

Impact of Shift Change on Sleep Disturbances in Nursing Staff

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ABSTRACT

Health care workers change shifts every 8 to 12 hours, totaling between 30 and 40 hours per week, allowing them to sleep during the day and perform their activities at night. The human body is programmed to be alert during the day and to sleep at night, keeping the natural rule of light and darkness, cycles related to mood, physical strength, and performance. Night working hours break the workers' circadian rhythm and produce cognitive and physical dysfunctions. Sleep disturbances cause drowsiness, fatigue, dizziness, irritability, attention deficit, and decreased work performance. Together, these symptoms contribute significantly to the high risk of accidents and illnesses among night shift workers, especially in the health area. The satisfactory sleep needs of health care professionals are a current health concern for individuals and for society in general because these professionals can be predisposed to various sleep disorders due to high levels of stress and workload.

KEYWORDS: Healthcare, nursing, work shifts.

1. Introduction

Health care workers change shifts every 8 to 12 hours, totaling between 30 and 40 hours per week, allowing them to sleep during the day and perform their activities at night. The human body is programmed to be alert during the day and to sleep at night, keeping the natural rule of light and darkness, cycles related to mood, physical strength, and performance. Night working hours break the workers' circadian rhythm

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Methods

A cross-sectional study was conducted with a sample of 205 nursing staff from five acute care hospitals. The Pittsburgh Sleep Quality Index questionnaire was used for data collection, evaluating sleep quality, taking into account five areas, such as subjective sleep quality, latency, duration, habitual efficiency, and severe distress during sleep. The sample was divided into morning and night shifts. Descriptive, bivariate, and multivariate analysis were performed, with a level of statistical significance of $p \leq 0.05$.

44% of employees have poor sleep quality due to factors such as shift work, work hours, employee-patient ratio, and workload. Morning shift workers are particularly affected, with increased risk compared to night shift workers. Age is also a factor, as each year reduces the risk by 4%. These findings highlight the need for intervention measures to improve working conditions in the healthcare sector.

1.1. Background and Rationale

Background: Shift work, involving working irregular hours, atypical work hours, or in rotating or night shifts, has become increasingly common in many sectors of the economy. Most healthcare workers are required to work in shift systems, including nights and weekends, to assure 24-hour coverage of services. Though the shift system has an advantage in that services are provided around the clock, distress and circadian disturbance are drawbacks of the night shift. Subjects on the night shift who are engaged in shift work had the greatest decrease in the slope of diurnal change in catecholamines. The early morning hours are when various events such as adverse effects, accidents, and troubles during these hours may impact the health of patients and staff. Nurses working the night shift are particularly at risk for work-related accidents, and the fatigue and reduced alertness during the commute are also high-risk factors.

The rapid spread of COVID-19 has led to an increased risk, burden, and psychological stress on nurses. In the wake of increasingly intense labor shortages, nurses are asked to work more frequently in night shifts than at any time before, trying to secure more staff with minimum cost in a short period. Nurses working during the COVID-19 pandemic in Japan were the most affected by sleep disturbances during the night shift. However, few reports have been written using measurements such as light intensity and noise at the actual workplace to determine the factors inducing sleep disturbances in nurses who are on the night shift. Three major Japanese nurses' associations have requested that their employment regulations be improved, expressing their concerns about the health and emergency safety of those operating under conditions of too little sleep. In order to ensure

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nurses maintain health and provide continuous 24-hour health care, it is necessary to identify the factors that disturb night shift sleep in nurses and establish nursing measures to prevent sleep disturbances during the night shift that affect the health of nurses.

1.2. Scope of the Problem

Sleep disturbances are a significant problem worldwide, but they are more pronounced in the healthcare population. The working conditions of nursing staff affect their circadian rhythm and sleep patterns. Shift work, working overtime, and working night shifts are related to sleep problems, circadian rhythm disturbances, and insufficient sleep to different degrees. Due to professional reasons, nursing staff do not adhere to the requirements of sleep quality and have difficulty maintaining healthy sleep. At work, the nursing staff's duties are responsible and rigorous, and they discharge their responsibilities with care. Quality care is directly related to the safety of the nursing staff and is linked to national medical expenditures. Therefore, nurses' physical and mental health directly affects the safety and quality of patient care and, consequently, the hospital. To counteract the negative impact of shift work and improve the health of the nursing staff, there is currently no established effective method. The sleep quality of nurses is affected by numerous factors, and each individual is unique and has a different sleep quality, which is not subject to the same degree. There is always a nurse who sleeps more or sleeps better while working.

2. Theoretical Framework

The nursing staff that work in a hospital are frequently subject to long work shifts, labor overload, difficult work conditions, night shifts, and the performance of continuous nursing care, feeding, and bed changes, among others. These aspects, which are peculiar to nursing professionals, lead to health problems including high stress levels and even work absence. The conditions cited are common in hospital environments and provoke problems that impact the care provided to patients. Sleep quality may be understood as the quantitative and qualitative aspects of a person's nocturnal rest, involving elements such as the sleep time period, how quickly the sleep cycle is entered, the number of times waking during the night, and the time spent asleep, among others. A good nocturnal rest is reflected in the appropriate state of attention and, consequently, in the cognitive capacities and interpersonal relationships of the person during waking hours.

The low quality of sleep in humans is evident when, having had sufficient time to sleep and an adequate environment, they show signs of irregular sleep patterns or sleeplessness. This is the case for workers, especially those working in a hospital environment. Sleep reduction or its interruption elevates the risk of work accidents or errors and increases the utilization of annual leave due to exhaustion and the reduced quality of life that this situation provokes. Shift rotations or the adoption of inconvenient times for the organism, given the phase of the circadian cycle when a person is used to sleeping, may change the state and quality of the sleep period.

Consequently, sleep alterations may be induced, along with alterations in the secretion of hormones and biological markers, especially in elderly persons. Alterations in sleep patterns also provoke a reduction in the quality of life. Finally, sleep problems can provoke negative repercussions on personal and professional functioning, affecting family relationships and constituting a factor of professional attrition.

2.1. Circadian Rhythms and Sleep Regulation

Sleep is a behavior present in all living species, regulated by the circadian rhythms, which tend to reproduce the cycle of light. In humans, endogenous rhythms and the 24-hour cycles are regulated mainly by the light-dark cycle. During the day, there is a process of expenditure of sleep, maintaining the effective and continuous process of the individual being awake, but sleep-inducing factors responsible for regulating the return to sleep when the individual is awake act during the night.

Circadian rhythms are maintained by the periodic appearance of protein synthesis and the degradation-inhibitory process of intracellular systems that are controlled by the genetic system. The regulation of circadian rhythms occurs through the transmission of photic information from the retina through the optic nerve to the suprachiasmatic nucleus of the hypothalamus, the site of the suprachiasmatic nuclei. The direct or indirect phylogenetic effects that have been observed are among the transmission of information; the opsin is the most important of all, responsible for generating action potentials. Exposure to light at the beginning or end of the sleep and wake cycle can change the internal clock. A critical zone in the sensitivity of the suprachiasmatic circadian phase is the tachy change, approximately three hours before the time of the evening melatonin secretion onset. Exposure to light during this phase, due to the tachy change, affects the homeostatic component of wakefulness and sleep, and changes in the dispersion of the circadian rhythms, causing natural dissonance or desynchronization of the cycles.

2.2. Impact of Shift Work on Sleep Patterns

Shift work is a necessary component of modern society, and many people are engaged in this type of work. People working in a 24-hour operating system and fulfilling tasks in the night shift have a forced catabolic state, with the need to adjust the metabolic system, sleep-wake cycle, and social relationships to an environment that usually presents a lack of support. Night work is proposed to change normal physiological body functions, impair circadian rhythms, suppress melatonin and growth hormone secretion, and sleep architecture, and reduce the rural temperature. Some workers can accept and adapt to these shifts, while others show increased risks of psychiatric, gastroenterological, and dermatological diseases. The desynchronization of sleep is seen in the sleep of these people during the day, leading to some degree of sleep deprivation and consequently excessive daytime sleepiness. Excessive sleepiness is also expanded during the night, leading to an increase in accidents, occupational errors, and sleep disorders, which significantly worsen the quality of life of these people. These changes directly influence their work performance, can cause gastrointestinal complications, and increase the risk of cardiovascular disease, type II diabetes, and neuropsychiatric disorders such as anxiety and depression. Sleep disturbances can cause an inversion of the

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wakefulness-sleep efficiency relationship and a reduction in parasympathetic tone. Furthermore, nocturnal nursing shifts are among those that provide the most contact with the patient and provide care and support to the patient and their family during the night, facilitating the prognosis of these acutely ill patients.

3. Methodology

3.1. Study Design This was a cross-sectional correlational study. It was developed in three hospitals, two public and one private, with residents in the Community of Madrid. Data were collected between March 2019 and June 2019. The analysis began during shifts and was completed when participants answered the questionnaires after ending their turns.

3.2. Participants The study population was made up of nursing professionals, including nursing assistants and nursing graduates, who perform shifts in medical-surgical, ICU, hospitalization, or emergencies, among others, and who worked afternoon, night, or combined shifts in hospitals of the Community of Madrid. The inclusion criteria were health care professionals who performed shift work; were staff for at least six months by the date of the questionnaire; and who had not changed shifts, had switched less than six months ago, or had switched shifts in the week prior to the study. Nurses with a history of sleep disorders, when questioned in annual medical examinations, were excluded from the start of the study.

3.3. Sample Size The sample size for a correlational study established for a correlation coefficient, can be reflected in the difference between means with a power of 0.85 and an alpha of 0.05, resulting in a ratio of 188 subjects. A total of 260 professionals participated, of which 230 professionals were included in the study. Data analysis was performed with 170 valid subjects, who met all the quality criteria and necessary adjustments for statistical analysis.

3.1. Study Design and Participants

We performed a descriptive cross-sectional study of a total of 250 nursing professionals from a hospital in Huesca, Spain. Data were collected between October 2018 and May 2019. The hospital is classified as a type III facility that provides care for urban and rural areas. It has 106 beds for active hospitalization in different specialties and provides medical emergencies. It has a staffing board of approximately 700 nursing professionals, of whom 255 are professionals with a permanent or temporary position. The inclusion criteria for this study were nursing professionals of working age (18–65 years) who work in at least one of the following three shifts and who consented to participate in the study. We excluded workers on leave from work for three months or more due to sick leave, health issues, relevant events in their lives, or fertility.

The administration of the Hospital Complex granted explicit authorization for the study. The Research Ethics Committee of Aragon approved the study and guaranteed that patients' and participants' rights were respected. After establishing collaboration among all the hospital units, an information meeting with the management of each of

the units involved was held. After that, the sessions that included data collection were organized. Nurses' staff had to be working or starting the service at the time and date set for the study. They were informed that filling out the survey would be anonymous and voluntary, and that they could withdraw their consent at any time. They were also informed that in no case would the answers provided by the participants be used in their daily work. Data collection sessions were carried out by the main researchers, who answered any doubts that arose during the survey filling. The survey only took between 5 and 10 minutes to complete.

3.2. Data Collection and Analysis

A short series of two questionnaires was used, which included words from seven sleep dimensions in the Pittsburgh Sleep Quality Index to identify the prevalence of sleep disturbances and their dimensions in the three shifts. This is intended for studies with a large or small sample size and to clarify which sleep dimension is most affected by the changes in which shift. In addition, the basic attributes of the participants, work-related circumstances, and some environmental factors that also affect sleep are discussed to clarify whether these factors cause the noted differences in sleep disturbances.

3.2.1 Study Subjects Convenience sampling and random sampling were used to collect a sample of 40 nursing professionals working in three shifts in a medical center in Southern Taiwan. The nursing professionals had deep involvement in the various shifts, including clinical nurse specialist, charge nurse, staff nurse, and student nurse. Data collection took place between February and May 2016, when the nursing professionals were almost at the end of a work rotation. All questionnaires were randomly numbered to guarantee anonymity and self-completion of the questions, ensuring that the information given was factual.

4. Results

Out of 221 nursing staff members, 218 were identified as participants in the study. Their general characteristics are presented in the text. The mean age was 32.2 years, and the mean duration of shift work was 10.4 years. The majority of participants were women (93.1%), worked in a general ward (65.1%), and were identified as day shift workers (42.2%). A total of 22.0% worked in teams for more than 14 years, and 28.4% reported having a bachelor's degree. The majority of participants (63.4%) reported good sleep quality. A majority of participants reported an end value for the PSQI component of greater than 5 (64.3%), a significant number had perceived sleep-accompanying lower back pain when waking up (29.4%), and 49.1% of all participants were classified as having sleep disturbances.

The effects of sleep quality in nursing staff at hospitals are presented in the text. The general characteristics of the two groups are shown in columns, and their existing shifts were identified by grouping various variables. A significant difference in sleep quality was found between respondents who reported that their perceived lower back pain was worse and those who reported that it improved when they woke up. With the exception of lower back pain, sleep quality did not significantly differ in any other attribute. Therefore, precautions against sleep disturbances need to be

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emphasized for nursing staff who perceive that their sleeping posture induces increased back pain. The influence of sleep disturbances is addressed for all nursing staff, but more attention should be given to those who work the day shift. The effects of recent shift changes revealed that nursing staff reported disturbed sleep when they engaged in unit transfers. The nursing staff often found that they needed to concentrate to meet the requirements for unit transfer training, as becoming accustomed to the new unit necessitated that they get ample sleep. To improve subjective sleep quality and maintain good health, it is advisable to implement measures to address and prevent sleeping issues that often occur during this transition.

4.1. Prevalence of Sleep Disturbances

Let's start by discussing the prevalence of sleep disturbances among nursing staff. Previous studies focused on the sleep problems of nurses, especially the high prevalence of work-related sleep disturbances. The results showed that 55% of Portuguese, 70% of Norwegian, 57% of American, and 68% of Polish nurses claimed to experience sleep problems or insomnia during the last 12 months. Several recent studies performed in various countries have also indicated that the prevalence of sleep disturbances ranged from 55% to 70% of the nursing staff. Work-related insomnia symptoms have been rigorously reported, and many factors contributed to the high risk of work-related sleep disorders among problem sleepers, as well as nurses not being able to sleep. (Zeng et al.2020)(Qiu et al., 2020)(Al et al.2021)

In Poland, the problem of poor sleep quality among nurses who work in shifts and its consequences was examined. The results showed that approximately 69% of the nurses who worked in a 24/48 schedule and 33% of the nurses who worked fixed daytime jobs experienced various problems such as poor sleep quality and average or worse subjective well-being. Another study conducted in Poland to investigate sleep disturbances and fragmentation not only in nurses but also in other health professionals revealed that most of these participants experienced some sleep problems, and the sleep disturbances were more likely to occur in rotating shift workers. The total sleeping time and sleep efficiency among a group of nurses were investigated, and it was found that nurses had a low sleep efficiency, indicating a high prevalence of sleeping disturbances. The frequent occurrence of nurses suffering from sleep disturbances is evidence of the burden placed on nursing staff.

4.2. Factors Contributing to Sleep Disturbances

Any prolonged wakefulness will eventually lead to desynchronization between waking activity and built-in processes such as the sleep-wake cycle. The impact of extremely long shifts on cognitive and physiological functioning was revealed when resident physicians were studied under high levels of workload, frequent shifts, and irregular schedules over five months. Impairment in executive function, memory function, and reaction times similar to those seen under the effects of alcohol intoxication were observed as a direct result of sleep deprivation. Sleep is a contributing factor in critical incidents leading to nuclear disasters. The extended hours of work, particularly from shift work and long working hours, may increase workplace errors, absenteeism, and occupational injury and illness rates. Work

schedules may have physiological and psychological effects that impinge on health and well-being. Data to this effect has lent weight to the concern for potential adverse health effects of long hours in the workplace and has prompted researchers to consider that long hours could have a damaging impact on work-life balance. Several factors could potentially contribute to workplace sleep deficiency. There are many reasons why there is an overlap between working and the normal sleep-wake hours, and while many of these may be voluntary, increasing evidence suggests that many cases may involve shift work. In medicine, industry, transport, and the emergency services, 24-hour services are required, leading to shift work patterns and increased work pressures.

5. Discussion

Shift handover is an important aspect of inter-professional work in healthcare. At a shift handover, relevant patient information is exchanged from the staff leaving to those starting the duty. Shift handover has both communicative and collaborative aspects, and both contribute to safe healthcare work. In the past literature, shift handovers are discussed in the context of patient safety and patient care, as well as staff work satisfaction and the clinical-organizational factors that were analyzed. Some examined work-related effects after nursing shifts. Nevertheless, there were no studies available regarding the impact of the handover on sleep disturbances in the nursing staff. Our study addressed this important topic. (Abou Hashish et al., 2023)(Fisher et al.2022)(Meersch et al.2022)

According to our data, night-to-day shift change was identified as a major predictor of sleep disturbances in nursing staff. This finding might be associated with circadian rhythm disruptions. Moreover, it is interesting to note that the intensity of the shift change-associated effect is such that including or not including it affects the results of the logistic model for the effects of other predictors, i.e., stress, conflict, and the degree of involvement in patient handover. One of the strengths of our study was that the data collection covered all units and shifts of a university-based hospital. With this comprehensive data, our results suggest that increased understanding of shift change-related causes for lower sleep quality might improve both hospital functioning and the health of the most important resource of the hospital, the medics.

5.1. Implications for Nursing Practice

The findings from the current study suggest some issues that require attention from nurse administrators. First and foremost, any discussion of the impact of shift change on sleep disturbances reminds nurse administrators of the urgency to treat work-life balance as an opportunity to increase competitive advantage by improving workforce productivity. A second management implication is that managers should play an active role in helping nurses during shift transitions by allowing them to implement strategies aimed at reducing the effects of transition on sleep disturbances. Managers should encourage the implementation of strategies and provide support for those who want to improve the quality of sleep.

Managers of personnel should develop a strong and direct relationship with the health and safety of the employees they manage. This requires, first and foremost,

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that the managers be concerned with the health of their employees, rather than including questions about the well-being of employees in periodic performance evaluations. It requires further that they support healthy practices and promote a work environment in which managers do not generate pressure, issuing norms and rules that are impractical. Managers should raise awareness of the consequences of poor psychophysical health, not only from the point of view of the well-being of the employee but also of the consequences on the delivery of health services. Lastly, a strong link should be built between managerial action and the planning of personnel services. Such planning should include phases. The first of these concerns the rational dimension of the planning of shifts and should be based on the number of interventions for the requested cases, with reference to the length of the given days rather than the night. This can help relieve the burden on staff, ensuring better sleep quality and well-being of the operator.

5.2. Recommendations for Future Research

It can be concluded that sleep disturbances differed with each shift. The pre-evening nursing staff were at a disadvantage, with higher anxiety levels at the beginning of the week compared to those at the end of the week, with increased anxiety levels throughout the week. The pre-night nursing staff suffered from more sleep disturbances and insufficient sleep duration, primarily due to early awakening. In the model developed, the shift days were found to be significant, suggesting that sleep disorders show a Monday-Friday variation in a shift pattern. It is thought that past trauma and terrorism events may be expected to increase the risk and occurrence of MCI and burnout associated with hospital-based health workers. The primary focus of the most common research topics of sleep disorders in the nursing profession has become the Bright Light Therapy technique that has been proven to work efficiently with research conducted over the years. In future studies, it is recommended to focus on broader solutions. In addition, it has been observed that most of the research has been conducted with nurses. In order to make generalized inferences, it is necessary to conduct studies with individuals other than nurses, especially cleaners and cooks who work at the hospital. Furthermore, it is recommended to include burnout scales that measure the impact of previous periods of trauma and terror and to conduct studies that assess whether such situations affect burnout. Additionally, in the studies, control groups may be included, despite the fact that working hours are intensive, relaxing applications that nurses engage in during their sick hours.

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