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Health Problems and Social Implications of Night Shift Duties among Nurses in a General Hospital in Uyo, Southern Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author OEJ designed the study, analyzed the data and wrote the protocol and the first draft of the manuscript, while author DOO supervised the data collection and contributed to the first draft of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Night shift duty distorts the natural sleep pattern of those who engage in it with attendant consequences. The aim of this study was to identify the health problems and social implications of night shift duties among nurses in a general hospital in Uyo, Nigeria.
Materials and Methods: This was a cross sectional descriptive study. A semi-structured questionnaire was used to obtain information on socio-demographic characteristics, job history and common complaints resulting from night shift. A sample of 143 nurses was used for the study. Data analysis was done using descriptive and inferential statistics with the aid of the Statistical Package for the Social Sciences (SPSS) version 20. Level of significance was set at 0.5.
Results: The mean age of respondents was 32.86±12.06 years. Majority, 132 (92.3%) were females, 54.5% were single and 63.6% had less than 5 years working experience. Majority, 131 (91.6%) were on rotating night shift. Up to 42% reported sleeping <3 hours after night duty. The top 5 problems reported were fatigue, (65%), headache, (50.3%), body pains, (48.2%), reduced family time, (41.3%) and falling asleep on duty, (25.2%). Fatigue was highest among those aged 51-60

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years ($p<0.05$). Twenty eight, (19.6%) felt their work performance during the night was less than day duties, while 80 (55.9%) felt more fatigued and 78 (54.5%) reported breaking down more frequently after night than day duties. The proportion breaking down increased from 37.5% among those who did <5 nights monthly to 66.7% among those who did >10. The difference was however not significant ($p>0.05$).

Conclusion: It was advocated that health education on good sleep hygiene and introduction of naps during duty hours may be useful in reducing the negative impact of night shift duties.

Keywords: Nurses; night duty; health problems; general hospital; social implications; Nigeria.

1. INTRODUCTION

Shift duty is a pattern of work where one employee replaces another on the same job within a 24 hour period [1,2]. The demands for provision of goods and services at all hours of the day and night are on the increase. This fact is even more important in rendering efficient health care delivery to the populace. Health care givers are required to work at all hours usually in the form of work shift schedules or call duties.

Standard daytime work schedule involves activities during the day commonly for a period of 8 hours between 7.00 am and 6.00 pm. Any work arrangement outside the standard daytime work schedule may also be regarded as shift work [3,4].

Nursing services is important in the delivery of total and timely healthcare needs which has to be delivered round the clock. Application of shift duties in nursing routine work schedule makes this possible. Approximately 30% of the nursing population is employed in shift work [5]. Night staff nurses comprise of nurses of all ages and experience levels. There are 3 categories of nurses who work night shifts. These are those who love to work in the night, those who are required to work nights by the organization and those who have to work nights due to personal circumstances such as child care needs, financial constraints or studies [3].

There are several documented problems associated with night shift work. Rajaratnam et al. [6] found that shift work is associated with circadian rhythm misalignment, inadequate and poor- quality of sleep and various sleep disorders. Circadian rhythms are natural sleep-wake cycles that occur in harmony with the light-dark cycles of daytime and night time. Disruption of the circadian rhythm may alter the body's biochemical, physiological and behavioral processes [2]. Often, complete circadian adaptation does not occur even among permanent night shift workers [3,7].

Other hazards of night duty include restlessness, sleepiness on the job, fatigue, decreased attention, disruption of body's metabolic process and depression [8,9]. These often interfere with work performance and efficiency, making night shift workers more prone to errors and accidents. Shift work disorders are associated with performance impairment or lost productivity [10]. Data from some studies suggest that working as few as three night shifts a month for multiple years is associated with increased disease risk [11-13].

There has been a rising correlation between medical errors and time of shift work. This may be attributed to reduced concentration which is associated with prolonged night shift work. Akerstedt in 2003 reported that 50% of shift workers had severe decreased alertness while on the job [14]. An Australian study reported the risk of occupational accidents to be 60% higher for non-day shift workers [6].

Shift work has also been reported to affect the worker's family and social lives and also interaction with colleagues who work in the day [3,15].

The aim of this study was to identify the health problems and social implications of night shift duties on nurses in a general hospital in Uyo, Akwa Ibom State with the view of making necessary recommendations.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in St Lukes Hospital, Anua, in Uyo, the capital of Akwa Ibom State, southern Nigeria. The hospital is one of the foremost missionary hospitals in south-south

Nigeria established in 1937. It has grown over the years from a 12 bed to a 360 bed hospital. It is managed by the catholic mission in collaboration with the State government. The facility is the biggest secondary health facility in the State capital. It renders primary and secondary services. These include obstetric, gynaecological, surgical, paediatric, accident and emergency services. The 2015 projected population of Uyo was 413,381 [16].

2.2 Study Design/Population

This was a cross sectional descriptive study carried out among nurses working in the inpatient wards of St Lukes Hospital, Anua in southern Nigeria.

2.3 Sampling Size

Total sampling was used. The facility had 150 nurses involved in night duties. All consenting nurses who were in this category were enrolled into the study.

2.4 Inclusion/Exclusion Criteria

All nurses duly registered with the Nursing Council of Nigeria, aged 20 to 60yrs, without history of any chronic debilitating illness, who worked on night shift duty either on a permanent basis or as part of a rotating shift duty schedule were included in the study.

All nurses doing only morning duties and those with chronic debilitating diseases were excluded from the study.

2.5 Data Collection Instrument

A semi-structured questionnaire designed by the researchers was used to obtain information on the socio-demographic characteristics of the respondents, job history, frequency of night shift and common complaints resulting from night shift. Two nurses not involved in night duty were recruited into the study as research assistants after going through a one day training session on the content of the questionnaire.

2.6 Sampling Technique

All eligible consenting nurses were enrolled into the study. The research assistants and the second author administered the data collection tool during the respective shifts of the respondents. Data collection lasted for 30 days. In order to avoid data contamination and sharing of ideas among respondents, the questionnaires were administered to each batch of nurses as soon as they commenced night duty after returning from off duty. The period of data collection was that long to enable those on off duty to resume work.

2.7 Data Management

The data obtained was edited manually, entered into computer and analyzed using the Statistical Package for the Social Sciences (SPSS) version 20. Data analysis was done using descriptive statistics (Frequency, proportions, means and standard deviation to summarize variables). Chi square was used to test the significance of association between variables. The Fishers exact test was used wherever the expected values were less than 5. Level of significance was set at 5%.

2.8 Ethical Considerations

Ethical clearance for this study was obtained from the Akwa Ibom State Health Research Committee and permission to conduct the research was obtained from the medical director in charge of the hospital of study. Each respondent's consent was obtained after the objectives of the study and the rights of the respondent were clearly spelt out. In order to ensure confidentiality and anonymity, serial numbers and not names were used. Data collected was kept secure and made accessible to only members of the research team.

3. RESULTS AND DISCUSSION

3.1 Results

A total of 143 out of 150 nurses involved in night shift duties participated in the study, giving a response rate of 95.3%. The mean age of respondents was 32.86±12.06 years. Majority, 132 (92.3%) were females, 54.5% were single, while slightly more than half, (51.1%) had varying number of children. Those with general nursing qualification formed the largest group, 66 (46.1%) (Table 1).

A total of 92 (64.3%) were nursing officers with mostly less than 5 years of working experience. Majority, 97, (67.8%) reported earning less than 50,000 Naira ($156) monthly. Sixty five percent

were on 12 hourly night duties for 5-10 days monthly. Majority, 131 (91.6%) were on rotating night shift. Up to 94 (71.7%) did 5-10 consecutive night duties before alternating. Approximately half, (49.6%) reported having less than 5 days off after 7 consecutive nights of duty. Majority of the respondents in the study, 103 (72%) had done night duty for only 1-5 years (Table 2).

Table 1. Socio-demographic characteristics of respondents N=143

Variable	Frequency	Proportion (%)
Age group (years)		
20-30	94	65.7
31-40	14	9.8
41-50	9	6.3
51-60	26	18.2
Mean (SD)= 32.86 (12.06)		
Sex		
Male	11	7.7
Female	132	92.3
Marital status		
Single	78	54.5
Married	54	37.8
Others*	11	7.7
Number of children		
None	70	48.9
1-3	50	35.0
>3	23	16.1
Highest educational level		
Midwifery	49	34.3
Nursing (RN)	66	46.1
Nursing/ Midwifery	12	8.4
Tertiary	16	11.2

Widow, divorced and separated

A total of 45 (31.5%) preferred night to day duties. The most common reason given by 100% of those who preferred night duty was having free time in the day. Up to 60 (42%) of all respondents in the study reported sleeping for less than 3 hours during the day time (including naps) after completing a night duty (Table 3).

The top 5 problems highlighted by respondents to be associated with night duty were fatigue, 93, (65%), headache, 72 (50.3%), body pains, 69 (48.2%), reduced family time, 59 (41.3%) and falling asleep on duty, 36 (25.2%) (Table 4).

Up to 28 (19.6%) felt their work performance during the night was less than day duties, while 80 (55.9%) felt they were more fatigued after night duty than day duty. Seventy eight respondents, (54.5%) reported more frequent occasions of breakdown (bouts of illness) after night compared to day duty (Table 5).

Table 2. Work history of respondents N=143

Variable	Frequency	Proportion (%)
Rank		
Nursing officer	92	64.3
Senior nursing Officer	15	10.5
Chief nursing Officer	36	25.2
Working experience (years)		
<5	91	63.6
5-10	16	11.2
>10	36	25.2
Monthly Income (Naira)		
<50,000 ($ 156)	97	67.8
50,000-100,000 ($156-312)	27	18.9
>100,000 (>$312)	19	13.3
Monthly night duties (days)		
<5	32	22.4
5-10	93	65.0
>10	18	12.6
Nature of 12 hourly night shift		
Permanent	12	8.4
Rotating	131	91.6
Consecutive Night duty days before alternating	**N=131**	
<5	28	21.4
5-10	94	71.7
>10	9	6.9
Days off after 7 days of night duty		
<5	71	49.6
5-10	67	46.8
>10	5	3.5
Years of night shift		
1-5	103	72.0
6-10	22	15.4
>10	18	12.6

There was no association between breaking down (becoming ill) after night duties and the ages of respondents. The proportion of those who broke down was however observed to increase from 37.5% among those who did less than 5 nights a month to 66.7% among those who did more than 10. The difference was however not significant (p>0.05). Also, those who did fewer nights before rotating tended to suffer more break down. The difference was however also not significant (p>0.05) There was a

significant association between age and fatigue. The proportion of those who complained of fatigue seemed to increase with age from 41 years (Fishers Exact=0.00). There was also a significant association between age and preference of night duty ((Fishers Exact=0.01) (Table 6).

Table 3. Night shift preferences and daily sleep duration N=143

Variable	Frequency	Proportion (%)
Preference of night shift		
Yes	45	31.5
No	98	68.5
If yes specify reasons for preference*	**N=45**	
Free time in the day	45	100.0
Cumulative off duty	13	28.9
Furthering education/2nd job	6	13.3
Less work	5	11.1
Total sleep duration after each night duty (hrs)		
<3	60	42.0
3-6	56	39.1
>6	27	18.9

***multiple answers*

3.2 Discussion

The mean age of respondents was 32.86±12.06 years. About two thirds were young people aged 20-30 years. There was a significant association between age and preference of night duties. Majority of the younger nurses did not prefer night duty, and an even greater proportion of the 51-60 year olds did not prefer night duty too. Also, about half of the respondents in this study were single. Overall, almost a third of the nurses in the present study preferred night to day duties. The most common reason given was having free time in the day. A similar study also reported that younger people were more likely to do shift duties than older people and single more than married people [3]. A study in Benin, Nigeria however reported that the younger nurses disliked night duties more than the older ones (p=0.01) [15].

In the present study, nine out of every ten respondents were females. This was much higher than findings of a similar study where 64.1% of respondents were females [17]. The higher number of males in that study may have been because the hospital used in that study unlike the present study had a psychiatric unit with many male nurses.

Table 4. Problems associated with night shift N=143

Problems*	Frequency	Proportion (%)
Fatigue	93	65.0
Headache	72	50.3
Body pains	69	48.2
Reduced time with family	59	41.3
Falling asleep on duty	36	25.2
Back pain	33	23.1
Reduced time with friends	33	23.1
Reduced time for social events	30	21.0
Reduced concentration	24	16.8
Isolation from daytime staff	28	16.1
Increased BP	15	10.5
Needle prick	11	7.7
Irritability	10	7.0
Depression	7	4.9

- *multiple answers*

Table 5. Comparison of night duty to day duty N=143

Variable	Frequency	Proportion (%)
Work performance		
Same	89	62.2
Less	28	19.6
Better	26	18.2
Level of fatigue		
More	80	55.9
Same	34	23.8
Less	29	20.3
Breaking down		
Yes	78	54.5
No	65	45.5
History of road traffic accidents after night duty		
No	134	92.7
Yes	9	6.3

Up to two thirds of the respondents in the present study had less than 5 years working experience. They obviously still needed adequate supervision from more experienced senior colleagues who were relatively few on night duty. Moreover, almost two thirds earned less than 50,000 Naira

Table 6. Association between some health consequences of night shift and selected variables

Variable	Breakdown		Total	Statistical indices
	Yes N=78 n(%)	No N=65 n(%)	N=143 n(%)	
Age (years)				
20-30	53 (56.4)	41(43.6)	94 (100)	
31-40	7 (50.0)	7 (50.0)	14 (100)	Fishers exact=0.41
41-50	5 (55.5)	4 (44.5)	9 (100)	
51-60	13 (61.5)	13 (38.5)	26 (100)	
Consecutive night duty days before alternating	**N=70**	**N=61**	**N=131**	
<5	16 (57.1)	12 (42.9)	28 (100)	Fishers exact=0.83
5-10	50 (53.2)	44 (46.8)	94 (100)	
>10	4 (44.4)	5 (55.6)	9 (100)	
Number of monthly night duties (days)				
<5	12 (37.5)	20 (62.5)	32 (100)	$\chi 2 = 5.60$
5-10	55 (59.1)	38 (40.9)	93 (100)	p=0.06
>10	1 2 (66.7)	6 (33.3)	18 (100)	
	Fatigue			
Age group (years)	**Yes N=93**	**No N=50**		
20-30	57 (60.6)	37 (39.4)	94 (100.0)	
31-40	10 (71.4)	4 (28.6)	14 (100.0)	Fishers
41-50	6 (66.7)	3 (33.3)	9 (100.0)	exact=0.00*
51-60	20 (76.9)	6 (23.1)	26 (100.0)	
	Preference for night duty			
Age group (years)	**Yes N=44**	**NO N=99**		
20-30	30 (31.9)	64 (68.1)	94 (100.0)	
31-40	9 (64.3)	5(35.7)	14 (100.0)	Fishers
41-50	2 (22.2)	7 (77.8)	9 (100.0)	exact=0.01*
51-60	3 (11.5)	23 (88.5)	26 (100.0)	

Significant

($156) monthly. This low level of pay might lead to their taking up a second job in order to augment their pay, which would in turn deprive them of time to rest.

There are several documented problems associated with night shift work. One of them is sleep deprivation. Up to 40% of all respondents in the present study reported sleeping for less than 3 hours after night duty including naps. This proportion was much higher than the finding reported in a study among nurses on night duty in University of Benin Teaching Hospital Edo State, Nigeria, where 8.7% complained of sleep deprivation [15]. A Brazillian study also reported that the nurses on night duty slept significantly less than exclusively daytime workers [18]. The sleep deprivation may be due to the need to create time for routine daytime responsibilities like taking care of children, cooking, doing house chores. Some also used the day time to further their education. The internal circadian clock may also keep people from sleeping during the day as daytime sleep is curtailed since the circadian clock promotes wakefulness [19]. There is thus a conflict between the day oriented circadian physiology and the requirement for work and sleep at the "wrong" time of the day [20] Moreover, many of these nurses may not have had quiet dark places to sleep as they may have had disturbances from family members who were carrying out their daytime activities and were not sleeping. Lack of adequate sleep in the day, however, is likely to affect the body functions and also lead to sub optimal performance while on night duty. Some studies have reported

retirement from work to be associated with better sleep quality [21-23].

Almost two thirds of the respondents in the current study identified fatigue as a top problem they encountered as a result of night duty. Although the longer people work, the more they will tire, it is also important to relate work to the time of a 24 hour day it is performed and not just the cumulative amount of work done in total. As far back as 1997, Fletcher and Dawson found that fatigue accumulated faster during night work compared with day work [24]. Mistakes from fatigued shift workers can affect the public's safety or health [3]. Fatigued workers are more prone to errors. In the present study, up to a quarter fell asleep on duty and about one sixth had reduced concentration. Another study reported that 21.3% lacked concentration [15]. The proportion of those who complained of fatigue in the current study seemed to increase with age from 41 years. The difference was however not significant. An Iranian study also reported that the effects of fatigue was worse on older nurses (more than 40yrs of age) [25]. Age may have been a confounder in both cases as it is to be expected that the older one gets, the less a person's stamina and therefore the more easily one gets tired.

Burn out stress is closely related to fatigue. It is a sustained response to chronic work stress. A study of 270 nurses in a Nigerian General Hospital found that too frequent night duties was associated with burnout stress [17].

Headache and body pains are also common complaints of night shift work. This may be due to chronic sleep deprivation and lack of rest. Isah et al. [15] reported that out of 310 nurses in a teaching hospital, 128 (58.7%) and 68 (21.9%) had generalized body pains and headaches respectively. In the present study, approximately half of the respondents complained of headache and body pains.

Night duty has also been reported to interfere with social and family life. Most social and family events happen in the evening or on weekends. The night shift workers are either preparing for work in the evening or asleep during the day. This denies them quality time with their family and also causes them to be absent from important social events [3]. Four out of every 10 respondents in the present study complained of reduced family time and about a fifth highlighted interference with their social lives. A similar study reported that 205 (66.1%) night duty nurses complained of negative impact on social and family life [15]. In another study, respondents reported that working nights more than four times fortnightly was related to complaints about insufficient time for children, rest and leisure [26]. Night shift workers are also cut off from their other colleagues and staff who work in the day. This adversely affects their workplace social bonding with other co-workers and management staff [3].

Shift work has been linked with increased risk of motor vehicle crashes and occupational injuries [10]. Compared to day workers, the risk of accidents and near miss events is higher among night shift workers [27]. Only few cases of involvement in road traffic accidents (RTA) and needle pricks were however reported in the present study.

Nine of every ten respondents in the present study were on rotating night shift. The night shift was for 12 hours (8 pm-8 am), while evening shift was for 6 hours (2 pm-8 pm) and morning shift was also 6 hours (8 am-2 pm). The rotating nurses were involved in all the 3 shifts. Approximately half reported having less than 5 days off after 7 consecutive nights of duty. Night duties of workers on rotating shifts have been reported to have a greater negative effect on sleep length than those on permanent night shift [28]. Also, some researchers have reported a lower accident rate and a higher rate of performance among permanent night workers compared to rotating shift workers who were reported to have more sleep/wake cycle disruption [29-30]. A study in Iceland documented that nurses working rotating day/evening/ night reported more stressful environmental risk factors and more strenuous work than those on single shifts [31] In the present study, those who did more nights before rotating seemed to suffer less episodes of breakdown. This could be due to the fact that their rhythm may have delayed and adapted to night work, thus enabling them to have more hours of sleep.

People who work in the night must combat the body's natural rest period while trying to remain alert. This may result in adverse health, safety and performance outcomes [6]. For instance, in the present study, one fifth of the respondents felt their work performance during night duties was less than during day. More than half also felt they were more fatigued and broke down more

frequently after night duty than day duty. Moreover, the proportion of those who broke down increased from 37.5% among those who did less than 5 nights a month to 66.7% among those who did more than 10 days of night monthly. Even though the difference was however not significant, it was still a pointer to the progression in the adverse effects of night duty as the days of duty increased. Scheduled napping during night shifts, for instance between 2 am to 3 am are reported to be beneficial [32]. A study has suggested that night time napping break could play a role in improving working conditions, work performance and safety [33], while another in addition suggested that challenging tasks should be completed before 4am to reduce patient care error [34].

4. CONCLUSION

Nurses on night duty face a lot of health and social challenges while rendering services. A possible way of reducing the negative impact may be to increase the number of nurses on night shift such that they can take turns to have naps. This can play a role in reducing medical errors, improving their health status, work performance and safety. Health education on adopting good sleep hygiene may also be beneficial.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Managing Shift Work, Health and Safety Guidance, Health and Safety Executive, HSG256. 2006;6.
2. Roth T. Prevalence, associated risks and treatment patterns of insomnia. J Clin Psychiatry. 2005;66(10-3):42-3.
3. Roger R. Rosa, Michael J. Colligan. Plain language about shift work: US Department of Health and Human Services (DHHS) (NIOSH) Publication. 1997;97-145:1.
4. Wright KP, Bogan RK, Wyatt JK. Shift work and the assessment and management of shift work disorders (SWD). Sleeo Med Rev. 2013;17:41-54.
5. Hughes R, Stone P. The perils of shift work: Evening shift, night shift and rotating shifts: Are they for you? Am J Nurs. 2004;104(9):60-3.
6. Rajaratnam SM, Howard ME, Grunstein RR. Sleep loss and circadian disruption in shift work: Health burden and management. Med J Aust. 2013; 199(8):11-15.
7. Rajaratnam SM, Arendt J. Health in a 24-h society. Lancet. 2001;358:999-1005.
8. Price M. The risks of night work. Monitor Staff. 2011;42(1):38.
9. Roth T, Roehrs T. Insomnia: Epidemiology, characteristics and consequences. Clin Cornerstone. 2003;5:5-15.
10. Barger LK, Lockley SW, Rajaratnam SM, Landrigan CP. Neurobehavioural, health and safety consequences associated with shift work in safety-sensitive professions. Curr Neurol Neurosci Rep. 2009;9:155-164.
11. Brown DL, Feskanich D, Sanchez BN, RExrode KM, Schernhammer ES, Lisabeth LD. Rotating night shift work and the risk of ischaemic stroke. Am J Epidemiol. 2009; 169:1370-77.
12. Pan A, Schernhammer ES, Sun Qu FB. Rotating night shift work and risk of type 2 diabetes: Two prospective cohort studies in women. PLoS Med. 2011;8:e1001141.
13. Viswanathan AN, Hankinson SE, Schernhammer ES. Night shift work and the risk of endometrial cancer. Cancer Res. 2007;67:10618-10622.
14. Akerstedt T. Shift work and disturbed sleep/wakefulness. Occup Med. 2003; 53(2):89-94.
15. Isah EC, Iyama CA, Imoudu GO. Health effects of night shift duty on nursing in a university teaching hospital in Benin City, Nigeria. Niger J Clin Pract. 2008;2:144-148.
16. Ministry of Economic Development, Uyo, Akwa Ibom State, Projected Population 2007-2015; 2014.
17. Lasebikan VO, Oyetunde MO. Burnout among nurses in a Nigerian general hospital: Prevalence and associated factors. ISRN Nursing. 2012;(2012):1-6.
18. Ribeiro-Silva F, Rotenberg L, Soares RE, Pessanha J, Ferreira FL, Oliveira P, Silva-Costa A, Benedito-Silva AA. Sleep on the job partially compensates for sleep loss in night shift nurses. Chronobiol Int. 2006; 23(6):1389-99.
19. Smith MR, Eastman CI. Shift work: Health, performance and safety problems, traditional countermeasures, and innovative management strategies to

reduce circadian misalignment. Nat Sci Sleep. 2012;4:111-132.
20. Akerstedt T, Wright K. Sleep loss and fatigue in shift work and shift work disorder. Sleep Med Clin. 2009;4(2):257-271.
21. Kronholm E, Hyyppa MT. Age related sleep habits and retirement. Annals of Clinical Research. 1985;17:257-64.
22. Marquie JC, Foret J. Sleep, age and shift work experience. J Sleep Res. 1999;8:297-304.
23. Vahtera J, Westerlund H, Hall M, Sjosten N, Kivimaki M, et al. Effect of retirement on sleep disturbances: The GAZEL Prospective Cohort Study. Sleep. 2009;32(11):1459-66.
24. Fletcher A, Dawson D. A predictive model of work related fatigue based on hours of work. J Occup Health and Safety- Australia & New Zealand. 1997;13(5):471-485.
25. Nasrabadi AN, Seif H, Latifi M, Rasoolzadeh N, Emami A. Night shift work experiences among Iranian nurses a qualitative study. International Nursing Review. 2009;56(4):493-503.
26. Portela LF, Rotenberg L, Waissmann W. Self reported health and sleep complaints among nursing personnel working under 12 h night and day shift. Chronobiol Int. 2004;21(6):859-77.
27. Folkard S. Lamboard, DA, Tucker PT. Shift work: Safety, sleepiness and sleep. Industrial Health. 2005;443:20–23.
28. Pilcher JJ, Lambert BJ, Huffcutt AI. Differential effects of permanent and rotating shifts on self report sleep length: A meta-analysis review. Sleep. 2000; 23(2):155-63.
29. Totterdell P, Spelten E, Smith L, Barton J, Folkard S. Recovery from work shifts: How long does it take? J. Applied Psychol. 1995;80(1):43-57.
30. Gold DR, Rogacz S, Bock N, Tosteson TD, Baum TM, Speizer FE, Czeisler CA. Rotating shift work, sleep and accidents related to sleepiness in hospital nurses. Am. J. Publ. Health. 1992;82(7):1011-14.
31. Sveinsdottir H. Self assessed quality of sleep, occupational health, working environment, illness experience and job satisfaction of female nurses working different combinations of shifts. Scand J Caring Sci. 2006;20(2):229-37.
32. Ruggiero JS, Redeker NS. Effects of napping on sleepiness and sleep related performance deficits in night shift workers: A systematic review. Biol Res Nurs 2014;16(2):134-42.
33. Takeyama H, Kubo T, Itani T. The nighttime nap strategies for improving night shift work in workplace. Ind Health. 2005;43(1):24-9.
34. Berger AM, Hobbs BB. Impact of shift work on the health and safety of nurses and patients. Clin J Oncol Nurs. 2006; 10(4):465-71.

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