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QUALITY OF CARE, NURSES' WORK SCHEDULES, AND FATIGUE

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Executive Summary

The modern health care environment includes increased demands regarding improving patient care outcomes at the same time it is facing a serious nursing shortage. Work environments for nurses include changing work patterns, lengthy shifts, and added overtime. These aspects coupled with the increased acuity of patients and complexity of care set the stage for fatigue in nurses and increased errors affecting patients. Additionally, these issues may affect recruitment and retention of the nurses needed for effective care. Evidence regarding work schedules, fatigue, error, and how these are related to patient safety, quality of care, and nurse recruitment and retention provides a basis for specific recommendations.

Patient safety is a national issue being addressed by numerous governmental agencies and entities within the health care system because errors have been identified as responsible for significant morbidity and mortality. Fatigue resulting in diminished performance is revealed as a system wide source of error. Fatigue is affected by cumulative sleep loss, continuous hours of wakefulness, and the circadian time of day. These all occur for those working night shifts, long hours, and overtime in health care. The physical nature of nursing work also contributes to fatigue.

The effects of fatigue on performance are manifested in decreased alertness, vigilance, concentration, judgment, mood, and performance. Fatigue and errors have been shown in many non-health care occupations such as flight crews, truck drivers, and mine workers. In studying 10,793 workers in a wide variety of occupations, extended work hours per day were associated with a 37% higher injury rate, extended hours per week had a 23% higher injury rate, and working overtime was associated with a 61% higher injury rate (Dember, et al., 2005). Other studies have shown higher injury rates for those on night shifts (Smith et al., 1994). Work schedules that include longer hours have been associated with higher musculo-skeletal and needle-stick injuries in nurses (Trinkoff, et al., 2006).

Fatigue and shift work also impact health and well-being. Rotating shift workers are one of the four major groups at most risk of driver fatigue related auto accidents (Sorenson, 1999). Nurses report drowsy driving after working night shifts, especially when sleep duration was shortened (Scott, et al., 2007) raising the potential for automobile accidents. Shift workers report less sleep, more fatigue, and increased health problems (Hollain, et al., 2004; Harrington, 2001; Shen, et al., 2006). Shift work may even affect the incidence of cancer (IAC, 2007).

Studies of resident physicians showed negative impacts of long work hours and limited sleep on both cognitive and psychomotor skills and increased errors (Lockley, et al., 2007; Gander, et al., 2007; Ayas, et al., 2006; Barger, et al., 2006). Pharmacists also express concern about errors caused by fatigue and work volume (Petersen et al., 1999). The aging of the nursing workforce, 73.7% of nurses are over 40 and 25.2% are over 54 (BHP, 2006), creates additional challenges. Older workers provide expertise but may have more personal health issues such as arthritis and other chronic illnesses that may contribute to fatigue from long work hours. Injuries that occur may heal more slowly in the older worker.

Current work schedules of nurses originate from a constellation of events. The higher acuity of patients increases demand. There is a shortage of nurses and efforts to meet the demand often involve current nurses working longer shifts, overtime, and extra shifts with some even extending to 24 hour shifts (Rogers, et al., 2004). Erratic census patterns may result in nurses being asked to take days off without pay when census is below average and work extra hours when census rises. Concern about mandatory overtime has resulted in legislation prohibiting this practice in ten states (ANA, 2001a).

Some nurses perceive long work days (12 hour shifts) as a benefit by reducing the number of staff hand-offs and increasing continuity of care. They also prefer fewer days at work and therefore less commute time and easier scheduling of home life responsibilities. (Richardson, et al., 2007)

Both working during the night and working long hours are associated with more errors. In an early study, nurses on rotating shifts have reported more errors than those on the day shift (Gold, et al., 1992). A study of critical care nurses and errors recommended that the use of 12 hour shifts should be minimized and no more than 12 hours should be worked in a 24 hour period (Scott, et al., 2006). Working overtime has been associated with increased error as has any shift longer than 12.5 hours (Rogers, et al., 2004).

Nurses on night shifts have reported high levels of stress, physical exhaustion, and mental exhaustion (Dorrian, et al., 2006). In another study nurses reported that during only half of their shifts were they able to take breaks or meals (Rogers, et al., 2004). Stress is associated with an increase in use of sick leave and decreased job satisfaction (Zboril-Benson, 2002). Fatigue and stress were increased for those with care-giving responsibilities for elders (which is a significant concern in an older primarily female group) as well as for those with care-giving responsibilities for children (Scott, et al., 2006).

Examination of the roots of the nursing shortage have revealed that burn-out and stress as well as undesirable hours contribute to decisions to leave nursing (Aiken, et al., 2001; Buerhaus, et al., 2001). One study identified that increased flexibility of hours and the availability of part time hours were key to decisions to remain in the nursing workforce (Andrews, et al., 2004). The American Public Health Association (2006) identified best practices for retaining experienced nurses; among them were flexible work options, caregiving and grief resources, mentoring programs, phased retirement, workplace redesign, and ergonomic improvements.

Strategies used in non-health care related fields to prevent error and fatigue have included the use of check lists, specific protocols for enhanced communication within the team, limitations on work hours and overtime, and the use of fatigue countermeasures such as controlled rest. Specific policies relative to work hours, participation of nurses in schedule planning, as well as legislation limiting work hours have been used to prevent fatigue related error.

Specific strategies may help individuals adapt more effectively to shift work and enhance the health of those working nights. Environmental management in the work setting may assist individuals to remain awake and alert. Night workers also need to develop personal strategies to assure adequate sleep and rest.

Recommendations

Recommendations involve individual nurse actions, employer actions, nursing education responsibilities, research needed, and possible policy implications.

INDIVIDUAL NURSE ACTIONS

The ANA has made the following recommendations:

- Consider the impact that multiple jobs have on their level of fatigue and ability to practice safely.
- Continue to document unsafe staffing conditions.
- Recognize that they may have to confront a nursing colleague who is too fatigued to work.
- Collective action— – involving individual nurses, colleagues, professional associations and other stakeholders—-is necessary to change the current work culture to one that recognizes the impact of fatigue on patient safety and accepts the registered nurse's right and obligation to refuse an assignment if impaired by fatigue. (ANA, 2006a)

Additionally, the individual nurse has an obligation to:

- Engage in education regarding avoiding fatigue and the use of fatigue countermeasures.
- Develop the ability to recognize feelings of fatigue in self and use personal fatigue countermeasures appropriately.
- Collaborate with other nurses to help one another with identifying fatigue.

EMPLOYER ACTIONS

- Address the overall work environment for nurses as recommended by the Institute of Medicine report (2004).
- Identify situations and settings in their own organization that promote fatigue in nursing staff and create an unsafe environment for patients.
- Designate positions for an adequate number of registered nurses to provide quality care and assure that nurses are able to work an appropriate schedule including breaks and without overtime.
- Seek creative options to fill registered nurse positions including part time, partial shifts, and other strategies.
- Develop, in collaboration with workers, specific policies regarding length of work times that are based on the individual setting, patient and provider needs. In all circumstances these should avoid any nurse work time of more than 12.5 consecutive hours.

- Provide education for all care providers on the hazards and causes of fatigue, recognizing fatigue, and the obligation of individuals to assure that they are able to provide safe care.
- Establish guidelines and training for workers in the use of multiple fatigue countermeasures including controlled rest periods.
- Provide education for all shift workers regarding the hazards of shift work and the measures that can be taken to mitigate these hazards and promote healthy wake and sleep patterns.
- Institute policies regarding shift work that will promote health and enhance work life balance for workers.

NURSING EDUCATION PROGRAMS

Basic Nursing Education Programs can contribute to solving this problem by:

- Educating nursing students in regard to fatigue as a contributing factor in error and fatigue countermeasures.
- Structuring their own clinical assignments to assure that nursing students are not assigned to clinical work schedules that would promote fatigue and increase error.

RESEARCH AGENDA

- Research the use of creative staffing patterns to meet patient needs,
- Research the use of fatigue countermeasures in health care settings,
- Research the use of checklists for preventing error
- Research the potential value of various approaches to crew resource management and their applicability to healthcare environments.
- Possible Policy Implications
- A requirement that employers work together with employee groups to establish safe work hours based on the individual setting, patient and provider needs.
- A requirement that an institution have a program in place for instituting fatigue countermeasures that could prevent fatigue and errors.

The Problems of Work Schedules, Fatigue, and Quality of Care

The patient care environment has changed dramatically. Short lengths of stay in hospitals mean that patients are much sicker and that convalescent patients are gone from the hospital environment. Nursing home facilities now care for those who require more complex care than was once true. Those requiring less care are often in assisted living and other such environments.

Today's health care environment includes increased demands regarding patient care outcomes and nursing shortages. In response, many changes have been instituted in nurses' work schedules. No longer are nurses working a traditional 40 hour week composed of five eight-hour days. Nurses may be working 10 or 12 hour days. Weeks may be scheduled for 36 or 48 hours as well as the traditional 40 hours. While there may be a basic schedule, nurses are also subject to overtime and call-backs. Days off may be scattered. Added to this is the challenge of units that operate without enough nursing staff to meet the needs of the patients. The nurses working in these environments are providing care for multiple very ill patients. During the work day, the demands of the environment may cause nurses to forego breaks and lunch times and work overtime (Rogers, Hwang, & Scott, 2004). Nurses may feel frustrated in their attempts to provide quality care. These work environments may contribute to fatigue, loss of sleep due to changing work patterns, stress and other adverse consequences. Nurses who experience these adverse consequences may be more susceptible to attentional failure and errors.

Nurses working in adverse environments also may become discouraged with nursing, its demands, and their concerns about quality of care. These feelings may lead some to leave nursing or limit their work hours. In a time of nursing shortage, this loss of experienced nurses poses risks to the health care system and the patients who need care. In order to recruit and retain the expert nurses needed by the health care system, issues that interfere with effective recruitment and retention must be addressed. In its recommendations regarding registered nurse recruitment and retention the Joint Commission states, "...organizations are more likely to retain RNs when there are more RNs per patient and fewer complaints by RNs of emotional exhaustion, burnout, and job dissatisfaction." (Joint Commission, 2005, par.5)

Goal

This paper is designed to explore the evidence regarding work schedules, fatigue, and error and how these are related to patient safety and quality of care. In addition the relationship of these factors to the problems of personal well-being, recruitment and retention of registered nurses will be addressed. A further goal is to make specific recommendations regarding various stakeholders' actions that could help to achieve the goals of patient safety and quality of care as well as retention of expert nurses.

Patient Safety as a National Issue

In 1999 the Institute of Medicine released its key report on errors in the health care system (Kohn, Corrigan, & Donaldson, 1999). The report identified that more than 98,000 people in the U.S. may die each year from errors in health care making this the fifth leading cause of death. Errors are also costly to the system even when death does not result. Additional medications, multiple diagnostic and laboratory tests, and costly care may be needed to treat the results of error. To work toward the goal of safety from injury caused by error, a variety of strategies were proposed.

Since the original report major campaigns have been instituted to decrease errors and increase patient safety. Among these are the "1000 Lives Campaign" (Institute for Healthcare Improvement, 2001). Strategies in six areas to meet the goals of this campaign were described by Saver (2006b). They included deploying rapid response teams, improving care of those with acute myocardial infarction, preventing adverse drug effects, preventing central line infections, preventing surgical site infections, and preventing

ventilator associated pneumonia. Through this campaign the IHI estimates that 122,300 lives were saved in 18 months (Saver, 2006a). A second campaign "Protecting 5 Million Lives From Harm" was initiated in 2006, and designed to continue until December 2008 (Institute for Healthcare Improvement, n.d.). The strategies for this campaign include: prevent harm from high-alert medications, reduce surgical complications, prevent pressure ulcers, reduce methicillin-resistant staphylococcus aureus (MRSA) infection, deliver reliable, evidence-based care for congestive heart failure, and get "boards on board." Health care agencies and institutions joined in this effort by adopting recommended safe practice strategies.

The Joint Commission has initiated multiple programs designed to help health care agencies adopt policies that will decrease error. These include safety goals that are updated annually, policies regarding the use of abbreviations and patient identification, medication administration strategies, the adoption of electronic records, and competency assurance. Information regarding the Joint Commission's patient safety program can be found at www.jointcommission.org/PatientSafety/.

As continued attention is paid to the effect of errors on quality of care, system wide sources of errors are being identified. One system wide source of error identified involves fatigue and the resulting diminished performance of health care workers. Addressing this issue may further enhance patient safety and quality of care.

Relationship of Fatigue to Errors

Fatigue and error have been documented in many different settings and in relationship to many occupations. Examining what has been learned in these occupations may be instructive for nursing.

Understanding Fatigue and Sleep

Sleep is a basic human need related to both circadian rhythms and homeostatic mechanisms of the body (Zeman & Reading, 2005). The circadian rhythm is the internal clock that regulates body functions from the hypothalamus. It governs the usual pattern of waking for the daytime and sleeping at night. It can be reset by deliberate actions. The homeostatic mechanism is controlled by time spent awake. As time without sleep passes, an individual develops what is termed sleep drive most probably from the accumulation of somnogens. This creates a pressure to sleep that increases in a linear fashion the longer a person is awake. Naps are known to decrease sleep drive and therefore prolong the time a person can comfortably remain wakeful. Sleepiness may also result from boredom or inattention and is not always related to a need to sleep.

Fatigue is defined as "a condition characterized by a lessened capacity for work and reduced efficiency of accomplishment, usually accompanied by a feeling of weariness and tiredness." (Medicine.net, n.d) In other writings fatigue is defined as "a state of tiredness associated with extended periods of being awake and consequently being without sleep." (Pigeon, et al., 2003) Mann (1999, par. 2) stated that "rather than simply being a mental state that can be willed away or overcome through motivation or discipline, fatigue is rooted in physiological mechanisms related to sleep, sleep loss, and circadian rhythms." He further identified three core physiologic factors that contribute to fatigue. These are cumulative sleep loss, continuous hours of wakefulness, and circadian time of day. These three attributes occur in many health occupations when individuals work long hours, work shifts that require being awake and alert during the night and sleeping during the day, and where the life demands and choices of workers lessen the total amount of sleep. The National Sleep Foundation polls have identified that women consider getting enough sleep one of their lowest priorities (NSF, 2007). Fatigue is also increased by the nature of the work itself. Those who work with many physical demands may feel greater fatigue at the end of a work shift.

Effects of Fatigue on Performance

Fatigue has deleterious effects on all types of performance. Dowson & Zee (2005) identified that fatigue has negative effects on alertness, vigilance, concentration, judgment, mood, and performance.

While resident physicians work different types of shifts than nurses, the cumulative effects of work hours for physicians in training alert us to potential concerns for nurses who end up working long hours and multiple shifts. The effects of fatigue on the cognitive and psychomotor skills of surgical residents were studied by Kahol, Leyba, Deka, et al. (2008). They identified a significant decrease in memory, attention, and coordination tasks

when residents were in a post-call situation where they were identified as being fatigued. Both cognitive and psychomotor skills were negatively impacted by fatigue and sleep deprivation. According to the a study of resident physicians (Arnedt, et al., 2005) a rotation of heavy call in which the individual worked an average of 80-90 hours per week with 34-35 consecutive hours of work every fourth or fifth day when on call resulted in decreases in attention, vigilance, and simulated driving similar to that from a blood alcohol concentration of 0.04 to 0.05 g%. The researchers suggest that chronic partial sleep loss imposed upon acute sleep loss is at least partially responsible for this effect.

Fatigue, Errors and Injuries in Non-Healthcare Occupations

Fatigue and errors have been studied in relationship to flight crews, truck drivers, and other occupations. The Institute of Medicine study noted that in high hazard occupations outside of health care, fatigue is assumed to be associated with extended hours; therefore, hours of work have strict limitations (Kohn, Corrigan, et al., 1999). This is true for airline pilots and long distance truck drivers among others.

The National Transportation Safety Board studied incidents among flight crews in the years between 1978 and 1990 (Mann, 1999). When accidents were analyzed, 50% of the airline captains in charge of the plane involved had been awake for more than 12 hours prior to the incident. The conclusion was that impaired judgment, decision making, and flight handling abilities were caused by fatigue.

Extended work schedules and overtime prove to be hazards whatever the workplace. The National Longitudinal Survey of Youth (NLSY) was begun in 1979 to collect data regarding work life patterns and associated personal information over time. Dembe, Erickson, Delbos, and Banks (2005) used these data to analyze the impact of overtime and extended working hours on the risk for occupational injuries and illnesses. This study used data from 10,793 participants and nearly 100,000 job records to examine the effects of extended hours per week, extended hours per day, overtime, and extended commute time. Any job might have more than one of these factors affecting the person. They found that even after accounting for differences in age, gender, occupation, industry, and region, those with extended hours per day have a 37% higher injury hazard rate. Those with extended hours per week had a 23% higher injury hazard rate. Working in a job with overtime was associated with a 61% higher injury hazard rate. No association was identified between extended commute time and the injury hazard rate. This is clearly the largest study that clearly demonstrated the problems for workers who must work long hours. There was a clear effect in which the number of hours per week over 40 hours and the number of hours per day over 8 hours were positively associated with an increasing risk for injury. There was even greater risk for those whose work schedules exceeded 60 hours per week and 12 hours per day. The study did not identify the causal connection between extended work hours and injury but hypothesized that fatigue and stress could be the intervening factors causing a higher injury rate.

A study of over 4,000 workers at an engineering firm that had workers on three shifts around the clock revealed that the incidence of accidents to workers increased on evenings and was highest on the night shift (Smith, et al., 1994). While the work was the same, the risk of injury was 20% higher for those on the night shift than on the day shift. The participants described their sleep patterns, and the increase in accidents and injuries was not related to a decrease in reported sleep.

There are federal regulations limiting the hours of driving of long haul truckers. However, these regulations are frequently ignored. Truck drivers have been identified as having very limited sleep with an average of 3.5 hours of sleep in a 24 hour period (Mitler, et al., 1997). 58% of traffic accidents involving truckers have been identified as sleep related (NTSB, 1995). The most important predictor of an accident was the total number of hours of sleep in the previous 24 hour period (NTSB, 1995).

Fatigue, Shift Work, and Personal Health

Because human beings developed for a life style of wakefulness in daylight hours and sleep during hours of darkness, changing this pattern of wakefulness and activity creates the potential for increased fatigue and sleepiness. Working during the night is referred to as “shift work.”

One of the consequences of working long shifts or working nights can be a decrease in the total amount of sleep for an individual. Many who work night shifts report that their total sleep is five or six hours (Gold, et al., 1992). The researchers suggest that disrup-

tion of circadian rhythms make it very difficult for shift workers to achieve adequate amounts of sleep.

Very long shifts, especially those that push past 12 hours are likely to decrease the amount of time available for sleep. Multiple studies have been done regarding the effects of shift work and sleep deprivation on people. Sorenson (1999) reported that the National Transportation Safety Commission states that each year 100,000 of the accidents reported to law enforcement are related to driver fatigue and rotating shift workers are one of the four major groups at most risk. Nurses reported drowsy driving after working, especially when sleep duration was shortened, with those on night shifts more severely affected (Scott, et al., 2007).

According to an article in Nursing Economics (Shift work affects. . ., 2005) 30% of full time health care workers are shift workers with 9 percent working nights, 11 percent working evenings, and 3 percent working rotating shifts. The author stated that shift work can result in fatigue, irritability, reduced performance, and decreased mental agility.

Adverse effects of shift work may have multiple contributing sources. One research group (Hossain, et al., 2004) studied the occurrence of fatigue and performance measures in mine workers. Ten hours night shifts produced fewer adverse responses than did eight hour night shifts. In examining their data the researchers hypothesized that the start and end times were an important contributor to effects of the different schedules. The relationship of such multiple factors highlights the difficulty in making judgments about individual work patterns.

Researchers regard fatigue and sleepiness to be two distinct phenomena. In one study of those whose work life included shift work, subjective fatigue was significantly related to amount of shift work but subjective sleepiness was not related to shift work (Shen, Botley, Chung, et al., 2006).

In December of 2007, the International Agency for Research on Cancer released the conclusions of an expert working group on the effect of shift work on the incidence of cancer (IARC, 2007). The full report will be released in the 2008 Monograph. The data released thus far supports that disturbance of circadian rhythms through shift work is probably carcinogenic to humans. Studies used as evidence investigated the incidence of breast cancer in long term night workers including nurses. The evidence in this case is Group 2a which means that the epidemiologic evidence in humans provides strong evidence of carcinogenicity.

The European Union has concluded that there are many adverse consequences for individuals engaged in shift work. These include a reduction in quality and quantity of sleep, widespread complaints of "fatigue", anxiety, depression, and increased neuroticism, increasing evidence of adverse cardiovascular effects, possible increase in gastrointestinal disorders, increased risk of spontaneous abortion, low birth weight, and prematurity (Harrington, 2001).

Injuries on the job are an additional health related issue. Common nursing injuries include musculo-skeletal injuries and needlestick injuries. Adverse schedules such as workdays longer than 13 hours, weekend work, working without breaks, returning to work on days off, on-call work, and overtime have all been found to relate significantly to the incidence of musculo-skeletal injury in nurses (Trinkoff, et al., 2006). These same schedule characteristics have also been found to be significantly related to the incidence of needlestick injuries among nurses and interns (Trinkoff, et al., 2007; Ayas, et al., 2006). Because follow-up care and treatment of both of these sources of injury are a significant financial cost to institutions, attention to scheduling may be an important injury prevention strategy.

Fatigue and Errors in Healthcare Occupations

Concerns about the potential for medical errors when interns and resident physicians work long unrelieved hours prompted the Accreditation Council of Graduate Medical Education to establish a limit on the hours that physician in training can be assigned. There are limitations on both maximum continuous hours worked and total hours per week worked. The hour requirements in these standards greatly exceeds nurses assigned hours but have been justified based on the nature of the work that is performed. An assumption was often made that when they are on-call, residents have periods of relief from direct responsibility and an opportunity to recover from fatigue. The long on-duty times have been further justified because they provide for continuity of care for patients and enhanced learning opportunities for the physicians in training (Kohn, Corrigan, et al., 1999). The Institute of Medicine has established a committee titled "Optimizing Graduate Medical Trainee (Resident) Hours and Work Schedules to Improve

Patient Safety" that will review this topic and report back at the end of 2008 (IOM, 2008).

Multiple studies have been conducted that have revealed the negative effects of long hours for physicians in training (Lockley, et al., 2007; Gander, et al., 2007; Ayas, et al., 2006; Barger, et al., 2006). For example, resident physicians who were working on-call shifts longer than 24 hours had an increased risk of sharps injury on the job. Those working these long on-call shifts committed 36% more serious medical errors than those working 16 hour shifts. Additionally, they made 300% more fatigue-related medical errors that led to patient death than those working shorter shifts (Lockley, et al., 2007).

In a study of pharmacists, 82% believed that error in dispensing was increasing. They cited as reasons high prescription volumes, pharmacist fatigue, pharmacist overwork, and interruptions (Petersen, et al., 1999). These are issues that also affect nurses.

Age and Work Schedule Related Issues

The age of the current nursing workforce presents specific challenges when examining work schedules and fatigue. The National Sample Survey of Registered Nurses (Bureau of Health Professions, 2006) identified that 73.7% of nurses are over 40 and 25.2% are over 54 years of age.

While the older worker may have expertise that is invaluable to the employer, there are accompanying concerns. One concern may be the health related issues that begin to appear in individuals as they age. Heart disease, diabetes, circulatory disorders, adverse responses to menopause (such as depression and migraine headaches), sleep disorders, arthritis, and a wide variety of other health issues increase with increasing age. These affect the ability of people to manage long work schedules. There needs to be recognition that injuries due to lifting are more likely, healing from those injuries will be slower, and fatigue increases the incidence of injury for the older worker.

The relationship between shift related sleep-wakefulness and age was examined in aircraft maintenance workers who have demands for 24 hour coverage of work needs (Bonnefond, Harma, et al., 2006). This role requires attention to detail, vigilance regarding deviations from the norm, and exacting standards of performance, all of which are part of nursing practice. While the youngest age group, 25-34 years, reported the most sleepiness, the middle (35-49 years old) and older (50-58 years old) groups had increased performance lapses during the night shifts. Similar results might be found if nurses were studied in the same way. These researchers recommended that special efforts are needed to lower fatigue levels during night shifts.

Work Schedules of Nurses

Work schedules of nurses are developed around the needs for patient care. In hospitals and nursing homes, nurses are needed 24 hours a day and seven days a week. This presents special challenges in scheduling hours of work, days off, and breaks within shifts. Historically nurses have worked a variety of shifts from the 24 hour shifts where nurses slept on their wards in nursing's early history moving to the standard 8 hour day after World War II.

Basic Work Schedules for Nurses

In response to the current nursing shortage, concerns about continuity of care, and long commute times in many locations, many health care institutions have initiated longer shifts. In some areas these may be a choice by nurses who prefer a less traditional schedule; in other settings this is a requirement. The number of long shifts that nurses work within a week, the number of days without a day off, and the characteristics of the shift itself all affect the ability of the nurse to function safely and effectively while on the job.

In their study of hospital staff nurses working hours and safety, Rogers, et al. (2004) identified that scheduled shifts of the nurses studied were designated as 8, 12, and sometimes 16 hours long. Although, in their study they referred to these as 8.5, 12.5, and 16.5 hour shifts because each required a "hand-over" time. The long shifts might be 7 am to 7 pm and 7 pm to 7 am, some shifts were 3 am to 3 pm. Some 24 hour shifts were identified. There were shifts scheduled for as long as 20 hours and extended to 23 hours and 53 minutes.

Why nurses are often willing to work long work schedules when overtime is not "mandatory" has been asked. Feelings of obligation to patients and concern for the workload of colleagues on the nursing staff are one part of the answer. Another issue that contributes is the practice of some health institutions of requiring that nurses take days off without pay if the census on their unit drops (referred to as "flexing down"). The individual nurse may be notified in the two hours before the shift begins that she or he is not needed. Some contracts or policies provide for two hours of pay if the person does come in to work and is sent home. Nurses in these settings must either use their vacation time for these low census days or have a decrease in income. In hospitals where traveling nurses are employed, their contracts may protect them from losing days of work and therefore it is the permanent employee who bears the burden of this income uncertainty. Some hospitals have recognized that this practice contributes to low employee morale and have eliminated the practice and use these days for a variety of activities that support organizational effectiveness. The Kaiser Permanente Hospitals in California are one example (Nelson & Kennedy, 2008).

Extending Work Schedules Through Overtime

The study by Rogers, et al. (2004) also revealed that nurses consistently worked overtime with participants working an average of 55 minutes per day over their assigned shift. One third reported working overtime every day they worked. The nurses worked an average of 40.2 hours per week but 25% worked more than 50 hours per week for two or more consecutive weeks. Thus overtime and extended work hours were not a single day phenomenon but rather represented a pattern for many nurses.

Overtime work presents additional challenges. Mandatory vs. voluntary overtime has become a major issue for many nurses. Mandatory overtime is required by the employer and failure to work that overtime might result in sanctions from employer including termination. In 2000, nurses at one large hospital engaged in an 81-day strike in protest of being forced to work overtime to fill routine schedules. The hospital was staffed for average census. Whenever census rose above average, nurses were required to work additional shifts to provide adequate patient care (Trossman, 2008).

Concern about mandatory overtime has been widespread in nursing resulting in efforts to obtain legislation prohibiting such practices. In 2001, the American Nurses Association published a position statement in opposition to mandatory overtime (ANA, 2001a). Ten states including Washington have enacted legislation prohibiting mandatory overtime. In states with this legislation, a nurse who does not believe that he or she can be safe when working additional hours cannot be required to do so. There is no limitation on voluntary overtime work and voluntary overtime is a common occurrence as noted above.

Whether voluntary overtime is truly voluntary creates another issue. From 2000-2001 the American Nurses Association conducted a survey of registered nurses to explore the working conditions of nurses. Responses of nearly 7,300 nurses were analyzed (ANA, 2001b). 56% indicated that the time available for patient care had decreased and more than 50% indicated that they were experiencing an increased patient care load. 75% reported a decline in the quality of care in their settings. The nurses also reported decreased ability to take breaks including meal breaks, increased pressure to accept "voluntary" overtime, and an increase in stress related illness. This pressure to accept overtime may include the nurses' own concerns about the quality of care patients were receiving as well as pressure from their managers. Pressure from managers may take the form of encouragement to be a "team player" or being made to feel guilty for not providing needed care. In organizations that use "flexing down" to manage low census, the concern about having adequate income to meet needs can be met by the nurse agreeing to overtime and extra shifts when the patient census is higher.

Effects of Extended Work Schedules on Patient Quality of Care

Work schedules have both negative and positive effects. Positive effects of extended work hours are related to the system operation and in some instances to preferred life scheduling for nurses. Negative effects occur both for patient quality of care and for the well being of nurses themselves.

Positive Aspects of Extended Work Schedules

When a group of critical care nurses in Great Britain were studied in relationship to working 12 hour days (Richardson, Turnock, et al., 2007), many positive factors were identified. These included improved planning and prioritizing care, improved relationships with patients/relatives, good-quality time off work and ease of travelling to work. When nurses work 12 hours there are only two hand-off periods. This decreases the potential for errors associated with poor communication at hand-off. Family members and patients have fewer individuals with whom to relate making communication easier for them.

Another critical care unit in Great Britain trialed 12 hour shifts. After 12 weeks on the new shifts, nurses were questioned regarding their responses to the new schedule. 92% identified the change as positive. 58% identified increased job satisfaction. Doctors and other were favorable toward the change and noted increased continuity of care.

Extended Work Hours and Errors

Nurses have many critical responsibilities in regard to patient care. These responsibilities are carried out in an environment with many individuals, interruptions, and demands. Several studies have examined the issues surrounding nursing errors.

In 2004, Balas, Scott, and Rogers identified that 30% of the 393 full time nurses who were studied reported an error within the 28 days when data were collected. Another 33% reported a near error. Most of these were medication errors but errors also occurred in documentation, procedures, and transcribing orders. This study did not attempt to identify the causes of these errors but highlighted the importance of examining the issue.

In a series of studies nurses work hours and the occurrence of errors have shown a consistent result that extended work hours increase the risk of errors and near errors. One of the earliest studies (Gold, et al., 1992) asked nurses to answer questions related to fatigue, sleepiness, and accidents and near-miss accidents which included automobile accidents, medication errors, procedural errors, and personal injuries. The study revealed that nurses on rotating shift schedules were less likely to report adequate sleep and more likely to fall asleep at work than those with regular day schedules. The rotators also reported almost twice as many accidents and near miss accidents as those working regular day schedules. Both rotators and night nurses reported more accidents when driving home from work.

Nurses have also reported decreased ability to be vigilant and struggling to stay awake when work hours are extended. When critical care nurses were studied, two thirds had trouble staying awake on duty when working extended shifts. Therefore, the researchers concluded that the use of 12 hour shifts should be minimized and no more than 12 hours should be worked in a 24 hour period (Scott, Rogers, Hwang, & Zhang, 2006).

While all errors are of concern, the relationship between hours worked and the incidence of error deserves attention. Rogers, Hwang and others (2004) studied the relationship of working hours of hospital staff nurses to error. During the 5,312 shifts worked by 393 nurses a total of 199 errors and 213 near errors occurred. Of the shifts studied 46.6% were scheduled to be the traditional length (8.5 hours accounting for the hand-over time), but in reality only 14.5% of the shifts were this length. 22.5% were scheduled for between 8.5 and 12.5 hours but only 46.8% were actually this length with rest being longer. While just 30.9% were scheduled to be longer than 12.5 hours, 38.7% ended up being longer than 12.5 hours. Most of these nurses were working more

than 40 hours per week. A striking finding was that the odds of making an error were three times as great when the shift was longer than 12.5 hours than when it was 8.5 hours or less. When work was 8.5 hours or less, 1.6% of shifts reported an error. When work was greater than 8.5 hours but less than 12.5 hours, 3.1% of shifts reported an error. When shifts were greater than 12.5 hours, 5% of shifts reported an error. Working overtime was associated with increased error regardless of the length of scheduled shift. Although errors were not common, any error has the potential to be serious and some errors can be life-threatening. Therefore, the prevention of error must examine multiple antecedent causes.

The concern about the effect of work schedules on fatigue and errors is not confined to the United States. This issue confronts nurses in Australia as well. A study of Australian nurses (Dorrian, Lamond, et al., 2006) found that nurses struggled to remain awake during 36% of their shifts and they reported twenty errors, 13 near errors, and 22 observed errors during the study time.

Some nurses as well as their employers are reluctant to accept that long work hours may result in high levels of fatigue and may increase the rate at which nurses will make errors. They may be convinced that nurses will be aware of their own limitations and will make adjustments if needed. Evidence is needed to help all those involved acknowledge individual limitations and to support system-wide changes to work schedules and/or strategies to mitigate the effects of these extended work schedules.

Effects on Nurses of Extended Work Schedules

A variety of negative effects on the worker have been shown to result from extended work schedules and shift work. In the Australian study noted above the nurses on 23% of night shifts reported high levels of stress; on 40% of shifts reported physical exhaustion, and on 36% of shifts reported mental exhaustion (Dorrian, Lamond, et al., 2006). Other reports are of increased use of sick leave, stress in care giving roles, and work related illness and injury as described below.

Working life for nurses creates many stresses. One source of stress is the lack of regular breaks and the inability to eat meals at appropriate times. In a study of 393 nurses who kept log books for 28 days, nurses reported that during only half of their shifts were they able to take breaks or meals without having patient care responsibilities (Rogers, Hwang, & Scott, 2004).

One response of individuals, who experience stress from the work environment and its demands, is an increase in the use of sick leave. Canadian nurses reported that 12% of their absences were related to concerns about overtime at the end of a shift or fatigue from the length of shifts worked. The RNs had 7.4 sick days per year compared to 3.2 for other workers. The nurses working 12 hour shifts were less satisfied with their jobs than were nurses working 8 hour shifts and had higher absentism rates. (Zboril-Benson, 2002)

Work life balance appears as a topic for many articles and workshops designed to help people manage stress in their lives. For many nurses in the current workforce, part of managing this work-life balance is managing care giving roles both for children and for older family members. Scott, Hwang, and Rogers (2006) examined fatigue and stress among nurses who were care givers for an aging family member compared to those who cared for children under aged 18 and those with no care giving responsibilities. Fatigue and stress levels were significantly higher for those with care giving responsibilities but those caring for elders were more fatigued, sleep deprived, and likely to make errors at work. Because nursing remains a predominantly female occupation (94.2% women) nurses more commonly assume caregiver roles for elderly family members. With only 26.3% less than 40 years of age and 25.2% over the age of 54 (Bureau of Health Professions, 2006), the reality of these demands must be considered when identifying the effects of extended work hours on individual nurses.

A major concern for nurses is the incidence of on-the-job injury. Due to the physical nature of the work, back, elbow, shoulder, and neck strain are not uncommon. Needlestick injuries and spills of hazardous chemicals are also a safety concern. Evidence is accumulating that extended work schedules and overtime increase individual susceptibility to occupational injury.

Needlestick injuries are a particularly troublesome hazard for nurses because of the dangers of serious communicable disease such as HIV and hepatitis B and C as well as the danger of a localized infection at the needlestick site. In a study of earlier data (Clarke, Sloane, & Aiken, 2002) nurses who worked on units with low staffing and what was identified as poor organizational climate were twice as likely to suffer needlestick injuries or near misses for needlestick injuries. While not identified in the study,

nurses report that units with low staffing more frequently require overtime or call backs.

Effects of Work Schedules on Recruitment and Retention

At a time of nursing shortage, the effect of extended work schedules and fatigue on recruitment and retention warrants examination. In several surveys of registered nurses that examined the roots of the nursing shortage, many nurses reported being "burned out" or stressed (Aiken, et al., 2001; Buerhaus, et al., 2001). Workloads and work schedules contribute to this stress.

In 2005, 27% of nurses surveyed indicated that undesirable hours were one of the main reasons for the nursing shortage (Buerhaus, et al., 2005). While the researchers noted that this was an improvement over a previous survey, it still represents a very large number of nurses. One contributing factor to the decrease in perception of work hours as a main reason for the shortage may have been the effect in several large states of limitations on mandatory overtime (although this is not verifiable).

The United Kingdom also faces a nursing shortage and is exploring ways to enhance the nursing workforce. Research focused on the retention of nurses older than 50 and revealed that there were both "push" factors (those that tended to push nurses out of the workforce) and "pull" factors (those that would cause them to remain). Among other issues, they noted that increased flexibility of hours and the availability of part time hour were key aspects of decision making in regard to remaining in the nursing workforce (Andrews, et al., 2004).

The American Public Health Association identified the loss of experienced public health nurses through retirement as a serious concern. Losing these experienced nurses loses the wisdom of expertise and is not simply a matter of numbers. In their efforts to combat this problem, they identified 12 best practices that would assist in retaining experienced nurses in the workplace and providing for transition to a new generation of nurses. Some of the major ones were flexible work options, caregiving and grief resources, mentoring programs, phased retirement, workplace redesign and ergonomic improvements (American Public Health Association, 2006).

Strategies for Preventing Error and Promoting Quality Care

Patient safety can be promoted through multiple strategies. These include duty hour restrictions and fatigue countermeasures. Fatigue countermeasures are actions that can be taken to prevent or treat on-the-job fatigue and thus prevent adverse consequences. Strategies in use to combat fatigue and prevent error in other occupations may have merit for use with health care workers.

Individual Fatigue Countermeasures

Individual nurses can develop strategies to counter fatigue. These include managing sleep, breaks, potential controlled rests, and the shifts and hours worked.

Sleep is critical for individual health and well being (Zeman, 2005). Individuals can manage personal sleep to ensure an adequate number of hours of sleep even when working nights or extended shifts. Much has been written about sleep hygiene as an overall strategy for promoting sleep. Sleep hygiene includes scheduling adequate time for sleep, setting up effective sleep routines, and enlisting the support of others in the household in maintaining an environment conducive to adequate sleep. When changing shifts, an individual needs to plan strategies for adapting personal circadian rhythms. The use of medications to support adequate sleep has potential adverse consequences. The individual nurse should consult with a personal health care provider before deciding to use either non-prescription or prescription sleep medications. (Smith, 2005)

Individuals benefit from taking assigned breaks and meal periods without responsibilities. Pressures from the workload may accumulate and encourage nurses to work through break times. This is counterproductive to being alert and performing effectively. Breaks allow a person to recover from fatigue and return to work more refreshed.

Controlled rests, such as have been used in the airline industry, are uncommon in health care settings. There appears to be limited understanding of the usefulness of controlled rest. One nurse in Great Britain noted that in her employment setting, sleeping during breaks was considered cause for disciplinary action. Even when not discouraged by an employer, co-workers may have negative attitudes about sleeping during breaks and thus create peer pressure against such actions. Nurses can advocate for setting up the work environment to not only permit but encourage controlled rest periods. These periods can be structured to assure uninterrupted rest with a specific time limitation.

Working many shifts in a row makes the worker more prone to fatigue. In today's health care world, some nurses work for more than one employer. This sets the stage for working excessive days in a row even when an individual employer does not make such an assignment. The individual nurse is the only one who can monitor this aspect of scheduling and make changes.

Managing the Work Environment of Nurses

While the focus of this paper is fatigue and the work schedules of nurses, these issues can never be separated from all of the issues relating to the work environment of nurses. In 2004 the Institute of Medicine published it monograph "Keeping Patients Safe: Transforming the Work Environment of Nurses." The report cited frequent failures to address management practices that relate to safety. These included loss of trust by nurses because of perception that efficiency was valued over patient safety and the decrease in nursing leadership as hospitals were re-structured. The report also noted unsafe workforce deployment such as increasing the numbers of patients for whom each nurse is responsible, decreasing the orientation of new graduate nurses, and providing workspace design that does not promote effective functioning. Included in the discussion of workforce deployment was concern over the increase in work hours, both the number of hours in a single shift and the total weekly hours for nurses.

The IOM report recommended that a constellation of actions be adopted that would transform the work environment and promote patient safety. One of the recommendations was the need to develop transformational nursing leadership in all levels of health care organizations (from unit leaders to chief nursing officers) in order to restore trust and include nurses in decision making. The report also recommended that health care organizations educate their board members, and managers at every level about the link between management practices and safety. The management structure should balance efficiency and safety, demonstrate and promote trust of all workers, actively manage the process of change and establish every organization as a "learning organization." It is essential that all health care organizations join in this movement.

Some organizations, notably those that have or are seeking magnet status, have embraced these recommendations and are in the process of moving forward for a more effective work environment for nurses and a safer environment for patients. Magnet status is "an award given by the American Nurses Credentialing Center, an affiliate of the American Nurses Association, to hospitals that meet criteria designed to measure the strength and quality of their nursing" (Ferket, et al., 2007 p. 15). The 2008 Model for magnet status (ANCC, 2008) uses five model components: transformational leadership; new knowledge, innovation and improvement; structural empowerment; exemplary professional practice; and empirical quality results. Within each component "forces of magnetism" are itemized. These represent the attributes that contribute to an excellent nursing work environment and attract, maintain, and retain a quality nursing workforce. These attributes include items that relate to the IOM recommendations such as the management style, personnel policies and programs, autonomy, professional development, and interdisciplinary relationships.

Governmental Regulation

Because labor standards are enacted and enforced at the state level in the United States, work hour regulation becomes a complex issue to address with governmental regulation. Additionally, governmental regulation of work hours has been resisted by many in the U.S. The concern is that governmental regulations will fail to take into consideration the varied settings and patient needs in health care and the problems associated with the nursing shortage. Some regulatory impact has occurred in those states in which mandatory overtime has been proscribed. While this legislation protects nurses if they refuse to work overtime, many continue to work voluntary overtime for a variety of reasons. These include the pressure of wanting to meet patient needs and assist other staff as well as the financial benefit of working at a higher rate of pay. California has also instituted mandatory staffing ratios that differ for different settings. Lower patient/nurse ratios decrease work load and make it possible for nurses to complete their work without the need for overtime. The concern remains as to whether

health care organizations will be able to hire enough nurses to meet requirements for mandatory ratios.

Europe has long had more closely regulated work hours than the United States and other non-European countries. The European Union created a directive regarding work hours (European Union, Working Time Directive, 1993) that was designed to take into consideration the modern world economic setting in which many businesses operate around the clock, seven days a week. Some countries have used these standards as written while others have modified them. The main features of these standards have been incorporated into work hour standards in the United Kingdom (Harrington, 2001).

EUROPEAN UNION WORK HOUR DIRECTIVE OF 1993

- No more than 48 hours a week averaged over a 17 week period
- A minimum daily rest period of 11 consecutive hours
- A minimum weekly rest period of 24 or 48 consecutive hours averaged over 14 days
- A minimum of 20 minutes rest in any work period of more than 6 hours
- A maximum of 8 hours night work every 24 hours averaged over a 17 week period
- Free health assessments for night workers
- Paid annual leave of at least 4 weeks. (Harrington, 2001).

There are other countries in which regulation of work hours is more specific than in the United States. In Brazil there are specific governmental regulations regarding work hours. These include legally mandated breaks if the shift is six hours or less. If the work day is eight hours or more there must be one hour for a meal break. This hour is not included in the 8 hours so the person is at the work site for 9 hours. The longest work day allowed is 12 hours with a one hour meal break within the 12 hours. In no instance is a work day longer than 12 hours permitted. There is a limitation of no more than 7 work days in a row. (All information on Brazilian work hours from Michel, 2008)

Strategies Used in Other Occupations

The Fatigue Counter Measure Program of the National Transportation Safety Agency has led the airline industry in adopting measures that will combat fatigue among members of air crews. Among these measures are limiting time on duty, mandating opportunities for sleep, and using controlled rest periods.

All air crews have limitations on the amount of time they can be on duty. These regulations are written in detail and differentiate between situations where circadian rhythms are disrupted and those without this added factor. Controlled rest periods have become part of the FAA regulations that specify the number of hours individuals may be in the air, the total hours of rest between flights, and the environment that must be available for rest. Controlled rest which involves individual crew members each having short opportunities to nap during a long flight is described carefully in terms of length of rest, setting for rest, and education. Individuals participating in controlled rest must be certified as having been trained in these provisions (FAA, 1995). Controlled rest periods are based on research data that showed that for air crew on long flights, rest periods of 40 minutes that resulted in average sleep of 26 minutes were found to produce increased alertness and performance. Air crew members studied were able to schedule these rest periods by trading off times (Mann, 1999).

Crew Resource Management (CRW) represents a strategy developed by NASA for airline crews that is now being piloted in health care agencies (Pizzi, et al., 2001). There is no one model of establishing crew resource management. The original program focused on interpersonal communication, leadership, and decision-making in the cockpit. These same concerns are reflected in health care settings. One of the expectations of the CRM approach is that using the resources of the entire team may overcome the effects of fatigue and decrease error. Teaching people specific strategies to improve communication and ways of working in teams has the potential to improve care especially for critical situations. Implementation of CRM is costly and while promising the outcome of decreased error cannot be guaranteed.

Five surgical sites were part of a large trial of using a CRM type "Human Factors Program" for training (Marshall & Manus, 2007). Included in the processes were briefings of the entire perioperative team before beginning a procedure and debriefing at the end. While improvements in safety processes and communication were noted and at some sites there was whole hearted participation in the process, at other sites there were significant problems to be overcome. Some physicians saw the processes as infringing on their autonomy. The turnover of residents in one large medical center also posed a challenge.

In another study of the compliance with perioperative safety practices after CRM training, there was only 60% compliance

(France, et al., 2008). Although the study was limited to one setting, this low level of compliance was disappointing and underscored that there are many issues to be resolved before recommending this process.

The use of check lists for critical processes and procedures has been a consistent part of flight operations for many years. Check lists provide a mechanism for individuals to assure that all essential system assessments and tasks are completed without relying on the working memory of the individual and thus decrease human error (Hales & Provonost, 2006; Morrow & Shriver, 2007). The use of check lists creates a systematic approach that assures that every individual meets the same standards and may compensate for fatigue and age related decreases in performance.

In May, 2008, a review of 27 studies regarding shift work was published (Bambra, et al., 2008). The health problems cited included fatigue, sleep disturbances, stress, and digestive problems. Work-life balance refers to the person's ability to have fulfillment both inside and outside of the work setting. The conclusions of the authors were that while the data are limited there does appear to be adequate support for three strategies that can help shift workers increase health and work life balance. One of the useful strategies was the use of fast rather than slow rotations of shifts. A slow rotation was 6 or 7 shifts of nights in a row while a fast rotation included only 3 or 4 shifts of nights in a row. A second useful strategy was the use of forward rotations (nights to days, days to evenings, and evenings to nights) and avoiding backward rotation. The third strategy of use was the self scheduling of shifts that provided more control for the worker in relationship to life needs. These three strategies would have minimal costs and could be implemented by any organization seeking to alleviate problems experienced by shift workers.

Strategies Used in Healthcare Settings

Lockley, Barger, Ayas, et al. (2007) reviewed the evidence available and concluded that work schedules have a widespread effect on the ability of workers to sleep when off-duty and their performance and safety while on duty. Their recommendation was that the United States establish and enforce safe work hour limits for health care providers. The work hour limitations established by the Accreditation Council of Graduate Medical Education represent one approach to setting authoritative standards for work hours for health care providers.

Certainly many individuals did not believe that this was a feasible strategy nor that it would change patient safety, but growing evidence supports that this was a positive effort at increasing quality of care. Some studies have demonstrated that the restriction of duty hours for physicians in training has improved outcomes for patients in areas such as in prescribing recommended therapies, decreased prescribing errors, lengths of stay, and six-month mortality (Volpp, et al., 2007; Bhavasar, et al., 2007; Horwitz, et al., 2007). There are other studies that have not found this difference. Many factors are affecting the reduction of errors in health care as the entire system focuses on this important issue. Certainly many individuals did not believe that that work hour reduction was a feasible strategy nor that it would change patient safety, but growing evidence supports that this was a positive effort at increasing quality of care. While the work hour situation of physicians in training is not directly comparable to the schedules of nurses, the process of setting standards that limit hours is a useful model.

Checklists to reduce error have had success in some areas of health care (Hales & Provonost, 2006). They are most commonly found in operating rooms and in critical care units. The use of checklists has not become widespread in health care, however, an organization may find it useful to consider where checklists might enhance safety and help to avoid the consequences of fatigue.

The use of multiple strategies from the aviation industry in error prevention is receiving attention in many health care settings. Memorial Healthcare system in Broward County Florida has adopted the use of checklists, briefings, and debriefings for its operating rooms. Teamwork training is an important part of their development of safer systems. When the processes are well established in the OR setting, the intent is to spread this approach throughout the institution. (Wood, 2008)

Promoting Health in Health Care Workers

Research on sleep and circadian rhythms has identified many strategies that can assist people to adapt to shift work and maintain adequate sleep. Some of the strategies rely on employer willingness to address the concerns of shift workers and others remain the responsibility of the individual worker.

Developing a schedule for rotating forward (from days to evenings, from evenings to nights, or nights to days) when shifts must changed facilitates adaptation. This pattern appears to allow for more effective transition of biological rhythms and sleep patterns (Bonnefond, Tassi, et al., 2004). Likewise, a 24 hour period off work before changing to another shift facilitates effective transition. Employers should avoid scheduling education events at the end of the night shift because it impacts the biologic mechanisms the worker has established.

During the night, the ventilation, lighting, and temperature need to be adequate. While health care workers must work in dimmed halls and rooms to promote patient sleep, staff work areas should be lighted more brightly to support the body's adaptation to night time waking.

An important part of adapting to shift work lies in establishing adequate and good quality sleep during the daytime. The National Sleep Foundation (2008) suggests many different actions that may assist in the challenge of attaining adequate sleep during the day. These include establishing a regular sleep schedule, the use of room darkening drapes or shades, ear plugs, shutting off telephones, and establishing a calming pre-sleep routine. Others in the household should be asked to support the sleep of the shift worker by avoiding noisy activities and sleep interruptions. One suggestion is that night workers wear dark glasses on the drive home to avoid exposure to bright light that might stimulate wakefulness. Carpooling promotes safety on the drive home.

Behavioral approaches to obtaining sufficient sleep are preferred over the use of medications or supplements. Some writers suggest that in individual cases a careful evaluation and use of over the counter or even prescription of sleep aids may be needed (National Sleep Foundation, n.d).

In a small study of nurses in a neonatal intensive care unit, fatigue related errors were identified (Dean & Short, 2006). The case studies led to the recommendations that nurses need to employ good sleep habits, shift rotations and excessive work hours should be minimized, and strategic naps should be employed.

Recommendations for Action

Preventing error and maximizing quality of care for patients requires that those in health care be open to a variety of strategies for modifying work schedules and preventing fatigue that may require changes in long standing behaviors and preferences. Pointing fingers and directing "other people" to change will not achieve the goals desired. Maximum effectiveness will be achieved when each person or organization participates in the process and identifies their own responsibilities for change.

Individual Nurse Actions

The ANA has taken the position that individual nurses have an ethical obligation to NOT work when fatigue and stress from extended hours might increase the potential for error (ANA, 2006a). Individual nurses must accept their own responsibility to avoid working while fatigued. The ANA has outlined the following six responsibilities of the individual registered nurse:

- Consider the impact that multiple jobs have on their level of fatigue and ability to practice safely.
- Continue to document unsafe staffing conditions.
- Encourage collaboration among nurses in recognizing fatigue in self and in one another.
- Use fatigue countermeasures appropriately.
- Recognize that they may have to confront a nursing colleague who is too fatigued to work.
- Collective action— – involving individual nurses, colleagues, professional associations and other stakeholders—-is necessary to

change the current work culture to one that recognizes the impact of fatigue on patient safety and accepts the registered nurse's right and obligation to refuse an assignment if impaired by fatigue. (ANA, 2006a)

Additionally, the individual nurse has an obligation to:

- Engage in education regarding avoiding fatigue and the use of fatigue countermeasures.
- Develop the ability to recognize feelings of fatigue in self and use personal fatigue countermeasures appropriately.
- Collaborate with other nurses to help one another with identifying fatigue.

Employer Responsibilities

Health care organizations are ultimately responsible for the safety of the patients in their care; therefore, they have a responsibility to take action when there are practices demonstrated to increase error and decrease quality of care. The employer must take major responsibility for the safety of patients. Because nursing requires the performance of physical tasks, vigilant monitoring of patients who may be critically ill, decision-making that is critical to patient safety and positive outcomes, and attention to detail for such tasks as medication administration, employers have an obligation to address the issue of fatigue in order to promote quality of care. Most nurses are employees in health care organizations and many needed actions are outside of their power to change. The American Nurses Association position statement Assuring Patient Safety: The Employer's Role in Promoting Healthy Nursing Work Hours for Registered Nurses in All Roles and Settings emphasizes that employers are responsible for providing "a work schedule that provides for adequate rest and recuperation between scheduled work" and compensation adequate enough that individuals do not feel "compelled to seek supplemental income through overtime, extra shifts, and other practices that contribute to worker fatigue" (ANA, 2006b).

Further, implementing changes to the work environment and instituting the use of fatigue countermeasures that include appropriate schedules and supporting shift workers may assist in preventing the loss of experienced nurses to the profession which further exacerbates a serious nursing shortage.

Employer actions should include:

- Address the overall work environment for nurses as recommended by the Institute of Medicine report (2004).
- Identify situations and settings in their own organization that promote fatigue in nursing staff and create an unsafe environment for patients.
- Designate positions for an adequate number of registered nurses to provide quality care and assure that nurses are able to work an appropriate schedule including breaks and without overtime.
- Seek creative options to fill registered nurse positions including part time, partial shifts, and other strategies.
- Develop, in collaboration with workers, specific policies regarding length of work times that are based on the individual setting, patient and provider needs. In all circumstances these should avoid any nurse work time of more than 12.5 consecutive hours.
- Provide education for all care providers on the hazards and causes of fatigue, recognizing fatigue, and the obligation of individuals to assure that they are able to provide safe care.
- Establish guidelines and training for workers in the use of multiple fatigue countermeasures including controlled rest periods.
- Provide education for all shift workers regarding the hazards of shift work and the measures that can be taken to mitigate these hazards and promote healthy wake and sleep patterns.
- Institute policies regarding shift work that will promote health and enhance work life balance for workers.

Nursing Education Programs

Basic Nursing Education Programs can contribute to solving this problem by:

- Educating nursing students in regard to fatigue as a contributing factor in error and fatigue countermeasures.
- Structuring their own clinical assignments to assure that nursing students are not assigned to clinical work schedules that would promote fatigue and increase error.

Research

Additional research regarding possible strategies for combating the adverse effects of fatigue in health care workers in needed.

- Research the use of creative staffing patterns to meet patient needs,
- Research the use of fatigue countermeasures in health care settings,
- Research the use of checklists for preventing error

- Research the potential value of various approaches to crew resource management.

Policy Implications

There are many difficulties in regulating work schedules for an occupation as large as nursing that is practiced in such varied settings. Regulations may be part of legal codes but may more easily and effectively be instituted by accrediting agencies. Regulatory pressure is often essential to motivate change in entrenched practices.

The following regulations might be useful tools.

- A requirement that employers work together with employee groups to establish safe work hours based on the individual setting, patient and provider needs.
- A requirement that an institution have a program in place for instituting fatigue countermeasures that could prevent fatigue and errors.

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