Original Article

Influence of Workload Burden on Shift Work Disorder among Nurses in Selected Nigerian Teaching Hospitals

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Abstract

Background: High nurse-patient ratios are burdensome for nurses and seem to be associated with shift work disorder. This study determined nurses' workload using nurse-patient ratios as indexes and examined the influence of workload burden on shift work disorder (SWD) among nurses.
Methods: An ex-post facto design was utilized and was conducted in selected tertiary hospitals in Southwestern Nigeria. A multistage sampling technique was used to select 422 respondents. A structured questionnaire was used to collect data. Data was analyzed with SPSS Version 20.
Results Mean of respondents working on the wards was 13 ±5.1; the average nurse-patient ratio was 1: 8 ± 6.4. Prevalence of symptoms predictive of SWD was (49.6%). More than half of the nurses (55.9%) had high workload, while (44.1%) had low workload. Workload was significantly associated with insomnia (χ^2 = 7.07, p = 0.001), and sleepiness (χ^2= 5.77, p = 0.01) among nurses.
Conclusion: The study concluded that nurses who had more patients to care for had more symptoms predictive of shift work disorder.

Keywords: Workload, shift work, insomnia, sleepiness and Shift work Disorder.

Background

Work and Health are two important variables that must be balanced for optimal functioning of any professional. It is obvious that the health of the individual, society and that of the nation are the primary concern of nurses and that is why as health care providers, they are obliged to work during the day and night to cater for the needs of individuals/ patients (Abdalkader & Hayajneh, 2008; Taranjit, Kaur & Shiva, 2012). Consequently, the health of a nurse contributes to the health of her patient/clients; this is because, a sick nurse cannot provide quality care. Patients and clients may require care during the day, afternoon and night. Hence, nurses must be physically

present to provide such care. Nurses, in other to care for the individual, engage in non-standard work schedules which may include shift work. This nature of work predisposes nurses to developing a disorder called Shift Work Disorder. Shift work disorder (SWD) is a sleep disorder characterized by sleepiness and insomnia, which could be attributed to the nurses' work schedule. Sleepiness and insomnia increases the risk for committing medication errors, and could result to personal injuries on shift and while driving home (Fallis et al. 2011) Some nurses most especially in Nigeria have learnt to adapt to the various working conditions in spite of their dissatisfaction with some of the conditions at work. However, for others, the burden of workload in conjunction with the stress that shift work brings may increase the symptoms predictive of shift work disorder among nurses. This had contributed to the high prevalence of symptoms predictive of shift work disorder among nurses.

So, in addition to the stress that shift work brings, nurses were most times burdened by the level of their workload. In determining the workload of nurses, Carayon and Gurses (2008) submitted that nurse-patient ratio was used as the measure of nursing workload. According to Nursing and Midwifery Council of Nigeria, (NMCN, 2009) the standard nurse-patient ratio was put at 1:1 to 1:5, that is, between a nurse to a patient and five patients, depending on the ward. Furthermore, California Nurses Association (CNA, 2008) provided the mandated minimum nurse-patient ratios, for example, in the general medical and surgical wards; the mandate was one nurse to five patients. However, In Nigerian hospitals, anecdotal evidence has shown that the standardized nurse-patient ratios were not adhered to; hence, nurses are most times burdened by the number of patients assigned to them for care. A reason for this may be due to the fact that there were inadequate numbers of nurses available to do the job. Also, a change in workload, meaning a change in the number of patients assigned to a nurse to care for, tends to change the stress level of nurses. Hence, when workload pressure becomes excessive it has negative health impact on the nurse (Shah, Jaffari, ,Wasiq, Ul-Haq & Raza, 2011).

Nurses who ran shifts, probably because of high workload might manifest symptoms predictive of shift work disorder compared to nurses with low workload. Gander, Van den Berg and Signal (2008) found an association between high workload among shift workers and acute sleep loss and fatigue. This clearly showed that high workload and job strain resulting from a high workload had negative impact on employees' sleep processes. Also, high levels of short term sleep loss and waking up feeling un-refreshed were found to be linked to high workload (Gander, et al. 2008). In the study conducted by Greenglass, Burke and Moore (2003) in Alarcon (2011) workload was seen as contributing to distress and depression and that workloads have increased among hospital staffs, particularly among nurses. In our environment, inadequate numbers of nurses available have increased the workload of nurses making them to work excessively, resulting to negative health outcomes. One of which is shift work disorder. There seems to be dearth of information on the role of workload; either low or high on shift work disorder among nurses in Southwestern Nigeria, hence, this paper looked at the associations between workload and symptoms of shift work disorder among nurses, this was with a view to providing recommendations to improve work performance and productivity.

Methodology

Research Design: The study adopted an ex-post facto design to examine the influence of workload on shift work disorders among nurses in selected tertiary hospitals in Nigeria.

Population And Sampling: The study was conducted among nurses working in Lagos University Teaching Hospital (LUTH) Lagos, Obafemi Awolowo University Teaching Hospitals Complex, Ile Ife and Federal Medical Centre, Owo. A multistage sampling technique was used to select 422 nurses from the tertiary hospitals. The sample for this study was determined using the following formulae as used by Daniel, (1999) :

$$n = \frac{Z^2 xP(1-P)}{d^2}$$

Where n= sample size

Z= is standard normal deviation set at 95% (1.96) confidence level

P = is the expected prevalence, a prevalence rate of 50 % (0.5) was used for the study.

d= is level of precision (0.05)

$$n = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.05)^2} = 384$$

10 % was added for attrition; hence 422 nurses were selected for the study.

Instrument For Data Collection: Data were collected with the aid of a questionnaire. The questionnaire was used to assess shift work characteristics, workload, sleep quality and symptoms of shift work disorder. It was adopted from the Pittsburgh Sleep Quality Index (PSQI), the Bergen insomnia scale (BIS) and the Epworth Sleepiness Scale (ESS).It was adapted to suit the culture and settings of the study. It had 3 sections. Section A comprised eleven items on socio demographic variables, while section B contained the Pittsburgh Sleep Quality Index (PSQI), good sleep quality was (PSQI <5) while poor sleep quality was (PSQI>5). Section C comprises the Bergen insomnia scale (BIS) and the Epworth Sleepiness Scale (ESS). Workload was determined using nurse-patient ratios as indexes and were categorized as low if a nurse was assigned to (< 5patients), high workload (>5 patients). 8-item Epworth Sleepiness Scale (ESS) was used to assess sleepiness.. A 6-item Bergen insomnia scale (BIS) was used to assess insomnia among nurses.

Data Analysis: Data collected was analyzed using descriptive and inferential statistics with the aid of Statistical Product & Service Solution (SPSS), version 20.

The data were analyzed using descriptive and inferential statistics to present in a concise and understandable form the information gathered from the study.

Descriptive statistics like frequency table, bar chart, percentages were used to summarize and provide clear description of the data from sample, while inferential statistics such as Chi-square test and ANOVA were used to for inferential statistics, value of 0.05 was considered significant.

Ethical Consideration: Ethical approvals for this study were obtained from the ethical committees of the three selected tertiary hospitals with the following reference numbers: OAUTHC/ERC/2016/08/05,LUTH/ADM/DCST/HREC/APP/1275,&FMC/OW/380/VOL.LII/33.

Introductory letter was also collected from the Department for the authorities of all the selected institutions. Permission was obtained from the authorities of the selected hospitals with the aim of seeking approval for the conduct of the study. Informed consents were obtained from the respondents, these were, nurses and patients, and their participation was strictly voluntary. In cases where the patients were vulnerable, informed consent was obtained from their relatives. Respondents were not coarse into participating in the study. Their confidentiality was also guaranteed. Their rights to participate or not to participate were duly respected.

Results

Four hundred and twenty-two nurses participated in the study. 48.6% worked in OAUTHC, 33.4% were in LUTH, while 18% were from FMC, Owo. Respondents socio-demographic variables were presented in table I. Majority were female (85.1%), respondents mean age was 33.1(SD = 9.4years), mean work experience was 10.3(SD = 8.0years). More than one quarter (31.8%) worked in Medical wards.

Workload Determination using Nurse-patient Ratios as indexes : The nurse-patient ratios across the various wards were presented in table II. Medical, surgical and emergency wards of the hospitals used for the study had the highest nurse-patient ratios of a nurse to nine patients (1:9), while the average nurse-patient ratio was a nurse to eight patients (1:8, SD= 6.4). Also, table III presented the workload burden across the hospitals, while information on the workload across the wards was presented in Fig.I. Table III showed that LUTH had the highest nurse-patient ratios and high workload. Fig. I showed that nurses working in medical and surgical wards had high workload due to the number of patients they took care of.

Table 1: Socio-Demographic Data of Nurses

Variable	Hospital			
	OAUTHC 205(48.6%) N(%)	LUTH 141(33.4%) N(%)	FMCOWO 76(18%) N(%)	Total n=422 N(%)
Age				
20-30	106(51.7)	59(41.8)	22(27.6)	187(44.3)
31-40	56(27.3)	37(26.2)	26(33.8)	119(28.3)
41-50	29(14.1)	31(22.0)	14(18.2)	74(17.5)
Above 50	14(6.8)	14(9.9)	14(19.5)	43(10.0)
Mean±SD	33.1±9.1	34.8±9.1	38.8±10.0	33.1±9.4
Sex				
Female	167(81.5)	127(90.1)	64(84.2)	359(85.1)
Male	38(18.5)	14(9.9)	12(15.8)	63(14.9)
Marital status				
Married	126(61.5)	114(80.9)	63(82.9)	302(71.6)
Single	77(37.6)	24(17.0)	12(15.8)	113(26.8)
Widow	2(1.0)	3(2.1)	1(1.3)	7(1.6)
Professional cadre				
NO II	112(54.6)	42(29.8)	6(7.9)	160(37.9)
NO I	22(10.7)	36(25.5)	22(29.0)	80(19.0)
SNO	28(13.7)	27(19.1)	22(29.0)	77(18.2)
ACNO	10(4.9)	11(7.8)	2(2.6)	23(5.5)
CNO	8(3.9)	18(12.8)	12(15.8)	38(9.0)
ADNS	25(12.2)	7(5.0)	12(16.8)	44(10.4)
Work experience				
1-5	100(48.8)	41(29.1)	18(23.7)	159(37.7)
6-10	47(22.9)	46(32.6)	22(29.0)	115(27.3)
11-15	14(6.8)	12(8.5)	4(5.3)	30(7.1)
Above 15	44(21.5)	42(29.8)	32(42.1)	118(28.0)
Mean±SD	9.1±7.8	10.3±7.8	14.1±9.2	10.3±8.0
Ward				
Paediatric	47(22.9)	16(11.3)	31(40.8)	95(22.5)
Medical	48(23.4)	56(39.7)	31(40.8)	134(31.8)
Surgical	57(27.8)	17(12.1)	2(2.6)	76(18.0)
A & Emergency	4(2.0)	18(12.8)	4(5.3)	26(6.2)
Psychiatry	6(2.9)	1(0.7)	2(2.6)	9(2.1)
Obstetric &Gynae	25(12.2)	33(23.4)	4(5.3)	62(14.7)
ICU	18(8.8)	0(0.0)	2(2.6)	20(4.7)

Table 2: Nurse-patient Ratios

Ward	Overall no of nurses	Average no of patients per a nurse	±SD
Paediatric	95	6	3.8
Medical	134	9	7.4
Surgical	76	9	6.4
Emergency	26	9	8.8
Psychiatry	9	4	1.0
O & G	62	7	6.2
ICU	20	4	2.4
Total	422	8	6.4

Table 3: Level of workload among nurses by hospitals

Hospitals	**High work load One nurse:>5patients**	**Low work load One nurse: < 5patients**
OAUTHC	108(52.7)	97(47.3)
LUTH	93(66.0)	48(34.0)
FMC-OWO	35(46.1)	41(53.9)
Overall work load	236(55.9)	186(44.1)

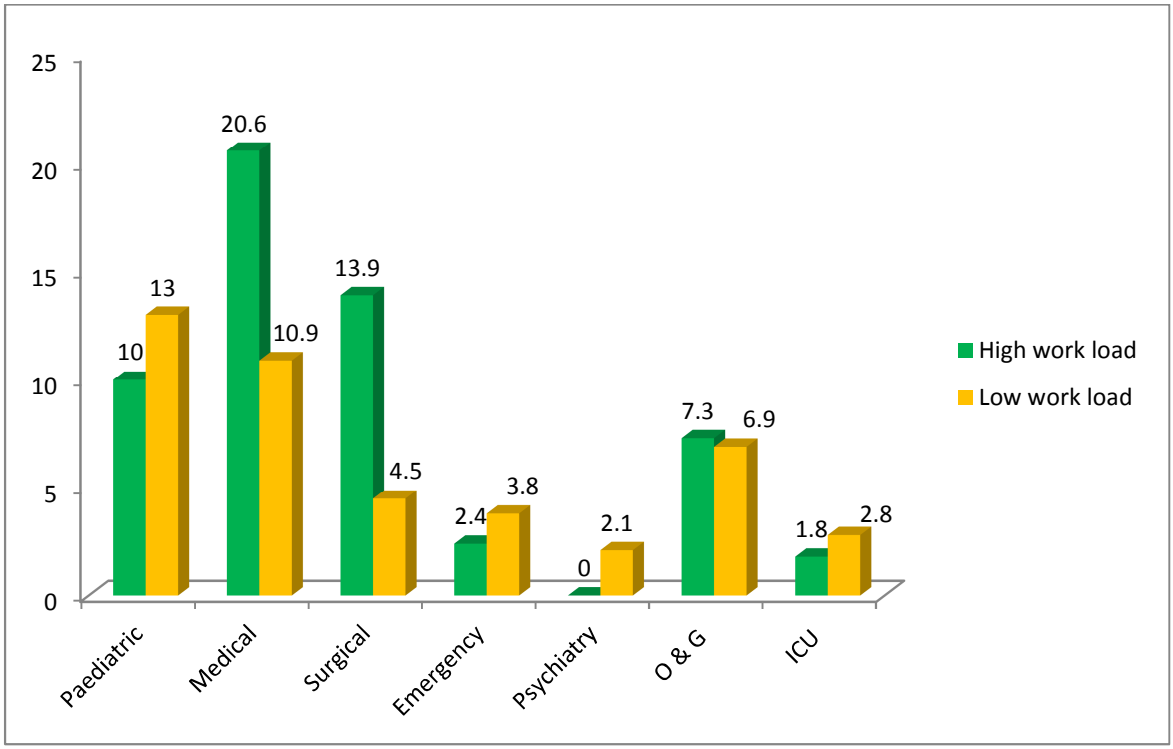

Fig. 1: Level of workload across respondents ward.

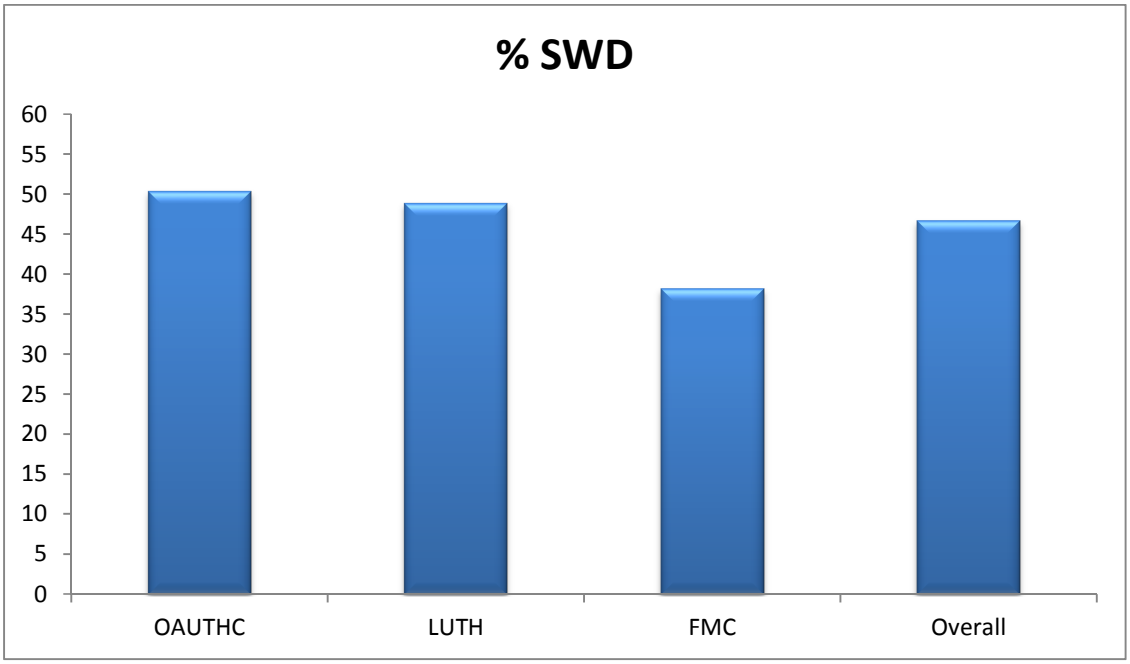

Fig. 2: Prevalence of SWD among Nurses per hospital type

Table 4: Association between type of shift and shift work disorder among nurses in OAUTHC, LUTH AND FMC

Vaariables	Morning	Afternoon	Night	Total	df	χ^2	p-value
Significant sleepiness (ESS score ≥10)	82 64.1	26 20.3	20 15.6	128 100.0	2	0.64	0.72
Non-significant sleep(ESS score < 10)	200 68.0	54 18.4	40 13.6	294 100.0			
Insomnia	72 57.6	29 23.2	24 19.2	125 100.0	2	7.04	0.02
Non insomnia	210 70.7	51 17.2	36 12.1	297 100.0			
Sleep quality (difficulties)							
Good sleep quality (PSQI <5)	227 68.8	56 17.0	47 14.2	330 100.0	2	4.08	0.13
Poor sleep quality (PSQI >5)	55 59.8	24 26.1	13 14.1	92 100.0			

Table 5: Influence of workload on Shift work disorder among nurses

Variables	Low workload	High workload	Total	df	χ^2	p-value
Significant sleepiness (ESS score ≥10)	71 55.5	57 44.5	128 100.0	1	5.77	**0.01**
Non-significant sleepiness(ESS score <10)	199 67.7	95 32.3	294 100.0			
Insomnia	68 54.4	57 45.6	125 100.0	1	7.07	**0.001**
Non insomniac	202 68.0	95 32.0	297 100.0			
Sleep quality (difficulties)						
Good sleep quality (PSQI <5)	223 67.6	107 32.4	330 100.0	1	8.48	**0.001**
Poor sleep quality (PSQI >5)	47 51.1	45 48.9	92 100.0			

Prevalence of Shift Work Disorder among Nurses: The prevalence of symptoms predictive of shift work disorder was presented in Fig.II. The figure showed that 50.3% nurses working in OAUTHC had symptoms ranging from sleepiness and insomnia, which are predictive of SWD. Overall, 46.7% of the respondents in this study had symptoms predictive of SWD.

Influence of shift work, workload on SWD among nurses: The result on the association between type of shifts done by respondents and SWD was presented in table IV. The type of shift done by the nurses was significantly associated with insomnia (p= 0.02), no association was observed between the type of shift and sleepiness (p =0.72). Also, table V presented information on the influence high workload had on SWD. The table showed that workload burden by nurses was significantly associated with sleepiness (p = 0.01) ,

workload was also associated with insomnia among nurses (p = 0.001).

Discussion

The study showed that two-third of the nurses were female, this finding agreed with Ogunlade and Ogunfowokan (2014) who reported that up to two-third of the nurses in their study were females. This explained the fact that female nurses were more than male nurses. The study also showed that up to three-quarter of the nurses were Yoruba, this was probably because the study was conducted in Southwestern Nigeria, being a Yoruba dominated area. The study further showed that the mean working experience was 10.7±8.4. This agreed with finding from Ogunlade and Ogunfowokan (2014), who reported a mean work experience of 12 .6 (±9.6) years.

The study further showed that the nurse-patient ratios for Paediatric was 1: 6, Medical 1: 9, Surgical 1: 9, Emergency unit 1: 9, Psychiatry 1:4, Obstetrics & Gynaecology 1: 7 and in Intensive care units 1: 4. Overall, the mean nurse-patient ratio was 1:8 ± 6.4, this finding agreed with Hugonnet, Chevrolet and Pittet (2007) who reported the average nurse-patient ratio to be 1:9. This ran contrary to the recommendation from the Nursing and Midwifery Council of Nigeria (NMCN, 2009) who stipulated that the standard nurse-patient ratio in Nigeria should be between 1:1 and 1: 5 depending on the type of ward. Also, the finding from this study disagreed with the recommendation from California Nurses Association (2008) who showed the mandated staffing levels across Californian care settings. The mandate provided a minimum number of nursing staff to patients that must be on duty, not including the ward manager. In the general, the mandate stipulated that in medical and surgical wards, the ratio should be one nurse to five patients. This showed that there were high nurse-patient ratios in medical, surgical wards and emergency units and does not conform to the standards stipulated by both national and international bodies. The study showed that, up to half of the nurses had symptoms predictive for shift work disorder. This finding was in contrast to the study conducted by Anbazhagan, Ramesh, Nisha and Joseph (2016) who reported that less than half of nurses in their study had shift work disorder .

This study showed that more than half of the nurses in LUTH had high workload, a little above half of the nurses in OAUTHC had high workload and in FMC, OWO, below half of the nurses had high workload. This showed that nurses in LUTH had higher nurse to patient ratios compared to nurses in OAUTHC and FMC. Overall, the study showed that more than half of the nurses had high workload, while below half of the nurses had low workload. On type of shift and SWD, this study reported that insomnia was statistically associated with type of shift (χ^2=7.04, df=2, p=0.02). Furthermore, the study showed that there was a significant difference between insomnia and workload among nurses at χ^2 (1, N=422) = 7.07, p <.05). Also, there was a significant difference between sleep quality and workload among the nurses, as workload affected the quality of nurses sleep statistically at χ^2 (1, N =422) = 8.48, p <.05). Also, the study discovered a significant difference between significant sleepiness and workload among the nurses, as nurses with high workload seemed to have more significant sleepiness at χ^2 (1, N =422) = 5.77 p < .05. These findings showed that the level of workload was effective in influencing insomnia and significant sleepiness which are symptoms predictive of shift work disorder. This disagreed with Stanyar (2012) who indicated that high workload was negatively related with sleep quality (r= -15, p< 0.05). The researcher further submitted that high workload produced longer sleep onset latencies (p < 0.05, d= 0.63) and less wake after sleep onset (p < 0.05, d=0.64) than moderate workload. The finding on workload and insomnia of this study agreed with Nishitani and Sakakibara (2010) who in their study showed that insomnia was significantly related with appropriateness of quantitative workload (p<0.05). Also, findings on workload and significant sleepiness agreed with Kanazawa, Suzuki, Onoda and Yokozawa (2006) who found a significant association between excessive sleepiness and overtime work, a significant association was also found between subjective sleep quality and overtime work. Also, finding from this study agreed with Lin, Liao, Chen and Fan (2014) who posited that job stress was inversely related with sleep quality. Also, findings of this study agreed with Geiger-Brown, Rogers, Valerie .Trinkoff, Alison , Robert , Barker and Scharf (2012) who in their study reported that less

than half of the nurses had high sleepiness score > 7 on at least one shift.

Conclusion

Modalities on work distribution or allocation among nurses has a relationship with the health and productivity of the nurses, this study had shown that nurses who had more patients to take care of presented more features indicative of shift work disorder. Hence, attention of policy makers and stakeholders are being drawn to ensuring that the standard nurse-patient ratios are maintained across all units.

Limitations of the Study: Information collected for this study was from a questionnaire, clinical and laboratory analyses were not done, hence respondents could not be diagnosed as having Shift work disorder.

Implications for Nursing

Nursing Administration: The care the nurse renders is not limited to day duties; hence, she must work on shifts. This will ensure provision of care to clients and patients round the clock.

- Nurse Managers should regularly review workloads to ensure nurses have sufficient resources (in terms of time, administrative support or equipment).
- Nurses' workloads can be reviewed during team meetings, through an informal check-in with the supervisor or by undertaking ward assessments (Workplace Health & Safety, 2014).
- In other to reduce the workload on nurses, there should be adequate staff strengths and staff mixes on the wards.
- Nurse administrators should endeavor to implement the standard nurse-patient ratios across all wards.
- Also, nurse administrators should where possible, ensure shift rosters are agreed upon by the nurses and provide communication and consultation when designing or changing roasters.

Hospital Administrators

- Employers must assume responsibility for safeguarding the health of the nurses assigned to shift work, this they can do through collaborative effort between them and the nurses.
- Hospital administrators should incorporate short breaks into the work schedule of the nurses.
- Fewer successive shift changes and shorter shift lengths may be developed and implemented. Such changes could potentially minimize sleep deficits and preserve the sleep quality and sleep duration of shift workers (Barion & Zee, 2007).
- Administrators should ensure the standardized nurse-patient ratio benchmark is implemented in their hospital.

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