



Neonatal Nurse and Neonatal Nurse Practitioner Fatigue



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ARTICLE INFO

Keywords:

Neonatal nurse
Neonatal nurse practitioner
Sleep related fatigue
Quality of care

ABSTRACT

Current workforce shortages may cause some neonatal nurses and neonatal nurse practitioners (NNPs) to schedule and work more hours than their normal hours, leading to inadequate sleep and recovery. Sleep related fatigue of neonatal nurses, including NNPs, is a serious but common health issue that can lead to personal and patient safety problems if not effectively addressed. Elements contributing to sleep disturbances and related fatigue are multifactorial, and include personal, work group, organizational and administrative factors. Improving individual knowledge and accountability while working collaboratively with employers and regulatory bodies to address these issues can improve safety and quality of care for patients and improve the health and wellbeing of neonatal nurses and NNPs.

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Workforce Shortages and Shift Work

Across the United States, neonatal intensive care units (NICUs) are faced with staffing shortages of neonatal nurses and neonatal nurse practitioners (NNPs).^{1,2} This comes at a time when hospitals are challenged to ensure that patient care is safe, effective, efficient, timely, equitable, and patient centered.³ Inadequate nurse staffing places NICU patients at risk for adverse outcomes,¹ and can cause burdensome workloads for nurses and NNPs.² In an effort to improve clinical coverage in the NICU, many hospitals are offering financial and other incentives for neonatal nurses and NNPs to work above their normally scheduled hours, which could lead to sleep related fatigue and unintentionally cause patient or caregiver harm. While there may be some unique differences between the workflows and functions of bedside nurses and NNPs, both are human and susceptible to sleep related fatigue. As organizations move towards establishing a culture of safety in order to achieve best outcomes for patients and families, sleep related fatigue must be evaluated and addressed using the best evidence possible.

Shiftwork

According to the Centers for Disease Control & Prevention (CDC), 15 million Americans are “shift workers”.⁴ Shift work is defined as work scheduled outside of the normal “9 AM to 5 PM” daytime, five days per week work routine, and generally includes early morning hours, late evening, and/or night hours. Shift work can improve worker continuity and productivity without increasing expenditures, particularly in businesses that require 24 hours a day operations, such as hospitals.⁵ Shifts that last longer than eight hours are considered “extended shifts”.⁶

Many nurses and NNPs who work fulltime often schedule three 12 hour shifts per work week.² Even though the work week is compressed into fewer than five days, many workers enjoy the flexibility that shift work brings when balancing or integrating work with home life, as well as the opportunity to work additional hours for additional income.^{7,8} However, along with the benefits of shift work, come hazards related to worker health and patient safety.

Both patient and personal safety are compromised when nurses, including NNPs, are sleep deprived and experience sleep related fatigue. Critical thinking and professional judgment are impaired after 8–10 hours on the job, leading to delayed cognitive processing and response time to patient care,⁹ as well as increased incidence of needle sticks, musculoskeletal injuries, and automobile accidents.^{8,10–12} For nurses working 12 hour shifts or longer, there is a markedly increased risk of “decision regret”, which is the cognitive emotion felt when the actual outcome of a decision is not what was intended, as a result of faulty decision making.¹³ Not only can decision regret result from an actual patient care error, the nurse or NNP making the error can suffer from the “second victim” phenomenon, carrying the burdens of regret, guilt, and shame which in turn increase stress levels.¹³ More frighteningly, after 17–19 hours without sleep, performance is equivalent to that of individuals with blood alcohol levels of 0.05%, and approaches 0.1% with worsening sleep deprivation.⁹ Further, a recent study of pediatric nurses, including those working in intensive care, found that those who worked 12 or more hours reported worse job related outcomes such as feelings of dissatisfaction and burnout, and decreased measures of patient quality and safety such as central line infections, compared to pediatric nurses who worked 8 hour shifts.¹⁴

For those who exclusively work twelve hour shifts, the interwork interval (the amount of time from departure from work at the end of one shift until the time of return to work for the next shift) may be a contributing factor in sleep related fatigue. A study of 1990 nurses in

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Norway, where the average length of work shifts is 9 hours, demonstrated a relationship between “quick returns” (defined as returning to work the next day in less than 11 hours), and insomnia, excessive sleepiness, excessive fatigue, and shift work sleep disorder.¹⁵ Experts have found that nurses working successive 12 hour shifts typically get an average of 5.5 hours of sleep before returning to work,¹² falling short of the recommended 7–9 hours of sleep for adults,¹⁶ accumulating sleep debt and, in turn, sleep related fatigue over the work week.¹²

Despite the risks of extended shifts, there is insufficient evidence that one length of shift is better than another.¹⁷ Shift length alone is not the sole determinant of excessive sleepiness, fatigue and safety lapses. Shift rotation, total hours worked, working consecutive days, and working additional hours play a role as well.^{8,17}

According to a national survey of NNPs in 2014, most respondents provided services in tertiary care NICUs, have worked an average of 14 years as an NNP, and had an average age of 49 years.² Forty three percent of respondents indicated that they work greater than 40 hour per week. Most NNPs surveyed work day–night rotations of 12 hours or 24-hour shifts, and 70% of those who work 24 hour shifts *did not have guaranteed downtime* to rest during those shifts, thus preventing the NNP from achieving 7–9 hours of sleep during that 24 hour period. Those in level IV NICUs were more likely to work 12 hour day–night rotations.² These factors place the NNP at risk for sleep related fatigue and in turn, patient and personal health and safety hazards.

Physiology of Sleep

Sleep is an important restorative function of the body. It is important in the regulation and maintenance of the physical, psychological and emotional health of the individual, and is closely tied to resiliency.¹⁸ The body regulates sleep through the interaction of two systems: the sleep/wake homeostasis system and circadian rhythm system. Both sleep intensity and sleep duration mediate these two systems. Sleep/wake homeostasis regulates the intensity of sleepiness or alertness based on the quantity of sleep experienced. Circadian rhythm regulates the timing of sleep based on a 24 hour “internal clock” mechanism.¹⁹ The circadian rhythm rises and falls throughout the day, with the strongest biological drive to sleep occurring between 2AM and 4AM, and between 1PM and 3PM in most people.¹⁸

Lightness and darkness signals are transmitted from the optic nerve to the suprachiasmatic nucleus (SCN) of the hypothalamus, which in turn signals other areas in the brain which control the release of hormones (such as cortisol and melatonin) and body temperature. These act to make the individual feel rested and alert, or tired and fatigued.¹⁸ Typically, light triggers the release of cortisol, which helps with alertness, and dimness triggers the release of melatonin, which helps to regulate sleepiness. Together, the circadian rhythm, quantity and quality of sleep experienced, hormonal levels, lightness/darkness triggers and other biological factors work together to regulate the alertness or the sleepiness of the individual.

Short and Long Term Health Consequences of Disturbed Sleep

Most adults require between 7 and 9 hours of good quality sleep each day for the restorative processes of the body to be realized.¹⁸ Even short and/or temporary sleep disturbances, such as those related to disturbed sleeping or sleeping for 6 or less hours, can have negative effects on neurobehavioral measures.²⁰ Poor sleep leads to increased secretion of cortisol, insulin, and ghrelin, and decreased secretion of leptin. Collectively, these imbalances lead to increased blood sugar and abnormal food cravings (such as late night munchies). Over time, these can result in weight gain, diabetes, hypertension, impaired immune function, emotional health disturbances, and early death.²¹

Generally speaking, most people can recover from a few nights of interrupted or poor sleep by getting additional sleep and rest the next night. Additionally, many shift workers are able to adjust their lifestyles

and sleep practices to accommodate their unique sleep/wake patterns. However, workers over the age of 40 have reported a greater incidence of sleep related disorders stemming from the inability to adjust their circadian rhythm after disrupted sleep.²² Further, Clendon and Walker (2013) found that nurses over the age of 50 had decreasing physical and emotional tolerance for shiftwork, and noted that fatigue and family time were most negatively impacted.²³ Furthermore, women who work night shifts are at higher risk of irregular menstrual cycles, difficulty getting pregnant, higher rates of miscarriages, premature births and low birth-weight babies.¹⁸ Long term, sleep related fatigue can lead to feelings of burnout, decreased quality of life and other emotional health disturbances, as well as staff turnover.²⁴

Contributing Factors to Sleep Related Fatigue

Social Context

The social context which contributes to neonatal nurses' and NNPs' poor sleep patterns is complex and includes many factors. In some settings, practicing while sleepy or fatigued seems to be socially acceptable. Some may believe that they are not affected by the effects of fatigue and claim to not be sleepy, when, in fact, studies have demonstrated that individuals are poor judges of their level of fatigue.²⁵ Many neonatal nurses and NNPs work twelve hour shifts and rotate between day and night shift. Regardless of how mindful the initial scheduling may be in order to create a stable schedule, many neonatal nurses and NNPs will alter their schedules to accommodate home and life related activities or to help a coworker with his or her scheduling needs. Subtle or outward coercion by peers or management, as well as family and non-work commitments, could be a factor related to working additional shifts or making changes to their individual schedules that result in “flipping” day and night shifts without adequate rest and recovery time in between.²⁴

While at work, many neonatal nurses and NNPs do not take duty free breaks, which have been shown to decrease fatigue and improve performance, either because patient care responsibilities interfered with the break, there was lack of sufficient coverage for the break, or because the individual chose to not take a break.¹⁷ Further, some hospitals may not offer conducive areas for nurses to take restful breaks.²⁶

As with other health care shift workers, the work-life balance of neonatal nurses and NNPs is a challenge, and many competing responsibilities often vie with the need to sleep when away from work. In order to find more time to balance the demands of home and work, evening and night shift workers tend to decrease the amount of sleep they get.²⁷ Neonatal nurses and NNPs with infants and small children in the home may stay up after working a night shift in order to care for them. Additionally, many neonatal nurses and NNPs will work beyond their scheduled 12 hour shifts or pick up additional shifts in order to make more money. This is not surprising given the fact that 35% of nurses are the primary earners in their households, and some estimate that 20–30% of nurses hold a second position to contribute to the family's financial health.²⁸

Work Environment

During the nighttime hours in the NICU, oftentimes the lights are dimly lit in the patient care areas in an attempt to support the circadian rhythms of the patients, but this may further confuse the nurses and NNPs' circadian rhythms while working.²⁹ When the “bewitching hours” of 2–4AM come around, some neonatal nurses and NNPs will consume caffeine and eat unhealthy foods in an attempt to stay alert. Experts recommend deliberate use of caffeine and dietary changes at specific times during the work shift as a counter measure to sleepiness.³⁰ Some organizations have begun to offer strategic napping periods, which are effective at decreasing sleep related fatigue during the night shift when the short nap, lasting between 15–60 minutes, is

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