

ENVIRONMENTAL SERVICES AND POLICIES RELATED TO  
REST BREAKS FOR NIGHT NURSES IN MONTANA HOSPITALS

by

Anita Marie Kellam

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

Master

of

Nursing

MONTANA STATE UNIVERSITY  
Bozeman, Montana

April, 2008

©COPYRIGHT

by

Anita Marie Kellam

2008

All Rights Reserved

APPROVAL

of a thesis submitted by

Anita Marie Kellam

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citation, bibliographic style, and consistency, and is ready for submission to the Division of Graduate Education.

Rita E. Cheek, PhD, RN

Approved for the Department of Nursing

Elizabeth Nichols, DNS, RN, FAAN

Approved for the Division of Graduate Education

Dr. Carl A. Fox

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a master's degree at Montana State University, I agree that the Library shall make it available to borrowers under rules of the Library.

If I have indicated my intention to copyright this thesis by including a copyright notice page, copying is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for permission for extended quotation from or reproduction of this thesis in whole or in parts may be granted only by the copyright holder.

Anita Marie Kellam

April, 2008

## TABLE OF CONTENTS

1. INTRODUCTION TO THE STUDY .....	1
Introduction.....	1
Background and Significance .....	2
Theoretical Framework.....	10
Statement of Problem.....	11
Purpose.....	12
Definitions.....	13
2. LITERATURE REVIEW .....	15
Introduction.....	15
Consequences of Working Night Shift .....	15
Errors and Night Shift.....	19
Sleepiness and Night Shift .....	21
Naps .....	23
Breaks .....	25
Self Care and Nurses Working at Night .....	27
Environment .....	29
Summary of Literature Review.....	21
3. METHODOLOGY .....	34
Questionnaire .....	34
Participants.....	35
Rights of Human Participants .....	35
Data Collection and Procedures.....	36
Data Analysis .....	38
4. RESULTS .....	39
Introduction.....	39
Demographics .....	40
Policies.....	41
Rest Breaks and Naps .....	42
Environmental Services .....	44
5. DISCUSSION .....	47
Hospital Policies .....	47

TABLE OF CONTENTS-CONTINUED

Rest Breaks .....	48
Environmental Services .....	50
Limitations .....	51
Implications & Recommendations.....	52
Summary .....	53
REFERENCES CITED.....	55
APPENDICES .....	63
APPENDIX A- Data Collection Instrument .....	64
APPENDIX B- Human Participant Approval.....	67
APPENDIX C- Telephone Script .....	69
APPENDIX D- Human Participant Information .....	71
APPENDIX E- Follow-up Letter .....	73

LIST OF TABLES

Table	Page
1. Hospital Demographics Related to Night Nurses .....	41
2. Rest Breaks and Naps .....	43
3. Environmental Services .....	45

LIST OF FIGURES

Figure	Page
1. Break Areas and Hospitals.....	44
2. Environmental Services in Acute Care and Critical Access Hospitals .....	46

## ABSTRACT

The nurses who work at night in acute care and critical access hospitals often must cope with a decreased amount of sleep, increased fatigue, and disruption of multiple physiological circadian rhythms. There is increased demand and rigor placed on night nurses in acute care adding to overall stress and demands on the nurse's ability to function safely and accurately. Simple environmental changes related to rest breaks, naps, and environmental services (work areas, break areas, eating facilities) can optimize the working environment and facilitate the nurse's self care during the challenges of night work. The goal of this descriptive study was to describe the environmental services and policies regarding rest breaks and naps in Montana acute care and critical access hospitals. The Hospital Environment and Policy Survey was developed for this purpose. Method: An anonymous electronic survey was done regarding breaks, policies related to rest breaks (written and unwritten), naps and environmental services available for night shift nurses. Results: There was a 52% response rate (4 of 15 acute care and 26 of 43 critical access hospitals). Of the respondents, 83% of hospitals do not provide night nurses with access to a cafeteria at night; however, 73% have vending machines. Almost half of the hospitals provide an area for night nurses to exercise, but few had a well-lit area to walk outside. Only 2 hospitals have a policy that allows night nurses to take a nap on their break, but 37% of respondents reported that nurses nap during the night shift. Seventy percent of the nurses reported getting their breaks "routinely" or "most of the time". Conclusion: Results of this study indicate a need for various improvements in the policies related to naps and environmental services particularly break areas, food services and exercise areas. These improvements can help address nurses' challenges of working at night.

## CHAPTER 1

## INTRODUCTION TO THE STUDY

Introduction

Working night shift is a cause for concern for Registered Nurses (RNs) and Licensed Practical Nurses (LPNs) who must deal with the associated fatigue, lack of sleep, and circadian rhythm changes. Night nurses are awake at a time when their body is naturally telling them to sleep. During a typical night shift the cafeteria is closed, staffing is reduced, and lighting is dimmed for patient comfort. After their shift has ended nurses must remain alert for the drive home and then sleep during daylight hours. Daytime sleep can be another cause of concern for the typical night nurse because daytime sleep is often shorter and less restorative than night time sleep. Changes in the sleep/wake cycle of the night nurse can affect fatigue levels, ability to concentrate, performance of logical tasks and overall health and well-being (Smith-Coggins, 2006). Nurses spend time and energy caring for others often at the expense of their own needs. The hospital working environment can provide resources which either facilitate or hinder the needs of nurses working at night and thereby alleviate their concerns.

Montana is a large rural state that has both acute care and critical access hospitals for its residents. Acute care hospitals provide care for patients who are physiologically unstable and offer medical, surgical and/or obstetrical services. Acute care hospital funding can vary depending on their purpose with some being for profit and some not for

profit. Critical access hospitals were created with special federal funding for small rural hospitals in order to provide short-term hospitalization for patients with non-complex health care needs. Federal regulations mandate that critical access hospitals have no more than 25 acute care beds and patients can stay for a maximum of 96 hours. Critical access hospitals are rural hospitals at least 35 miles from another hospital or 15 miles in the case of mountainous terrain or secondary roads (Rural Assistance Center, n.d.).

### Background and Significance

Nurses make up a large number of the night shift work force in the United States. The 2004 National Sample Survey estimated that 2.9 million nurses work in the United States (U.S. Department of Health and Human Services, 2004). Of those, 56.2% (1,360,847) are employed in hospitals with a majority of the hospital nurses (70.6%) performing direct patient care. Of the total number of healthcare professionals in the United States, 24.6% work night shift in long term care facilities as well as hospitals (Berger & Hobbs, 2006). That means that over 700,000 nurses work night shift in the United States.

Night shift workers, including nurses, tend to get less sleep than day shift workers (Kunert, 2007, Stokowski, 2004). For example, night shift workers' total sleep time is one to four hours shorter and less restorative than day shift workers (Akerstedt, 2003, Fletcher & Dawson, 1997). Daytime sleepers tend to be easily awakened, sleep for shorter, fragmented periods and wake up feeling less restored than people who sleep during the night (Akerstedt, 2003). Typically, the night nurse does not nap before starting

the shift and is awake for 24 hours during the first night of work (Akerstedt, 2003). A study of nurses (N=635) found that rotating and night shift nurses reported getting less sleep than those who worked day or evening shift (Gold, et al., 1992). Merely 29% of nurses who rotate shifts and 21% of night nurses reported sleeping longer than seven hours compared to 39% of day and evening nurses.

The physiological organization of sleep is structured at the cellular level. The timing and duration of daily sleep/wake cycles are regulated by a circadian rhythm and the homeostatic process, but all of the factors involved are not known at this time (Owens, 2007). The homeostatic process is influenced by the amount of time since the last sleep period (including naps) and is considered the biologic pressure to sleep (Blachowicz & Letizia, 2006, Owens, 2007). Circadian means “around the clock” and refers to changes or patterns that occur over the course of the 24 hour day. There are many structures in the brain that influence this natural cycle, including the pineal gland and retina and the suprachiasmatic nucleus (SCN), or “master clock”, within the hypothalamus. The synthesis and release of melatonin are stimulated by darkness and suppressed by light. The retina contains photoreceptors that convert energy from light into nerve impulses and these impulses send signals to the SCN (McCance, 2006). The SCN is responsible for regulating the rhythm of melatonin, growth hormone, and cortisol (Wisconsin Medical Center, 1999). In humans, melatonin secretion normally increases soon after the onset of darkness, peaks in the middle of the night (between 2 and 4 a.m.), and gradually falls during the second half of the night (Brzezinski, 1997).

Though the specific function of sleep is debatable, there is agreement that sleep restores the body's physiological systems to promote growth and healing as well as mental, immune and metabolic functions (McCance, 2006). This restorative theory of sleep suggests that sleep helps the body recover from all the work it did while awake.

The architecture of sleep has two distinct phases defined by an EEG recording: rapid eye movement (REM) sleep and non rapid eye movement (Non-REM) sleep (Owens, 2007). Adults spend approximately 20% of their sleep in REM sleep. Non-REM sleep accounts for 75-80% of sleep time and can be divided into the following four stages:

Stage 1: This is a state of light sleep and a person can be awakened easily. The EEG frequency is 6-8 Hertz and low amplitude. During this stage, many people experience sudden muscle contractions.

Stage 2: There is an occasional burst of brain wave activity on EEG. The EEG frequency is 4-7 Hz and medium amplitude with occasional sleep spindles and occasional K complexes. The purpose of sleep spindles and K complexes is uncertain at this time. Conscious awareness of external environment is lost.

Stage 3: Delta waves are the slowest of all four brain wave frequencies on the EEG. This is a period of deep sleep and people are hard to arouse. The EEG frequency is 1-3 Hz with high amplitude.

Stage 4: Delta waves are present on EEG more than half of each 30 second period. People are also difficult to arouse. The EEG frequency is less than 2 Hz and high in amplitude (McCance, 2006).

REM sleep is characterized by bursts of rapid eye movement, increased brain waves on EEG, low muscle tone, loss of temperature regulation, and alteration in heart rate and blood pressure (McCance, 2006). REM and Non-REM sleep alternate throughout the

period of sleep in cycles of about 90-110 minutes with approximately five to six sleep cycles per night.

Many individuals use the terms sleepiness and fatigue to describe the same circumstances, but they are two different concepts (Shen, 2006). When a person is sleepy there is a strong desire to go to sleep and this desire is usually strongest during darkness between midnight and 6:00 a.m. (Shen, 2006). Fatigue is the aversion to carry on with the task at hand and occurs with repetitive activities. Fatigue is associated with lack of energy and motivation with lower physical and mental performance (Tucker, 2003, Folkard & Akerstedt, 2004, Stokowski, 2004). Knowing this distinction makes fatigue much easier to understand. A person can feel fatigued without being sleepy, but fatigue and sleepiness often go together.

The Association of Professional Sleep Societies' Committee on Catastrophes, Sleep and Public Policy analyzed data showing that fatigue and sleepiness of night shift workers correlates with some of the worst human disasters in history (Mitler, 1988). The Three Mile Island nuclear reactor accident in Pennsylvania occurred between 0400 and 0600 hours and was due not only to the stuck valve that caused a loss of coolant water, but more notably, to a failure to recognize this event leading to the near meltdown of the reactor. Similar nocturnal accidents at the David Beese nuclear reactor in Ohio and at the Rancho Seco nuclear reactor in California were prevented before catastrophic results occurred (Mitler, 1988). The committee also reported that the National Aeronautics and Space Administration (NASA) Challenger space shuttle disaster stemmed from errors in judgment made in the early morning hours by people who had inadequate sleep for

multiple days before the launch. Finally, the Chernobyl nuclear reactor accident in the Soviet Union occurred at 1:35 a. m. because of human error as a result of fatigue and sleepiness (Folkard & Akerstedt, 2004).

Night shift workers frequently suffer from sleep difficulties related to fatigue and sleepiness that significantly affect their health and wellness. There is increased sleepiness during the actual night shift and day time sleeping is less effective than night time sleeping (Loudoun, 1997, Bonnefond, 2001, Stokowski, 2004). These sleep difficulties occurred so frequently that the Diagnostic and Coding Manual was revised to include shift work sleep disorder (SWSD) as a medical diagnosis (Diagnostic and Statistical Manual of Mental Disorders, 2000).

Sleep deprivation is an important issue for night shift nurses. When people are sleep deprived they think and move more slowly, are more irritable, make more mistakes, communicate poorly, are more prone to accidents and have trouble remembering things which leads to decreased productivity (Stokowski, 2004). Ongoing sleep deprivation of even an hour a day can lead to an accumulated sleep debt over time that is difficult, maybe impossible, to recover (Stokowski, 2004).

The likelihood of falling asleep on the drive home from work is also a serious concern for night nurses and their employers. There is an increase in the risk of sleep related vehicular accidents in the early morning hours (Akerstedt, Bjorn, Anund, & Kecklund, 2005). After 24 hours of being awake, the impairment from fatigue is equivalent to someone who has had 2-3 alcoholic drinks and whose blood alcohol is 0.1%, a level that is considered legally drunk in the United States (Kuo, 2001, Stokowski,

2004, Lamberg, 2005). New Jersey is the first state in the U.S. to pass a law, commonly referred to as “Maggie’s Law”, that is specific to drowsy driving. Maggie’s Law defines fatigue as more than 24 hours without sleep and allows prosecution of fatigued driving as recklessness under the state’s existing vehicular homicide statute. There are other states with legislation pending that address concerns regarding drowsy driving and other issues related to sleep. This change in legislation has a significant influence on corporations that employ night shift workers. Not only will there be personal liability for the worker, but corporations may also be liable for accidents that occur as a result of drowsy driving. Safety driving home is one area every night nurse and their employer must consider.

Night nurses who work in acute care and critical access hospitals are faced with different issues than those who work during the day. The day shift worker has more ancillary and administrative personnel available, as well as more experienced nurses because of their seniority which enables them to get preferred day shift assignments. There are fewer people working night shift and night nurses are often less experienced (Kunert, 2007).

Night nurses need to be able to distinguish between events that require immediate assistance from a provider and those that can wait until the morning. It is not uncommon for night nurses to stabilize an emergency situation on their own until additional help arrives. If the nurse decides that there is an urgent need, he or she would usually have to interrupt the provider’s sleep and report the current situation. A fatigued, sleepy nurse might not be able to concentrate or communicate effectively and could miss clues to a deteriorating patient condition.

There can be significant health consequences for people working night shift. To combat these disorders researchers recommend a working environment to facilitate nurses self care. Studies show that night shift workers often suffer from digestive disturbances, insomnia, emotional and mental problems, and chronic fatigue and have an increased risk of cancer, cardiac disease and endocrine disorders (Stokowski, 2004, Berger & Hobbs, 2006, Samaha, 2007, Fischer, 2006, Horowitz, 2001). To combat these disorders researchers recommend a nap and adequate light during the night shift (Akerstedt, Bjorn, Anund, & Kecklund, 2005).

Nurses have found unofficial ways to combat sleepiness and fatigue, such as drinking caffeine, getting fresh air, staying busy, or taking a break. Research supports some of these ideas. The amount of caffeine found in coffee and tea varies. The caffeine in 8 oz of brewed coffee is 80-135mg. Caffeine found in 8 oz of brewed tea is 40-60 mg. The effects of caffeine can be felt 20 minutes after ingestion and can last 13-14 hours with only half of the caffeine being eliminated in the first 6 hours (Wyatt, Cajochen, Ritz-De Cecco, Czeisler, & Dijk, 2004). Approximately 200mg of caffeine, equivalent to 2 cups of coffee, consumed during a night shift can enhance cognitive performance on simple and complex tasks and improve subjective feelings of alertness. Caffeine should be limited at the end of the shift, however, to allow for better daytime sleep (Kohler, Pavy, & Van Den Heuvel, 2006).

Other helpful measures to maintain alertness are applying a cool cloth to the face and making healthy food choices (Berger & Hobbs, 2006). There is some evidence that a short nap in the workplace can help reduce fatigue and sleepiness. As a result there is an

improvement in alertness. Prontis-Routoll (2001) interviewed nurses who reported additional ways to survive the night shift. One nurse reported getting together with other nurses at 3:00 a.m. to take a two-mile walk around the “health-trail” (p 68). The working environment needs to enable nurses to meet their needs in order to maintain alertness.

A good physical working environment enables nurses to meet their self-care needs. It is important for the workspace to be well ventilated with bright lighting to help maintain alertness (Tanabe & Nishihara, 2004). Bright indoor light of 450 lux in the angle of gaze and 1,100 lux of ambient light with a maximum of 1,500 lux is recommended to combat sleepiness (Wright, Hughes, Kronauer, Dijk, & Czeisler, 2001). A place to exercise inside or a well-lit area to walk outside can be an important resource for night shift workers. Also, the availability of a cafeteria or vending machines with healthy food choices can help create a supportive work environment (Faugier, et al., 2001). Another important aspect for the night shift worker is a rest area away from patient care with a place to lie down.

Research regarding rest breaks has focused primarily on industrial and transportation industries and the usual breaks of 15 minute rest breaks every 4 hours have been incorporated into the written policies of many large corporations. Rest breaks are important for the human resource management department in hospitals to consider. Federal law does not require meal or coffee breaks, despite widespread popular misconceptions; however many employers offer breaks and federal law includes them in work time that requires payment (U.S. Department of Labor, n.d.). According to the U.S. Department of Labor, there are 21 states that have laws providing rest breaks, but

Montana is not one of them. Workers in this state must rely on their employers or union representatives to include rest break periods in their collective bargaining agreements. Adequate rest breaks are important for the health and wellness of night nurses.

Maintaining the health and safety of the nursing workforce is essential for providing patient care activities, but nurses often neglect their own needs in order to perform patient care. People working nights consume less nutritious foods and participate in less aerobic activity than those working days (Blachowicz & Letizia, 2006, Persson, 2006). They often use more caffeine, alcohol, tobacco, sleeping medications, and over-the-counter medications which leads to additional health risks for the night worker (Berger & Hobbs, 2006, Blachowicz & Letizia, 2006, Samaha, 2007).

Working at night helps maintain productivity, as well as provide around-the-clock care for the sick. Shift work means working outside the normal daylight hours and, because humans are accustomed to being active during the day and sleeping at night, changing that routine can lead to a lack of sufficient sleep. Environmental factors in the workplace, such as allowing naps, bright lighting in work areas, break areas away from patient care, and available eating facilities can help night nurses so that they stay awake and safely perform necessary activities.

### Theoretical Framework

Dorothea Orem's Self Care Deficit Theory is the chosen framework for this study because it offers an explanation for both internal and external conditions involved in health states. The Self Care Deficit Theory plays a significant role in understanding how

individuals engage in self-care activities. Orem focuses on the individual's ability to perform self-care, and initiate activities on their own to maintain life, health, and well-being (Orem, 1985). Her theory strives to enable people to care for themselves to the utmost of their ability. She describes nursing as a profession of caring and incorporates five main views into her theory: person, agent, symbols, organism and object (Orem, 2006). According to Orem it is the special focus on human beings that distinguishes or differentiates nursing from other human services. Orem stated nurses use their specialized capabilities to create a helping system in situations where persons are deemed to have an actual or potential self-care deficit.

Orem's model can be applied not only to patients, but also to nurses with a self-care deficit. Nurses must take care of themselves in order to take care of their patients.

Orem specifically states:

Nurses know that they have rights as persons and as nurses and that they must defend and safeguard these personal and professional rights; their powers of nursing agency must be adequate to fulfill responsibilities to meet nursing requirements of persons under their care; they must know their deficiencies, act to overcome them, or secure help to make up for them; they must be protective of their own biological well-being and act to safeguard themselves from harmful environmental forces (2006, page 146).

Orem's Self-Care Deficit Theory is applied to this study by assessing what resources are available to nurses for self-care or to meet basic needs while working night shift.

### Statement of Problem

The nurses who work at night hospitals must cope with a decreased amount of sleep, increased fatigue, and disruption of multiple physiological circadian rhythms

(Akerstedt & Gillberg, 1981, Rogers, 2004). Night nurses must also be aware of the potential consequences night shift has on the health and safety of themselves and their patients. There is increased demand and rigor placed on night nurses in acute care, adding to overall stress and demands on their ability to function safely and accurately. Night work requires a group of skillful, alert, educated staff to tend to the needs of patients with varying levels of acuity. Convincing evidence has been found in the literature to relate fatigue and sleepiness to decreased work-place performance in nursing and other disciplines that work around-the-clock. Easy to implement changes to the workplace environment such as rest breaks, naps, and providing supportive environmental services can help night shift workers maintain alertness in order to better care for themselves. Nurses and hospital administrators can play a significant role in the creation of policies and a working environment that will help night shift nurses care for themselves, to fight sleepiness and fatigue.

### Purpose

The purpose of this descriptive study is to assess environmental services and policies related to breaks and naps for Registered Nurses and Licensed Practical Nurses working night shift in Montana acute care and critical access hospitals. The specific aims are to describe environmental services (work areas, break areas, eating facilities), naps and policies related to naps and breaks. These environmental services can support the needs of the night shift worker in acute care and critical access hospitals.

Definitions

The definitions used in this study are the following:

Acute care hospitals: a health care setting in which a patient is treated for a brief but severe episode of illness, for the sequelae of an accident or other trauma, or during recovery from surgery.

Alert: fully aware and attentive; wide-awake.

Break: refreshing ease or inactivity after exertion or labor; to cease from motion.

Critical Access Hospitals: a health care setting with limited service designed to provide essential services in rural communities.

Circadian rhythm: pattern based on a 24-hour cycle, especially the repetition of certain physiologic phenomena, e.g. sleeping.

Environment: external factors surrounding and affecting a given organism at any time.

Fatigue: weariness from bodily or mental exertion; disinclination to continue performing the task at hand.

Night Nurse: an Registered Nurse or Licensed Practical Nurse who works night shift.

Policy: principle or guideline that governs an activity and that guides the work of employees or members of an institution or organization.

Service: an act of helpful activity; aid.

Shift: a unit of paid work time, typically 8 or 12 hours in length.

(a) Day shift is a work period that typically begins about 7:00 am.

(b) Evening shift is a work period that typically begins about 3:00 pm.

(c) Night shift is a work period that typically begins after 7:00 pm.

Sleepiness: desire or inclination to sleep.

Sleep Inertia: transient impairment of performance and mood just after awaking from sleep.

## CHAPTER 2

### LITERATURE REVIEW

#### Introduction

Night shift workers contend with increased fatigue and sleepiness that can affect their performance in the workplace. A significant amount of research has been done to assess the varied aspects of shift work and male night shift workers in particular. Yet very little research has focused specifically on the working environment for night shift nurses in acute care. The literature reviewed for this study focuses on the consequences of working night shift, fatigue and errors, sleepiness and night shift, naps, breaks, environment, self care and nurses working at night. There was no research found that related Orem's Self Care Theory to environmental self-care services for night shift nurses.

#### Consequences of Working Night Shift

There is significant evidence that working night shift puts increased stress on the human body and causes physiologic changes (Tennant, 2001). Adrenocorticotrophic hormone (ACTH) and cortisol levels are lower in night nurses than nurses working day shift, suggesting that the pituitary-adrenocortical function responds to the reversal in the sleep wake cycle (Munakata, et al., 2001). Holmback, et al., 2003, studied the changes in endocrine responses to meals during a 24 hour period. Seven men participated in two seven-day experimental sessions, in which one group ate a high carbohydrate diet and the

other a high fat diet. On the sixth day participants were kept awake for a 24 hour period, and blood samples were taken. Researchers found that insulin and leptin had differing responses to meals depending on the time of day the meals were eaten. There was a nocturnal increase in glucose concentration, decrease insulin sensitivity and increase thyroid hormone levels. Cortisol secretion was suppressed after the daytime meal, but not after the nighttime meal. The researchers concluded that decreased evening/nocturnal responses of cortisol and pancreatic polypeptides indicate that nocturnal eating and night work could have health consequences for night shift workers (Holmback, et al., 2003). Several other credible studies demonstrated that night nurses are at an increased risk of obesity, impaired glucose and lipid tolerance, cardiovascular disease, and gastrointestinal disorders (Reid, 1997, Learhart, 2000, Geliebter, 2000, Munakata, et al., 2001, Al-Naimi, Hampton, Richard, Tzung, & Morgan, 2004).

Working night shift has an adverse effect on a person's health. There is some evidence that working night shift can increase the risk of breast and/or colorectal cancer possibly due to exposure to light at night (Schernhammer, 2003). Because of changes in the hormone levels and ovarian function, female night shift workers can be at increased risk of menstrual irregularities, miscarriage and premature labor (Labyak, 2002, Zhu, 2004).

In separate well-defined studies Loudoun (1997) and Tennant (2001) examined work/non-work variance and subjective well-being among female shift workers (Loudoun, 1997, Tennant, 2001). Both researchers concluded that female shift workers had more household work and less free time than their male counterparts. Female shift

workers also found it more difficult to combine work with family life (Clissold, 2002). The male shift workers used their time off to participate in leisure activities with family and friends, while female shift workers used their time off to catch up on household chores at the expense of necessary sleep (Scott, 2006). A 1981 study by Gadbois found that married women slept an hour and 20 minutes less than single women after working night shift than single women, because of necessary child care and household chores. These studies support the idea that daytime sleep is affected by household responsibilities for female night shift workers.

The risk of falling asleep at work can increase during a night shift. This statement is supported by a survey of 5589 participants in a work organization and sleep study (Akerstedt, et al., 2002). Participants were divided into 3 groups: day work, shift work with day work only and shift work with night work only. The prevalence of unintentionally falling asleep at work was highest for night shift workers. This research found that the risk of unintentionally falling asleep at work was positively correlated with disturbed sleep, shift work, and higher socioeconomic groups. The tables for this study were difficult to interpret and the self-reported questionnaire decreased the validity of the study.

Lamond, et al. (2003) assessed the impact that a week of night work has on a person's sleep, circadian phase and performance. Fifteen subjects participated in seven simulated eight hour night shifts and before the drive home were exposed to 20 minutes of natural light to simulate light exposure. During the simulated night shift, participants completed hourly performance tests, and saliva samples were collected at half hour

intervals to measure the level of melatonin. The participants then went to sleep during the day in darkened rooms without distractions and were instructed to sleep until they naturally awoke. Results showed that sleep and performance at night improved over the course of the week with minimal accumulation of sleep debt and some circadian adaptation as evidenced by shifts in melatonin. The researchers related these changes to the controlled setting with limited distractions. This demonstrates that under ideal conditions the body can adjust to night shift, but some sleep debt remains.

Multiple studies show that night shift workers have more sleep disturbances and compensate for their disturbed sleep by increasing their sleep during days off (Lavie, 1989, Akerstedt, et al., 2002, Knuttson, 2003, Kanazawa, 2006). More recently Kunert (2007) conducted a survey regarding sleep quality, sleep duration, sleep medication use and daytime dysfunction in acute care nurses using the Brief Fatigue Inventory (BFI) and the Pittsburgh Sleep Quality Index (PSQI). The results of this study were consistent with those found in a study done by Ohida (2001). Both showed that night shift nurses had poorer subjective sleep quality and sleep duration, used sleep medication more often and had greater daytime drowsiness than the day shift nurses (Kunert, 2007, Ohida, 2001).

In summary, this literature demonstrates that night shift has significant consequences on the physical and mental health of the night shift worker. Significant health problems are caused by increased stress on the normal physiological functions of the human body, poor sleep quality, changes in hormone levels, and decreased immune response. In addition, rotating shift workers get less sleep than permanent night shift workers, thus increasing their risks of falling asleep at work. The women who work night

shift also have difficulty combining work and household responsibilities. These issues require thoughtful consideration in order to minimize the serious consequences of working night shift.

### Errors and Night Shift

The number of errors and risk of accidents can increase with night shift work. Suzuki, et al. (2004) surveyed 4,407 nurses in eight hospitals in Japan in an attempt to identify areas to improve the work environment of night nurses. These researchers also wanted to provide data that would increase awareness and help prevent errors. In the study they assessed the relationship of mental health status with occupational accidents and night shift work. They had four areas of concern: drug administration errors, incorrect operation of medical equipment, errors in patient identification, and needle stick injuries. The researchers concluded that night and irregular shift work were associated with the most performance errors. The results were not reported for permanent night shift workers.

The trucking industry has done a lot of research to study how long hours and shift work contributes to fatigue levels. An excellent study from 1996 surveyed 80 commercial truck drivers in order to assess their levels of fatigue and alertness over a four day period (Federal Motor Carrier Safety Administration, 1996). The participants were divided into four shift groups: 10 hour daytime, 10 hour rotating, 13 hour night time, and 13 hour daytime. Numerous instruments and monitoring devices such as video monitoring, lane tracking, steering wheel movement, physiological monitoring and cognitive tests were

used to track cognitive and physical performance and assess fatigue. They simulated a commute home after a night shift for ten shift workers and compared their driving experiences with those driving after a normal night's sleep. The night time driving group got 1 to 1 1/2 hours less sleep and had the worst performance of all the groups. The results showed that driving after a night shift caused increased duration in eye closure, increased levels of subjective sleepiness, and clearly caused incidents. In the United States the National Highway Traffic Safety Administration (2000) estimated that driving while fatigued was responsible for 100,000 crashes, 40,000 injuries, and 1550 deaths annually. Driving in the early morning hours increases the risk of an accident for professional drivers and commuters (Akerstedt, 2005). Other reputable studies show that night shift and extended shifts increase the risk of motor vehicle accidents on the drive home (Barger, et al., 2005, Scott, et al., 2007).

Fatigue is a significant issue for nurses who work at night. Fatigue can lead to medication errors, decreased work performance, decreased mental acuity, absenteeism and job dissatisfaction (Jansen, et al., 2003, Ruggiero, 2003, Trinkoff, 2001). Each person's response to fatigue and circadian rhythm disruption varies and can be caused by extended time awake, inadequate sleep quantity, sleep disturbances, and disruption in sleep (Boivin, Tremblay, & James, 2007). Kuo's study (2001) assessed 39 individuals of which 30 were employees from the transport industry and nine were from the US military, to compare the relative effects on performance of sleep deprivation. The results showed that participants who were awake for up to 19 hours scored very poorly on performance and alertness testing. In another study, critical care nurses who worked over

12.5 hours had two to three times the risk of making an error on night shift and reported difficulty staying awake at work compared to nurses working less than 12.5 hours (Scott, 2006, Rogers, 2004). The health care industry has resisted changing the work hours of nurses to shorter shift lengths (Gaba & Howard, 2002). Yet, the increased awareness regarding working hours of nurses and the accumulation of fatigue and sleepiness are important considerations for the preservation of the night nurses self care.

### Sleepiness and Night Shift

Night workers are subject to two types of sleep deprivation. The first type is acute sleep deprivation experienced as a night shift progresses and normal night time sleep is absent with total time awake longer than 24 hours. The second is cumulative sleep deprivation that occurs after working several night shifts due to less restorative sleep during the day and continued circadian rhythm disruption.

The amount of sleep a person needs varies from individual to individual. The universal recommendation is 6 to 10 hours of sleep in a 24 hour period. Most people get an average of eight hours of sleep (National Sleep Foundation, 2007). When adults get less than five hours of sleep in a 24 hour period, peak mental abilities begin to decline, response time is slower and cognitive performance will decrease 25% from baseline (Krueger, 1989). In one study, night shift workers' slept an average of 25% to 33% less than day or evening workers and night shift workers sleep was of poorer quality leading to increased reports of sleepiness on the night shift (Akerstedt, 1981).

Night nurses also report feeling sleepier because they have to work during the low point of the circadian cycle. Alertness starts to fall immediately after the termination of sleep with significant decreases noted eight hours after awakening (Akerstedt, 2003). The normal circadian cycle in humans shows a peak in performance and metabolism in the late afternoon and has reached its nadir in the early morning and the night workers are working against their natural biological rhythms (Akerstedt, 2003).

It is difficult for the day sleeper to obtain uninterrupted rest periods. The normal circadian rhythm signals a rise in body temperature at mid-day that can disrupt the day time sleep, which triggers a person to wake up and become alert (Stokowski, 2004). External factors that can disrupt day time sleep are road noise, phone calls, and household activity. These disruptions result in interrupted sleep periods with subsequent fatigue accumulating faster during night work compared with day work (Fletcher & Dawson, 1997).

Alertness has been shown to decline as sleepiness increases. Akerstedt, Torsvall, and Gillberg (1982) studied a group of people to compare levels of sleepiness and alertness. Six people were put into isolation with the usual time of day cues removed. One group had a normal night sleep (2300h-0700h) and one group had a short day sleep (0700h-1100h). Before and after the sleep episode, sleepiness was measured in two hour increments using the Multiple Sleep Latency Test, MSLT, and self-ratings (Akerstedt, et al., 1982). The results showed a late evening alertness and late night sleepiness with increases in episodes of sleep between 0400-0500 hours. Another study assessed the neural basis of alertness and cognitive performance during sleepiness (Thomas, et al.,

2000). The study involved 17 volunteers who were subjected to progressive sleep deprivation. Researchers collected data regarding the metabolic rate of glucose usage using a PET scan, as well as levels of alertness, cognitive performance, and mood. After 24 hours of sleep deprivation there was a significant decrease in the amount of glucose within the brain observed on Positron Emission Tomography (PET) scan. Both objective and subjective alertness declined, but mood remained constant. Cognitive performance also declined significantly leading to the researchers' conclusion that 24 hours of sleep deprivation diminishes waking brain activity (Thomas, et al., 2000). These results can be applied to night shift workers because they are typically awake for 24 hours by the end of their first night shift.

### Naps

A nap can help improve mood, alertness and performance (Rosekind, et al., 1995, Owens, 2007). Three types of naps are identified: planned naps; emergency naps, and habitual naps. Planned naps involve taking a nap before a person actually becomes sleepy and could be helpful to night shift workers prior to their shift or mid-shift. Emergency naps are taken suddenly when a person is feeling very tired and cannot continue an activity. A useful example of emergency napping would be in the case of drowsy driving. Last is a habitual nap that is practiced at the same time every day and is often evidenced by children and elderly people.

Nighttime naps help combat sleepiness and fatigue for night shift workers with limited risk. Researchers identified that a 20-30 minute nap during the night shift can

improve performance and increase alertness (Takeyama, Kubo, & Itani, 2005, Berger & Hobbs, 2006, Smith-Coggins, 2006, Smith, Kilby, Jorgensen, & Douglas, 2007).

Following a nap, psychomotor performance metrics (response speed and fastest 10% reactions times) improved and self-reported sleepiness was reduced compared to nights without a nap. These improvements persisted to the end of the night shift (Smith, Kilby, Jorgensen, & Douglas, 2007). According to a review of the literature by Takeyama, Kubo and Itani, a 20 minute nap can maintain a worker's alertness as well as improve their overall performance and worker well-being during the time awake following a nighttime nap. They also reported a significant expansion of nighttime nap systems in Japanese industries with overwhelming approval among the workers. One limitation related to napping is sleep inertia after a nap. The feeling of sleep inertia lasts from a few seconds to 15 minutes, while the benefits of a nap can last for hours (Takeyama, Kubo, Itani, 2005).

Naps can enhance workplace performance. An evaluation conducted with airline pilots demonstrated that the workers' performance decreased as the night shift progressed (Purnell, 2001). The experimental group was allowed a 20 minute nap between 0100 and 0300 hours while the control group did not take a nap. Each group completed a battery of tests to assess performance and subjective levels of fatigue. They were also asked to rate their sleepiness on the drive home. The no-nap group had a significant decline in speed of performance on vigilance tests, while the 20-minute nap group had improved performance that was restored to baseline. The subjective reports of fatigue and sleepiness on the drive home were similar between both groups even though performance

improved with the nap group. Purnell concluded that a short nap taken in the workplace during the night shift can counteract performance deficits that accompany fatigue. A similar study done by NASA researchers used planned naps during long flights to examine differences in performance and fatigue. The 3 person crew was assigned to a rest group and non-rest group. The rest group was given an opportunity for a 40 minute nap while the non-rest maintained normal activities (Rosekind, et al., 1994). They found that on 93% of the nap opportunities the rest group fell asleep in 5.6 minutes and slept for 25.8 minutes. The non-rest group demonstrated reduced performance on night flights compared to day flights. The rest group maintained consistent performance on both day and night flights (Rosekind, et al., 1994). Additional studies support research data that structured naps at work can allow the employee time to rest and provide a break, leading to decreased risks associated with fatigue (Rosekind, et al., 1995, Takeyama, et al., 2005). An important study was done with 49 night shift physicians and nurses who were divided into nap and no-nap groups (Smith-Coggins, 2006). In order to assess the relationship between performance and fatigue levels the nap group was offered a 40 minute nap opportunity at 3:00 am during a 12 hour shift. The results showed improved mood, increased performance, and reduced fatigue levels for the remainder of the shift after the nap.

### Breaks

Very little research has been done regarding rest breaks and the healthcare industry. A survey of 212 government managers, not working in healthcare, was done to

assess how often they took their breaks, what they did on their break and the perceived outcomes (Berman & West, 2007). These researchers stated that the purpose of rest breaks are to allow an employee time to reflect, become physically and mentally restored, and balance work with non-work obligations. The results of this study report that 23.6% of respondents took a break once a day for an average time of 15.6 minutes. Almost half of the respondents reported that breaks make them more effective managers and allows them to clear their mind to reenergize. The breaks were effective when they could limit other distractions by taking a walk, attending to personal matters or exercising. These researchers recommend that employers examine the policies and practices regarding rest breaks within their organization to help workers feel more effective and restored.

A study done by Faugier, et al. (2001) identified the main areas of the day and night nurses' working environment that prevented healthy eating. Of 126 nurses, 6% of respondents never took breaks, 15% almost never took breaks, and 16% sometimes took their breaks. The specific reasons identified for not taking uninterrupted breaks were: patient assignments, lack of staff, and shorter breaks were necessary due to workload. Rest breaks are an important part of the work environment. A break can be any activity away from work responsibilities, such as using the employee lounge for a meal or rest, taking a walk, climbing the stairs, or napping. A study of 393 nurses over 28 days was done to determine the effects of breaks on staff nurse performance (Rogers, 2004). In Rogers study, nurses reported that having a break or meal period away from patient care areas occurred in less than half of their worked shifts. There was no increase in the number of errors associated with missing breaks or meal periods in this study.

### Self Care and Nurses Working at Night

Health promotion activities are important for individuals to achieve their self care needs. The working environment can facilitate the night nurse's ability to perform self care. A survey of 310 nurses was done to ascertain and evaluate the relationship among self-nurturance, perceived Magnet hospital features and life satisfaction (Nemcek & James, 2007). The goal of their study was to identify strategies to promote nurses' health and enhance retention of an experienced workforce. They found that nursing has high work demands which may conflict with personal self-nurturance needs. Some of the nurses sampled found it difficult to self-nurture while providing patient care. Nurses working at hospitals with more Magnet features felt more satisfied with their life and work than those working at hospitals with less Magnet features. The researchers recommended providing a workplace environment that would help nurses feel supported and have healthy meal choices available at work.

A study by Geliebter & Aronoff (2000) attempted to determine if night shift workers were at risk of weight gain. A questionnaire was administered to day and night shift hospital workers with questions regarding weight, food intake, exercise and sleep. There were 85 participants, 36 day shift and 49 evening/night shift. One result was a 4.3 kg weight gain for evening/night shift workers. These workers reported eating fewer meals and ate their last meal later than the day shift. In addition, night shift workers reported taking more naps and exercising less than those workers who worked during the day. This study provides support to enhance the working environment so that night nurses

will have the necessary environmental resources so they can meet their self-care needs related to nutritional needs.

A healthy, well-balanced diet is important for individuals working night shift. These workers are at an increased risk of obesity and metabolic disorders (Holmback, et al., 2003). A survey of 27 night nurses was done to assess situations that influence the diet and exercise habits of night nurses (Persson & Martensson, 2006). They found that nurses who were concerned with a healthy lifestyle at home were more likely to make healthy food choices while at work. However, some of the nurses interviewed for their study reported that high work demands and stress led to unhealthy eating habits and they were more likely to eat “junk” food.

Exercise is an important aspect for night nurses to include in caring for themselves. A number of studies show that exercise can reduce fatigue (Akerstedt, 2004, Yamanaka, 2006, Samaha, 2007). The nurses in Persson & Martensson’s 2006 study cited fatigue as a reason that they did not exercise and would rather rest than exercise even though they were aware of the benefits. In addition, lack of exercise or recreational activity has also been cited as a possible cause of chronic fatigue (Samaha, 2007). There are many possible explanations for night nurses lack of desire to exercise. Further research regarding exercise at night is needed so that nurses can have the knowledge, awareness, and solutions for maintaining their health and well-being while working at night.

Many night shift workers rely on caffeine to maintain alertness. For example, drinking caffeinated beverages early in the shift, between 2220 and 2250 hours can help

workers maintain alertness (Walsh, et al., 1990, Jay, Petrilli, Ferguson, Dawson, & Lamond, 2006). Caffeine is a central nervous system stimulant. When ingested in moderate amounts, 200 mg, it has been shown to increase levels of alertness and cognitive performance (Van Dongen, et al, 2001, Wesensten, et al., 2002). Judelson et al. (2005) studied 60 healthy, non-smoking males who habitually consumed low to moderate quantities of caffeine. Individuals who regularly ingested more than 600mg of caffeine daily were eliminated from the study. Participants had a controlled caffeine intake, and performed cognitive and motor testing for a period of five days. The results of this study showed that there was no affect on performance related to caffeine intake, suggesting a tolerance to caffeine had occurred. The tolerance to caffeine that occurs over time demonstrates that night nurses need to be aware of the amount of caffeine that they are consuming. Excessive use of caffeine late in the shift could be problematic and make it difficult for nurses to sleep.

### Environment

A positive work environment is an important part of nurses' perception of the workplace and health can be enhanced by modifying the workplace. A majority of the research reviewed addressed work environment aspects, such as scheduling, patient flow, and leadership. There were no studies found in the literature review that addressed the rest area environment, exercise or food availability for night shift nurses. There are frequent recommendations in the literature on how to cope with working night shift. The availability of an exercise area, a place to lie down to rest, and healthy food are reported

as important parts of the working environment for night shift workers. Though no data was found to support these recommendations and the question regarding their benefit for night shift nurses remains unanswered.

Timed exposure to bright light has been successful in helping night shift workers stay more alert. A recent study by Horowitz, involved 54 subjects who participated in a lab simulated night shift and went home to sleep in darkened rooms. These participants were divided into 4 groups: bright light with scheduled sleep times, bright light with self-controlled sleep times, room light with scheduled sleep, and room light with self-controlled sleep. The bright light group was exposed to 2500 lux of light from 2300 hours to 0500 and 150 lux from 0500 to 0700. The room light group was exposed to 150 lux for the full 8 hours. The results of this study showed that both bright light with 2,500 lux and fixed sleep schedules significantly delayed melatonin release leading to increased alertness during the night shift (Horowitz, 2001). No studies were found that examined the amount of light in hospital's working environment at night.

Bright light during the night shift can help night workers, such as nurses, adjust their circadian rhythm. A thorough study done by Crowley, et al. (2003) used various combinations of interventions to phase-delay circadian rhythms in order to correct their misalignment with night work and day sleep. Participants took a placebo or melatonin (1.8 mg sustained release) before daytime sleep. They were also involved in five consecutive simulated night shifts (2300 to 0700), followed by sleeping in a darkened bedroom in their home (0830 to 1530). Participants wore sunglasses with normal or dark lenses when outside during the day. During the night shifts, participants were exposed to

intermittent bright light (~5000 lux, 20 min on, 40 min off, and 4-5 light pulses/night) or remained in dim light (~150 lux). There were 6 intervention groups ranging from the least complex (normal sunglasses) to the most complex (dark sunglasses + bright light + melatonin). The dim light melatonin onset was assessed before and after the night shifts. With bright light during the night shift, almost all of the participants achieved complete re-entrainment of circadian phase indicated by melatonin. With only room light during the night shift, darker sunglasses helped participants phase-delay more than normal sunglasses, but melatonin did not increase the phase delay. The researchers' conclusions recommended the combination of intermittent bright light, similar to outdoor lighting on a cloudy day, during the night shift, sunglasses (as dark as possible) during the commute home, and a regular, early daytime dark/sleep period in order to complete circadian adaptation to night-shift work. Lockley, Brainard, & Czeisler (2003) reported that lighting with shorter wavelengths is an effective way to delay the circadian phase. The implementation of appropriate lighting in the work environment can help night nurses adjust to working at night and help eliminate an unnecessary barrier to their health.

There can be multiple barriers to healthy eating in the hospital work environment. A study done by Faugier, Lancaster, Pickles, & Dobson (2001) assessed for possible barriers nurses might have to making healthy food choice. The results of their study identified several possible barriers. These barriers were the selection of food choices offered, distance from food services, and breaks/staffing levels/workload issues. The researchers made several recommendations to improve the eating environment for nurses.

They recommended vending machines with healthy options, packed lunches and salads available to night shift, and a selection of sandwiches available after visiting hours.

A national survey of critical care nurses was done using The Nursing Work Index-Revised (NWI-R) tool and the Perceived Nursing Work Environment (PNWE) instrument (Choi, Bakken, Larson, Du, & Stone, 2004). These researchers surveyed ICU nurses working in 68 magnet and non-magnet hospitals in the United States over a six month period. Magnet hospitals are known for leadership attributes of nursing administration, professional attributes of staff nurses, and an environment that supports professional practice. The questions in this study's survey related to autonomy, control over work environment, and relationships with physicians, and organizational support, but no information regarding the physical environment was included. The results of this study showed that nurses who worked in Magnet hospitals perceived their work environments more positively though they did not address the working environment for night shift nurses.

### Summary of Literature Review

Night shift workers have different needs and concerns than day shift workers. Working night shift reverses the circadian rhythm of the sleep wake cycle. This disruption to the circadian rhythm leads to sleepiness, fatigue, and associated consequences: decreased alertness, sleepiness, possible health problems, and driving dangers. Nursing is a discipline that has more female workers than male workers, yet a majority of the research reviewed focused on male shift workers in other industries.

There is some evidence that the female shift worker has trouble balancing the responsibilities of work and home, but more research is needed for verification.

There are numerous recommendations regarding methods to decrease sleepiness and fatigue levels to help night workers cope with night shift, but specific research is limited. These recommendations include well lit work areas, healthy meal choices, food services, and calm places to take a break away from patient care. Incorporating these recommendations into the hospital working environment would be easy to do, but research is needed to validate these recommendations.

Several areas have been identified to help night shift workers take better care of themselves. The areas are: rest breaks, increasing the total amount of sleep by adding naps; using caffeine to promote alertness early in the nightshift, and the availability of well-lit work areas. Physical activity while on a break, for example exercise or a walk outside may alleviate stress and also improve the health of nurses. Night nurses and hospital administration need to work together in order to develop an optimal working environment for the night worker to meet their self-care needs.

## CHAPTER 3

### METHODOLOGY

Descriptive methods were used to study policies and environmental services of hospitals in Montana. Descriptive research is a non-experimental design used by researchers to give an accurate portrayal of the characteristics of persons, situations, or groups, and/or the frequency with which certain phenomena occur. A questionnaire was developed to survey private sector acute care and critical access hospitals.

#### Questionnaire

The Hospital Environment and Policy Survey instrument (see Appendix A) was designed to gather data about the working environment for night shift nurses in acute care and critical access hospitals. In particular, information was requested regarding the hospital's demographics, policies related to rest breaks, and available environmental services. This questionnaire was formulated to meet the needs of this research study. The questionnaire contained 25 questions about the hospital and is divided into five sections: general data, demographics, written/unwritten policies, policies regarding rest breaks, and environmental services. A majority of the questions were closed ended. A section on comments regarding working conditions, rest breaks, and environmental services was included (questions 26-28). The questionnaire was examined for content validity by a panel of experts that consisted of two Family Nurse Practitioner faculty members, a nursing professor, and a critical access hospital Chief Executive Officer (CEO), all with

experience working in healthcare and working night shift. They assessed the questionnaire for appropriateness, usage of words, reliability, validity, and item structure, and agreed that particular items were essential. The domains to be studied were discussed. There were multiple revisions before acceptance of the final product. The instrument was developed to gather information for this study from the perspective of the night shift supervisor or night shift charge nurse.

### Participants

The target population for this study was private acute care and critical access hospitals in Montana. There are 15 acute care hospitals and 43 critical access hospitals within the state of Montana that were eligible to participate. Hospitals within the Indian Health Services and United States Veteran's Affairs were excluded. Each hospital's director of nursing identified a night shift supervisor or night charge nurse working at least half time. The identified individuals were asked to complete the survey about their facility because of their familiarity with the night shift culture in their hospital.

### Rights of Human Participants

Human participant approval was received from the Institutional Review Board (IRB) for Montana State University (see Appendix B). There were no known risks to participating in this study. Possible benefits of participating in this survey were that administrators might become more aware of strategies to optimize the hospital's working environment and to enable night nurses to care for themselves during the shift. The

directors of nursing and night shift supervisors were both made aware of the purpose and potential benefits of the study and that there were no identifiable risks. They were also informed that participation in this study was voluntary. The critical access and acute care hospital survey participants could respond to any or all of the questions as they preferred. Their rights as human participants were protected by ensuring anonymity on questionnaires and maintaining confidentiality of contact information. Participants were not asked to sign a consent form. The completed questionnaire constituted the participants' willingness to take part; therefore a signed consent was not necessary.

#### Data Collection and Procedures

Contact information for Montana hospitals was collected from public records. Information regarding Montana critical access hospitals was obtained from the Montana Department of Public Health and Human Services website. This site included a list of the 43 critical access hospitals in Montana, their addresses, telephone numbers, directors of nursing, and additional information pertinent to critical access hospitals. The United States Department of Health & Human Services website link titled "Hospital Compare" was also used to search for hospitals in Montana. Within that site, a list of 15 acute care hospitals and 43 critical access hospitals, their telephone numbers, and addresses were obtained. The contact information for critical access hospitals was compared with the information already obtained to insure accuracy.

Each hospital's director of nursing was contacted via telephone to discuss the survey, allow time for questions, and ask about their agency's willingness to participate

(see Appendix C). If they were willing to have their hospital participate, the directors were asked who to contact and for that person's e-mail address in order to deliver the survey. Several of the critical access hospital nurses did not have access to the internet at work. In that case, the director of nursing volunteered to enter in the information once the survey was answered by the night shift nurse. After contact information was received from the director of nursing, the survey link to the SNAP survey was e-mailed to the designated participant (night supervisor or night charge nurse) by the researcher. The e-mail message included a description of the study, its purpose, potential benefits, and that there were no identifiable risks (see Appendix D). A follow-up message was e-mailed to all participants two weeks later to thank them for their participation or remind them to complete the questionnaire (see Appendix E). Data collection continued for six weeks from the first e-mailed message.

The survey data was collected using the SNAP program. SNAP is an electronic program for collecting survey data and was utilized to administer the questionnaire. The web link to the program was delivered via an e-mail message and, therefore, required no personal identifying information when the participant responded, thus providing anonymity. No numbers were assigned to the hospitals or persons for tracking purposes. There was no way of connecting individual responses with a specific agency or person, unless participants asked for study results. After data was submitted by the participant, an e-mail message was automatically generated that notified the Manager of the College of Nursing Office of Research of the submission. The manager forwarded results for groups of responses to the investigator in SPSS format.

### Data Analysis

Data was analyzed using descriptive statistics with SPSS for Windows.

Descriptive statistics were used to describe the basic features of the data gathered.

Together with simple graphic analysis, descriptive statistics form the basis of virtually every quantitative analysis of data. Responses for each question were compiled by the SNAP program for all participants. Responses were analyzed for the group with frequency distributions for questions 1-4, 6-12, and 14-25 and a mean for question 5.

Question number 13 was a qualitative question that allowed for a short answer. Data was analyzed for all hospitals and divided into two groups: acute care and critical access hospitals.

## CHAPTER 4

### RESULTS

#### Introduction

There were a total of 58 hospitals contacted (15 acute care and 43 critical access); 44 of the 58 were willing to respond with 30 returning the survey for a 52% response rate. One critical access hospital declined to participate. There were 33 surveys sent to critical access hospitals with 26 (78%) responding. A total of 11 surveys were sent to acute care hospitals with 4 (36%) responding.

The survey was sent to the contact person identified by the director of nursing during the phone interview. Each contact person was asked to report their title to identify who responded to the survey. The titles reported by critical access participants are as follows: RN (1), night charge nurse (14), night supervisor (4), RN Manager (1), interim director of nursing (1), director of nursing (4), and CEO (1). The acute care hospital participants consisted of a night shift supervisor (1) and director of nursing (3). It is uncertain if each of these respondents is familiar with night shift nursing. Some of the critical access hospitals do not have internet access for all employees so in that situation the director of nursing indicated he /she would enter responses from the contact person and submit the electronic survey.

### Demographics

The majority of night nurses in these hospitals were registered nurses working 12 hour shifts and many rotating shifts. According to the participants, 60% of hospitals had 81-100% RN's on night shift (see Table 1). Acute care hospitals had 100% RN's at night and no LPN's. The majority of both critical access (77%) and acute care (50%) hospitals that responded have 0-50 patient beds and 21 critical access hospitals reported that they have 0-50 beds. There were two acute care hospitals that reported having 101-200 hospital beds. The critical access hospitals reported 77% of their nurses work 12 hour shifts and acute care hospitals reported that 100% of their nurses work 12 hour shifts. The number of nurses who rotate shifts was well dispersed among the sample. Of the hospitals sampled, 23% do not rotate shifts and 6% reported that 81-100% of night nurses do rotate shifts. Almost all of the respondents (97%) stated that hospital written policy does not require rotating shifts and one respondent did not know if it was required.

Table 1: Hospital Demographics Related to Night Nurses

Demographics	Critical Access (N=26)	Acute Care (N=4)	Total (N=30)
% RN's (of night nurses)			
1-20%	2 (8%)		2 (6%)
21-40%	2 (8%)		2 (6%)
41-60%	5 (19%)		5 (17%)
61-80%	3 (16%)		3 (10%)
81-100%	14 (54%)	4 (100%)	18 (60%)
% LPN's (of night nurses)			
0%	6 (23%)	2 (50%)	8 (27%)
1-20%	9 (35%)	2 (50%)	11 (37%)
21-40%	4 (15%)		4 (13%)
41-60%	6 (23%)		6 (20%)
% nurses work only nights			
0%	1 (4%)		1 (3%)
1-20%	7 (27%)	1 (25%)	8 (27%)
21-40%	4 (15%)	1 (25%)	5 (17%)
41-60%	1 (4%)		1 (3%)
61-80%	5 (19%)	2 (50%)	7 (23%)
81-100%	8 (31%)		8 (27%)
% night nurses rotate shifts			
0%	6 (23%)	1 (25%)	7 (23%)
1-20%	11 (42%)		11 (37%)
21-40%	6 (23%)	1 (25%)	7 (23%)
61-80%	1 (4%)	2 (50%)	3 (10%)
81-100%	2 (8%)		2 (6%)

### Policies

The majority of hospitals sampled (77%) do not have a policy that allows naps (see Table 2) and 17% of nurses responded that they did not know the policy regarding naps. Additional comments regarding policies were:

- 1) "I couldn't find any policy regarding rest breaks or naps."
- 2) "Break policies need to be enforced for smokers."

### Rest Breaks and Naps

Staffing in these hospital permits breaks in almost all (93%) with only two critical access hospitals reporting that staffing did not permit breaks (see Table 2). Fifty percent of respondents conveyed that nurses take their breaks “most of the time” and 26% of respondents said nurses get their breaks “some of the time”. According to this sample, 50% of acute care nurses are relieved by nursing supervisors for breaks, but 50% of the critical access nurses answered “not applicable.”

Of the 30 hospitals, only one critical and one acute care hospital allow night nurses to take a nap on their break, but 37% of respondents reported that nurses nap during the night shift (see Table 2). One critical access nurse wrote that a nurse in that facility can nap, “Only if caught up.” One acute care nurse reported that they are allowed to nap on their 30 min lunch break or a 15 min break, but 63% of both groups reported that they cannot combine their breaks to nap. Additional comments regarding rest breaks were:

- 1) “Only one night nurse and no naps are allowed.”
- 2) “Recliners are available to put feet up and read.”
- 3) “Limited staff, so breaks are when and if you have time.”
- 4) “Smokers are a problem. They slip outside for a cigarette and do not consider it a break.”
- 5) “We can take nap breaks if not too busy. I appreciate that because daytime responsibilities often take away from sleep.”

Table 2: Rest Breaks and Naps

Rest Breaks	Critical Access (N=26)	Acute Care (N=4)	Total (N=30)
Written policy allows naps on breaks:			
Yes	1 (4%)	1 (25%)	2 (7%)
No	20 (77%)	3 (75%)	23 (77%)
Don't know	5 (19%)		5 (17%)
Length of breaks:			
2x15 min break + 30 min meal	16 (62%)	1 (25%)	17 (57%)
3x 15 min break + 30 min meal	4 (15%)	3 (75%)	7 (23%)
15 min break every 2 hours + 30 min	3 (12%)		3 (10%)
2x 20 min break + 30 min meal	2 (8%)		2 (6%)
None	1 (4%)		1 (3%)
Staffing permits breaks			
Yes	24 (80%)	4 (100%)	28 (93%)
No	2 (8%)		2 (7%)
Night nurses take breaks			
Routinely	6 (23%)		6 (20%)
Most of the time	11 (42%)	4 (100%)	15 (50%)
Some of the time	8 (31%)		8 (26%)
Rarely or never	1 (4%)		1 (3%)
Nursing supervisor relieve for breaks			
Routinely	3 (12%)	2 (50%)	5 (17%)
Most of the time	3 (12%)	1 (25%)	4 (13%)
Some of the time	3 (12%)	1 (25%)	4 (13%)
Rarely or never	4 (15%)		4 (13%)
Not Applicable	13 (50%)		13 (43%)
Night nurses nap:			
Yes	11 (42%)		11 (37%)
No	14 (54%)	4 (100%)	18 (60%)
Don't Know	1 (4%)		1 (3%)
Combine breaks to nap			
Yes	3 (12%)	1 (25%)	4 (13%)
No	16 (62%)	3 (75%)	19 (63%)
Don't Know	7 (27%)		7 (23%)

### Environmental Services

Environmental services in acute care and critical access hospitals were quite similar (see Table 3). Most of the hospitals provide a safe, comfortable area away from patient care for the night nurse to take a break (see Figure 1); however, only 33% have a place to lie down.

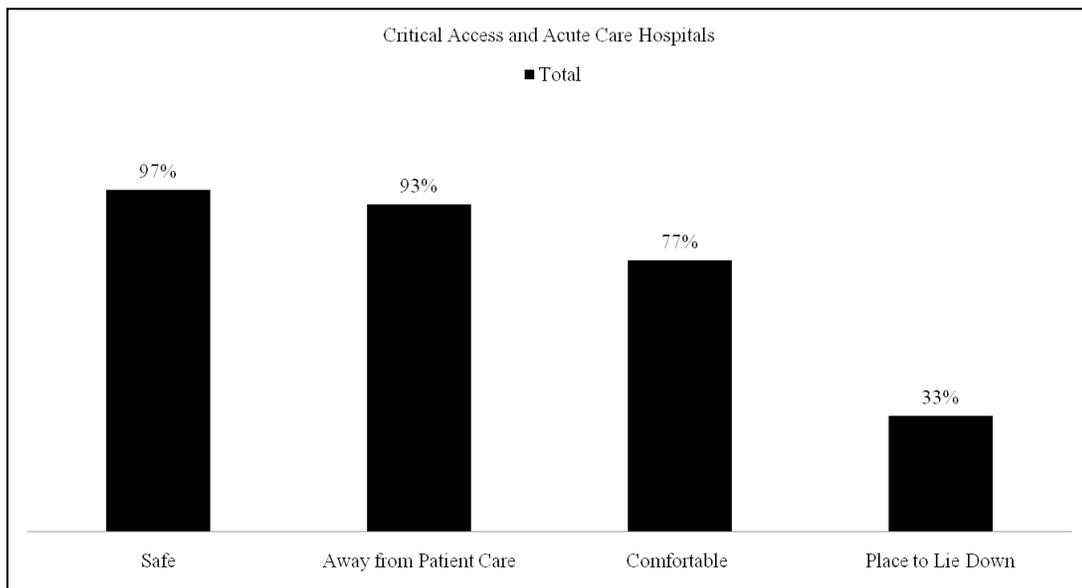


Figure 1: Break Areas and Hospitals

In this sample, 83% of hospitals do not provide night nurses with access to a cafeteria at night, but 73% of hospitals have vending machines available. Almost half of the hospitals provide an area for night nurses to exercise, but few had a well-lit area to walk outside (see Table 3). A summary of these results can be seen in Figure 2.

Table 3: Environmental Services

Environmental Services	Critical Access (N=26)	Acute Care (N=4)	Total (N=30)
Safe area to take a break:			
Yes	25 (96%)	4(100%)	29 (97%)
No	1 (4%)		1 (3%)
Break Area away from patient care			
Yes	24 (92%)	4 (100%)	28 (93%)
No	2 (8%)		2 (6%)
Comfortable break area			
Yes	19 (73%)	4 (100%)	23 (77%)
No	6 (23%)		6 (20%)
Place to lie down in break area			
Yes	8 (31%)	2 (50%)	10 (33%)
No	18 (69%)	2 (50%)	20 (67%)
Cafeteria available			
Yes	3 (12%)	1 (25%)	4 (13%)
No	22 (85%)	3 (75%)	25 (83%)
No response	1 (4%)		1 (3%)
Vending machines available			
Yes	19 (73%)	3 (75%)	22 (73%)
No	7 (27%)	1 (25%)	8 (27%)
Well lit work stations			
Yes	24 (92%)	4 (100%)	28 (93%)
No	2 (8%)		2 (6%)
Well lit area to walk outside			
Yes	9 (35%)	4 (100%)	13 (43%)
No	17 (65%)		17 (57%)
Area to exercise			
Yes	12 (46%)	2 (50%)	14 (47%)
No	12 (46%)	2 (50%)	14 (47%)
No response	2 (8%)		2 (6%)

There were quite a few comments from the critical access hospital night nurses who participated in this study. Several nurses reported that they have to bring their own meals from home or order from restaurants because vending machines are stocked with

chips, candy and carbonated beverages. Two hospitals provide an area for staff to cook hot meals or eat outside and a microwave, toaster, popcorn maker and an espresso area are in the break room. A major concern that is common practice in smaller facilities was reported by a critical access nurse who noted that “Night nurses perform housekeeping duties.” One acute care nurse stated that the air-conditioning and heating typically do not work in non-patient areas at night (nurses’ station/ break areas). Additional comments regarding environmental services were:

- 1) “Eat to stay awake”
- 2) “No cafeteria services available on nights”
- 3) ”Leftover foods are “undesirable,”
- 4) “The staff forgets to leave meals out for the night shift.”

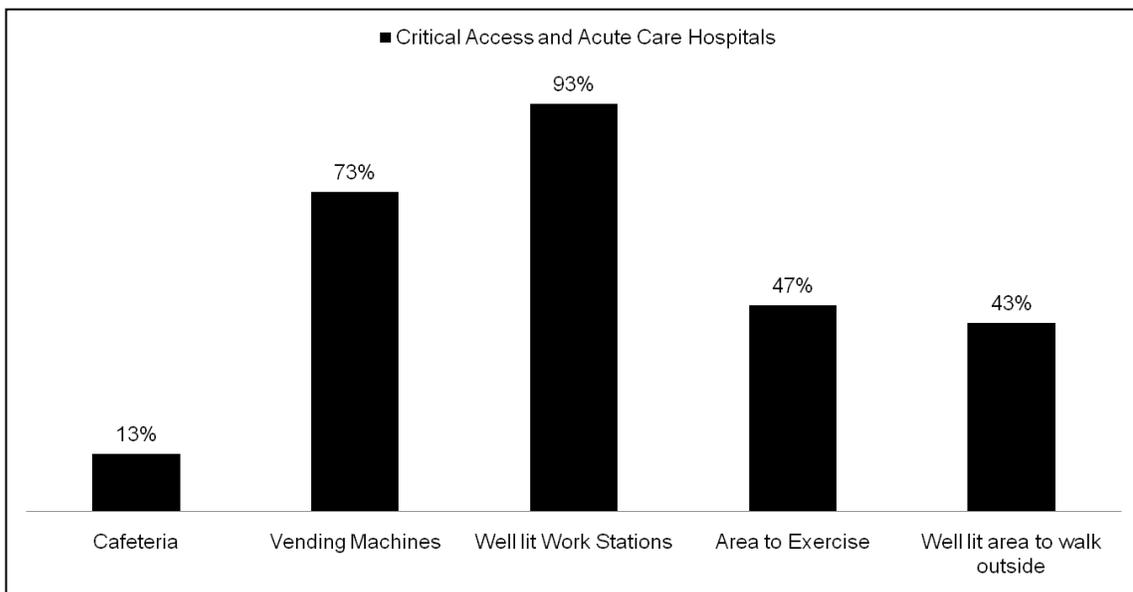


Figure 2: Environmental Services for Acute Care and Critical Access Hospitals

## CHAPTER 5

### DISCUSSION

This study of Montana acute care and critical access hospitals was done in order to describe hospital policies and environmental services available to night shift nurses. Most of the Montana critical access and acute care hospital nurses who responded indicated that they work in hospitals that provide a safe, comfortable, area away from patient care to take a break. From their perspective these Montana hospitals also provide well-lit working environments for their night nurses. Very few hospitals offer cafeteria services at night or have a policy that allows naps during rest breaks. Even though hospital policy does not allow for naps on breaks in a majority of the sampled hospitals, almost 40 % of the night nurses reported that they take a nap while on a break. This study reveals night shift nurses feel that naps are important. The results of this study indicate that there is need for improvement in the policies and environmental services available for nurses in Montana acute care and critical access hospitals.

#### Hospital Policies

Written policies can enhance the working environment and build a loyal team of nurses. A majority of the nurses who responded to the survey report working 12 hour shifts. More than half of the hospitals sampled (57%) have a written policy of two 15 minute breaks and one 30 min meal break. Other nurses in our survey reported that their facilities allow three 15 minute breaks and one 30 minute meal break in a 12 hour shift.

The Fair Labor Standards Act (FLSA) does not regulate meal or rest periods and generally these are agreements made between the employer and the employee (U.S. Department of Labor, n.d.). One nurse's comment that break policies need to be enforced for smokers brought up a valid point; just because a policy is in place does not mean that it will be enforced. Effective policies help nurses care for themselves. When their needs are met, a stable workforce can be maintained.

### Rest Breaks

The nurses in this sample get their breaks more frequently than reported by Rogers (2004). Her recent study reported that nurses have a break or meal period away from patient care areas in less than half of their worked shifts. The results of this study indicate that half of the nurses in Montana hospitals get their rest breaks "most of the time" and another 20% reported that they get their breaks "routinely." The critical access nurses did not get their breaks quite as often as acute care and that could be related to their limited staffing and lack of a night shift supervisor to relieve them for breaks.

More than 90% of the hospitals included in the survey provided a safe, comfortable break area away from patient care, but few (33%) had a place for nurses to lie down while on their break. Insuring that nurses are able to get their rest breaks in areas away from patient care is very important for each nurse's health and wellbeing, as well as allowing them time to recuperate. Hospitals should be able to easily provide comfortable rest areas with a place to lie down so that the working environment for night nurses is enhanced.

Napping at the workplace is a concept that is being studied and gaining popularity, but studies have not often included nurses. There is some research that has demonstrated that napping is an effective way to combat fatigue and sleepiness and may ultimately improve performance (Rosekind, et al., 1995, Owens, 2007). Naps have been found to be important for workers who need to maintain a high degree of alertness, attention to detail, and the ability to make quick decisions (Smith-Coggins, 2006). The idea of workplace naps has met with some resistance because of concerns regarding sleep inertia which may not occur, but if it does the effects usually dissipate within minutes. Many (42%) of the nurses in critical access hospitals who responded to this survey take naps on their breaks as long as patient acuity and staffing allow. Very few (12%) combine their breaks to take a nap.

#### Environmental Services

Night work increases the risk of health consequences as a result of the physiologic changes placed on the workers body (Reid, 1997, Learhart, 2000, Geliebter, 2000, Munakata, et al., 2001, Al-Naimi, Hampton, Richard, Tzung, & Morgan, 2004). The fatigue and sleepiness associated with working at night can be decreased with helpful environmental services, such as cafeteria services, vending machines, exercise, and well-lit areas to work or walk outside (Walsh, et al., 1990, Horowitz, 2001, Jay, 2006). Implementation of these environmental services can assist nurses during the night shift.

Fresh cooked meals, or at least healthy vending machine food, can help night nurses care for themselves. A large number of respondents (83%) reported their hospitals

do not have cafeteria services offered at night, but vending machines are available in a majority (73%) of hospitals. This study failed to address what is stocked in the vending machines, which would have been valuable information. Cafeteria services and vending machines with healthy choices are helpful, easy to implement changes that could enhance the working environment for night nurses.

Exercise inside or a walk outside in the fresh air may help maintain the nurses' alertness as well as promote their overall health. A total of 43% of the nurses responded that there is a well lit area to take a walk outside. Half of the nurses reported that their hospital does provide an area to exercise, however they don't use it. It is imperative to find out why nurses are not using the resources provided for them. Some of the reasons may include; a lack of education regarding the benefits exercise can have on fatigue reduction, working at a low point in their circadian rhythm, or no nurse to cover the unit while taking a break to exercise. These concepts were not addressed in the course of the survey, but deserve further study. Hospitals have a responsibility, not only to provide the environmental tools, but to make them accessible in order to help maintain the health and wellness of their nurses.

Well lit work environments can help decrease fatigue and sleepiness (Horowitz, 2001). The specific mechanism for the decrease in fatigue and sleepiness is still in question, but some researchers believe that light may suppress the release of melatonin. There are some health effects that are believed to be a result of light exposure at night, such as breast and colorectal cancer. The most appropriate amount and type of light in the working environment is still unknown. A large number of hospital nurses in this sample

(93%) reported that they work in a well lit environment. The amount of lighting at each facility is not known. Possibly these nurses consider their work area to be well lit, but the available lighting may be inadequate or have health implications and these workers might benefit from improved lighting. More study is needed on the effects of lighting on night shift workers.

### Limitations

In order to accomplish the goals of the study a new questionnaire was developed. This is the first time the Hospital Environment and Policy Survey questionnaire was used and its reliability has not been demonstrated. It would have been helpful to do a pilot test by having night supervisors or night charge nurses answer the questionnaire prior to its use in order to identify ambiguous questions.

The director of nursing from some of the critical access hospitals reported that their nurses do not have internet access. If the director of nursing did not know the nurses personal e-mail addresses, he/she volunteered to enter in the information for the nurse. This allowed another person to view the nurses' responses prior to submitting the survey. There is the possibility that the answers could have been altered or that the nurses did not respond in a way that would reflect negatively on the facility.

The small sample is a limitation to this study. There was a total of 58 hospitals contacted (15 acute care and 43 critical access). A total of four acute care and 26 critical access hospitals responded. Time constraints did not allow for additional attempts to make contact or survey acute care and critical access hospitals in order to get more

responses. Additional attempts to contact hospital administrators and follow up with non-responders would be recommended in any future studies.

Other limitations to this study may include errors and biases that can occur with surveys, including sampling design errors, non-response bias, and respondent recall error. The response rate was moderate (53%), which does not rule out non-response bias.

### Implications and Recommendations

There are a variety of reasons for further study. First, future research could address the limitations of this study and gather more comprehensive data. Second, a survey should be taken of all the night shift RN's and LPNs in Montana acute care and critical access hospitals regarding their perceptions of the workplace environment during their night shifts. This would highlight areas that nurses believe are important and would increase awareness in areas of environmental needs. Third, there is a lack of research on napping for night nurses in acute care settings. An intervention study of night nurses with a nap group sleeping 30 minutes each shift for one month and non-nap group working their normal shift will help determine if there is a benefit with napping, as well as compare the levels of fatigue and sleepiness between the groups. Fourth, establishing environmental services (work areas, break areas, eating facilities) discussed in this study and measuring fatigue and sleepiness levels prior to and after implementation could validate the effect of services on night shift workers. Further research in targeted areas could improve the working conditions for night nurses so that they will be satisfied in their work and possibly remain in their positions.

### Summary

Shift work is a necessary element of hospital care in our country today and night nurses are a fundamental part of that care. Without them, hospitals across the nation would cease to operate. While there are some benefits when working at night, shift work can increase levels of fatigue and sleepiness limiting the nurse's ability to perform self-care.

This survey of Montana acute care and critical access night nurses assessed the available environmental services and policies regarding rest breaks in their hospitals. The results of this study indicate that these nurses get their breaks more often than previously reported. They also report working in well lit environments with comfortable break areas away from patient care; yet, most hospitals do not have a policy that allows naps on their rest breaks or have access to a cafeteria at night. These results indicate areas in need of improvement so that night nurses can have the necessary resources to properly care for themselves while at work during the night.

Nurses share the responsibility with administration to ensure an optimum working environment in order to help night nurses maintain alertness and care for themselves. Hospital administrators could consider a policy that allows nurses to nap as well as provide areas to take breaks and naps. According to this study, there are areas in the working environment for Montana nurses that are lacking and could be improved by providing a place to lie down, and nap, as well as the availability of healthy food options and exercise. These changes may help in the retention and recruitment of night nurses. If

the needs of night nurses are neglected, the results of fatigue and sleepiness can not only damage the health and wellness of the nurses working the shifts, but also their patients and the community.

REFERENCES CITED

- Akerstedt, T. & Gillberg, M. (1981). *Sleep disturbances and shift work*. Oxford: Pergamon Press.
- Akerstedt, T., Torsvall, L., & Gillberg, M. (1982). Sleepiness and shift work: Field studies. *Sleep*, 5, 95-106.
- Akerstedt, T., Knutsson, A., Westerholm, P., Theorell, T., Alfredsson, L., & Kecklund, F. (2002). Work organisation and unintentional sleep: Results from the WOLF study. *Occupational and Environmental Medicine*, 595-611.
- Akerstedt, T. (2003). Shift work and disturbed sleep/wakefulness. *Occupational Medicine*, 53, 89-94.
- Akerstedt, T., Bjorn, P., Anund, A., & Kecklund, G. (2005). Impaired alertness and performance driving home from the night shift: A driving simulator study. *Journal of Sleep Research*, 14, 17-20.
- Al-Naimi, S., Hampton, S. M., Richard, P., Tzung, C., & Morgan, L. M. (2004). Postprandial Metabolic profiles following meals and snacks eaten during simulated night and day shift work. *Chronobiology International*, 21 (6), 937-947.
- Barger, L., Cade, B., Ayas, N., Cronin, J., Rosner, B., Speizer, F., et al. (2005). Extended work shifts and the risk of motor vehicle crashes among interns. *The New England Journal of Medicine*, 352 (2), 125-134.
- Berger, A. & Hobbs, B. (2006). Impact of shift work on the health and safety of nurses and patients. *Clinical Journal of Oncology Nursing*, 10 (4), 464-471.
- Berman, E. & West, J. (2007). The effective manager...takes a break. *Review of Public Personnel Administration*, 27 (4), 380-400.
- Blachowicz & Letizia (2006) The challenges of shift work. *Medical Surgical Nursing*, 15(5):274-80.
- Boivin, D., Tremblay, G., & James, F. (2007). Working on atypical schedules. *Sleep Medicine*, 8, 578-589.
- Bonnefond, A. (2001). Innovative working schedule: introducing one short nap during the night shift. *Ergonomics*, 44 (10), 937-945.

- Brzezinski, A. M. (1997). Melatonin in humans. *New England Journal of Medicine*, *Volume 336* (3), 186-195.
- Choi, J., Bakken, S., Larson, E., Du, Y., & Stone, P. (2004). Perceived nursing work environment of critical care nurses. *Nursing Research*, *53* (6), 370-378.
- Clissold G, S. P. (2002). A study of female nurses combining partner and parent roles with working a continuous three-shift roster: the impact on sleep, fatigue and stress. *Contemporary Nurse*, *12* (3), 294-302.
- Crowley, S., Lee, C., Tseng, C., & Fogg, L. (2003). Combinations of bright light, scheduled dark, sunglasses, and melatonin to facilitate circadian entrainment to night shift work. *Journal of Biological Rhythms*, *18* (6), 513-523.
- Department of Public Health and Human Services (n.d.). *Critical access hospitals*. Retrieved September 5, 2007, from: <http://www.dphhs.mt.gov/qad/healthcarefacilitieslist/criticalaccesshospitals.pdf>
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders-tr* (4th ed.). Washington, D.C.: American Psychiatric Association.
- Faugier J, Lancaster, J., Pickles, D., & Dobson, K. (2001). Barriers to healthy eating in the nursing profession: Part 1. *Nursing Standard*, *15* (36), 33-36.
- Faugier, J., Lancaster, J., Pickles, D., & Dobson, K. (2001). Barriers to healthy eating in the nursing profession: Part 2. *Nursing Standard*, *15* (37), 33-35.
- Federal Motor Carrier Safety Administration. (1996, December). *Commercial Motor Vehicle/Driver Fatigue and Alertness Study*. Retrieved February 11, 2008, from Drowsy Driving: <http://www.fmcsa.dot.gov/facts-research/research-technology/publications/cmvfatiguestud>.
- Fischer, R. B. (2006). Work ability of health care shift workers: What matters? *Chronobiology International*, *23* (6), 1165-1179.
- Fletcher, A. & Dawson, D. (1997). A predictive model of work-related fatigue based on hours of work. *Journal of Occupational Health and Safety-Australia and New Zealand*, *13* (5), 471-485.

- Folkard, S. & Akerstedt, T. (2004). Trends in the risk of accidents and injuries and their implications for models of fatigue and performance. *Aviation, Space, and Environmental Medicine*, 75 (3), 161-167.
- Gaba, D. & Howard, S. (2002). Fatigue among clinicians and the safety of patients. *The New England Journal of Medicine*, 347 (16), 1249-1255.
- Geliebter, A. & Aronoff, N. (2000). Work-shift period and weight change. *Nutrition*, 16 (1), 27-29.
- Gold, D., Rogacz, S., Bock, N., Tosteson, T. D., Baum, T. M., & Speizer, F. E. (1992). Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. *American Journal of Public Health*, 82, 1011-1014.
- Holmback, U., Forslund, A., Lowden, A., Forslund, J., Akerstedt, T., Lennernas, M., et al. (2003). Endocrine responses to nocturnal eating-possible implications for night work. *European Journal of Nutrition*, 42 (2), 75-83.
- Horowitz, T. C. (2001). Efficacy of bright light and sleep/darkness scheduling in alleviating circadian maladaptation to night work. *American Journal of Physiology- Endocrinology & Metabolism*, E384-E391.
- Jay, S., Petrilli, R., Ferguson, S., Dawson, D., & Lamond, N. (2006). The suitability of a caffeinated energy drink for night-shift workers. *Physiology & Behavior*, 87, 925-931.
- Jansen, N., van Amelsvoort, L. G., Kristensen, T. S., van den Brandt, P. A., & Kant, I. J. (2003). Work schedules and fatigue: A prospective cohort study. *Occupational and Environmental Medicine*, 60 (1), i47-i53.
- Judelson, D., Armstrong, L., Sokmen, B., Roti, M., Casa, D., & Kellogg, M. (2005). Effect of chronic caffeine intake on choice reaction time, mood, and visual vigilance. *Physiology & Behavior*, 85, 629-634.
- Kanazawa, H., Suzuki, M., Onoda, T., & Yokozawa, N. (2006). Excess workload and sleep-related symptoms among commercial long-haul truck drivers. *Sleep and Biological Rhythms*, 4, 121-128.
- Kohler, M., Pavy, A., & Van Den Heuvel, C. (2006). The effects of chewing versus caffeine on alertness, cognitive performance and cardiac autonomic activity during sleep deprivation. *Journal of Sleep Research*, 15 (4), 358-368.

- Krueger, G. (1989). Sustained work, fatigue, sleep loss and performance: A review of the issues. *Work and Stress* (3).
- Kunert, K. K. (2007). Fatigue and sleep quality in nurses. *Journal of Psychosocial Nursing and Mental Health Services*, 45 (8), 30-37.
- Kuo, A. (2001, March). Does sleep deprivation impair cognitive and motor performance as much as alcohol intoxication? *The Western Journal of Medicine*, p180.
- Labyak, S. L. (2002). Effects of shift work on sleep and menstrual function in nurses. *Health Care for Women International*, 23 (6-7), 703-714.
- Lamberg, N. (2005). Heavy call schedule has alcohol-like effect. *Psychiatric News*, 40 (21), 17-18.
- Lamond, N., Dorrian, J., Roach, G. D., McCulloch, K., Holmes, A. L., Burgess, H. J., et al. (2003). The impact of a week of simulated night work on sleep, circadian phase, and performance. *Occupational Environmental Medicine*, 60 (e13), 1-9.
- Learhart, S. (2000). Health effects of internal rotation of shifts. *Nursing Standard*, 14 (47), 34-36.
- Lockely, S., Brainard, G. C., & Czeisler, C. (2003). High sensitivity of the human circadian melatonin rhythm to resetting by short wavelength light. *The Journal of Clinical Endocrinology & Metabolism*, 88 (9), 4502-4505.
- Loudoun, R. B. (1997). Work/non-work conflict and health in shiftwork: Relationships with family status and social support. *International Journal of Occupational Environmental Health*, 3 (3), S71-S77.
- Mayo Foundation for Medical Education and Research. (n.d.). *Melatonin*. Retrieved March 7, 2008, from MayoClinic.com:  
[http://www.mayoclinic.com/health/melatonin/NS\\_patient-melatonin](http://www.mayoclinic.com/health/melatonin/NS_patient-melatonin).
- McCance, K. H. (2006). *Pathophysiology: The biologic basis for disease in adults and children* (5th ed.). St. Louis: Elsevier: Mosby.

- Mitler, M. C. (1988). Catastrophies, sleep and public policy: Consensus report. *Sleep, 11*, 100-109.
- Munakata, M., Ichii, S., Nunokawa, T., Saito, Y., Ito, N., Fukudo, S., et al. (2001). Influence of night shift work on psychologic state and cardiovascular and neuroendocrine responses in healthy nurses. *Hypertension Research, 24* (1), 25-31.
- National Sleep Foundation*. (n.d.). Retrieved February 11, 2008, from How much sleep do you really need?:  
[http://www.sleepfoundation.org/site/c.huIXKjM0Ix/b.2417325/k.3EAC/How\\_Much\\_Sleep\\_Do\\_We\\_Really\\_Need.htm](http://www.sleepfoundation.org/site/c.huIXKjM0Ix/b.2417325/k.3EAC/How_Much_Sleep_Do_We_Really_Need.htm).
- Nemcek, M. & James, G. (2007). Relationships among the nurse work environment, self-nurturance ad life satisfaction. *Journal of Advanced Nursing, 59* (3), 240-247.
- Ohida, T. K. (2001). Night-shift work related problems in young female nurses in Japan. *Journal of Occupational Health, 43* (3), 150-156.
- Orem, D. (1985). Nursing: concepts of practice. In M. Parker, *Nursing Theories & Nursing Practice*. New York: McGraw-Hill.
- Orem, D. (2006). Dorothea E. Orem's self-care deficit nursing theory. In M. Parker, *Nursing Theories & Nursing Practice* (2nd ed., pp. 141-148). Philadelphia: F.A. Davis Company.
- Owens, J. (2007). Sleep loss and fatigue in healthcare professionals. *Journal of Perinatal Neonatal Nursing, 21* (2), 92-100.
- Persson, M., Martensson (2006). Situations influencing habits in diet and exercise among nurses working night shift. *Journal of Nursing Management, 14*, 414-423.
- Pilcher, J., Lambert, B., & Huffcutt, A. (2000). Differential effects of permanent and rotating shifts on self-report sleep length: A meta-analytic review. *Sleep, 23* (2), 155-163.
- Purnell, M. F. (2001). The impact of a nap opportunity during the night shift on the performance and alertness of 12-h shift workers. *Journal of Sleep Research, 11*, 219-227.

- Reid, K. R. (1997). Improving shiftwork management: Shiftwork and health. *Journal of Occupational Health and Safety-Australia and New Zealand*, 13 (5), 439-450.
- Rogers, A. H. (2004). The effects of work breaks on staff nurse performance. *Journal Of Nursing Administration*, 34 (1), 512-519.
- Rosekind, M., Gregory, K., & Mallis, M. (2006). Alertness management in aviation operations: Enhancing performance and sleep. *Aviation, Space, and Environmental Medicine*, 77 (12), 1256-1265.
- Rosekind, M., Smith, R., Miller, D., Co, E., Gregory, K., Webbon, L., et al. (1995). Alertness management: Strategic naps in operational settings. *Journal of Sleep Research*, 4 (2), 62-66.
- Ruggiero, J. (2003). Correlates of fatigue in critical care nurses. *Research in Nursing & Health* (26), 434-444.
- Rural Assistance Center (n.d.) *Rural Assistance Center Health and Human Services Information for Rural America*. Retrieved March 10, 2008, from: [http://www.raconline.org/info\\_guides/hospitals/cahfaq.php](http://www.raconline.org/info_guides/hospitals/cahfaq.php)
- Samaha, E. L. (2007). Psychological, lifestyle and coping contributors to chronic fatigue in shift-worker nurses. *Journal of Advanced Nursing Original Research*, 221-232.
- Schernhammer, E. L. (2003). Night-shift work and risk of colorectal cancer in the nurses health study. *Journal of the National Cancer Institute*, 95 (11), 825-828.
- Scott, L. D., Wei-Ting, H., Rogers, A. E., Nysse, T., Dean, G., & Dinges, D. (2007). The relationship between nurse work schedules, sleep duration, and drowsy driving. *Sleep*, 30 (12), 1801-1807.
- Scott, L. H. (2006). The impact of multiple care giving roles on fatigue, stress, and work performance among hospital staff nurses. *The Journal of Nursing Administration*, 36 (2), 86-95.
- Scott, L. R. (2006). Effects of critical care nurses' work hours on vigilance and patients' safety. *American Journal of Critical Care*, 15, 30-37.

- Shen, J., Botly, L., Chung, S., Gibbs, A., Sabanadzovic, S., & Shapiro, C. (2006). Fatigue and shift work. *Journal of Sleep Research, 15*, 1-5.
- Smith, S., Kilby, S., Jorgensen, G., & Douglas, J. (2007). Napping and nightshift work: Effects of a short nap on psychomotor vigilance and subjective sleepiness in health workers. *Sleep and Biological Rhythms, 5*, 117-125.
- Smith-Coggins, R. H. (2006). Improving alertness and performance in emergency department physicians and nurses: The use of planned naps. *Annals of Emergency Medicine, 48* (5), 596-604.
- Stokowski, L. (2004). A wake-up call for nurses: Sleep loss, safety, and health. *Medscape*.
- Suzuki, K., Ohida, T., Kaneita, Y., Yokoyama, E., Miyake, T., Harano, S., et al. (2004). Mental health status, shift work, and occupational accidents among hospital nurses in Japan. *Journal of Occupational Health, 46*, 448-454.
- Takeyama, H., Kubo, T., & Itani, T. (2005). The nighttime nap strategies for improving night shift work in workplace. *Industrial Health, 43*, 24-29.
- Tanabe, S. & Nishihara, N. (2004). Productivity and fatigue. *Indoor Air, 14* (7), 126-133.
- Tennant, C. (2001). Work-related stress and depressive disorders. *Journal of Psychosomatic Research, 51*, 697-704.
- Thomas, M., Sing, H., Belenky, G., Holcomb, H., Mayberg, H., Dannals, R., et al. (2000). Neural basis of alertness and cognitive performance impairments during sleepiness. Effects of 24 h of sleep deprivation on waking human regional brain activity. *Journal of Sleep Research, 9*, 335-352.
- Trinkoff, A., Storr, C. L., & Lipscomb, J. A. (2001). Physically demanding work and inadequate sleep, pain medication use, and absenteeism in registered nurses. *Journal of Occupational and Environmental Medicine, 43*, 355-363.
- Tucker, P. (2003). The impact of rest breaks upon accident risk, fatigue and performance: A review. *Work & Stress, 17* (2), 123-137.

- U.S. Department of Health and Human Services. (2004, March). *National Sample Survey*. Retrieved February 1, 2008, from Health Resources and Services Administration: <http://www.bhpr.hrsa.gov/healthworkforce/rnsurvey04/>.
- U.S. Department of Labor (n.d.). *Work hours: Breaks and meal periods*. Retrieved April 9, 2008, from: <http://www.dol.gov/dol/topic/workhours/breaks.htm>
- Van Dongen, H., Price, N., Mullington, J., Szuba, M., Kapoor, S., & Dinges, D. (2001). Caffeine eliminates psychomotor vigilance deficits from sleep inertia. *Sleep, 24*, 813-819.
- Walsh, J.; Muehlbach, M.; Humm, T.; Dickins, Q. S., & Sugerma, J. (1990). Effect of caffeine on physiological sleep tendency and ability to sustain wakefulness at night. *Psychopharmacology, 271-273*.
- Wesensten, N. J., Belenky, G., Kautz, M. A., Thorne, D. A., Teichardt, R. M., & Balkin, T. J. (2002). Maintaining alertness and performance during sleep deprivation: Modafinil versus caffeine. *Psychopharmacology, 159*, 238-247.
- Wisconsin Medical Center (1999). Sleep and circadian rhythms (Publication. Retrieved August 26, 2007, from MCW Healthlink: <http://healthlink.mcw.edu/article/922567322.html>
- Wright, K., Hughes, R., Kronauer, R., Dijk, D., & Czeisler, C. (2001). Intrinsic near-24-h pacemaker period determines limits of circadian entrainment to a weak synchronizer in humans. *Proceedings of the National Academy of Sciences of the United States of America, 98* (24), 14027-14032.
- Wyatt, J., Cajochen, C., Ritz-De Cecco, A., Czeisler, C. A., & Dijk, D. J. (2004). Low-dose repeated caffeine administration for circadian-phase-dependent performance degradation during extended wakefulness. *Sleep, 27* (3), 374-381.
- Yamanaka, Y., Honma, K., Hashimoto, S., Takasu, N., Miyazaki, T., & Honma, S. (2006). Effects of physical exercise on human circadian rhythms. *Sleep and Biological Rhythms, 4* (3), 199-206.
- Zhu, J. L., Hjollund, N. H., & Olsen, J. (2004). Shift work, duration of pregnancy, and birth weight: The national birth cohort in Denmark. *American Journal of Obstetrics and Gynecology, 191* (1), 285-291.

APPENDICES

APPENDIX A

DATA COLLECTION INSTRUMENT

**Hospital Environment and Policy Survey**

General Data

1. Which best describes your position in your hospital?  
Charge Nurse/ Night shift supervisor/ Director of nursing
2. Is your hospital a critical access facility? Yes or No

**The following questions are related to your hospital demographics.**

3. How many patient beds are licensed in your hospital?  
0-50/ 51-100/ 101-200/ >201
  4. How many hours do night nurses work per scheduled shift at your hospital?  
8/10/12 / Other
  5. How many night nurses work in your hospital? \_\_\_\_\_
  6. What percentage of night nurses are Registered Nurses?  
0/ 1-20%/ 21-40%/ 41-60%/ 61-80%/ 81-100%
- What percentage of night nurses are Licensed Practical Nurses?  
0/ 1-20%/ 21-40%/ 41-60%/ 61-80%/ 81-100%
- What percentage of nurses work only night shift?  
0/ 1-20%/ 21-40%/ 41-60%/ 61-80%/ 81-100%
- What percentage of night nurses rotates to other shifts?  
0/ 1-20%/ 21-40%/ 41-60%/ 61-80%/ 81-100%

**The following questions are related to your hospital's written/unwritten policies.**

7. Does your hospital's written policy require that night nurses rotate to other shifts?  
Yes/No/Don't Know
8. According to written hospital policy are nurses allowed to nap on their break?  
Yes/No/ Don't Know
9. If so, how long are they allowed to nap on their breaks? \_\_\_\_\_
10. According to unwritten policy, do night nurses nap on their breaks?  
Yes/No/Don't Know

**The following questions are related to your hospitals policies regarding Rest Breaks.**

11. Does staffing usually permit night nurses to take their breaks?  
Yes/No/Don't Know
12. Over the past 12 months would you say night staff nurses take their breaks:  
Routinely / most of the time / some of the time / rarely or never/Don't Know

13. What is the policy regarding number of rest breaks in a given shift?  
\_\_\_\_\_

14. Can rest breaks be combined into one longer break to take a nap?

Yes/ No/ Don't Know

15. In times of limited staffing, will the nursing supervisor relieve staff for breaks?

Routinely / most of the time / some of the time / rarely or never/Don't Know

**The following questions are related to your hospital's environmental services**

16. Is there a cafeteria open to night shift workers?

Yes/No

17. Are vending machines available with food and beverages for night shift workers?

Yes/No

18. Is there a place for night shift workers to lie down and rest while on a break?

Yes/No

19. Are work stations well lit at night?

Yes/No

20. Is there a well lit area outside for night workers to take a walk?

Yes/No

21. Is there an area for staff to exercise at night?

Yes/No

22. If yes, please describe (ex. Floor space, equipment) \_\_\_\_\_

23. Is there an area available, away from patient care, for staff nurses to take their breaks? Yes/ No (please describe) \_\_\_\_\_

24. Is this area a safe place to take a break?

Yes/No

25. Is it comfortable?

Yes/No

**Please provide any comments about working conditions for night nurses.**

**Please provide any comments about rest breaks for night nurses.**

**Please provide any comments about available environmental services for night nurses.**

**If you would like a copy of the results please include your e-mail address.**

APPENDIX B

IRB: HUMAN PARTICIPANTS APPROVAL



**INSTITUTIONAL REVIEW BOARD**  
**For the Protection of Human Subjects**  
**FWA 00000165**

960 Technology Blvd. Room 127  
 c/o Veterinary Molecular Biology  
 Montana State University  
 Bozeman, MT 59718  
 Telephone: 406-994-6783  
 FAX: 406-994-4303  
 E-mail: cherylj@montana.edu

*Chair:* Mark Quinn  
 406-994-5721  
 mquinn@montana.edu  
*Administrator:*  
 Cheryl Johnson  
 406-994-6783  
 cherylj@montana.edu

**MEMORANDUM**  
 .....

**TO:** Anita Kellam

**FROM:** Mark Quinn, Ph.D. Chair *Mark Quinn*  
 Institutional Review Board for the Protection of Human Subjects

**DATE:** November 13, 2007

**SUBJECT:** *Environmental Services and Policies Related to Rest Breaks at Montana Hospitals*

The above research, described in your submission of November 13, 2007, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal Regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- (b)(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods
- (b)(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.
- (b)(3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- (b)(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- (b)(5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- (b)(6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review

APPENDIX C

TELEPHONE SCRIPT

Hello (*Insert Persons Name Here*),

My name is Anita Kellam and I am a Family Nurse Practitioner Student at Montana State University-Bozeman. Currently I am conducting research for my Master's thesis discussing hospitals' policies regarding rest breaks, and environmental services for night shift nurses. I am asking night shift supervisors, or night shift charge nurses to participate in a 15 minute electronic survey.

The questions in the survey focus on specific demographic data, policies and information about the work environment at your hospital. The purpose of this research is to assess what Montana acute care and critical access hospitals offer their nurses during night shift. The results of this survey could help us learn about optimal environment which ultimately helps retain night nurses. Individuals and specific agencies will not be identified. Data is reported as group information.

Do you have any questions? (Questions will be answered appropriately).

Would you be willing to give me the name and e-mail address of your night shift supervisor or night charge nurse who could respond to the survey?

Thank you for your time.

APPENDIX D

HUMAN PARTICIPANT INFORMATION

### **Hospital Environment and Policy Survey**

I am asking you, the night shift supervisor or charge nurse, to participate in a 15 minute, electronic survey about your hospital's policies regarding rest breaks, and environmental services for night shift nurses. This important research is being done as part of my Master's thesis work. The questions in the survey focus on specific demographic data, policies and information about the work environment at your hospital. The purpose of this research is to assess what Montana acute care hospitals offer their night nurses during their shift. The results of this survey could help optimize your hospital's working environment and ultimately help retain night nurses. In addition, administrators might become aware of strategies for enabling night nurses to better care for themselves during the shift.

There are no known risks to your participation in this study. This information is significant to health care in Montana, particularly to those who manage or oversee health care organization and set policies affecting the working conditions of night shift staff. Individual organizations will not be identified. All data will be reported as group information. If you decide not to complete the survey, you may stop at any time.

Thank you for your participation. For more information or questions regarding this research please contact, Anita Kellam, Family Nurse Practitioner-Student, at 406-357-2755.

APPENDIX E

FOLLOW UP LETTER

Hello,

Two weeks ago an e-mailed questionnaire was sent to you regarding your hospital's policies and environmental services related to night nurses.

If you have already completed and returned the questionnaire, please accept my thanks. If not, I am asking you to please fill out the questionnaire and return it in the next few days. I am grateful for your response, which will help us recognize what Montana hospitals are offering their night nurses.

If you have not received a questionnaire or if it has been misplaced, please refer to the link:

[http://www.montana.edu/nursingsurveys/HospitalEnvir/hospital\\_environment\\_and\\_policy\\_survey.htm](http://www.montana.edu/nursingsurveys/HospitalEnvir/hospital_environment_and_policy_survey.htm)

Anita Kellam, RNC, BSN, Family Nurse Practitioner Student