSN, RN, CNOR
Doctoral Candidate
Duquesne University School of Nursing



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