



Effect of Sleep Deprivation among Night-Shift Nurses on Patient Safety

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Abstract:

Background: Maintaining optimal physical and mental health requires getting enough sleep. Negative effects from sleep loss may occur in healthcare workers, who frequently experience sleep problems. The current study aims to analyze the effect of sleep deprivation among night shift nurses on patient safety.

Methods: The study has a descriptive cross-sectional design that included a sample of 102 nurses. A self-report questionnaire was used to gather data between January 10 and February 10, 2024. The first section of the questionnaire collected data on demographic information such as age, sex, education level, ward, and tenure. The second section focused on 12 multiple-choice items to gauge sleep deprivation. The third section evaluated patient safety during adverse events.

Results: based on results of the simple linear regression, the quality of sleep among nurses has no effect on the frequency of negative events among patients. at $p \leq 0.05$.

Conclusion: The study found that the majority of nurses had moderate sleep quality. Also, the results show no significant effect of sleep deprivation among night shift nurses on patient safety.

Keywords: Sleep deprivation, Patient Safety, Night shift nurses.

Introduction:

Maintaining optimal physical and mental health requires getting enough sleep (1). Negative effects from sleep loss may occur in healthcare workers, who frequently experience sleep problems (2). Lack of sleep has been linked to several negative outcomes, including decreased psychomotor alertness, cognitive decline, poor performance, and workplace accidents and mishaps (3). According to the National Sleep Foundation in the US, getting 7-8 hours of sleep per night is essential (4).

Weariness can result from not getting the recommended 7 hours of sleep every night, which can negatively affect both physical and mental health (5).

Specific to healthcare workers in the US and Europe, working too many hours can still cause both acute and chronic sleep deprivation and possibly jeopardize patient safety (6). Patient safety is the priority for healthcare organizations.

Healthcare quality is essential and should not be optional (7). From the beginning to the end, the patient must be the center of attention while delivering continuous process improvement because the patient's experience with treatment is frequently the outcome of the process (8).

Al-Ameri stated that night shift nurses are in charge of patient care while receiving limited assistance in a challenging work environment. They also face challenges such as fatigue and other issues that are specifically tied to working at night (9). A nurse's ability to focus is especially important in emergencies. Any decline in consciousness, memory, or coordination might impair function and result in fatal mistakes (10). As those who provide direct care, nurses are essential to ensuring patients' safety (11)(12)(13).

The primary issue in all healthcare systems worldwide is patient safety. The World Health Organization (WHO) has acknowledged this concern and called on health organizations to take immediate action in this area in 2001. Acute adverse events have been the focus of the patient safety field (14). A crucial measure of patient safety is the frequency of adverse occurrences. According to the World Health Organization's (WHO) Global Patient Safety Action Plan 2021–2030, patient safety errors are one of the main causes of death and disability globally and are acknowledged as a significant and expanding global public health concern (15).

Materials and Methods:

Study design:

A quantitative descriptive cross-sectional study design was used to analyze the effect of sleep deprivation among night shift nurses on patient safety.

Ethical consideration:

The current study was conducted after obtaining full ethical approval from the Independent Ethics Committee at the College of Nursing, University of Baghdad, in the second session of November 22, 2023. Next, the authors sought approval from the health directorate of the Salah al-Din governorate, Iraq, before getting the final approval from the

hospital. All the study participants were first interviewed to get informed consent.

Setting and Period:

The study was conducted among night shift nurses working in wards, critical care units, and the emergency department of the public hospitals in Salah al-Din, Iraq, between January 10, 2023, and February 10, 2024.

Study Population and Sample Size:

Convenience sampling was used to select the participants working the night shift in the emergency room and critical care units from 11 p.m. to 6 a.m. A total of 300 nurses were selected. Sample size calculation was performed based on the Richard Geiger equation, with a margin of error set at 5% and a confidence level of 85%. The minimum estimated sample size required was 123 respondents. Seventeen nurses refused to participate, and four nurses withdrew.

Inclusion and exclusion criteria:

The sample included all nurses who agreed to participate and excluded those who did not agree to participate and nurses with less than one year of experience.

Study Instruments and Data Collection

Procedure:

Data were collected using a self-report questionnaire, between January 10 and February 10, 2024. The study instruments consisted of three parts. The first part focused on demographic data, including age, sex, level of education, ward (site of work), and tenure (years of work).

The second part included 12 multiple-choice questions to assess sleep deprivation (Non-Restorative sleep scale), consisting of six items that were assessed positively and six items that were rated negatively. These items pertain to daily activities, affective symptoms of NRS, physical/medical indicators of NRS, and refreshment after sleep. The measurement instrument exhibited a high level of internal consistency ($\alpha = 0.88$) and indicated satisfactory test-retest consistency ($r = 0.72$). A weighted score between 1 and 5 is assigned to each item (that is, on a scale of 1 to 10, replies 1 and 2 are assigned a value of 1, responses 3 and 4 a score of 2, etc.).

Items with negative wording are flipped before scoring. A higher rating on the scale indicates a milder manifestation of NRS (16).

The third part focused on adverse events to assess patient safety. The nurses were asked about the frequency of adverse events during the past few weeks. A 6-item Likert-type scale was employed, with answers ranging from 1 (never) to 4 (often). The items focused on medicine administration errors, patient falls, delayed patient care, insufficient or erroneous documentation, and nosocomial infections (17).

Pilot study: On January 10, 2024, a total of 10 participants were recruited for this pilot study using a convenience sampling method. The primary aims of this study were to assess the efficacy, comprehensibility, and reliability of the research instrument, while also estimating the duration required for each participant to complete the data collection during the interview phase and identifying any potential challenges.

Validity of study instrument:

A panel of 11 experts in the various domains determined the face and content validity. The panel includes members of the expert group from the Universities of Baghdad, Kufa, Mosul, and Babylon College of Nursing, psychiatry experts from Ibn Rushd Mental Hospital, and professors at

the College of Nursing in Bagdad. Their answers showed that they all were in agreement with the questionnaire's substance, clarity, relevancy, and sufficiency. They also made some small edits, such as rewriting the section on demographic characteristics in its text form. As a result, it was accepted after taking into account their ideas and recommendations for enhancement.

Reliability Analysis of the Instruments (N= 10)

The reliability of the study instruments was tested on ten nurses to estimate internal consistency. The Cronbach's alpha value was (0.891) for the non-restorative sleep scale and for nursing adverse events (0.734). The study instruments were reliable to measure the desired variables of the study.

Data analysis:

The data were analyzed and interpreted using the Statistical Package for Social Sciences (SPSS), version 26.0, which uses descriptive statistics to describe the sample and inferential statistics to test hypotheses about the relationships between variables. Descriptive statistics: Frequencies, percentage, mean standard deviation. inferential statistics: Cronbach's alpha, simple linear regression.

Results:

Table (1): Distribution of Nurses According to their Socio-demographic Characteristics

List	Characteristics	F	%	
1	Age (year) M±SD= 28.8 ± 5	20 – <30	64	62.7
		30 – <40	32	31.4
		>40	6	5.9
		Total	102	100
2	Sex	Male	39	38.2
		Female	63	61.8
		Total	102	100
3	Qualification in nursing	Vocational school	38	37.3
		Diploma	38	37.3
		Bachelor	26	25.4
		Total	102	100
4	Word	ICU	47	46.1
		Emergency Unit	55	53.9
		Total	102	100
5	Years of Experience	1 – <10	79	77.5
		10 – <20	18	17.6
		>20	5	4.9
		Total	102	100

f: Frequency, %: Percentage, M: Mean, SD: Standard deviation

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The descriptive analysis in Table 1 shows that the average age of the nurses is 28.8 ± 5 years, 62.7% of whom fall in the age group of 20 – <30 years.

Regarding nurses' sex, 61.8% of nurses working during the night shift are females, while 38.2% are males.

Regarding the qualification of the nurses, 37.3% of them graduated from preparatory vocational

schools, 37.3% graduated with a diploma and 25.4% with a bachelor's degree.

Concerning the wards that the nurses work in, 53.9% of nurses work in emergency units, while 46.1% work in intensive care units.

About 77.5% of the nurses working night shifts had 1 – <10 years of experience.

Table (2): Overall Assessment of Sleep Quality among Nurses

Sleep quality	f	%	M	SD	Ass.
Poor	9	8.8	36.83	7.126	Moderate
Moderate	77	75.5			
Good	16	15.7			
Total	102	100			

f: Frequency, %: Percentage, M: Mean for total score, SD: Standard Deviation for total score, Ass: Assessment, Poor= 12 – 28, Moderate= 29 – 44, Good= 45 – 60

This table indicates that nurses on night shifts have moderate sleep, as reported by 75.5% of them ($M \pm SD = 36.83 \pm 7.126$), but 15.7% expressed good quality of sleep.

Table (3): Overall Assessment of Negative Events for Patients

Negative events	f	%	M	SD	Ass.
Low	23	22.5	7.62	2.282	Moderate
Moderate	77	75.5			
High	2	2			
Total	102	100			

f: Frequency, %: Percentage

M: Mean for total score, SD: Standard Deviation for total score, Ass: Assessment

Low= 0 – 6, Moderate= 7 – 12, High= 13 – 18

This table manifests that patients are moderately associated with frequent negative events, as reported by 75.5% ($M \pm SD = 7.62 \pm 2.282$).

Table (4): Effect of sleep deprivation on adverse events among patients (N=102)

Sleep Negative events	Unstandardized Coefficients		Standardize d Coefficients	T	Sig.
	B	Std. Error	Beta		
Injuries due to care	.008	.008	.094	.942	.349
Patient falls	.008	.009	.089	.898	.372
Nosocomial infections	.001	.013	.008	.083	.934
Medication administration errors	.002	.009	.027	.269	.789
Incomplete or incorrect documentation	.002	.008	.022	.225	.823
Delayed patient care	.002	.009	.025	.245	.807
Overall	.005	.032	.015	.149	.882

This table (4) presents an analysis of the effect of sleep deprivation on adverse events among patients by simple linear regression. The results of simple linear regression showed that sleep deprivation among nurses has no effect on the frequency of negative events among patients at $p \leq 0.05$.

Discussion:

Our study sample consisted of 102 participants aged between 20 and 60 years old. The majority of the participants (62.7%) were in the age group of 20 to <30 years, while 5.9% were in the age group of >40 years. On average, the participants' age was 28.8 ± 5 years. According to a 2023 study published in the Iraqi National Journal of Nursing Specialties, most nurses fell in the age group of 20 to <30 years, and on average, the participants' age was between 28.22 and 31.8 years (18–20). These findings suggest that the majority of nurses working in hospital settings are relatively young, with a significant portion falling within the 20 to 30 age range (21)(22). This trend may have

implications for workforce planning and development strategies in the healthcare sector.

In this study, 63 individuals (61.8%) were female, while the remaining 39 individuals (38.2%) were male. Notably, these results are consistent with those obtained from a prior study that aimed to investigate nurses' distribution of nurses according to their professional characteristics. In a 2023 study by Hassan and Alwan in Iraq, it was observed that 64.7% of the nurses were female (23). The same result was found in Ali and Hattab's study, where 60.3% of the nurses were female (24). These consistent findings suggest that the sex distribution among nurses in Iraq has remained relatively stable over time.

The quality of sleep among nurses does not significantly impact the frequency of adverse events among patients. As such, our study did not observe a correlation between the nurses' sleep quality and patient adverse events. This result contrasts previous studies (25-28) that have established a connection between short sleep

duration or insomnia and patient safety, specifically adverse events.

Several factors may contribute to the contrasting nature of the association between nurses' sleep deficiency and the work units from which data were collected, including the criteria used to assess the former and the number of nurses on duty during the night shift. It is noteworthy that the sample size of nurses on duty during the night shift was deemed adequate when compared to prior research (29). This association suggests that there may be various underlying concerns at both individual and organizational levels. At the individual level, nurses who enjoy a good quality of sleep are less likely to feel fatigued when they come to work, which may result in better performance.

Conclusion:

The study found that the majority of nurses had moderate sleep quality. Also, the results show no significant effect of sleep deprivation among night shift nurses on patient safety.

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This study received no funding whatsoever.

Conflict of interest

The authors declare no conflict of interest.

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