INTERSHIFT COMMUNICATION BETWEEN CAREGIVERS:

PATIENT HANAOFFS

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in
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by
Deborah A. Clifton
Spring 2009
INTERSHIFT COMMUNICATION BETWEEN CAREGIVERS:

PATIENT HANDOFFS

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Spring 2009

APPROVED BY THE INTERIM DEAN OF THE SCHOOL OF GRADUATE, INTERNATIONAL, AND INTERDISCIPLINARY STUDIES:

_________________________________
Susan E. Place, Ph.D.

APPROVED BY THE GRADUATE ADVISORY COMMITTEE:

Irene Morgan, Ph.D.
Graduate Coordinator

Jennifer Lillibridge, Ph.D., Chair

Sherry Fox, Ph.D.
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ABSTRACT

INTERSHIFT COMMUNICATION BETWEEN CAREGIVERS:
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by
Deborah A. Clifton
Master of Science in Nursing
California State University, Chico
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The patient handoff process is a transfer of patient care between caregivers that has been poorly researched, and it has been associated with the occurrence of errors. Standardization of the patient handoff process has been mandated by the Joint Commission on Accreditation of Hospitals Organization (JCAHO) and subsequent changes in the process have taken place. More understanding of the nurse’s access to information during the critical time of patient handoffs is needed.

The current study is a descriptive analysis of the perceptions of a convenience sample of nurses on the medical surgical units in an acute rural hospital. Content validity was used in the development of a survey instrument. The conceptual approach of the study is that of human factors science which essentially identifies the inherent limitations of human memory, the effects of stress and fatigue, and the dangers
associated with interruptions. The study explores the elements of the patient handoff process related to human factors science that may predispose the process to human errors.

The study results reveal that patient handoffs during the change of shift are occurring near the bedside, in a mostly verbal format and that data are omitted. The study sample demonstrated a correlation between working the day shift and omissions that result from fatigue. Findings reveal that we can be 93% confident that there is a relationship between utilizing a standardized checklist and the self reporting of omissions.

A standardized handoff format and checklist, such as those used in other industries to reduce errors could potentially have a profound impact on reducing omissions in patient handoffs and improve the safety of the process.
CHAPTER I

INTRODUCTION

Nurses rely on the content of patient handoffs, also referred to as shift report, to provide them with complete, accurate, and timely information (Streitenberger, Breen-Reid, & Harris, 2006). Ideally, an accurate patient handoff will allow nurses to be able to quickly assume care of their patients and to immediately implement the plan of care, which provides continuity of care (Groah, 2006; Patterson, Roth & Render, 2005; Strople & Ottani, 2006). Patient handoffs are a traditional process that occurs two to three times a day at change of shift on every nursing unit in hospitals around the world. Patient handoff is defined as an exchange of information between nurses to fulfill the primary purpose of conveying pertinent patient data to ensure continuity of care and to transfer the accountability for patients. Continuity of patient care depends upon effective and efficient communication between members of the healthcare team and is a fundamental principle of nursing practice, yet scholarly investigations of the concept of continuity are limited (Sexton et al., 2004; Sparbel & Anderson, 2000b). The caregiver use of standardized communication that facilitates accurate information retrieval and timely transfer of information has been identified as a key component in effective handoff communication that is essential to continuity of care (Sparbel & Anderson, 2000a).
Another vital element of an effective handoff is adequate staff training in the process (Sparbel & Anderson, 2000a). The exchange of information generally happens in fifteen to thirty minutes when there is an overlap of staff from two shifts and responsibility for the care of the patient is handed off. There is evidence the handoff process has a high potential for errors and it is recognized as a point of vulnerability in the process of patient care; a time when crucial information can and often is omitted or garbled (Dracup & Morris, 2008). Missed or incomplete information can and has been linked to errors that lead to patient harm (Strople & Ottani, 2006). An effective standardized approach in the communication of critical information has been identified as essential to the success of a patient handoff (Hohenhaus, Powell, & Hohenhaus, 2006). Additionally, clinicians are challenged to manage multiple distractions and competing priorities during handoffs (Streitenberger et al., 2006). Attention to human factors, such as distraction and fatigue, which impact the completeness, quality, and accuracy of the information communicated during patient handoffs, is vital in the prevention of adverse events that occur due to communication issues (Streitenberger et al.).

Problem Statement

In 2006, the Joint Commission on Accreditation of Hospitals Organization (JCAHO) introduced a National Patient Safety Goal (NPSG) requiring standardization of the information contained in any patient handoff. The JCAHO also mandates that there must be a “face to face” time for questions and answers between caregivers during the handoff. Until recently, the topic of patient handoffs was rarely discussed in nursing literature (Dracup & Morris, 2008). There is very little research available on how
handoffs are conducted or how interventions to improve the quality of handoffs have impacted the process (Patterson, Roth, & Render, 2005). Changes to the process have not been based upon evidence in the literature because surprisingly little is known about what makes a good handoff (Dracup & Morris, 2008). Research on the various styles of handoffs, such as bedside or taped handoffs do not establish a consensus and most studies have been small scale and qualitative that describe how the process is performed (Meibner et al., 2007). There are four main styles of handoffs described in the literature: verbal, tape recorded, written, and bedside (Sexton et al., 2004). Reviews of the literature do not identify any particular method as superior to another (Sexton et al., 2004).

One of the many challenges to standardization of patient handoffs is to determine the most effective method (script and structure of the process) of delivering the data. The necessary data must provide the oncoming caregiver with the knowledge base needed to allow for safe and appropriate decision making, problem solving, and care planning (Dowding, 2001; Streitenberger et al.). The next caregiver in line simply must have knowledge of all current information prior to assuming accountability for care of the patient (Streitenberger et al.). Other challenges to standardization are that patient handoffs occur at multiple times between multiple caregivers, including shift-to-shift, unit-to-unit, department-to-department and even physician-to-physician. A different structure of the information provided may be required in each scenario (Patterson, Roth, Woods, Chow, & Orlando, 2004).

The process of patient handoffs has become an international concern. Australia, Great Britain, and the United Kingdom are all reviewing the process and developing risk reduction recommendations (World Health Organization (WHO))
There are currently no existing best practice guidelines for improving the handoff communication, however, there are various strategies being implemented and studied around the world. Experts agree that system redesign using the science of human factors engineering (HFE) to create processes that rely on redundancy, forcing functions, and step reduction can enhance the effectiveness of the communication between caregivers and reduce opportunities for cognitive errors (WHO Collaborating Centre for Patient Safety Solutions).

Patient handoffs are a critical element in the care planning ability of the nurse assuming care of patients (Groah, 2006; Anderson & Mangino, 2006; Benson, Rippin-Sisler, Jabusch, & Keast, 2007). Research has indicated that there are certain types of information that need to be consistently conveyed during the handoff. The information should be individualized and yet comprehensive (Anderson & Mangino, 2006). Patient handoffs have traditionally been retrospective and task focused (Dowding, 2001).

There is very little evidence of research exploring the effect of the multiple styles of handoffs that have been developed, such as the bedside handoff, the audiotaped handoff, and the written form of handoff. Despite minimal evidence to base changes upon, changes are being made. Changes made to the handoff process will certainly impact the nurse’s ability to assimilate the patient data needed to be effective in providing care. More understanding of nurses access to information during the critical time of patient handoffs is needed. Changes have been made to the handoff process due to the new JCAHO standard, and they must be closely scrutinized to assure patient safety is not compromised by changes in the complexity of the patient handoff.
Relevance to Nursing

Improving patient safety through error prevention is a top priority in healthcare today. At the center of the daunting task of understanding the nature of medical errors are registered nurses and their practice (Potter et al., 2005). Nurses’ duties include the monitoring and management of the quality of patient care, requiring not only psychomotor and affective skills but complex thinking processes (Potter et al., 2005). Human factors science studies how humans perform physically and psychologically within their work environments. HFE plays an enormous role in efforts to improve patient safety (Draper, 2004). Unreliable access to resources and information that is inherent within the environment in which nurses practice, contributes to cognitive errors (Potter et al., 2005). The acceptance of distractions and interruptions as the norm is likely the result of a lack of appreciation for their impact on the accuracy and quality of handoff communication (Streitenberger et al.).

Purpose of the Study

This descriptive study examines the elements and tools currently being used in the new standardized process of handoffs on the medical surgical nursing units in a rural hospital setting in northern California. The purpose of the study is to use HFE to evaluate the revisions to the process of handoffs by collecting data that will:

1. Describe the information, elements, and structure of the process being used in handoffs that are a result of recent changes to the JCAHO regulations.
2. Contribute to the knowledge base of nursing practice about the new standardized handoff process.
3. Describe the perception of nurses about the safety issues associated with the current process.

Collected data were critically evaluated using the theory of human factors principles (which are based upon human cognitive failings) to identify risks in the handoff process that may predispose it to errors. Human components of medical errors are the most tangible, most visible, and the most disturbing (Cosby, 2003). It is necessary that the effectiveness and safety of the high-risk communication during handoffs be assured to minimize the risk to patients.

Conceptual Approach

Research has shown that an immense body of knowledge exists in HFE and it has been suggested that nursing should use these same principles in patient handoffs (Ralston & Larson, 2005; Rogerson & Tremethick, 2004; Rooney, Heuvel, & Lorenzo, 2002). Research from the fields of cognitive psychology and HFE has a much longer history of examining errors and safety (Warburton, 2005). Many other industries, such as aviation and nuclear power, use these methods with great success to prevent errors during handoffs (Hohenhaus et al., 2006; Patterson, Roth, Woods, et al., 2004). The study of HFE takes into consideration the cognitive failings of humans and uses standardization and redundancy to avert an error or adverse event from occurring (Cosby, 2003). Human factors science identifies the inherent limitations of human memory, the effects of stress and fatigue, and the dangers associated with distractions and interruptions (Leonard, Graham, & Bonacum, 2004). The limited ability of humans to multi-task ensures that even a proficient and experienced provider will make mistakes (Leonard et al., 2004).
The principles of HFE are used to design jobs, machines, operations, processes, and work environments to be compatible with human capacities and limitations (Leonard et al.; Rooney et al., 2002). The primary focus of HFE is to remove the likelihood of an error by anticipating the limitations of human cognition (Rogerson & Tremethick, 2004). Human factors are simply described as the consideration of the way in which an individual performs within systems, whether appropriate or inappropriate (Aziz, Khalil, & Hall, 2005; Woltosz, 2005). The systems approach used in HFE views system design as the key to error reduction (Warburton, 2005). Systems must be designed to be resistant to human error (Warburton, 2005). It is crucial that human factors be respected and considered in the development of healthcare handoff processes (Ralston & Larson, 2005). This study will use the theory of HFE to analyze the process of patient handoffs and identify components of the process related to human factors that may predispose it to human errors.

**Research Question**

An in-depth analysis (using human factors science) of the process of patient handoffs may reveal that standardization of the content does reduce the risk of errors associated with human cognitive failings. Studies analyzing handoffs in other industries have demonstrated extremely low error rates and experts recommend that healthcare incorporate these handoff strategies (Leonard et al.; Patterson, Roth, Woods, et al., 2004; Rogerson & Tremethick, 2004). More research is needed to understand the human factors involved in the complex process of a patient handoff from one nurse to another during shift change, as there is poor evidence in nursing related to human systems (Warburton,
There are an infinite number of cognitive variables in the elements required for an efficient and effective handoff of a single patient related to the complexity of that individual patient. The research questions for this study are: 1) what are the current practices of patient handoffs in a rural hospital, 2) how do these practices relate to the principles of HFE, 3) what are the perceptions of nurses about the safety issues associated with the current handoff process?

Definition of Terms

Adverse Event

The unexpected outcome of patient death or a life-threatening event that results from an action or treatment (Guyton, 2002). The outcome is more specifically defined as an injury that is caused by medical management rather than by the patient’s underlying disease process or condition (Rooney et al.; Friesdorf, Buss, & Marsolek, 2007). The most frequent cause of adverse events is cited as communication failures (JCAHO, 2006).

Data Elements

Information about the clinical situation of a patient including: name, age, diagnosis, assessments, allergies, medications, recent laboratory values, radiology results, diagnostic tests, nursing interventions, risk factors, diet, activity level, fall risk, vital signs including urine output, and pertinent history (Dowding, 2001; Strople & Ottani, 2006).
Error

As defined by Ralston and Larson (2005) “error” is an act of omission or commission that is based upon currently available information that substantially increases the risk of an adverse event.

Failed/Missed Communication

The inadvertent deficiency or omission of sharing a pertinent patient data element at a crucial time, which causes or has a high potential to result in an adverse event (Dowding, 2001; Leonard et al.). Communication failure involves communication that is flawed in concept, purpose, audience, and/or occasion (Streitenberger et al.).

Human Cognitive Failings

The cognitive limitations of human performance and memory associated with effects of stress, fatigue, distractions, interruptions, and the limited ability to multi-task (Leonard et al.).

Human Factor Principles

The interaction of people, the tools they use, and the environment in which they live and work (Guyton, 2002).

Patient Handoff

Interactive communication between caregivers that involves the transfer of care and accountability for a patient (Groah, 2006; Keyes, 2000). There are numerous types of handoffs including; shift change for nurses, transfer of responsibility from physician to physician or from one nurse to another (such as break relief), and from nurses or physicians from one department to another (Groah, 2006).
Standardization

A procedure style that provides a step-by-step description of how and when to perform a specific task that uses redundancy to prevent errors (Rogerson & Tremethick, 2004; Rooney et al.).

Qualifications of the Researcher

The researcher is a registered nurse with 15 years experience that is currently enrolled in a master of science in nursing (MSN) program at CSU, Chico in California. The researcher has ten years of experience in nursing leadership. The researcher also maintains her Critical Care Registered Nurse (CCRN) credential by working clinically in the critical care area providing direct patient care. The experience of the researcher that is related to the research topic is both direct, from the performance of patient handoffs, and indirect through the investigation and correction of nursing process issues that were related to communication failures. Additionally the researcher has completed a graduate level course in nursing research.

Summary

The study explored methods of communication that both promote patient safety and improve patient outcomes by applying the science of HFE to patient handoffs. Further exploration of the literature in the next chapter will reveal that the science of HFE is well suited to the chaotic and critical process of patient handoffs.
CHAPTER II

LITERATURE REVIEW

Utilization of an effective standardized approach is essential in the process of patient handoffs to assure patient safety and continuity of care. Review of the literature revealed there is extensive research that strongly supports a modification in the patient handoff process, as the process has been noted to be associated with missed or failed communication that places patients at risk (Groah, 2006; Patterson, Roth, Woods, et al., 2004; Strople & Ottani, 2006). The latest data published regarding the number of Sentinel Alerts received by the JCAHO was that 65% of those adverse events were linked to communication issues (Groah, 2006).

The search terms used to conduct the literature review included: patient handoff, nursing handoff, shift report, nursing shift report, nursing shift change, human factors science, human factors engineering nursing, and human factors nursing. Multiple databases were searched including CINAHL, Academic Search, PubMed, Science Direct, and Cochrane library. Additional literature was obtained through internet searches such as the JCAHO website for data on NPSG’s and from the reference lists of retrieved articles.

This literature review begins with information about the nature and likelihood of human errors in healthcare, which serves as the rationale for the current study. Human
factors science is then discussed and the support offered in the current literature for utilizing HFE principles to develop a standardized method of patient handoffs is reviewed. The final area of focus is an exploration of the processes and elements of patient handoffs in the literature that should be considered a part of an effective standardized handoff process.

Human Errors

Medical errors reported by the Institute of Medicine (IOM) have been very poorly researched and until recently little funding has been dedicated to this important phenomenon (Leape, Berwick, & Bates, 2002; Stelfox, Palmisani, Scurlock, Orav, & Bates, 2006). In a report by Stelfox et al. (2006) analyzing the literature published on patient safety in the five years after the infamous IOM report on medical errors, there was a 64% increase in published articles. There had not been an increase in the funding of research of patient safety until the 2001 fiscal year, when the awards for research increased by 569% (Stelfox et al.). Safety issues in healthcare are currently the focus of intense investigation. Patient handoffs are presently being scrutinized very closely and changes are being made to the process.

Human errors are defined by Rooney et al. as “any human action or lack thereof that exceeds the tolerances defined by the system within which the humans interact” (p. 28). The authors assert that the possibility for errors exist in each and every task that is performed by a nurse, physician, or any healthcare worker (Rooney et al.). Rooney et al. noted that even highly trained and motivated healthcare professionals will inevitably perpetrate a human error because human errors are a natural result of the
variability of human-system interactions. Understanding human errors and the types of variability that occur can help to gain an understanding of human errors and what can be done to control them (Rooney et al.). The authors describe performance shaping factors that need to be considered and understood when work situations and processes are being designed. Approximately 80-85% of human errors are a result of the design of the work situation, such as tasks, equipment, and environment (Rooney et al.). Potential error causing situations include: deficient procedures, poor communication between staff, inadequately trained staff, conflicting interests of staff, and inadequately labeled or poorly designed equipment (Rooney et al.). Rooney et al. concluded that the allocation of time and resources to understand human factors are needed to identify and eliminate error prone situations and significantly improve overall system performance and safety. This article did not represent a research study, but rather a reflection of the expertise of the authors in risk and reliability engineering, and on the concepts used to reduce human errors in other industries. These authors offered insight into the development of processes that use HFE as one of the elements in the process design that can reduce the risk of human error.

In an article about the reliability and safety of work processes, Friesdorf and Gobel (2003) emphasized the health risk of human errors as a significant hazard for hospitalized patients. Some of the particular human factors that are identified by the authors as possibly contributing to errors were:

1. Increasing workload due to staffing shortages and economic pressures.
2. Increasing complexity in medicine that makes system control of processes more difficult.
3. Increasing complexity and volume of technical equipment.
4. Underdeveloped human factors research in medicine.
5. Difficulty of transferring knowledge and experience of HFE from other domains, such as nuclear power and air traffic control, to medical work processes.
6. Not enough scrutiny of the loss of each and every life.

Among other aspects of the clinical work system in medicine, the authors identify the large variations in patients and patients’ reactions as barriers to the successful implementation of standardized procedures that could simplify human error identification early in the process.

Friesdorf et al. (2007) asserted that the individual nature of patients’ manifestations of different diseases contribute to the very diverse reasons for adverse events in the treatment processes of patients. In many situations, it is a lack of coordinated rules and missing standardization that leads to fatal medical problems that are attributed to human error. While standardization of processes is a necessity to improve safety in medical treatment, process monitoring was also recommended (Friesdorf et al.).

Human Factors Engineering

In a recent two part series of educational articles on “Enhancing Healthcare Process Design with Human Factors Engineering and Reliability Science,” Boston-Fleischhauer (2008a) presented the value of HFE and reliability science knowledge in operational and clinical process design methods in healthcare. Carayon and Smith (as cited in Boston-Flieshhauer, 2008a) described the five interrelated human factor
components within a work system as: the individual, tasks, tools and technologies; the physical environment; and working conditions. HFE experts assert that these interrelated components must be equally considered in the design of an effective, efficient, and safe system, process, or product. HFE presumes that the needs of the human being are closely matched in a well designed system, process, or product.

Human limitations are taken into account when designing an effective, efficient, and safe process. Those limitations are categorized as physical, cognitive, and organizational. Specific examples of human limitations cited in Boston-Flieschhauer (2008a) include:

1. Physical: noise; climate; lighting.
2. Cognitive: short term memory capacity; fatigue levels; how humans present, perceive, and process information; decision making approaches and cues.
3. Organizational: job and task design.

The fundamental goal of HFE is to optimize human performance within a process design by deliberately taking into account human limitations and capabilities (Boston-Flieschhauer, 2008b). Human factor limitations inherent to healthcare environments that contribute to errors are: limited memory capacity, negative effect of stress on cognitive function, negative impact of fatigue and sensory overload, and over reliance on multi-tasking in a complex work environment.

Another educational article published in *Dimensions of Critical Care Nursing* proposed that HFE should be utilized to reduce errors in intensive care units (Rogerson & Tremethick, 2004). The authors affirmed that a significant reduction in medical errors may be achieved by focusing on human factors and systems failures as opposed to human
failures and the blame game (Rogerson & Tremethick, 2004). The authors declared that many complex technical fields that require an extremely high degree of reliability have designed and instituted systems that anticipate human errors, and either prevent or compensate for them before they can cause harm (Rogerson & Tremethick, 2004). Use of a standardized handoff checklist by the aviation industry to enhance coordination and reduce variability is an example of a simple tool that has been used to improve communication during the handoff process (Streitenberger et al.). HFE techniques such as simplification, standardization, automation, simulation techniques, practice guidelines, and modeling are cited to reduce errors and improve safety (Rogerson & Tremethick, 2004). Rogerson and Tremethick emphasized that HFE has “identified communication as a key opportunity for addressing medical errors” (2004, p. 173) and that HFE has been applied to shift report in other industries. The most compelling assertion made by these authors is that the key component identified in a successful handoff, one that reduces medical errors, is a standardization of the communication (Rogerson & Tremethick, 2004). One of the authors, Tremethick, has extensive nursing experience and the other author, Rogerson, has over 25 years experience in high tech high risk environments that require human error minimization and apply HFE principles.

Leape et al. (2002) discussed the contrasting recommendations of the Evidence Report 43 (published in 2001) commissioned by the IOM that focused solely on evidenced based medicine (EBM). EBM accounted for only one third of the adverse events; in contrast, the remaining two thirds of adverse events reported being a result of errors, not medical science. The authors discussed the limitations of the Evidence Report as it did not address key safety practices. Evidence Report 43 omitted many established
standardized practices such as a sponge count in the operating room, because there was not enough data from controlled clinical trials to support the practices (Leape et al.).

In discussing human factor principles, the authors stated there was an immense body of knowledge about the value of practices based upon principles like standardization, simplification, and the use of protocols that are known to compensate for cognitive failings of humans (Leape et al.). “Standardization” is among practices that have been extensively researched in other disciplines. Standardization is based upon the human factor principles that have been found to be effective in compensating for human cognitive failings (Leape et al.). Simplification and standardization are design principles that can contribute significantly to the prevention of adverse events (Ralston & Larson, 2005).

Warburton (2005) asserted that even good changes can create unexpected new hazards and all changes must be implemented with an understanding of human factors engineering (HFE). Further studies need to be completed that analyze the shift report process and human factors. The safety of the new methods being used in patient handoffs in response to the new JCAHO regulatory requirements needs to be determined.

The expertise of a human factors engineer and a nurse researcher were combined in a study funded by the Agency for Healthcare Research and Quality (Potter et al., 2005). The study documented the observed physical activities of three registered nurses during a work shift and the qualitative analysis of those activities within the context of the nursing process. The HFE data collection consisted of the actual physical activities, which were later categorized, and the amount of time the nurse spent in each category was then calculated. Interruptions were counted with specific notation of
interruptions that occurred in the medication room. The nurse researcher shadowed each of the nurses for the entire shift, beginning with report, observing all activities and categorizing them into the five steps of the nursing process.

The quantitative data obtained by the human factors engineer and the qualitative data obtained by the nurse researcher were merged and the nursing process steps were mapped to develop a cognitive pathway of the nurses. Identification and confirmation of the interruptions were defined from the nursing process context and not the HFE context, which differed. Omissions in care were determined by the incomplete activities that were identified at the end of the shift. The researchers then calculated the cognitive stacking load of the nurse by an accumulative measure, quantifying tasks and priorities that the nurse needs to perform at any given time.

The study used HFE to assist in the development of cognitive pathways to examine the working environment and complex nature of nurses’ work. Of concern was the potential for errors and omissions due to the high cognitive stacking load of the nurse coupled with the high-frequency of cognitive shifts and interruptions.

Patient Handoffs: The Process and Elements

Dowding (2001) explored the impact that the manipulation of the content of shift report (SR) had on nurses’ ability to plan care for their patients. Dowding found 49 published articles on shift report and 19 of those contained actual research reports; the remainder of the articles reviewed were anecdotal. The studies analyzed by Dowding focused on the information and data content of the communication. Dowding concluded that there were assumptions in the literature that changes in the content and format of
shift report affected the nurses’ ability to plan care. However, there is no information in those studies on the actual effect that the changes had on patient care.

Dowding’s study (2001) was an experimental study that used two independent variables, report style and schema information, and employed four convenience samples. Forty-eight subjects on two units were randomly assigned. Outcome measures, including the amount of information recorded and recalled as well as the nurses’ abilities to plan care, were evaluated using a checklist and a scoring mechanism respectively. The theoretical frameworks used by Dowding were the theories of knowledge organization and information processing. She used these theories to develop and analyze the schema variables. The effect that the knowledge level of the nurse had on the nurse’s ability to process the information obtained in report was also analyzed based upon the theoretical framework.

Dowding (2001) uncovered that the type of report (retrospective, what care happened on the previous shift, versus prospective, predicting care needed on the next shift) had little impact on the nurse’s ability to record and recall information, as the amount of information recalled was not statistically different. However, Dowding concluded that the type of report did have a statistically significant impact on the ability of the nurse to plan the care of the patient. The retrospective method was found to have higher care planning scores. The effect of the type of schema used in report (consistent versus inconsistent) had the opposite effect. A significant difference was observed in the schema consistent group and the nurse’s ability to recall and record information. Cross comparisons revealed that retrospective report resulted in the recall of the same amount of data regardless of the type of schema used. This study provided insight into the
effectiveness of a report format that supports nurses’ ability to recall data and to plan care for their patients.

Patterson, Roth, Woods, et al. (2004) analyzed observational data based on evidence from 21 different handoff strategies used in industries with high consequences for failure and also provided some insight for consideration for a safe handoff process. Direct observations of handoffs in several facilities were observed. NASA Johnson Space Center in Texas, nuclear power plants in Canada, a railroad dispatch center in the United States (US), and an ambulance dispatch center in Toronto were described. The observed handoffs were transcribed as unstructured handwritten details of the activities and verbalizations that occurred.

The details of the 422 hours of observation of over 60 handoff events were then compared to 21 identified handoff strategies and summarized. The list of 21 handoff coordination and communication strategies was compiled from previous research on shift change updates in space shuttle mission control. The objectives of the 21 strategies identified were to improve handoff effectiveness, efficiency, and coordination with others, as well as to increase access to data, and to enable error detection and recovery. One interesting aspect of the handoffs observed was the particularly short duration of time spent in the typical handoff in comparison to nursing patient handoffs, with the range being from 1-10 minutes in the study handoffs, compared to the 15-30 minute average patient handoff range of duration.

Analysis of the observational data concluded with a discussion of the similarities between the four study sites and healthcare settings. A comparison of the characteristics of observed handoffs in the study sites with handoffs in healthcare settings
was reviewed. Suggestions were made on how to apply the identified strategies to the healthcare setting using a nursing shift change as an example. Some of the suggestions included a face-to-face verbal exchange, reviewing of charts during the handoff, reduction of interruptions, and utilization of new technology (including the use of electronic medical record) to improve efficiency.

In a subsequent exploratory observational study, Patterson, Roth, and Render, (2005) investigated whether the previously identified 21 strategies were utilized during nursing shift change. One of the authors observed 46 handoffs on four different nursing wards and transcribed notes on the handoff strategies. Additionally one nurse on each ward was observed for an entire shift to examine preparation for the handoff to the oncoming shift. The format of the handoff strategies included audiotaped (which was the most common), written, and face-to-face.

The authors concluded that there was significant variability across wards and even within wards for several of the 21 strategies. Of the 21 strategies identified, six of them were always or usually used, two of them were occasionally used, two of them were rarely used, and eleven were not observed. The six strategies that were observed to occur always or usually were: limitation of interruptions, limitations of operator action during handoff, outgoing has knowledge about prior shift activities, incoming receives primary access to the most up-to-date information, make it clear to others at a glance which personnel are responsible for which duties at a particular time, and overhear others’ updates. Among those strategies that were rare was face-to-face verbal update with interactive questioning. Among those strategies that were not observed were: information in the same sequences every time, incoming scans historical data prior to update,
incoming receives paperwork with handwritten annotations, and unambiguous transfer of responsibility.

The authors suggested that standardization of handoffs, which is one of the new JCAHO regulations, may require substantial process changes. Additionally the authors reflected that the practice of asking questions during handoffs may need to be encouraged in order to realize the full benefit of the face-to-face handoffs. This recommendation was due to the observation of the researcher that minimal questions were being asked during face-to-face handoffs. However, interruptions for clarification during the handoff may disrupt the flow of thought and verbalization from the provider of information, causing them to omit a key piece of information (Streitenberger et al.). The practice of asking questions should perhaps be limited to the end of the handoff communication and caregivers should be encouraged to list questions while receiving information to improve their attentiveness during the handoff.

Strople and Ottani (2006) performed a literature review that analyzed the process of shift report and the current methodologies in relation to the potential benefit of using technology to improve the process. Their review closely scrutinized the purpose, role, data collection tools, content and format of the current shift report methods. The problems that have been linked to shift report, including legal implications for nurses, were also examined. Among the conclusions drawn from the literature reviewed was that a considerable rationale exists for the development of innovative methods to facilitate the communication of shift report.

An extensive regional health authority project in Canada, called Achieving Benchmarks though Collaboration, which consisted of 34 major projects and numerous
subprojects, evaluated shift report and made recommendations for improvements in the process (Benson et al., 2007). The subproject on shift report began with a review of the literature and identified that a gap in the literature existed (Benson et al.). It was discovered that there was very little agreement on the shift report process and that few in depth studies had been conducted. Furthermore, there was evidence the process “often lacked formal structure and could be compromised without guidelines” (Benson et al., pp. 80-81). The team developed some recommendations for improvement of shift report. Some of the recommendations made by the team included: utilization of a preprinted handoff documentation tool, the development of written guidelines that includes the process and the content, and that a periodic exam is completed after the changes are initiated. Written surveys and discussion forums were used to gain a better comprehension of current practices, and it was determined that there was great variability in the process (Benson et al.). The team’s final framework consisted of a definition, the principles, and guidelines for shift report. The most important of these were the guidelines that were used to provide a consistent focus and to organize report. The implementation, process and tools were discussed as well as the evaluation plan (Benson et al.). This article reviewed the process and clearly outlined the final reconfiguration of shift report in a regional health authority project in Canada. The recommended guidelines for report included in the study were that report be: objective, concise, relevant, and accomplished within the designated time frame, and should not include normal/routine data or inappropriate comments about the patient or family members (Benson et al.). Additionally the guidelines listed the following specific elements to be included:
1. Pertinent demographic data.
2. Safety issues.
3. Unusual occurrences.
4. Discharge planning issues.
5. Significant changes, observations, or findings.
6. Care needed by the oncoming shift such as lab tests, and outstanding calls/consultations.
7. Medication administration, including times and response.
8. Observable and measurable changes in patient condition, and family needs or concerns.
9. The use of a documentation tool and a bedside visit should be considered.

Current practices and trends are reflective of changes that are occurring in the shift report process. This report highlights two other details of interest, the first is that the process must be consistent, and the second is that very little research exists on the process of shift report.

There is very little research on the process of patient handoffs and there are new processes emerging in hospitals across the United States as changes are being implemented pursuant to the 2006 NPSGs. Several facilities are using mnemonics to standardize the information in an attempt to provide the same data consistently (JCAHO, 2006). While the JCAHO does not state that taped reports are unacceptable, they do state there are problems with this method and they do not recommend it for shift change.
Summary of Literature

The need for the current study, an analysis of the process of patient handoffs applying the principles of HFE, has been clearly established in the literature. The review of the literature revealed that the process of patient handoffs is being modified due to changes in regulatory requirements. The literature strongly supports the use of HFE in the development of a standardized format of patient handoffs that reduces the likelihood of errors. The current study describes the elements of the new patient handoff process based upon the principles of human factors science. The next chapter will provide details of the research methodology, the sample, human subjects’ considerations, and the processes of data collection and analysis.
CHAPTER III

RESEARCH DESIGN AND METHODS

A typical quantitative descriptive study design was utilized to complete an in-depth analysis of nurses’ perceptions of the process of patient handoffs on the medical-surgical units of an acute care hospital in a rural setting. The study investigated the phenomenon of patient handoffs and may provide much needed knowledge about this complex process that has been identified as having a high incidence of failure. A descriptive study design was used to contribute knowledge needed for the purpose of developing theory, identification of problems with practice, justification of current practice, and making judgments about practice (Burns & Grove, 2005). Descriptive research is an approach that can be used to generate new knowledge (Burns & Grove, 2005). The chosen research design provides data that creates a portrayal of the current characteristics of the process of patient handoffs.

Studies suggest nursing should use the science of Human Factors Engineering (HFE) to refine the patient handoff process (Leape et al.; Patterson, Roth, Woods, et al., 2004). An analysis of the human factors that are inherent in the patient handoff process was completed. Nurses and patients vary greatly and standardization of the patient handoff process has been targeted by healthcare regulatory agencies as an approach to reduce errors (JACHO, 2006). An exploration of the strategies and data elements
commonly used in a patient handoff process may provide the knowledge base needed to broaden the perspective from which a framework to standardize the process can be developed.

Study Variables

Demographic variables collected to allow the researcher to accurately describe the study sample include: age, gender, ethnicity, education level, type of licensure, years of experience in acute care setting, duration of employment on current unit, the shift worked, and country trained in.

Research variables included the data elements consistently communicated, the format, as well as the location of the handoff. Additionally variables associated with human factors were evaluated, such as the noise level, fatigue, and interruptions during the handoff. See Appendix A for an example of the data collection instrument.

Study Sample

The sample frame was identified as Registered Nurses (RNs) and Licensed Vocational Nurses (LVNs) working on the medical-surgical units of an acute care hospital in a rural setting. A convenience sample of RNs and LVNs from two medical-surgical units of a hospital in northern California was used. Sample size consisted of 43 subjects. Subject inclusion criteria consisted of: RN or LVN, providing direct patient care, working full or part time (minimum of 16 hours per week) on a medical-surgical unit, working at the identified acute care facility where the research was being conducted, must give or receive patient handoffs as part of routine duties, and must be English speaking. Subject exclusion criteria consisted of: an RN or LVN that does not provide
Recruitment of subjects required the researcher to provide a compelling reason for participants to complete the study questionnaire. Nurses on medical surgical units are typically extremely busy and time management is crucial to the nurse’s ability to meet the needs of their patients. The rationale for the study was to collect data that can be used to contribute to the development of a safer, more effective and efficient patient handoff process, which is in the best interest of nurses and patients.

Administration of the questionnaire needed to occur at a time and in a manner that was not disruptive to the nursing care of patients. The nurses were provided ample opportunity to contribute to the study. In addition to the initial provision of the survey, additional copies of the instrument were left on the unit. The survey was made available only on paper.

The sample pool consisted of approximately 70 nurses with a return of 43 surveys. The sample pool size estimate was determined by adding the total numbers of nurses on the schedules of each of the two units where the presentations were done and the additional nurses that were recruited from other medical surgical units on the days of data collection. The estimated survey return rate was 62%. The study sample consisted of 43 licensed nursing staff, with 38 of those being RNs and 3 of those being LVNs. The respondents worked in the medical surgical areas in a rural hospital setting. Eighty six percent of the respondents indicated that there were female, 7% indicated that they male, and 7% did not indicate their gender. The percentage of male RNs in the state California in 2006 was reported to be 10.5% (California Board of Registered Nursing, 2007). The
percentage of male nurses at the facility in the medical surgical areas is approximately 8%. The difference in the percentage of male RNs in the sample pool in comparison to the state of California may be reflective of the clinical area surveyed being limited to medical surgical. The average number of years on the nursing unit was six and the average number years of experience in acute care was twelve. The majority of the nurses in the sample were trained in the United States of America (USA); other countries of training included the Philippines, Canada, and South Africa. The ethnicity of the nurses was 63% White, 14% Filipino, and 7% each of African American, Hispanic, and Asian. Seventy two percent of the respondents worked day shift and 28% worked the night shift, which is likely to be a direct correlation with higher staffing levels during the day. The educational levels of the sample were 51% Associate Degree, 40% Baccalaureate, 7% 1-2 years of college, and 2% Masters prepared.

Protection of Human Subjects

Study approval was obtained from the Institutional Review Board (IRB) at California State University, Chico (CSUC). The informed consent form presented in Appendix B was provided to inform subjects of their rights. The five human rights of the subjects were protected by providing subjects written documentation of their rights on the Informed Consent form and by using the IRB.

The right to self-determination was protected by using an informed consent as seen in Appendix B and a statement at the top of the survey declaring that “completion of the survey signifies informed consent to participate in this study and for responses to be included in data analysis” (Burns & Grove, 2005). Subject right to anonymity was
protected by maintaining confidentiality of all responses and by not requiring a signed consent that could potentially link the subject to their responses (Burns & Grove, 2005). The researcher will keep all original surveys returned in a locked cabinet for up to seven years for the purpose of publication and possible further analyses. Privacy was maintained by not disclosing any data that could be used to identify any individual participant. Subjects were treated fairly and consistently by the researcher. Each subject was fully informed about the details of participation, their role, and the role of the researcher in the study. Informed consent specified any potential discomfort or harmful effects that participation might possibly elicit as well as a statement of the anticipated study benefits.

Data Collection

The method of data collection was a questionnaire that posed questions in a Likert Scale format so that interval level examination of the study variables can be described. Likert Scales are designed to determine opinions or attitudes of subjects (Burns & Grove, 2005). The items on the scale may be declarative statements that assess frequency, such as the responses used in this study instrument (Burns & Grove, 2005). Frequency items of the process of patient handoffs were behaviors, circumstances, or events that correlate well with the analysis process of HFE. The data collection tool is seen in Appendix B. A Likert Scale was used so that the frequency response statements of usually, frequently, sometimes, seldom, and never can be utilized. Likert Scale responses were quantified on the data collection questionnaire. Question format was
based upon events, circumstances, and behaviors found in the literature that pertained to the patient handoff process and human factors science.

The data collection instrument was developed and refined as part of this research proposal, as no developed measurement instruments could be found that assessed the specifics of the phenomenon of concern. The instrument was designed to obtain perceptions about the process of patient handoffs that are known by the subjects. To establish content validity a panel of experts were used to examine the questionnaire representation of the study variables. The panel of experts consisted of one to two nurses from the following: staff nurse, charge nurse, nurse educator, nurse researcher, and a nurse from a quality assurance department in an acute hospital. The panel members were asked to review questions on the survey for correct and accurate representation of the patient handoff process and to identify any omissions of the instrument. Additional questions were included in the survey based upon the recommendations of the expert panel members. Modifications were made to the instrument based upon feedback from the nurse researcher. A pilot test of five participants was used to ascertain the clarity of the questions and instructions and an accurate estimation of the time required to complete the survey. The estimated time required to complete the survey was reported to be 10-15 minutes. The instrument is appropriate for the identified quantitative descriptive research design, which was selected to illuminate the characteristics of the patient handoff process. The validity of the instrument is limited to content validity. The instrument has not been tested for reliability. The data collection instrument shown in Appendix 1 has been edited based on the panel member and pilot feedback.
A short five to ten minute presentation was given to potential subjects on the units at times unlikely to disrupt care. This was accomplished by providing lunch and presenting the study to subjects during their lunch/meal break. By supplying food for their meal break, subjects did not have to prepare or purchase their food and the presentation did not take away from their break time. The lunch was very well received by the staff. Many staff had enough time after their meal to complete the survey and chose to respond at that time. Their responses were placed in the locked box to protect anonymity. The presentation was done on two units and on both shifts to attempt to reach as many nurses as possible. Additional staff was recruited from the other medical surgical units to expand the sample size. The presentation was scripted and standardized ensuring that each group heard the exact same message regarding the importance of the data being collected. The researcher remained on the unit during the entire meal break period and repeated the presentation as needed to allow all staff an opportunity to hear about the study. A flyer announcing the date and time of the presentations with a brief description of the study was posted on the units several weeks prior to beginning the study. This was to encourage participation and to give nurses that were not working during the presentations the opportunity to contribute to the study. The researcher’s contact information was included on the flyer to allow interested staff to inquire about the study or to obtain a copy of the survey if needed.

A cover letter was provided to participants to explain the methods of data collection for the study. Instructions on completion of the survey including an estimate of time required to complete the study was given to each participant. An envelope with the researcher’s address and postage was provided to each participant in addition to contact
information for the researcher. In addition to the option of completing the survey at home and mailing it back, a locked box was used to facilitate survey return on the unit so that subjects were also given the option of completing the survey at work. The researcher returned to the unit during the collection time frame to supply additional survey forms and remind staff about the survey. Subjects were instructed on the methods of survey return. Data were collected for 28 days. The return visit occurred approximately half way through the proposed collection time frame. This allowed sufficient time to permit all subjects interested in contributing to complete the survey.

Data Analysis

The statistical analysis included proportions for each independent survey question. Data for each of the items on the instrument were analyzed on each shift and were also evaluated collectively. A statistician was utilized to assist in the data analysis. Additional statistical analysis, such as distribution of frequencies and chi-square test of independence were performed. When there appeared to be a correlation between two or more questions on the instrument, further analysis was done to examine possible significance of the association among the handoff elements. An in depth analysis of the statistics of each of the study variables was completed using descriptive statistics. The theory of human factors principles was used to determine specific components of the patient handoff process that are at risk for human errors. Once areas of risk have been identified, HFE concepts may be used to make recommendations for a standardized process. In addition to recommendations for the elements of a standardized process, questions for further research will be deliberated.
Summary

A typical descriptive study using a survey instrument was used to illustrate the current process of patient handoffs on medical surgical units of an acute hospital in a rural setting. Content validity of the instrument was established using a panel of experts. Descriptive statistics was used to examine the frequencies of the survey responses for each question and additional statistical analysis was performed to evaluate a possible relationship between identified responses. Data collected may provide a better understanding of the process of patient handoffs by applying the science of human factors engineering as the study framework.
CHAPTER IV

RESULTS

The information, elements, and structure of the patient handoff process were assessed using a voluntary anonymous survey of licensed nursing staff in the medical surgical areas within a rural hospital setting. The collected data were recorded using an Excel spreadsheet with each item being recorded as a numerical value unique to that particular response. Data for specific survey responses were then imported into JMP statistical software and contingency tables were generated and used to determine Chi Square test statistics and $p$-values. The data were also entered into an Excel spreadsheet to obtain percentages of each response and generate graphic images of the data.

Current Practices

The elements of current practice norms that were appraised in the survey can be described as the tasks, tools, and technologies that relate to the organization and design of the process of patient handoffs. The survey responses will be used to describe the current practices of patient handoffs as perceived by the study sample. The Likert Scale used to quantify data were defined on the instrument as follows: usually – almost daily; frequently - three to four times weekly; sometimes – one to two times weekly; seldom – once monthly; and never – not once.
The tasks and tools that the survey reviewed included the format and structure of patient handoff communication and the inclusion of some particular items of content. Results of the data analysis indicated that most of the nurses surveyed replied that the patient handoff was *usually* given by the direct care nurse and that very few indicated that it was *usually* given by the charge nurse of the previous shift. The data revealed that 46% of the sample indicated that electronic data were *usually or frequently* included in the transfer of care. See Figure 1 for a graphic display of the breakdown of the Likert Scale responses for each of the three variables associated with the source of the handoff.

![Figure 1. Source of the handoff.](image)

The data exhibited that 79% of respondents indicated that the format was *usually* totally verbal, 37% indicated that the format was *usually* both verbal and written, compared to 30% who responded that it *never* was both verbal and written. The study
results indicated that the format is rarely totally written, and 100% of the respondents noted that the format was *never* in a taped format. Results showed that 83% of the nurses noted that the format was *usually* or *frequently* the same for each patient. In contrast, 49% of respondents also indicated the format *usually* or *frequently* differed from nurse to nurse. Figure 2 represents the breakdown of responses that relate to the format of the handoff process.

![Figure 2. Handoff format.](image)

According to the data, about one half of the respondents specified that the process *usually* occurs at or near the patient's bedside and a small percentage indicated that it *usually* occurs at or near the nurse's station. However, the survey results also showed that the patient is not usually seen by both the off-going and on-coming nurse
during the handoff process, which would indicate the process occurs most often near the bedside in contrast to at the patient's bedside.

In relation to the content or data included in the patient handoff, 60% of the nurses responded that the accuracy of report was *usually or frequently* more accurate due to the experience level of the nurse. The analysis of the data demonstrated that 86% of nurses were *usually or frequently* able to determine which patient to see first based upon the content of the handoff communication. Survey results showed that 68% of the nurses noted that data communicated during the handoff process *usually or frequently* included the patient’s recent lab values and 72% of the nurses responded that vital signs were *either usually or frequently* included in the patient handoff. Additionally, 58% of nurses in the sample reported that only abnormal lab values and vital signs were *usually or frequently* included in the handoff, in contrast to the 7% of those who indicated that they were *never* included. Patient mobility and fall risk were noted as *usually or frequently* included by 49% of the nurses. The specific Likert Scale responses for the elements of the content assessed by the survey included in the patient handoff process can be seen in Figure 3.

**Analysis of the Human Factors**

The elements of human factors science considered in the survey instrument can be described as those elements that affect the individual or human cognitive functions that are part of the patient handoff process. Nurses’ ability to complete the handoff process effectively can certainly be impacted by the physical environment and the working conditions. Both of these elements of the process can be considered to have a
direct affect on the safety of the patient handoff (Page, 2004). The responses of the study participants will be used to describe nurses’ perceptions of these elements of the patient handoff process.

The human cognitive elements that can affect the patient handoff process examined in the survey include recall, fatigue, stress, and redundancy. The number of nurses indicating that omissions in communication of data occurred either by themselves or the off-going nurse during the handoff was 84 out of 86. The study results revealed that 49% of nurses indicated that recall *seldom* contributed to the omission of data by themselves. Interestingly 60% indicated that it *sometimes* contributed to omission of data by the off-going nurse. The study results also indicated that 44% of the nurses surveyed denoted that *sometimes* recall contributed to an omission that led to an error, and 33% of
the nurses replied that it *seldom* contributed. Data analysis indicated that the effect of fatigue on 37% of the nurses in the sample *sometimes* contributed to them forgetting to include data, and that 35% noted that it *seldom* contributed to their alertness while receiving data. The data signifies that 49% of the nurses in the sample indicated that stress *sometimes* contributes to them forgetting to tell the oncoming nurse something. Only 35% of the nurses indicated on the survey that they *sometimes* use a standardized format to give and receive data during the handoff process, which was the most frequent response and another 26% indicated that they *usually* did so. The frequency of response associated with the cognitive elements included on the survey instrument can be seen in detail in Figure 4.

![Figure 4. Cognitive elements.](image-url)
Two of the survey variables that were analyzed with the Pearson Chi Square test of independence were working day shift and fatigue causing the nurse to omit data from the handoff. The usually and frequently Likert Scale responses and the seldom and never responses were combined to decrease the risk of error related to zero replies for a particular Likert Scale response. The corrected test statistic was 6.945 with a $p$-value of 0.031, with a $p$-value of $<0.05$ being statistically significant. The Pearson’s Chi Square test of independence indicated that we can be 97% confident that the self report of omissions caused by fatigue is associated with working the day shift in the study sample. The Chi Square test of independence comparing the variables of the self report of omissions caused by fatigue and nurses working the night shift revealed that a statistically significant relationship did not exist. This could be related to the small sample size of nurses working the night shift and/or the higher workload on the dayshift. There was also not a statistically significant association between the survey questions of stress contributing to omissions and the self report of omissions.

A corrected test statistic of 8.42 and a $p$-value of 0.077 were noted for the variables of omissions and the use of a standardized checklist when giving or receiving a patient handoff. The Pearson Chi Square test of independence signifies that we can be 92% confident that the response to the survey question indicating self report of omission correlates with the response to the survey question indicating the use of a standardized checklist in the study sample. Although the $p$-value between these two questions was not statistically significant, a strong relationship is evident.

The environmental factors and/or working conditions that were evaluated with the survey instrument include the noise level, interruptions, hearing and understanding
the information, erroneous information, education of the staff on the handoff process, and staff input in the process design. Analysis of the data related to the noise level of the environment and its impact on the accuracy of the handoff indicated that 33% of nurses reported that it sometimes has an effect, 26% indicated that it frequently had an effect, and 28% noted that it usually had an effect. Twenty eight percent of nurses responded that interruptions usually lead to omissions of information, 30% responded that they frequently led to omissions, and another 28% replied that they sometimes led to omissions. Interestingly, the majority of nurses, which was 37% of the respondents, indicated that their ability to hear and understand reports seldom led to them missing something during the handoff process. Forty three percent of the sample only seldom received information during the handoff that was not related to the continuity of care. In terms of the education of staff on the handoff process, the results revealed that the sample was fairly equally distributed across all possible responses on the Likert scale. The responses of nurses with regard to having input in the design of the handoff process revealed that 42% indicated that they never had a chance to provide input. Figure 5 portrays a graphic display of the frequency of responses that were representative of the impact that environmental factors explored with the survey instrument.

Summary

The characteristics of patient handoffs including the format, as well as whom the nurse receives the handoff from, the content, the cognitive elements, and the environmental factors, were described using frequency of the nurses’ responses on a Likert Scale instrument. Patient handoff is more often given by the direct care nurses,
Figure 5. Impact of environmental factors on omission of information.

nearly the patient’s bedside, and in a mostly verbal format. A significant number of
participants indicated that handoff format was the same for each patient. Sixty percent of
participants indicated that handoff format was the same for each patient. However, 49% of respondents also indicated that the format *usually or frequently* differed from nurse to
nurse. Nurses indicated that they were often able to determine which patient to see first
based upon the content of the handoff and that recent lab values and vital signs were
regularly included in the handoff. Patient mobility and fall risk as well as abnormal vital
signs and lab values were also commonly included in the handoff but less frequently than
the previously mentioned content.

Constructs of stress and fatigue are somewhat subjective measures; however they are human factors that have been discussed in the literature as being major aspects of
the nursing patient handoff that lead to omissions in data and subsequent errors. Statistical analysis reflected that fatigue causing omissions was associated with working the day shift. The study data did not reflect that the nurses perceived that either stress or fatigue consistently led to omissions, but rather the data indicated that they occasionally led to omissions. This certainly could be associated with a reluctance of the nurses to self report. Of interest is that although there was not a statistically significant association between nurses utilizing a standardized format to give and receive report and the self report of omissions in data during the patient handoff, there was a 92% probability in this sample that a relationship does exist. Also of interest is that a large number of the nurses indicated that the noise level of the environment affected the accuracy of the handoff communication. Chapter V will consider the study findings using principles from the literature.
CHAPTER V

DISCUSSION AND IMPLICATIONS

An accurate, thorough, and timely patient handoff process is essential for the provision of safe and competent nursing care. There are many human cognitive aspects that affect the patient handoff process. The study findings related to the identified characteristics of nursing practice related to the patient handoffs will be discussed. The human cognitive aspects that affect the patient handoff process considered in the study were used to analyze their potential impact on the effectiveness of the process. In addition, the perceptions of the nurses surveyed about safety issues associated with the patient handoff process were evaluated.

In contrast to the study by Patterson, Roth, and Render (2005) there was seemingly less variability in this sample with regards to the format of the handoff process. One hundred percent of the sample indicated that the handoff was never taped and 79% indicated that it was usually totally verbal. There was however, great variability in the current study sample with regards to the use of written or electronic data during the patient handoff process. The oncoming nurses on each unit are provided an assignment sheet that has some particular patient information on it, which differs in content from unit to unit. Additionally an electronic report of the patient’s recent lab and vital signs, called the “Nurse Rounding Report,” is printed just prior to each shift change and is available for nurses to use during the handoff process. These two elements of the patient handoff
process are among strategies commonly employed in other high risk handoffs to reduce the risk of missed communication and errors (Patterson, Roth, Woods, et al., 2004). The variability in the study sample relative to the written and electronic format of data is consistent with these two elements not being utilized consistently and effectively. Perhaps this is due in part to too many data being printed that makes it too difficult to sift through to detect problems (Bates & Gawande, 2003). The use of computerized applications to look for trends and relations among data can be useful in the prevention of adverse patient outcomes (Bates & Gawande, 2003). As more and more patient data becomes electronic, the qualities of the information technology applications should be considered for their value to the patient handoff processes. Information systems can be of great value in assuring the flow of care during the handoff process (Bates & Gawande, 2003).

In relation to the characteristics of the content or data common to patient handoffs as identified in the study sample, recent vital signs and lab values, only abnormal lab values, and patient mobility were reported as usually or frequently being included in the handoff process by most of the nurses surveyed. However, the number of nurses that indicated that these data were not consistently included was also notable. This could infer that while most of the nurses noted that the format of the handoff was the same for each patient, that there was a significant amount of variability in the data included.

The human cognitive elements surveyed include recall, fatigue, stress, and redundancy or standardization. It is interesting that nurses indicated omissions occurred more frequently by the off-going nurse than themselves. This discrepancy could very
well be a self-reporting problem. The number of nurses indicating that omissions in communication of data occurred either by themselves or the off-going nurse was 98%. The frequency of the omissions was largely *sometimes* to *seldom*, but there was a strong indication that the omissions do occur. This is comparable with the study by Patterson, Roth, and Render (2005) that asserted that each nurse averaged four omissions in care per shift, none of which resulted in patient harm. The current study data indicated that most nurses responded that errors occur due to something that was not communicated during handoffs, although few nurses indicated that it occurred *usually* or *frequently*. According to Potter et al., omissions in care occur at various times and did not seem to correlate with a nurses’ cognitive stacking load, which was defined in the study by Potter et al. as an accumulative measure that quantifies the tasks and priorities that the nurse needs to perform at any given time (2005). However, the authors do assert that more research is needed to determine the precise relationship. It is highly likely that omissions that occur during patient handoffs, as indicated by the current study, may be associated with a high cognitive stacking load. The statistical analysis supports the likelihood of a high stacking load contributing to omissions of data and the correlation between working the day shift.

There is a strong relationship in the data between the self reports of omissions and using a standardized checklist to give and receive patient handoffs, which provides evidence that supports current practice recommendations. This sustains the need for an increase in the use of redundancy and standardization of the content as noted in the literature (World Health Organization Collaborating Centre for Patient Safety, 2007). The survey responses that related to redundancy indicated that 34 of 43 respondents *seldom* to *never* use a standardized list to give or receive report. Results from this study suggest
there is an opportunity to reduce the number of omissions by creating a change in the current process to require the use of a standardized checklist in giving and receiving patient handoffs. Most nurses use memory aids to assist them in the recall of activities and priorities, which begins with the patient handoff data. The appropriate technological support and task organization skills may eventually become evident with additional research about nurses’ ability to manage the incredibly high cognitive stacking loads that are inherent in their role and particularly during handoff communication (Potter et al.).

The use of technologies that can supply electronic patient data can be used to streamline information access and exchange (World Health Organization Collaborating Centre for Patient Safety Solutions, 2007). The literature strongly suggests that the key component of a successful handoff is a standardization of the communication and the current study data supports that assertion (Ralston & Larson, 2005; Rogerson & Tremethick, 2004).

The safety issues that were addressed are those environmental and working conditions that have been shown to impact the quality and accuracy of the information communicated during the patient handoff. The analysis of the current study data indicated that most nurses perceive the noise level of the environment has an impact on the accuracy of the handoff. When considering that the most common location of the handoff in the sample was near the patient’s bedside, in contrast to at the nurse’s station, this would seem to be the least noisy location possible for the handoff from direct care nurses. Ideally, a remote location would provide the least noise and fewest interruptions. However, this would be impossible due to the large volume of nurses engaged in the process at one time, as is the case during handoff from direct care to direct care nurse. Interruptions during the handoff communication are generally accepted in the health care
environment and may be the result of a lack of knowledge and appreciation of their impact on the accuracy and quality of the handoff communication (Streitenberger et al.). However, the current survey results indicated that the nurses perceive that interruptions do cause data to be missed.

The use of written surveys and discussion forums with frontline nursing staff to elicit input for the configuration of a standardized format and checklist would not only yield valuable information for the development of the process, but would also assist nursing staff in a successful change process and decrease the resistance to change (Benson et al.). The current study results indicated that among other factors, the lack of a standardized checklist could likely be associated with omissions in the patient handoff communication. Current study results also suggest that staff input in developing the process was not generally appreciated by the nurses surveyed. Another very important factor in the standardization of the process not evident in the study sample was that education should be provided to the nurses on the handoff process. The use of written materials, staff in-services, and wall posters are methods suggested in the literature to educate staff on the process (Benson et al.). Follow up evaluations of the handoff process are essential for ensuring the quality of the handoff process (Arora et al., 2006; Benson et al.).

Limitations

The most significant limitation of the current study was the limitation of the validity of the instrument to content validity and the lack of reliability data. Further research and the development of an instrument with established reliability and validity
would provide a valuable tool for use in the assessment of the patient handoff process that could facilitate changes in the process. The sample size and selection may limit the external validity and generalization of the findings. Replication of the study will be considered using a larger sample size to improve the ability to generalize findings. The use of a convenience sample and the sample size are other limitations to the current study.

Implications for Practice and Education

The current study supported the assertions in the literature that the use of a standardized checklist for the patient handoff process in nursing practice may limit omissions in the communication. Analysis of the current sample data revealed that omissions occur for various reasons and that a standardized format or checklist for giving and receiving the patient handoff was not consistently evident. The utilization of a standardized checklist for patient handoff communication should be a component of both current nursing practice and future nursing education. The involvement of nursing staff and nursing educators in the development of the handoff process is essential to its success in improving patient safety. Nursing educators should include instruction in curriculum not only about the risks associated with patient handoff communication but also the risks associated with the limitations of human cognition.

Future Research Recommendations

There is a need for further research of the human factors associated with the patient handoff process. Development of an instrument with established reliability and validity would be of great value to future research in this area. Additional research could
then be done that evaluated the effectiveness of a standardized checklist on the frequency of errors/omissions in the patient handoff process.

Additional research is needed to quantify the cognitive load of nurses and to develop information systems that can reduce the risk of omissions and errors. The current study results revealed that there is a higher likelihood of fatigue resulting in omissions associated with working the dayshift, which could be linked to a higher cognitive stacking load. Information systems need to be closely scrutinized and researched for their affect on the cognitive load of nurses. We must ensure that information systems decrease the cognitive stacking load of nurses to promote patient safety.

It is recommended that the science of human factors engineering be employed to assist in reducing the risk to patients posed by processes in nursing and in healthcare in general. More research of the patient handoff process is needed utilizing the principles of human factors engineering to decrease the risk of harm to patients that the current processes have been shown to impose.

Conclusions

The use of a systematic analysis of the handoff process and the involvement of staff in the development of a standardized handoff communication are key elements in improving the safety, quality, accuracy, and effectiveness of the handoff communication (Benson et al.). Written tools and guidelines that support the consistent ordering of the data and the use of a checklist are other key components of standardization (Arora et al., 2006). In the current study, neither of these processes was evident. It would be interesting to implement these processes and then re-survey the sample to assess the effect on the
perceptions of the nurses about the handoff process. Future research of the impact that the organization of the handoff has on the nurse’s cognitive function would also be beneficial.
REFERENCES


APPENDIX A
INFORMED CONSENT – NURSES

COMMUNICATION

Purpose:

Dear participant,

My name is Deborah Clifton and I am a registered nurse doing a survey, as research for my thesis, about how nurses communicate with each other. I am doing this research to meet the requirements for my Masters degree and it is not related to my employment with Fremont Rideout Health Group. The purpose of the survey is to supply new information about nurse’s views of shift report. The way nurses communicate is vital in the planning ability for nurses to assume care of patients. The data gathered may help to develop a safer, more useful shift report communication process. The results of the study will be seen by Fremont Rideout Health Group, however the survey responses will not be.

Procedures:

Consists of the completion of a survey by nurses about how communication occurs. This study has been approved by the Institutional Review Board at California State University Chico.

Benefits:

The benefit of the study is to add to our understanding about the process of shift report. There is no personal benefit to individuals participating in this study.

Potential Risks/Discomforts:

The likely risks related to finishing the survey are few and although not intentional, you may possibly find some of the questions upsetting. The completion of the survey will take about 10-15 minutes.

Contribution to the study is your choice and you are not required to participate. All survey responses will be kept strictly confidential. You will remain anonymous in any reports produced from survey information collected. Your completion of the survey can be considered as your consent to participate. All data collected will be stored in a secure place. You will not be paid to participate. You will receive a full copy of the survey results upon request. By completing the survey you are stating that you have read the consent form and you understand that participation in this study is voluntary. As a volunteer you may withdraw at anytime during the survey process without any effect to your employment.

For any further information or for questions about the study or about being a participant, you may contact me by email at dclifton1@csuchico.edu or you may contact Diane Smith at Chico State IRB at 530-898-4766.
Completion of the survey signifies informed consent to participate in this study and for responses to be included in data analysis.

**Demographic Data**

<table>
<thead>
<tr>
<th></th>
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<th>&gt;30</th>
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<tbody>
<tr>
<td><strong>Age</strong></td>
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<td><strong>Gender</strong></td>
<td>M</td>
<td>F</td>
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<tr>
<td><strong>Type of license</strong></td>
<td>RN</td>
<td>LVN</td>
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<td><strong>Number of years on unit</strong></td>
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<td><strong>Years experience in acute care</strong></td>
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<td><strong>Country trained in</strong></td>
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<td><strong>Ethnicity (Check one)</strong></td>
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<tr>
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<td>Hispanic</td>
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<td>Asian</td>
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<td>African American</td>
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<td>Filipino</td>
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<td>White</td>
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<tr>
<td>Other/Unknown</td>
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<tr>
<td><strong>Shift (check one)</strong></td>
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<tr>
<td>12 hour days</td>
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<td>12 hour noes</td>
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<tr>
<td><strong>Highest education level achieved (check one)</strong></td>
<td></td>
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<tr>
<td>Grade 12 plus 1-2 years college</td>
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<tr>
<td>Grade 12 plus Associates Degree</td>
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<td>Grade 12 plus Baccalaureate Degree</td>
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<tr>
<td>Grade 12 plus Masters Degree</td>
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### Likert Scale

<table>
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<tr>
<th></th>
<th>Usually</th>
<th>Frequently</th>
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<th>Seldom</th>
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<tbody>
<tr>
<td>Almost Daily</td>
<td>3 - 4 times weekly</td>
<td>1 - 2 times weekly</td>
<td>Once monthly</td>
<td>Not once</td>
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<thead>
<tr>
<th>Statement</th>
<th>Usually</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
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<tbody>
<tr>
<td>The direct care nurse provides me with shift report.</td>
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<td>I receive shift report from the charge nurse of the previous shift.</td>
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<tr>
<td>Shift report is given to me at or near the patient's bedside.</td>
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<tr>
<td>I receive shift report at or near the nurses’ station.</td>
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<tr>
<td>Shift report is given to me in a report room or conference room.</td>
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<tr>
<td>The shift report that I receive is in a totally verbal format.</td>
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<td>I receive shift report in a totally written format.</td>
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<tr>
<td>I receive shift report in both a verbal and written format.</td>
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<tr>
<td>Shift report is given to me via a taped report.</td>
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<tr>
<td>I receive shift report in the same format for each patient.</td>
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<tr>
<td>I receive shift report in a format that differs from nurse to nurse.</td>
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<tr>
<td>I think that more experienced nurses give a more accurate report.</td>
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<tr>
<td>I am able to decide which patients to see first based on shift report.</td>
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<tr>
<td>Recent lab values are reported on each patient during shift report.</td>
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<tr>
<td>Recent vital signs are reported on each patient during shift report.</td>
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<tr>
<td>Statement</td>
<td>Usually</td>
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<tr>
<td>Only abnormal lab values or vital signs are reported during shift report.</td>
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<tr>
<td>Patient mobility (including fall risk) is consistently reported on each patient during shift report.</td>
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<tr>
<td>In my opinion the noise level of the environment where report is given affects the accuracy of report.</td>
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<tr>
<td>Patients are seen by both off-going and on-coming nurse during report.</td>
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<tr>
<td>It is my belief that when report is interrupted data is missed.</td>
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<td>Electronic patient data (such as computer patient reports or the EMR) are included in the transfer of care.</td>
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<tr>
<td>I use a standard list to give report on every patient the same way.</td>
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<tr>
<td>I use a standard list to receive report on every patient the same way.</td>
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<tr>
<td>Statement</td>
<td>Usually</td>
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<tr>
<td>I forget to tell the oncoming nurse something about the patient.</td>
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<tr>
<td>The off-going nurse forgets to tell me something about the patient.</td>
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<tr>
<td>Fatigue contributes to me forgetting to tell the on-coming nurse something about the patient.</td>
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<tr>
<td>Fatigue contributes to me being less alert when getting report and I sometimes miss things.</td>
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<tr>
<td>Stress contributes to me forgetting to tell the on-coming nurse something about the patient.</td>
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<tr>
<td>Something that wasn’t included in shift report contributes to errors occurring.</td>
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<tr>
<td>Difficulty hearing or understanding report causes me to miss something.</td>
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<tr>
<td>I have the chance to ask the off-going nurse questions during or after shift report.</td>
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<tr>
<td>I receive information during shift report that is not related to continuity of care.</td>
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</table>

**Likert Scale**

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Frequently</td>
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<td></td>
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<tr>
<td>Never</td>
<td>Not once</td>
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</tbody>
</table>
Education on the process of shift report is provided to the nurses.

I believe that important information that I need to care for the patient is not passed on during shift report.

During shift report I receive information about patient care issues that require follow up during my shift.

I use a standard checklist when giving/receiving shift report.

I was given the chance to provide input to the shift report process that we use.