STRATEGIES FOR IMPROVING SLEEP HEALTH IN NURSES

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Abstract

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Loss of sleep affects an individual both physically and mentally. Health professionals with poor quality of sleep are at risk for patient medication errors and poor patient outcomes. Understanding the different dynamics of what may develop because of lack of sleep may motivate nurses to improve sleep health. Ways for improving sleep health are very basic and effective when addressed in the correct manner. Nurses, as well as other healthcare professionals, especially those who work irregular or night shifts, are at risk of sleep loss and/or sleep deprivation. This project, which was introduced in the style of a presentation/discussion, provided an evidence-based educational power point related to the effects of poor sleep quality, and sleep health promotion activities to enhance sleep health at a local 135 bed community hospital in Central Idaho. Thirteen nurses and eleven nursing students participated (n=24). Responses from participants were similar in that they all agreed they were affected by sleep loss. Nurses and the administrative staff must acknowledge and advocate for the improvement of sleep health. Improving sleep health may enhance personal health and work effectiveness and quality. Administrative personnel need to revisit the 12 hour shift policy, as well as investigate through on-site surveys the impact of shift work, staff meeting scheduling for night shift staff, overtime/call-back policies, and staffing policies that are sleep health-friendly.

Keywords: sleep deprivation, sleep loss, nurses, diabetes, obesity, and rotating shifts
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Introduction

The majority of nurses are employed in hospital and long-term care settings. Work schedules are a key element in nurses’ intent to remain employed. Negotiation of each nurses’ schedule involves delicate balance as unit staffing needs are matched to nurses’ desired schedules (Geiger-Brown & Trinkoff, 2010). The need to provide 24/7 patient care means that nurses must staff for 8 or 12 hour shifts. Many nurses work outside the 9:00-5:00PM work day. Extended shift (those past 8 hours) and overtime due to unplanned staff illnesses or increased hospital admissions can result in increased fatigue and sleep deprivation (Geiger-Brown & Trinkoff, 2010). It is clear that differing work schedules result in differing levels of fatigue, with shift work attributing to higher levels than day work (Yuan, Chou, Chen, Lin, Chen, Liu & Kuo, (2011). Sleep deprivation is defined as a sufficient lack of restorative sleep over a cumulative period so as to cause physical or psychiatric symptoms (Stedman, 2006). Studies related to fatigue and sleepiness indicate that adults require 6 to 10 hours of sleep in a 24-hour period. Modern society expects performance and productivity on a 24-hour basis. This need for round-the-clock operations in many spheres, including healthcare, often assumes precedence over the basic physiologic principles governing sleep and wakefulness (Owens, 2007). Several studies have established that impaired sleep is a common problem among nurses. Overworked, fatigued and stressed nurses are at a higher risk of making mistakes that threaten patient safety as well as their own health (Hasson & Gustavsson, 2010). Shift work, and particularly working night shift, is recognized as a source of stress for nurses (Fallis, McMillan, & Edwards, 2011). For nurses working either 8 or 12-hour shifts, sleep deprivation increases the risk for patient errors, near misses, and personal injuries on shift and while driving home (Fallis et al., 2011). To further compound this issue, most healthcare professionals, including nurses, typically receive little or
no formal education about normal sleep or the essential role of sleep in maintaining adequate health and performance either during or after their training (Owens, 2007). Other concerns related to sleep loss involve effects on the immune and cardiovascular systems. A decrease in the immune system is often associated with lack of quality sleep and cardiovascular regulation is important for both young and old; constant changes due to sleep loss could increase the risk of cardiovascular disease (Vaara & Koivu, 2010).

Statement of the Problem

In addition to a decrease in mental abilities relating to sleepiness, studies have reported that the effects of going without sleep for as long as 24 hours are similar to drinking two to three alcoholic beverages (Falleti, Maruff, Collie, Darby, & McStephen, 2003). Sleep loss substantially impairs physical, cognitive, and emotional function and failure to adhere to the needs for adequate amounts of and appropriately timed sleep results in an increase in sleepiness, fatigue, and a decline in waking function (Owens, 2007). The only sure way for people to overcome sleep deprivation, thus increasing sleep health, is to increase continuous sleep time. One possible option to aid in the fight against sleep deprivation and to increase alertness may be the recommendation of scheduled naps during an individual’s shift. Studies suggest that naps of 20 minutes may be beneficial in combating fatigue and increasing mental acuity in night-shift nurses (Hayashi, Chikazawa, & Hori, 2004). Other strategies include the limitation of stimulants, such as caffeine and to have available an environment that is dark, cool and quiet during nap time.

Statement of the Purpose

The purposes of the clinical project was to review the evidence-based research on the topic of the sleep health of practicing nurses and to offer guidelines to improve sleep health for
working nurses. The primary goal was to increase awareness of adverse effects of sleep loss by having nurses and other hospital personnel participate in an organized discussion forum. The purpose of the discussion was to develop an increased level of knowledge related to sleep health and to educate nurses about potential risks related to sleep deprivation. Another purpose for the discussion was to help nurses identify tools and strategies to improve sleep health.

Conceptual Framework

Health promotion and maintenance are an integral component of nursing. Nurses and the administrative staff of hospitals should encourage the availability and opportunity for continuing education about sleep health. Ways for improving the individual’s knowledge base are to develop different strategies to decrease barriers to sleep health and to develop tools to inform/educate the target populations. As mentioned previously, administrative awareness is one component that is a means for improving sleep health. Theoretical foundations of service learning have been widely used as a theoretical basis for designing and analyzing learning programs (Billings & Halstead, 2005). Reflective observation about the effects of sleep deprivation is essential to the learning process (Billings & Halstead, 2005). When addressing the concerns of sleep health during the project and the presentation, the conceptual framework was developed and involved individual decision making. Delve, Mintz, and Stewart (1990) developed a service learning model based on the theories of moral decision making and values clarification. Methods used to assess and evaluate the project were first to build awareness of the problem and then analyze the outcome based on formal evaluations. Analysis involved nurses’ and administrative personnel’s attitudes concerning sleep deprivation and their knowledge of the physiological adversities. This learning model included five phases of development:
a) Exploration, a phase that provides the individual the availability to actively address their current environment, as well as manipulate materials; b) Clarification involves the introduction and explanation of tools used and is designed to help explain concepts through verbalization; c) Realization is a more in depth and broader understanding of the different concepts; d) Activation allows for implementation of the learned concepts so that participants can move forward; and e) Internalization, a phase where learning can be assessed and participants gain a full understanding of key concepts and developed skills.

**Description of the Project**

An educational PowerPoint presentation and discussion was offered to all nursing and hospital staff at a small hospital (125 acute medical/surgical care beds, 20 adult acute care psychiatric beds, and 16 skilled nursing faculty beds in the Transitional Care Unit). Nursing students were also invited. The presentation reviewed evidence-based research on strategies needed to improve sleep health. The presentation was conducted within the education department at St. Joseph Regional Medical Center located in Lewiston, Idaho. Tools used in the presentation were a multitude of discussion forums among participants relating to sleep deprivation. A tri-fold handout discussing myths/facts (See Appendix A: Myths and Facts about Sleep), possible sleep aids and a section designed to be later utilized as a personal sleep diary for participants was available. Along with information concerning strategies for improving sleep health, the presentation also addressed the physiological and mental effects of sleep loss. After completion of the presentation, participants were asked to provide written evaluation about effectiveness of the presentation and the teaching tools.
Aims

The aims of this project were four-fold:

1) Increase the knowledge of sleep health dynamics.

2) Identify potential health risks related to sleep deprivation.

3) Identify the needed components to establish optimal sleep health.

4) Identify tools and strategies to improve sleep health.

Definition of Terms

1) “Sleep loss”- Sleep loss in the average adult refers to sleep of shorter durations than what is recommended. Symptoms might include fatigue, impaired cognitive and physical abilities, and alterations in health status.

2) “Sleep deprivation”- Sleep deprivation is a condition identified as not having enough sleep. Sleep deprivation may be chronic or acute. As indicated with sleep loss, sleep deprivation can cause changes with physical and cognitive function and changes in mood status.

3) “Sleep fragmentation”- Sleep fragmentation is a multitude of sleep disruption throughout one’s sleep cycle. Common symptoms associated with “Sleep fragmentation” include increased objective sleepiness (as measured by the Multiple Sleep Latency Test); decreased psychomotor performance on a number of tasks including tasks involving short term memory, reaction time, or vigilance; and degraded mood (Bonnet & Arand, 2003).

Significance to Nursing

Many healthcare professionals are subject to sleep loss and sleep deprivation. Decreased sleep increases the risk for physiological and mental adversities, as well as alters the quality of patient care. Fatigue from long shifts can reduce attention, affecting critical thinking and
decrease the quality of performance. Prolonged fatigue and inadequate recovery result in decreased work performance and more adverse incidents (Niu, Chung, Chen, Hegney, O’Brien, & Chou, 2011). Other aspects to take into consideration include the general health of nurses, the potential for nurses to be more susceptible to numerous diseases if sleep deprived, and the impact of sleep deprivation on the overall morbidity and mortality of nurses. The long term effects of sleep loss may also play a part in the current nursing shortage (Owens, 2007). Acknowledgement of this health concern is a small component in implementing a plan to improve the concern of inadequate sleep among nurses. With acknowledgement come the possible benefits of decreasing medical mistakes and increasing the longevity of nursing careers.

**Literature Review**

**Methods**

When researching the topic of sleep health, the search engines used were *WebMD*, *PubMed*, *MEDLINE*. Thirty-three relevant articles were identified and deemed relevant; the majority were published in the last 5 years. The conceptual categories utilized for the retrieval of articles were sleep deprivation (6 articles), sleep loss (5 articles), nurses (3 articles), diabetes (5 articles), obesity (4 articles), and rotating shifts (3 articles).

**Sleep Deprivation**

Sleep is an essential requirement for all humans and animals. It is a time for the body and mind to regenerate and rejuvenate. Much has been learned about sleep health over the past 10-20 years. NASA Aviation Safety Reporting Systems conducted a 7-year study and found that human error contributes to over half of all aviation mishaps (Billings & Reynard, 1984). Later, with the focus on safety, many governmental agencies began to realize the significance of lack of sleep or poor sleep quality. Moderate sleep loss compromises the function of neural circuits
critical to sub second attention allocation during working-memory tasks, even when an effort is made to maintain wakefulness and performance (Smith, McEvoy, & Gevins, 2002). Another at risk population is long haul truck drivers. A questionnaire and face to face interview addressing the overall health and obstructive sleep apnea syndrome of truck drivers was conducted (Fidan, Unlu, Sezer, & Kara, 2007). Drivers with a history of accidents often stated that the cause of the accident was falling asleep while driving (Fidan et al., 2007). Aviation, military, police, and health care personnel have been particularly interested in the operational impact of sleep deprivation and work schedules given the potential severe consequences of making fatigue-related errors (Neylan et al., 2010). Long work hours for healthcare staff and physicians have become a focus within the healthcare arena, recommendations such as brief mid-shift naps, management of the length of shift and rotating shifts and developing an increased knowledge base of sleep deprivation are key examples intended to reduce the negative effects related to sleep deprivation. Studies show that staff working rotating shifts average only 5.5 hours of sleep when working night hours (Aveni, 1999). Nurses and nursing leaders must be aware of the causes and effects of fatigue and ensure that its impact is considered where staffing and patient safety intersect (Graves & Simmonds, 2009). With awareness of the seriousness of safety and health concerns attributed to poor sleep health, state and federal laws were implemented to address some, but not all of the issues. For example, The American Nurses Association states that as of 2001 Oregon State enacted legislation that prevents a nurse from being required to work more than 2 hours beyond a regularly scheduled shift or 16 hours in a 24 hour time period. In 2002 Washington’s language states that acceptance of mandatory overtime by a nurse is strictly voluntary and refusal is not grounds for adverse actions against the nurse. Over the past 20 years, hospitals have increasingly replaced the typical 8 hour shift to 12 hours for nurses and
direct patient care workers (Richardson, Turnock, Harris, Finley, & Carson, 2007). An example of the alteration of a typical 8 hour schedule may be to decrease employment scheduling problems with coverage for 2 shifts (7AM-7PM and 7PM-7AM) versus 3 shifts (7AM-3PM, 3PM-11PM, and 11PM-7AM). It is further noted that nurses prefer this type of schedule (Rogers, Wei-Ting, Scott, Aiken, & Dinges, 2004). Hiring practices advertise 12 hour shifts with nurses going from a contracted 40 hours a week to 36 hours a week. The benefits for nurses and other workers are the 4 days off per week. However, it can be argued that nurses work 4-24 hours more per week when called in for emergencies, staff illnesses, and increased census. This expectation of health care professionals to work additional hours is often reflected in annual evaluations. In some work settings nurses may be mandated to work an additional 4 hours adding to their scheduled 8 hours if co-workers call in sick. These work environment concerns plague all facilities and employees. There has been increased attention to the overall effects of poor sleep health, sleep fragmentation, and sleep deprivation on patient care and patient safety (Kunert, King & Kolkhorst, 2007).

Research suggests that fatigue can negatively affect nurses’ health, quality of performance, safety and thus patient care, and that the effects of fatigue may be exacerbated for nurses over 40 years of age (Muecke, 2005). Health and safety are paramount within health care delivery (Fallis et al., 2011). It is therefore essential that nurses, both young and not quite so young, are physically able to administer the high standard of care that they are obliged both personally and professionally to give (Muecke, 2005).

Up to 20% of Americans report that they get less than 6 hours of sleep on average, and the number of Americans that report that they get 8 hours or more has decreased (Davis, 2010). It is well known that individuals experiencing sleep deprivation and fatigue pose serious health
and safety risks to others and themselves because of cognitive and motor impairments and mood disturbance (Fallis et al., 2011). In today’s fast-paced industrialized society, many individuals try to justify and/or accommodate ways for improving sleep. Justification might be to develop a habit of catching up on sleep and sleep long periods on days off. Reduction in the amount of sleep predisposes individuals to sleep deprivation, resulting in poor psychomotor performance and a decline in physiological health (Davis, 2010). Nurses working night shifts are at risk for sleep deprivation, which threatens patient and nurse safety (Fallis et al., 2011). Little research has addressed napping, an effective strategy to improve performance, reduce fatigue, and increase vigilance (Fallis et al.). The only truly effective intervention for sleep loss and fatigue, not surprisingly, is adequate sleep. However, there is a high probability that some degree of sleep loss and fatigue will be experienced by most healthcare personnel in their professional lives both in the course of training and in the performance of their regular jobs (Owens, 2007). Nurses on nightshift reported poorer sleep quality than nurses on other shifts and sleepiness was highest for nurses on rotating schedules (Garde, Hansen, & Hansen, 2009).

It has been known for years that short-term disturbances of circadian rhythms can cause health problems such as fatigue, insomnia, mood fluctuations, lack of appetite, and generally impaired performance: these phenomena are found in the well-recognized entities of “jet-lag” and “shift-lag” (Erren et al., 2010). When researching the physiological alterations related to sleep deprivation, breast and prostate cancer are among a multitude of adverse affects (Erren et al.). New research also suggests that lack of sufficient sleep leads to an increased chance of both breast and prostate cancer. Given the fact that many shift workers may be exposed to circadian disruption, thus increasing an individual’s risk of developing either of the previous cancer mentioned (Erren et al.).
Several possible mechanisms have been suggested in recent years to explain the association between exposure to light pollution, termed “Light-at-night” (LAN), and breast cancer (BC) (Kloog, Portnov, Rennert, & Haim, 2011). According to the American Cancer Society (2009-2010), breast cancer is the most common cancer among women, accounting for nearly 1 in 4 cancers diagnosed in US women. With limited sleep and the different characteristics of shift work, individuals have an increased possibility of exposure to light. Exposure to light-at-night is thought to be a contributing factor for the increase of melatonin in an individual’s system. The increase of melatonin is suggested as a contributing cause of breast cancer (Hansen, 2006). The risk factors of breast cancer are not clearly defined, but the adverse affects of sleep loss do affect different hormones levels.

Other hormones altered by lack of sleep are ghrelin and leptin; both are relevant to an individual’s appetite. Abnormal levels of these two hormones may increase the risk for increased weight and potentiate the alteration of metabolic hormones and insulin leading to the possibility of obesity and type 2 diabetes. Laboratory studies of healthy young adults submitted to recurrent partial sleep restriction, marked alterations in glucose metabolism including decreased glucose tolerance and insulin sensitivity have been demonstrated (Spiegel, Knutson, Leproult, Tasali, & Van Cauter, 2005).

Along with the concern of type 2 diabetes, breast cancer, and obesity, an additional concern is cardiac function. An increased shift in hormone levels leads to a build-up of noxious substance (plaque) in the blood. This, apart from other alterations, increases the risk for an individual to develop heart disease. Heart disease can manifest itself in many ways. Some individuals may develop hypertension, while others might suffer from high cholesterol or angina.
Whatever the condition, the build-up of toxins in the bloodstream may assist in an increased risk of cardiac disease.

Nursing as a profession, has seldom used regulation to enforce safe work: rather, it relies on self-regulation. Thus it is crucial that the nursing profession move beyond a focus on ratios and numbers and begin to apply research evidence to decision making to ensure that environment are healthy, and scheduling practices are appropriate (Montgomery & Geiger-Brown, 2010). Nurses on all shifts should be encouraged to take regularly scheduled breaks, including meal periods (Kunert, et al, 2007). Other ways to improve sleep health may be to increase nurses' knowledge related to sleep hygiene and factors that disrupt sleep. An emphasis on improved sleep quality could contribute to decreasing sleep deprivation and increasing psychomotor performance among nurses (Johnson, Brown, & Weaver, 2010).

**Summary**

Sleep loss and/or sleep deprivation is one of many of the concerns inflicting nurses and other healthcare professionals. Societal demands and lifestyle contribute to sleep deprivation, sleep fragmentation and poor sleep health. Whatever the causes, sleep loss can have serious effects on health. Complications of sleep loss can impact individuals physically and/or mentally, creating patient safety risks. Knowledge about barriers to quality sleep is essential for adapting improved lifestyle changes. Other ways might be to educate both nurses and administrators about different ways to improve sleep health such as adjusting staff meetings to meet the needs of all shifts workers, creating policies to meet the needs of night shift nurses and enhancing knowledge about the different components for improved sleep health. Education of co-morbid conditions associated with sleep loss may be obesity, cardiac disease, or type 2 diabetes. Understanding the physiological alterations related to sleep loss and establishing different strategies to improve
sleep health is essential for enhancing the quality of optimal health in nurses working varied shifts and long hours.

**Results of Project**

The actual project took place on January 28, 2011 at St. Joseph Regional Medical Center, located in Lewiston Idaho. Time of the presentation was 1430 to 1600. Of the participants who attended, there were 13 nurses from varied shifts and 11 nursing students for a total of 24 attendees. No administrative personnel were present. After the presentation, a discussion was held which entailed an activity. The activity was developed around materials developed by the author for the presentation: “Strategies for Sleep Health (myths & facts),” “Sleep Aids,” and “Personal History.” Participants were encouraged to interact and express individual thoughts and knowledge about the topic of improved sleep health. The majority of participants agreed that the material presented was easily understood. Some participants indicated the need for improved sleep health and a plan to implement some of the strategies described in the project. Others mentioned an interest in developing more material concerning the effects of the different hormones related to sleep loss. Overall the presentation was very well received and valued. Many participants felt they increased their knowledge regarding improved sleep health.

**Conclusions and Recommendations**

The actual project was informative and educational for all who attended. After the final and closing discussion, it was very apparent that improved sleep health among nurses is a concern. In the weeks following the presentation, requests have been received for additional presentations with the intent to educate and inform healthcare professionals in other outlying areas. One request was from a representative of the Idaho Nurses Association. The Association held an open house at the University Inn Hotel located in Moscow Idaho on March 18, 2011. The
focus of the open house was to inform and educate nurses of current issues affecting the working nurse. The presentation was delivered without modifications to the original format.

In addition to the impact of the actual presentation conducted on January 28, 2011, recommendations suggested in the presentation were available and received with much enthusiasm from all participants. One participant mentioned taking the information presented and consulting with her physician, with the intent to enhance her quality and quantity of sleep. Another found the information very useful and plans to incorporate it in her everyday life.

Listed below are the recommendations given to all participants; The American Academy of Sleep Medicine offers the following tips on how to get a good night’s sleep:

Follow a consistent bedtime routine.
Establish a relaxing setting at bedtime.
Get a full night’s sleep every night.
Avoid foods that contain caffeine, as well as any medicine that has a stimulant, prior to bedtime.
Do not bring worries to bed.
Do not go to bed hungry, but don’t eat a big meal before bedtime either.
Avoid any rigorous exercise within six hours of your bedtime.
Get up at the same time every morning.

Table 1

American Academy of Sleep
Along with the listed recommendations, an application of the theory of moral decision making and values clarification was addressed. This enabled the nurses and other healthcare professionals to move forward and develop an understanding of the characteristics involving strategies for sleep health. As mentioned tools were used to evaluate participant responses and solicit feedback. The evaluation tool addressed the listed objectives and the necessary tools needed to evaluate participant understanding of the subject matter for improving sleep health in staff affected by shift work (See Appendix B: Project Report Rubric).
References


Doi: 10.1053/smrv.2001.0245


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doi: 10.4037/ccn2011710


Appendix A

Myths and Facts about Sleep

Myth 1: Getting just 1 hour less sleep per night won’t affect your daytime functioning. You may not be noticeably sleepy during the day. But even slightly less sleep can affect your ability to think properly and respond quickly, and compromise your cardiovascular health, energy balance, and ability to fight infections.

Myth 2: Your body adjusts quickly to different sleep schedules. Most people can reset their biological clock, but only by appropriately timed cues—and even then, by 1–2 hours per day at best. Consequently, it can take more than a week to adjust after traveling across several time zones or switching to the night shift.

Myth 3: Extra sleep at night can cure you of problems with excessive daytime fatigue. Not only is the quantity of sleep important but also the quality of sleep. Some people sleep 8 or 9 hours a night but don’t feel well rested when they wake up because the quality of their sleep is poor.

Myth 4: You can make up for lost sleep during the week by sleeping more on the weekends. Although this sleeping pattern will help relieve part of a sleep debt, it will not completely make up for the lack of sleep. Furthermore, sleeping later on the weekends can affect your biological clock so that it is much harder to go to sleep at the right time on Sunday nights and get up early on Monday mornings.

Adapted from Your Guide to Healthy Sleep (PDF) - The National Institutes of Health
Appendix B

Project Report Rubric

A rubric is an explicit set of criteria used for assessing a particular type of work or performance. Included are different levels of potential achievement for each criterion. Numerical scores are given for achievement. A summary score will be produced by adding the scores for each criterion.

1.) The topic of the presentation was clearly defined. 1 2 3 4 5
2.) Concepts are accurately identified and clearly understood. 1 2 3 4 5
3.) The information presented addresses the problem. 1 2 3 4 5
4.) The information presented addresses alternatives for improving sleep health. 1 2 3 4 5
5.) The information presented addresses solutions for management and administration to help improve sleep health. 1 2 3 4 5
6.) The end product has some kind of visual aspect. 1 2 3 4 5
7.) The nurse demonstrated understanding of the topic during group discussion. 1 2 3 4 5

Total Points Possible: 35 points
Total Points Earned: __________

Figure A1. Example of Project report Rubric