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Original Article

Nurses' napping practices and their effects on sleepiness, fatigue, well-being, and quality of nursing care

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ABSTRACT

Background & Aim: Napping is one of the evidence-based countermeasures to fatigue and decreased alertness during night shift work. We aimed to understand night shift nurses' napping practices and study the effectiveness of different nap lengths on sleepiness, fatigue, well-being, and the quality of nursing care.
Methods & Materials: A comparative descriptive design was used. Data were self-reported by 305 nurses using the Questionnaire on Night Shift Napping Practices, the Karolinska Sleepiness Scale, the Fatigue Visual Analog Scale, the Everyday Feeling Questionnaire, and the Quality of Nursing Care Questionnaire. Data collection was done over 4 months between August and November 2022. Frequency tables, Mean, and standard deviation were used to describe data, and One-way analysis of variance (ANOVA) was used for means comparisons.
Results: About 40% of the nurses reported that they took naps during their night shifts. The majority (82.92%) reported that they napped for more than 45 minutes (N= 305). Napping was found to significantly reduce sleepiness (P= 0.002) and fatigue (P= 0.001) and improve the quality of nursing care (P= 0.03). The group who napped for more than 45 minutes reported significantly reduced levels of sleepiness (P= 0.02) and fatigue (P= 0.01) when compared to the group who either didn't nap or napped for less than 45 minutes.
Conclusion: This study suggests that implementing nap interventions for nurses on night shift can be an effective method to reduce sleepiness and fatigue, and improve patient care.

Introduction

Society requires nursing services round the clock. Consequently, nurses work on shift rotation and for extended work hours. Studies have linked working night shifts to fatigue and a decrease in psychological well-being (1, 2). This is a significant concern since the nurses' well-being can directly impact the quality of nursing services (3). The negative consequences of working the night shift are mainly due to the circadian misalignment whereby sleep-wake cycles are asynchronous with the biological night (4). The altered sleep/wake rhythm of nurses working night shifts has resulted in medical errors, near misses, incorrect charting, and personal injuries on shift and while driving home (5, 6). A study has reported that nurses working the night shift were 1.17 times more likely to report a medical error and 2.1 times more likely to report a near-miss medication error when compared to nurses working the day shift (7). Furthermore, working night shifts was linked to numerous health consequences, including increased risk for cardiovascular

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disease, obesity, and psychiatric conditions (4).

Nurses in Bhutan work in a three-shift system, with the morning and evening shifts each lasting six hours and the night shift lasting 12 hours. Bhutanese nurses preferred a 12-hour night shift scheme for transportation and security reasons. Extended shifts (> 8 hours) have been associated with greater fatigue and drowsiness at work (8). Findings revealed that at the eighth- and tenth-hour marks of their shift, night shift nurses' cognitive function was comparable to that of a person with a blood alcohol concentration of 0.05 percent and 0.08 percent, respectively (9). Maintaining adequate alertness throughout the night shift is a matter of practical concern for hospital managers, healthcare workers, and patients.

Several methods, including exposure to environmental stimuli like music and bright light, coffee use, and the use of other pharmacologically active substances, were recommended to maintain alertness, reduce fatigue, and sustain performance during the night shift (10). Providing a planned nap opportunity for nurses was identified as one possible strategy for reducing workplace fatigue and drowsiness (11). Laboratory and field studies support the idea that naps can improve alertness and cognitive performance (12). A nap has potential advantages over other approaches that primarily mask sleepiness because it directly addresses physiological sleep needs. It has been demonstrated that even a 10-minute nap can reduce tiredness and exhaustion and enhance cognitive performance (13). Although taking a nap during the night shift has been proven to be a successful remedy for fatigue and drowsiness in many safety-sensitive industries, nursing has been slow to adopt this approach (14). The use of naps in healthcare settings has been supported by a number of leadership organizations, including the Institute of Medicine, the Joint Commission, the American Nurses Association, and the American Academy of Nursing on Policy (15).

Although there is substantial data to suggest that naps are a suitable and successful safety intervention for night shift nurses, it is still unknown what duration of nap best enhances cognition and reduces fatigue (3). To validate or contradict the results of earlier studies and build a more comprehensive body of knowledge about workplace naps, more research on napping during the night shift is required. The objective of this study was to understand night shift nurses' napping practices and the effects of napping on sleepiness, fatigue, well-being, and the quality of nursing care.

Methods

This was a cross-sectional study. A comparative descriptive design was used. This study protocol was approved by the Research Ethical Board of the Ministry of Health, Bhutan (REBH/Approval/2021/151). A multistage cluster sampling technique was used to recruit the sample. Bhutan has 49 hospitals which include one national referral hospital, two regional referral hospitals, 18 district hospitals, two 60-bed hospitals, a 40-bed military hospital, three 20-bed and twenty-two 10-bed hospitals. Ten hospitals were randomly selected which included two referral hospitals, two 10-bed hospitals, and six non-10-bed hospitals. From these 10 hospitals, 305 participants were recruited using a simple random sampling technique. Bhutanese nurses have different levels of qualification- certificate, diploma, baccalaureate, and master's degree. All nurses were included in the sampling frame. Three hundred and five participants were recruited using a simple random sampling technique. A sample size of 305 was determined using the G*Power software (16). Prior research on napping in the nurse population is limited, and the majority of those that have been conducted have used a convenient sampling method. Therefore, the lower effect size of 0.33

was chosen to calculate the sample size (17). A power of 0.80 and an alpha value of 0.05 were considered. There was no sample attrition for this study, possibly because the average time taken to respond to the questionnaire was only 5 minutes.

Eligible subjects were nurses practicing on the night shift and willing to be a part of the study (N= 305). Informed written consent was taken from the nurses, after which they were asked to fill out a paper-and-pencil survey booklet, which included questions regarding their levels of sleepiness, fatigue, psychological well-being, and quality of nursing care. Furthermore, a one-time general questionnaire was included to collect the socio-demographic data of the participants. The survey booklet also contained a participant information sheet that described the study's objectives, benefits, and data confidentiality measures and assured participants of the absence of risks associated with their participation. Data were collected over a period of 4 months from August to November 2022. The researchers distributed the questionnaires and collected them between 6:00 a.m. and 8:00 a.m. to measure the momentary levels of their sleepiness, fatigue, and well-being. The participants responded to the questionnaire in a room identified by the researchers, and the data were self-reported.

The demographic data questionnaire was used to collect information regarding hospital type, age, gender, marital status, education level, hospital unit in which they worked, and years of nursing practice. The Questionnaire on night shift napping practices was designed to gather information about night shift nurses' napping practices, such as whether they napped during breaks, the length of their naps, the availability of napping space, the presence of a napping policy, whether they support napping practice and their concerns about napping on-shift. The questions were partly self-developed by researchers based on a literature review and the clinical experience of the research team and partly adopted from other questionnaires (11). To assess face and content validity, 6 experts in nursing reviewed the questions and made suggestions for revisions. The panel assigned each item a content validity index on a 4-point scale, and the score per item was calculated. Each item received a 4 (highly relevant) from all six members, yielding a content validity index of 1. To assess the content validity ratio (CVR), the expert panel rated each item on a scale ranging from 1 (not necessary) to 3 (essential). All of the items were rated as essential by the panel, indicating acceptable content validity. In addition, a pilot study was conducted with a group of nurses (N= 30). The nurses rated the survey as clear, relevant for gathering data to answer the study's research questions, and culturally appropriate.

The 9-point Karolinska Sleepiness Scale (KSS), which has been widely used in previous studies by shiftwork researchers, was used to assess sleepiness (18). A higher KSS score indicates greater sleepiness. Fatigue was assessed using the Visual Analog Scale (VAS) (19). Participants rated their fatigue on a 100-mm line. The values range from 0 mm (not at all tired) to 100 mm (extremely tired). The VAS technique, which yields global measures of fatigue, was found to be valid and reliable (19). Psychological well-being was measured with the Everyday Feeling Questionnaire (EFQ), which comprised 10 items ranging from 1 (strongly disagree) to 5 (strongly agree) (20). The items were slightly modified by adding the phrase "at the moment" to refer to the momentary level. Higher scores indicate greater emotional problems. In this study, Cronbach's alpha was 0.800 indicating sufficient reliability. A quality of nursing care questionnaire was used to collect information on the highest levels of nursing care quality that participants perceived they provided during the night shift on a scale of 1 (very bad) to 10 (very good). The information-gathering question was, "Please rate the highest levels of nursing care quality that you perceived you provided

during today's night shift, where 1 indicates "very bad" and 10 indicates "very good" (21). Single-item measures, often used in sleep and work diaries to reduce respondent burden, were reported to have acceptable measurement validity (22).

Data were analyzed using the Minitab software. Frequency tables, Mean, and standard deviation were used to describe data, and One-way analysis of variance (ANOVA) was used for means comparisons. The Tukey post hoc test was performed on variables demonstrating significant differences in group comparisons. A p-value of 0.05 was considered significant.

Results

Most participants (60.98%) were females and between the ages of 18 and 30 (63.93%). The mean age of the participants was 29.72 years (SD = 5.39). Approximately half of the nurses (54.75%) were married, and most had diploma qualifications (62.95%). Hospital departments were categorized according to different levels of workload (birthing, emergency, general ward, intensive care unit, maternity, medical, and surgical). A category designated as "other" included units such as dialysis, pediatrics, psychiatry, and oncology. The district and 10-bed hospitals have no separate wards and therefore are categorized as general wards. More than two-thirds of the nurses (73.78%) had nursing experience between 5 and 10 years. Nurse responses to demographic variables are shown in Table 1.

Table 1. Demographic description of nurses (N= 305)

Characteristics		**N**	**%**
Hospital	National referral	129	42.30
	Regional referral	72	23.61
	District	104	34.10
Age (years)	18-30	195	63.93
	31-50	109	35.74
	51-65	1	0.33
Gender	Female	186	60.98
	Male	119	39.02
Marital status	Married	167	54.75
	Single	134	43.93
	Divorced	4	1.31
Education level	Baccalaureate	100	32.79
	Diploma	192	62.95
	Certificate	13	4.26
Specific workplace	Birthing center	26	8.52
	Emergency	46	15.08
	General ward	53	17.38
	Intensive care unit	37	12.13
	Maternity ward	26	8.52
	Medical ward	62	20.33
	Surgical ward	19	6.23
	Others	36	11.80
Years of nursing experience	< 1	45	14.75
	1-5	129	42.30
	6-10	96	31.48
	>10	35	11.48

Napping practices

Two hundred sixty-four nurses (86.56%) said they get a break during their night shift. While the majority of the nurses (53.11%) reported that they just took a rest during the break, 39.34% reported that they took a nap during their night shifts. Most nurses who napped (82.92%) reported that they napped for more than 45 minutes. About

65% of the nurses reported that they had a place to nap, whereas 35% did not. Most (78.03%) took a pre-shift nap at home. All the nurses surveyed either reported that their hospital didn't have a napping policy or were unsure of it. As a result, 34.1% of them indicated that they were not permitted to take naps, while 46.23% were uncertain whether napping was allowed or not. The majority of nurses (60.98%) reported being concerned about the consequences of being caught napping. Almost all of the participants (95.41%) supported that napping should be allowed. Refer to Table 2 for information on napping practices.

Table 2. Nurses' report on napping practices during night shifts (N= 305)

Nurse napping practices		**N**	**%**
Occurrence of nurses getting a break	Yes	264	86.56
	No	41	13.44
If concerned nurses napped	Yes	123	40.33
	Rests only	162	53.11
	Neither	20	6.56
Nap length	Does not sleep	182	59.67
	<45 min	21	6.89
	≥45 min	102	33.44
Pre-shift nap at home	Yes	238	78.03
	No	67	21.97
Availability of a place to nap	Yes	198	64.92
	No	107	35.08
Participants' report on the availability of written policy for napping	No	218	71.48
	Unsure	87	28.52
If nurses felt napping is allowed	Yes	60	19.67
	No	104	34.1
	Unsure	141	46.23
If nurses felt napping should be supported	Yes	291	95.41
	No	14	4.59
If nurses were afraid of the consequences of taking a nap	Yes	186	60.98
	No	119	39.02
Concern about driving home after a night shift	Yes	213	69.84
	No	92	30.16

Differences in outcome variables between the nap and no-nap groups

When nap and no-nap groups were compared, statistically significant differences in sleepiness (P= 0.002), fatigue (P= 0.001), and quality of nursing care (P= 0.03) were reported. The groups 'rest only' and 'neither' were categorized as the no-nap group. The Tukey post hoc test revealed significant beneficial findings in those who reached naps. Refer to Table 3 for more information.

Duration of nap on sleepiness, fatigue, and quality of nursing care

When nap durations were compared, there were significant differences in sleepiness

(P= 0.02) and fatigue (P= 0.01). There is no gold standard definition for different nap durations. Most prior studies considered nap duration of less than 30-45 minutes as brief duration naps. In this study, we compared brief duration naps of < 45 minutes, long duration naps of > 45 minutes, and no nap condition. The Tukey post hoc test indicated that the group who napped for more than 45 minutes reported significantly lower levels of sleepiness and fatigue. However, no statistically significant findings were found for the quality of nursing care (P= 0.74).

Table 3. Comparison of self-reported sleepiness, fatigue, and quality of nursing care according to whether nurses could reach nap and the length of napping

Group	N (%)	Sleepiness (*M* ± *SD*)	Fatigue (*M* ± *SD*)	Quality of nursing care (*M* ± *SD*)	Psychological well-being (*M* ± *SD*)
Nap					
Yes	123 (40.33)	4.75+2.40	7.20 ± 2.46	7.18 ± 1.73	31.62 ± 3.21
Rests only	162 (53.11)	4.92 ± 2.23	6.13 ± 2.08	6.68 ± 1.94	31.15 ± 3.27
Neither	20 (6.56)	4.03 ± 1.70	5.59 ± 1.38	7.20 ± 2.19	31.60 ± 3.72
		F= 6.64	F= 7.41	F = 3.52	F = 1.02
		P= 0.002**	P= 0.001**	P = 0.03*	P = 0.36
Length of nap					
No-nap	182 (59.67)	4.83 ± 2.28	6.27 ± 2.15	7.13 ± 1.90	32.09 ± 3.35
<45 min	21 (6.98)	4.38 ± 2.01	5.52 ± 1.47	6.86 ± 1.85	32.00 ± 3.02
>45 min	102 (33.44)	4.10 ± 1.64	5.59 ± 1.37	7.20 ± 1.68	31.56 ± 3.18
		F= 4.17	F= 4.97	F = 0.30	F = 0.86
		P= 0.02*	P= 0.01*	P = 0.74	P = 0.42

* P < 0.05, **P< 0.01, *M*: Mean, *SD*: Standard Deviation

Discussion

This study revealed significant beneficial findings of napping. Moreover, a nap duration of more than 45 minutes was associated with favorable results in terms of minimizing sleepiness and fatigue. The majority of the nurses in Bhutan (86.56%) reported that they get breaks during their night shift. However, only about 40% of nurses reported napping during their breaks. One possible explanation for this is that there is no night-shift napping policy in Bhutan that gives nursing staff a legal right to nap, so many nurses (60.98%) reported being afraid of the consequences if they were caught napping. The other reason could be the lack of proper napping places. A study has reported that nurses feel napping during the night shift is stigmatized, and this could also be one reason nurses in our study were hesitant to take naps or report it (14). When asked if napping during the night shift should be supported, almost all of the participants (95.41%) were in favor of it.

In the nap and no-nap groups, our study found a significant difference in the participants' level of sleepiness, fatigue, and quality of nursing care. This provided evidence in support of other research that found that nap interventions significantly reduced perceived fatigue, sleepiness, and lapses (23). In our study, nap-group nurses also reported providing higher-quality nursing care. This supports earlier claims which reported that napping improved performance (3,21). Because of this, some authors have proposed nap interventions to lessen the impact of sleepiness while working at night (24). The current study's findings and earlier investigations are consistent with this assertion. It is imperative from these findings that nap interventions should be considered to boost cognition and maintain alertness in nurses on the night shift.

Our study reported no significant difference in psychological well-being between the nap and no-nap groups. This is in contrast to previous research that found that napping improved psychological well-being at the end

of the night shift (2). An explanation for this observation may be that a majority of our study participants (78.03%) reported taking pre-shift naps. These participants took prophylactic naps at home during the day before their night shift, which may have contributed to preventing psychological distress from night shift duty. There was also no significant finding for the group that rested during their breaks, which contradicts previous research that suggested that rests may also have a recuperative value (25). However, the results are consistent with a study that described the effect of sleeping but not resting on sleepiness (26).

In the literature, there are conflicting results and a lack of consensus regarding the duration of a nap during the night shift (27). In our study, participants who mentioned taking a nap for more than 45 minutes reported significant differences in sleepiness and fatigue when compared to those who either didn't nap or napped for less than 45 minutes. This finding suggests that a nap duration of at least 45 minutes could enhance nurses' performance and alertness optimally. However, studies have cautioned on the aspects of sleep inertia, which reduces vigilance during work with nap durations longer than 45 minutes (28). While there were significant differences between groups taking different nap lengths, it is important to exercise caution in generalizing the result to a larger population, as the mean scores for the outcome variables were relatively narrow. We suggest future research to further confirm this result. There was no significant difference in nap durations for the quality of nursing care or the psychological well-being of the nurses. A possible explanation for this could be that most of the participants (78.03%) took prophylactic naps at home.

Limitations

This study has several limitations. First, despite being quick and simple to read, single-item outcome indicators have drawbacks due to concerns over the completeness and accuracy of the results. Although the validity and reliability of single-item indicators have been shown to be acceptable in the field of nursing research, additional psychometric analyses for specific single-item outcome indicators should be performed. Second, this study is mainly based on participants' subjective perceptions and does not include physiological or objective measures. Another drawback of our study is the possibility of reporting bias since the data were self-reported.

Conclusion

Although prior studies have tested napping outside the medical profession, there is a limited study on napping among nurses. The findings of this study show that taking a nap can help reduce sleepiness and fatigue in nurses working night shifts, allowing them to be more alert on the job. The results also showed that napping intervention can help improve the quality of nursing care. Currently, nap interventions are uncommon in nurses' shift work. Considering the benefits of nap interventions, researchers, administrators, and nurses must work together to develop creative and effective napping policies.

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Conflict of interest

The authors declare no conflict of interest.

References

1. Min A, Hong HC, Son S, Lee T. Sleep, fatigue and alertness during working hours among rotating-shift nurses in Korea: An observational study. Journal of Nursing Management. 2021 Nov;29(8):2647-57.
2. Ferri P, Guadi M, Marcheselli L, Balduzzi S, Magnani D, Di Lorenzo R. The impact of shift work on the psychological and physical health of nurses in a general hospital: a comparison between rotating night shifts and day shifts. Risk management and healthcare policy. 2016 Sep 14:203-11.
3. Querstret D, O'Brien K, Skene DJ, Maben J. Improving fatigue risk management in healthcare: A systematic scoping review of sleep-related/fatigue-management interventions for nurses and midwives. International Journal of Nursing Studies. 2020 Jun 1;106:103513.
4. Baron KG, Reid KJ. Circadian misalignment and health. International Review of Psychiatry. 2014 Apr 1;26(2):139-54.
5. Di Muzio M, Reda F, Diella G, Di Simone E, Novelli L, D'Atri A, Giannini A, De Gennaro L. Not only a problem of fatigue and sleepiness: changes in psychomotor performance in italian nurses across 8-h rapidly rotating shifts. Journal of Clinical Medicine. 2019 Jan 5;8(1):47.
6. Fabbian F, Zucchi B, De Giorgi A, Tiseo R, Boari B, Salmi R, Cappadona R, Gianesini G, Bassi E, Signani F, Raparelli V. Chronotype, gender and general health. Chronobiology International. 2016 Aug 8;33(7):863-82.
7. Hong YH. Napping and Errors in Night Shift Nursing. Depaul University. Available from: https://via.library.depaul.edu/nursing-colloquium/207/Summer_2017/13/ (accessed 5 October 2022)
8. Bae SH, Fabry D. Assessing the relationships between nurse work hours/overtime and nurse and patient outcomes: Systematic literature review. Nursing Outlook. 2014 Mar 1;62(2):138-56.
9. James L, James SM, Wilson M, Brown N, Dotson EJ, Edwards CD, Butterfield P. Sleep health and predicted cognitive effectiveness of nurses working 12-hour shifts: an observational study. International Journal of Nursing Studies. 2020 Dec 1;112:103667.
10. Bonnefond A, Tassi P, Roge J, Muzet A. A critical review of techniques aiming at enhancing and sustaining worker's alertness during the night shift. Industrial Health. 2004;42(1):1-4.
11. Dalky HF, Raeda AF, Esraa AA. Nurse managers' perception of night-shift napping: A cross-sectional survey. In Nursing Forum. 2018; 53(2): 173-78.
12. Faraut B, Andrillon T, Vecchierini MF, Leger D. Napping: a public health issue. From epidemiological to laboratory studies. Sleep Medicine Reviews. 2017 Oct 1;35:85-100.
13. Brooks A, Lack L. A brief afternoon nap following nocturnal sleep restriction: Which nap duration is most recuperative? Sleep. 2006 Jun 1;29(6):831-40.
14. Brown JG, Sagherian K, Zhu S, Wieroniey M, Blair L, Warren J, Hinds P, Szeles R. Napping on the night shift: A two-hospital implementation project. The American Journal of Nursing. 2016 May;116(5):26.
15. Joint Commission. Sentinel event alert: health care worker fatigue and patient safety. Sentinel Event Alerts: Joint Commission. 2011;48.
16. Faul F, Erdfelder E, Lang AG, Buchner A. G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods. 2007 May;39(2):175-91.
17. Gray JR., Grove SK, Sutherland S. The practice of nursing research: Conduct, Critique and Utilization, Fifth Ed. St. Louis, United; 2016.
18. Åkerstedt T. Sleepiness as a consequence of shift work. Sleep. 1988 Jan 1;11(1):17-34.
19. Monk TH. A visual analogue scale technique to measure global vigor and affect. Psychiatry Research. 1989 Jan 1;27(1):89-99.
20. Uher R, Goodman R. The everyday feeling questionnaire: the structure and validation of a measure of general psychological well-being and distress. Social Psychiatry and Psychiatric Epidemiology. 2010 Mar;45:413-23.
21. Han K, Hwang H, Lim E, Jung M, Lee J, Lim E, Lee S, Kim YH, Choi-Kwon S, Baek H. Scheduled naps to improve drowsiness and quality of nursing care among 12-hour shift nurses. International Journal of Environmental Research and Public Health. 2021 Feb;18(3):891.

22. Geiger Brown J, Wieroney M, Blair L, Zhu S, Warren J, Scharf SM, Hinds PS. Measuring subjective sleepiness at work in hospital nurses: Validation of a modified delivery format of the Karolinska Sleepiness Scale. Sleep and Breathing. 2014 Dec;18:731-9.
23. Martin-Gill C, Barger LK, Moore CG, Higgins JS, Teasley EM, Weiss PM, Condle JP, Flickinger KL, Coppler PJ, Sequeira DJ, Divecha AA. Effects of napping during shift work on sleepiness and performance in emergency medical services personnel and similar shift workers: A systematic review and meta-analysis. Prehospital emergency care. 2018 Feb 15;22(sup1):47-57.
24. Dinges DF. An overview of sleepiness and accidents. Journal of Sleep Research. 1995 Dec;4:4-14.
25. Davy J, Göbel M. The effects of a self-selected nap opportunity on the psychophysiological, performance and subjective measures during a simulated industrial night shift regimen. Ergonomics. 2013 Feb 1;56(2):220-34.
26. Barthe B, Tirilly G, Gentil C, Toupin C. Job demands and resting and napping opportunities for nurses during night shifts: Impact on sleepiness and self-evaluated quality of healthcare. Industrial Health. 2016;54(2):157-62.
27. Silva-Costa A, Araú MM, Nagai R, Fischer FM. Environmental and organizational conditions for napping during night work: A qualitative study among nursing professionals. Sleep Science. 2010;3(1):11-5.
28. Hilditch CJ, Dorrian J, Centofanti SA, Van Dongen HP, Banks S. Sleep inertia associated with a 10-min nap before the commute home following a night shift: A laboratory simulation study. Accident Analysis & Prevention. 2017 Feb 1;99:411-5.