Advanced Nursing & Patient Care International Journal
ISSN: 2642-0147

Review Article *Volume 4 Issue 1*

Negative Effects of Night-Shift Nursing and Potential Strategies for Avoiding Them: A Systematic Review

Cheng M[1], Qiao J[1]*, Mellott S[2], Song H[1], Qi X[1], Wang W[2] and Goff M[2]

[1]The first affiliated hospital of Shan Dong First Medical University, Jinan, China

[2]Texas Woman's University, TX, USA

***Corresponding author:** Jianhong Qiao, The first affiliated hospital of Shan Dong First Medical University, 16766 Jingshi Road, Jinan, Shandong, China, Email: qiaojianhong@hotmail.com

Received Date: January 21, 2021; **Published Date:** February 26, 2021

Abstract

Developing effective management strategies is key for decreasing the negative effects of night-shift jobs such as nursing. This review aims to critically discuss the association between the risks of night-shift nursing and management strategies in a systematic literature review conducted for all studies published in MEDLINE/PubMed, EBSCO host, MEDLINE on Ovid SP PubMed, and Embase databases in the past 10 years. In total, 24 articles were included. All studies confirmed that the night-shift jobs lead to stress in work lives and increased the risk of developing health issues among nurses. Useful management strategies were proposed, including support from surrounding people, the organization, and environment, increasing manpower during heavy workload, flexibility in schedule, napping, and education regarding occupational health. However, few strategies have been effective in the long-term, and further studies for identifying effective and practical management strategies, which may reduce the adverse outcomes of night-shift work and promote the health of the nurses, are required.

Keywords: Nurses; Night-Shift Work; Management Strategies

Abbreviations: GH: Growth Hormone; PRL: Cortisol Prolactin; TSH: Thyrotrophic.

Introduction

Shift work is common among full-time and part-time workers worldwide, especially for nurses. Healthcare organizations often have to provide health care around the clock [1], which often leads to working between 11 pm-6 am, called the night-shift [2]. Night-shift duties have been part of nurses' profession since antiquity. Although night shifts are necessary in nursing, it may be deleterious to nurses' health and may decrease their work performance. Due to its relevance for the health and overall work performance for nurses, there is a growing body of research on night-shifts, predominantly quantitative. Previous systematic reviews have organized the existing knowledge regarding the physical illness and mental distress of night-shift work [3]. Qualitative research about nursing shift work has also been conducted, aiming to explore nurses' experiences of the night shift work and its health effects including the major concern for night shift nurses [4,5].

Many studies have suggested that night-shift work is associated with an increased risk of physical problems, including heart disease [6,7], ischemic stroke [5,8], metabolic syndrome [9], diabetes [10], menstrual disturbances [11,12], thyroid disease [13], ulcers [14], obesity [15], cancer [16-18] and gastrointestinal dysfunction [19]. Furthermore, night-shift nursing is associated with both circadian rhythm changes and sleep deprivation. The circadian rhythm cycle involves complex hormonal interactions, changes in body

temperature, and sleep-wake cycles, which may affect physical, mental, and behavioral attributes, resulting in increased stress in the body [20]. Furthermore, previous studies have suggested that the prevalence of shift work-related sleep disorder is approximately 10% among the night and rotating shift working population [21]. Night shift workers also experience a sense of isolation from family and friends, as well as depression, anxiety, irritability, and low self-esteem [22]. It also can increase the risk of developing insomnia and fatigue [23]. In addition, night-shift nursing is associated with a higher risk of work-related injuries, which include blood or body fluid exposure from needle sticks and musculoskeletal injuries [24]. A study showed that the night-shift nurses had significantly higher error rates and poor overall performance compared to day shift nurses [25]. Another study showed that shifts longer than 12 hours per day are associated with poor ratings of quality of care and high rates of unfinished work [26]. In a systematic review, researchers observed that the well-being of night-shift workers, especially those who rotated to work at night was poor and they were less satisfied with their jobs [27]. These in turn influenced the quality of medical care and patient safety and satisfaction.

Consecutive night-shift work is not only associated with physical illness, mental distress, and work-life imbalance, but also reduces overall work performance. Nursing in night shifts is impossible to avoid; hence, effective management strategies for reducing the impact of working at night on nurses' health and patient safety will be useful. Several strategies for decreasing the risks of night-shift nursing have been proposed. A flexible schedule based on staff needs promotes a sense of control and allows nurses an opportunity to achieve better work-life balance [6]. Napping is an evidence-based practice that has the potential to improve workplace safety between late working hours, such as between 4 am and 8 am [28]. The fatigue risk management system is another strategy developed by the Queensland Healthcare System [29], which involves hazard assessments that were grouped with a level of control from one to five. They also established strategies for managing fatigue risk at each level. However, few studies have evaluated the utility of these strategies in the long run [30].

Despite its importance, results of qualitative research are scattered throughout the literature. In this paper we present the first systematic review of this difficult nurse's experience, guided by the main research question, "What are nurse's experiences of night-shift?" We conducted a qualitative meta-analysis that interprets and synthesizes the existing qualitative data about night-shift work experience, with the aim of creating a more integrated view of the richness and diversity of nurse's accounts.

Methodology

The Researchers

Five researchers worked in nursing management field, at least as head nurses, and four researchers worked in clinical nursing with at least 3 years of shift work experience.

Search Strategy

An extensive literature search was conducted for English-language studies published in peer-reviewed journals in the last ten years (from Jan. 2010 to Dec. 2019). Attention was paid to studies on the effect of night shift, particularly in terms of DNA damage during night shift, and the increase in the working hours of nurses [1]. Electronic databases were searched using MEDLINE/PubMed, EBSCOhost, and MEDLINE on Ovid SP. The specific search terms included variations of the following key words: "nurses "," nursing", "shift work", "night shift work", "rotating work", "management", "administration", and "strategies". After reviewing the titles and abstracts, each article was reviewed for relevance, content, and research validity.

Inclusion and Exclusion Criteria

The PICO model recommended by the Australian JBI Evidence-based Health Care Center was used to formulate the inclusion and exclusion criteria for the literature. The model was developed and improved from the PICO model, as follows:

- Research types, using phenomenological research, grounded theory, ethnographic research, qualitative research methods such as field research and action research
- Research subjects, nurses, midwives, and other personnel engaged in nursing-related work
- Phenomena of interest, including the positive and negative experiences of shifts in the clinical nursing work by nurses or midwives , and role coping experience
- Situations, nurses or midwives and other personnel engaged in nursing-related work often work in night shifts during clinical nursing work [31].

❖ **Exclusion Criteria**

- Duplicate or incomplete information
- Cannot get full text
- Conference papers
- Non-Chinese and English literature

Date Extraction and Quality Assessment

The full text of all articles relevant to the systematic review or those having conclusive titles or abstracts were retrieved for further assessment. Based on the "qualitative research "QARI Data Extraction Tools" and qualitative research

quality evaluation standards for data extraction and quality evaluation of the included literature. Two reviewers arrived at independent decisions on whether to include each publication in the systematic review. Two of the authors reviewed all the relevant articles for inclusion in case of disagreement. Any disagreement or doubt was resolved via discussion. Date extraction fields were created to facilitate contrast and comparison of studies. These included the authors of the study, years of publication, country of study, and the level of the hospital. The sample population, sample size, multisite status, and study design were also extracted, as these factors were useful in distinguish the quality of the articles. The search procedure is displayed in Figure 1.

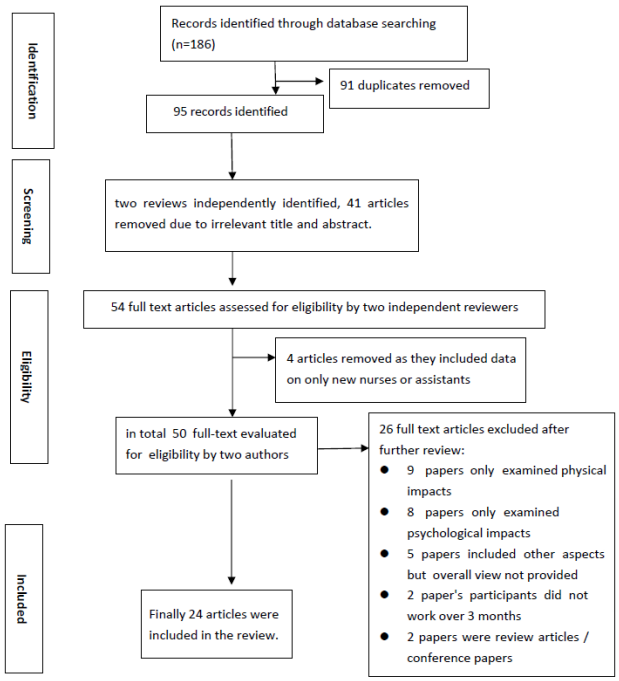

Figure 1: Search strategy and outcome.

Results

In total, 186 articles were found using the aforementioned search criteria. Of these, 91 were removed because of duplication, 41 were removed because they did not qualify based on the title and abstract, 4 articles were excluded because of the type of participants, 26 articles were removed because they only discussed the risks to nurses but not management strategies. Finally, 24 studies were included in the systematic review.

Of the final 24 studies, twenty studies used qualitative methodology, two studies used quantitative methodology, one was a systematic review, and one was a mixed methods study. The majority of them were conducted in developed countries such as the USA (n = 4), Australia (n = 3), Canada (n = 2), Japan (n = 2), and Korea (n = 1), while the others were in developing countries such as China (n =4), Brazil (n = 1) and so forth. Overall, nineteen articles used cross-sectional design, 4 articles used longitudinal method, and 1 article used a cohort study. Sixteen studies used a questionnaire survey, nurses were interviewed in 5 studies, 2 used focus group discussion, and 1 used an observer to observe the performance of the nurses working in the night shift.

All studies were evaluated for appropriate qualitative objective and method, description of the context and participants, justification of participant selection, description of qualitative data collection and analysis, and researcher reflexivity.

All nurses were registered nurses or licensed practice/ vocational nurses (LPN/LVN) who worked in the inpatient departments of hospitals. All of them worked for at least 3 months in three night-shift rotations and were involved in direct patient care. Two of these studies utilized nurses who were all over 45 years of age. Most nurses were from the intensive acute care units, emergency departments, and pediatric departments and worked at least four night- shifts per month.

Negative Effects of Night-Shift Nursing

These articles demonstrated several risks. Two studies referred to the category of shift work, which included the evening shift, night shift, morning rotating shift, and irregular shifts [32,22]. Nurses in the night shift had more sleep difficulties and showed errors in patient care [26,28] than the nurses in the other shifts. Two studies investigated the optimum night shift length and found that >12-hour shifts were associated with poor quality of care and more medical errors [27,13].

The attitudes toward night shift work were negative. Three studies showed that although working night shift was advantageous (as it allowed flexibility, spare time, and the scope of improving the work-life balance), it was worse than they expected owing to sleep deprivation [33,34]. Most of the researchers involved opined that night shift work was stressful, especially during work overload and in stressful workplaces such as the intensive care units [26,35]. One study showed that institute directors preferred to utilize 12-shift work hours as it had fewer overlaps between shifts, provided greater continuity of staffing, and was less cost-intensive [36]. Another study showed that the long work hours may compromise the care provided [26].

Management

Thirteen articles revealed that support from social networks,

organization, supervisor, coworkers and family were critical [30,33,34,37-45] as these can improve nurses' physical and mental problems. Leadership and sustained attention from the highest level of the organization was the key for progress [46]. Two studies concluded that the shortage of nurses and heavy workload should be improved by the social administration via implementation of proper policy [39,40]. Law makers and hospital administrators should incorporate measures for increasing the nurse-to-patient ratios to improve the environment and personal health status [40]. Four studies commented that the hospital should create supportive environments to decrease the stress of the night-shift nurses, i.e., they should build organizational culture of assisting each other [33], pay more attention to the diet of night-shift nurses [47] provide child care support [41] and comfortable work environment, design suitable, healthier, and science-based work schedules, and train for adopting a healthy life style [47,43] and work-life balance [41,34]. Managers should be alert to whether nurses on night shifts have any physical, psychological, and work-life balance problems [40]. Peer support from experienced nurses is also important for assisting and training new nurses [37,34]. Two studies showed that teamwork is an important issue that should be taken into account [38,33]. Two articles suggested that nursing leaders should take the initiative to preempt the likely dissatisfaction areas for the purpose of offering targeted support and employee services, and should communicate these to the directors [33,48].

Twelve studies observed that flexible shift arrangements can benefit both nurses and patients [25,26, 33,37,41-43,46,47,49,50]. Three studies emphasized that the schedules for nurses should enhance adaptability based on an individual's circadian type and reduce the effect of working in shifts on sleep quality [25,40,50]. Another study showed that fixed rotating work was helpful for mitigating the negative effect [51] and avoiding quick return to work, which meant > 11 hours between shifts [49]. Experienced nurses who had fixed schedule with night shift had better sleep qualities [32,34]. Four studies suggested that napping provided quiet time [25,40,50,52] and hence having a designated place for nurses before the start of the night shift was useful. A 40-min nap opportunity in the middle of a 12-hour night shift improved alertness and intravenous-insertion times among nurses working in emergency rooms [53] however, no policy support in this regard has been observed so far. Two researchers suggested that nurses older than 55 years should not be obliged to work night shifts [37,40] and that managers should pay more attention to the quality of work of older nurses. Hospitals and organizations are expected to consider the effects of night shift on health, because sleep-deprived nurses are likely to fall asleep during critical times, which may have catastrophic outcomes [43]. Using a staff development tool and completing time maps to assist staff retention may be a good approach for alleviating some of the stress [45].

Although several strategies have been demonstrated by these studies, most of them were only recommendations and their efficiency and cost-effectiveness have not been demonstrated.

Discussion

This review discussed the types, length, and timing of night shifts. Managers suggested that nurses working in fixed shifts showed fewer problems than those working in rotating shifts [54]. Fixed and 12 h-shifts are prevalent because of fewer overlaps, although it was not aggregable to the supervisors, as it involved working for long hours, which was not safe [42]. A fast shift rotation, which changed after every 3-5 days, may increase the level of anxiety and the risk of medical errors [55,54]. Decision-making, such as e-scheduling by nurses, particularly by middle-aged workers, is prevalent in medical settings, as they can organize their time [37]. All studies, both qualitative and quantitative, emphasized the importance of work-life balance. Nurses who are happy with their job exhibit better coping skills than those who are dissatisfied [56,54]. Some researchers have reported cost savings of 885,299 as reduced salary expenses and reduction in nurse turn-over rates from 14.2% to 10.9% [48].

In order to balance shift work, sleep, and life, it is necessary to obtain support from the government, supervisors, peers, and family members, in both formal and informal ways [30]. Government support is required to strengthen the human resources in healthcare [40]. Organizations that employ nurses and hospital managers are expected to implement valid strategies and health promotion measures, such as a provision of sleep hygiene advice and social support at worksites, which can possibly be effective in preventing or reducing occupational accidents among hospital nurses [57]. Nurse administrations are expected to employ more specialist nurses, such as occupational health nurses, who can address the effects of night shift in the workplace by implementing methods that are suitable for nurses [58].

The human body follows the circadian rhythm, and the only way to counteract the severe consequences of sleepiness is to sleep. Napping in nap pods before a work shift can increase alertness and reduce accidents; however, this is currently not acceptable and no policy has yet been formulated because of the shortage of nurses [28,53]. It is necessary for managers to allocate enough nurses and formulate policies to improve the situation. Sleep-related hormones such as growth hormone [GH], cortisol, prolactin [PRL], and thyrotrophic [TSH] may assist in sleeping, although the reasons for not using these medications without any medical requirement

are manifold [55]. Some scientists suggest prescribing melatonin supplements to night-shift workers when they attempt to sleep after their shift as it alleviates DNA damage, although this is yet to be proven [59].

Night shift work is irreplaceable. Although several different approaches to the problems associated with night shift have been suggested, research indicating the efficiency and effectiveness of these approaches are negligible, which is a challenge for health care executives. Science-based work schedules should consider the application of circadian principles and other factors for improving sleep disorders [60,61].

Conclusion

The negative impact of night shift work appears to be common among nurses. Night shift work is not good for the nurses' physical and psychological well-being, and quality of life. All the members, including governments, organizations, and nurses themselves, particularly managers in hospitals, should adopt measures for reducing occupational stress and enhancing coping strategies not only for encouraging nurses, but also for patient safety and improving the future of nursing.

Managers and hospital administrators should establish deliberate, sustained, and comprehensive efforts for cultivating a healthy workplace, allocate sufficient human resources, explore more science schedules, which will assist nurses in building positive attitudes toward sleep deprivation. Furthermore, education of night shift nurses regarding work-life balance, good sleeping habits, and sleep environment is required. More research, particularly inter-professional studies, is required to provide nurses the ability to maintain a safe work environment during the night shift in the workplace. Hospitals and organizations, as well as nurses themselves, should discuss these issues. Further research is required to formulate effective and practical management strategies that may reduce the negative outcomes of working in the night shift and improve nurses' health and patient safety.

Conflicts of Interest and Source of Funding

Jianhong Qiao has received a grant (ZR2015HL103) from the Shandong Provincial Natural Science Foundation, China. The remaining authors do not have any conflicts of interest.

References

1. Caruso CC (2014) Negative impacts of shiftwork and long work hours. Rehabil Nurs 39(1): 16-25.
2. Corporation BB (2015) Shift Working and Night Shifts.
3. Sun Q, Ji X, Zhou W, Liu J (2019) Sleep problems in shift nurses: A brief review and recommendations at both individual and institutional levels. J Nurs Manag 27(1): 10-18.
4. Books C, Coody LC, Kauffman R, Abraham S (2017) Night Shift Work and Its Health Effects on Nurses. Health Care Manag (Frederick) 36(4): 347-353.
5. Brown DL, Feskanich D, Sanchez BN, Rexrode KM, Schernhammer ES, et al. (2009) Rotating night shift work and the risk of ischemic stroke. Am J Epidemiol 169(11): 1370-1377.
6. Vetter C, Devore EE, Wegrzyn LR, Massa J, Speizer FE, et al. (2016) Association between Rotating Night Shift Work and Risk of Coronary Heart Disease Among Women. Jama 315(16): 1726-1734.
7. Wang X, Armstrong ME, Cairns BJ, Key TJ, Travis RC (2011) Shift work and chronic disease: the epidemiological evidence. Occup Med (Lond) 61(2): 78-89.
8. Frost P, Kolstad HA, Bonde JP (2009) Shift work and the risk of ischemic heart disease - a systematic review of the epidemiologic evidence. Scand J Work Environ Health 35(3): 163-179.
9. De Bacquer D, Van Risseghem M, Clays E, Kittel F, De Backer G, et al. (2009) Rotating shift work and the metabolic syndrome: a prospective study. Int J Epidemiol 38(3): 848-854.
10. Pan A, Schernhammer ES, Sun Q, Hu FB (2011) Rotating night shift work and risk of type 2 diabetes: two prospective cohort studies in women. PLoS Med 8(12): e1001141.
11. Lawson CC, Johnson CY, Chavarro JE, Lividoti Hibert EN, Whelan EA, et al. (2015) Work schedule and physically demanding work in relation to menstrual function: the Nurses' Health Study 3. Scand J Work Environ Health 41(2): 194-203.
12. Wan GH, Chung FF (2012) Working conditions associated with ovarian cycle in a medical center nurses: a Taiwan study. Jpn J Nurs Sci 9(1): 112-118.
13. Moon SH, Lee BJ, Kim SJ, Kim HC (2016) Relationship between thyroid stimulating hormone and night shift work. Ann Occup Environ Med 28: 53.
14. Laermans J, Broers C, Beckers K, Vancleef L, Steensels S, et al. (2014) Shifting the circadian rhythm of feeding in mice induces gastrointestinal, metabolic and immune

alterations which are influenced by ghrelin and the core clock gene Bmal1. PLoS One 9(10): e110176.

15. Zhao I, Bogossian F, Turner C (2012) The effects of shift work and interaction between shift work and overweight/obesity on low back pain in nurses: results from a longitudinal study. J Occup Environ Med 54(7): 820-825.

16. Hansen J (2006) Risk of breast cancer after night- and shift work: current evidence and ongoing studies in Denmark. Cancer Causes Control 17(4): 531-537.

17. Kwon P, Lundin J, Li W, Ray R, Littell C, et al. (2015) Night shift work and lung cancer risk among female textile workers in Shanghai, China. J Occup Environ Hyg 12(5): 334-341.

18. Wang P, Ren FM, Lin Y, Su FX, Jia WH, et al. (2015) Night-shift work, sleep duration, daytime napping, and breast cancer risk. Sleep Med 16(4): 462-468.

19. Nojkov B, Rubenstein JH, Chey WD, Hoogerwerf WA (2010) The impact of rotating shift work on the prevalence of irritable bowel syndrome in nurses. Am J Gastroenterol 105(4): 842-847.

20. Zelinski EL, Deibel SH, McDonald RJ (2014) The trouble with circadian clock dysfunction: multiple deleterious effects on the brain and body. Neurosci Biobehav Rev 40: 80-101.

21. Drake CL, Roehrs T, Richardson G, Walsh JK, Roth T (2004) Shift work sleep disorder: prevalence and consequences beyond that of symptomatic day workers. Sleep 27(8): 1453-1462.

22. Wilson JL (2002) The impact of shift patterns on healthcare professionals. J Nurs Manag 10(4): 211-219.

23. Lee CH, Lin LJ, Cheng CL, Kao Yang YH, Chen JY, et al. (2010) Incidence and cumulative recurrence rates of venous thromboembolism in the Taiwanese population. J Thromb Haemost 8(7): 1515-1523.

24. Bernal D, Campos-Serna J, Tobias A, Vargas-Prada S, Benavides FG, et al. (2015) Work-related psychosocial risk factors and musculoskeletal disorders in hospital nurses and nursing aides: a systematic review and meta-analysis. Int J Nurs Stud 52(2): 635-648.

25. Niu SF, Miao NF, Liao YM, Chi MJ, Chung MH, et al. (2017) Sleep Quality Associated With Different Work Schedules: A Longitudinal Study of Nursing Staff. Biol Res Nurs 19(4): 375-381.

26. Ball J, Day T, Murrells T, Dall'Ora C, Rafferty AM, et al. (2017) Cross-sectional examination of the association between shift length and hospital nurses job satisfaction and nurse reported quality measures. BMC Nurs 16: 26.

27. De Cordova PB, Phibbs CS, Bartel AP, Stone PW (2012) Twenty-four/seven: a mixed-method systematic review of the off-shift literature. J Adv Nurs 68(7): 1454-1468.

28. Geiger-Brown J, Sagherian K, Zhu S, Wieroniey MA, Blair L, et al. (2016) CE: Original Research: Napping on the Night Shift: A Two-Hospital Implementation Project. Am J Nurs 116(5): 26-33.

29. Lerman SE, Eskin E, Flower DJ, George EC, Gerson B, et al. (2012) Fatigue risk management in the workplace. Practice Guideline 54(2): 231-258.

30. Wilkins K, Shields M (2011) Employer-provided support services and job dissatisfaction in Canadian registered nurses. J Nurs Adm 41(7-8): S45-S53.

31. Cooke A, Smith D, Booth A (2012) Beyond PICO: the SPIDER tool for qualitative evidence synthesis. Qual Health Res 22(10): 1435-1443.

32. Bjorvatn B, Dale S, Hogstad-Erikstein R, Fiske E, Pallesen S, et al. (2012) Self-reported sleep and health among Norwegian hospital nurses in intensive care units. Nurs Crit Care 17(4): 180-188.

33. Gifkins J, Loudoun R, Johnston A (2017) Coping strategies and social support needs of experienced and inexperienced nurses performing shiftwork. J Adv Nurs 73(12): 3079-3089.

34. Qin Z, Zhong X, Ma J, Lin H (2016) Stressors affecting nurses in China. Contemp Nurse 52(4): 447- 453.

35. Stimpfel AW, Aiken LH (2013) Hospital staff nurses' shift length associated with safety and quality of care. J Nurs Care Qual 28(2): 122-129.

36. Trinkoff AM, Johantgen M, Storr CL, Gurses AP, Liang Y, et al. (2011) Nurses' work schedule characteristics, nurse staffing, and patient mortality. Nurs Res 60(1): 1-8.

37. Clendon J, Walker L (2016) Nurses aged over 50 and their perceptions of flexible working. J Nurs Manag 24(3): 336-346.

38. Da Costa DG, Dall'Agnol CM (2011) Participative leadership in the management process of nightshift nursing. Rev Lat Am Enfermagem 19(6): 1306-1313.

39. De Cordova PB, Phibbs CS, Stone PW (2013) Perceptions and observations of off-shift nursing. J Nurs Manag 21(2): 283-292.

40. Farzianpour F, Nosrati SA, Foroushani AR, Hasanpour F, Jelodar ZK, et al. (2015) Relationship Between Shift Work and Personality Traits of Nurses and Their Coping Strategies. Glob J Health Sci 8(5): 166-174.

41. Fujimoto T, Kotani S, Suzuki R (2008) Work-family conflict of nurses in Japan. J Clin Nurs 17(24): 3286-3295.

42. Han K, Trinkoff AM, Geiger-Brown J (2014) Factors associated with work-related fatigue and recovery in hospital nurses working 12-hour shifts. Workplace Health Saf 62(10): 409-414.

43. Rheaume A, Mullen J (2017) The impact of long work hours and shift work on cognitive errors in nurses. J Nurs Manag 26(1): 26-32.

44. Teclaw R, Osatuke K (2015) Nurse perceptions of workplace environment: differences across shifts. J Nurs Manag 23(8): 1137-1146.

45. West S, Boughton M, Byrnes M (2009) Juggling multiple temporalities: the shift work story of mid-life nurses. J Nurs Manag 17(1): 110-119.

46. Happell B, Dwyer T, Reid-Searl K, Burke KJ, Caperchione CM, et al. (2013) Nurses and stress: recognizing causes and seeking solutions. J Nurs Manag 21(4): 638-647.

47. Han K, Choi-Kwon S, Kim KS (2016) Poor dietary behaviors among hospital nurses in Seoul, South Korea. Appl Nurs Res 30: 38-44.

48. Robbins JR, Valdez-Delgado KK, Caldwell NW, Yoder LH, Hayes EJ, et al. (2017) Implementation and outcomes of an evidence-based precepting program for burn nurses. Burns 43(7): 1441-1448.

49. Eldevik MF, Flo E, Moen BE, Pallesen S, Bjorvatn B (2013) Insomnia, excessive sleepiness, excessive fatigue, anxiety, depression and shift work disorder in nurses having less than 11 hours in-between shifts. PLoS One 8(8): e70882.

50. Lin SH, Liao WC, Chen MY, Fan JY (2014) The impact of shift work on nurses' job stress, sleep quality and self-perceived health status. J Nurs Manag 22(5): 604-612.

51. Storemark SS, Fossum IN, Bjorvatn B, Moen BE, Flo E, et al. (2013) Personality factors predict sleep-related shift work tolerance in different shifts at 2-year follow-up: a prospective study. BMJ Open 3(11): e003696.

52. Dalky HF, Raeda AF, Esraa AA (2017) Nurse managers' perception of night-shift napping: A cross-sectional survey. Nurs Forum 53(2): 173-178.

53. Smith-Coggins R, Howard SK, Mac DT, Wang C, Kwan S, et al. (2006) Improving alertness and performance in emergency department physicians and nurses: the use of planned naps. Ann Emerg Med 48(5): 596-604.

54. Peters V, De Rijk A, Engels J, Heerkens Y, Nijhuis F (2016) A new typology of work schedules: Evidence from a cross-sectional study among nurses working in residential elder care. Work 54(1): 21-33.

55. Chang YS, Chen HL, Hsu CY, Su SF, Liu CK, et al. (2013) Nurses working on fast rotating shifts overestimate cognitive function and the capacity of maintaining wakefulness during the daytime after a rotating shift. Sleep Med 14(7): 605-613.

56. Chang YS, Wu YH, Hsu CY, Tang SH, Yang LL, et al. (2011) Impairment of perceptual and motor abilities at the end of a night shift is greater in nurses working fast rotating shifts. Sleep Med 12(9): 866-869.

57. Petrov ME, Clark CB, Molzof HE, Johnson RL, Cropsey KL, et al. (2014) Sleep Strategies of Night-Shift Nurses on Days Off: Which Ones are Most Adaptive? Front Neurol 5: 277.

58. Huth JJ, Eliades A, Handwork C, Englehart JL, Messenger J (2013) Shift worked, quality of sleep, and elevated body mass index in pediatric nurses. J Pediatr Nurs 28(6): e64-e73.

59. Bhatti P, Mirick DK, Randolph TW, Gong J, Buchanan DT, et al. (2017) Oxidative DNA damage during night shift work. Occup Environ Med 74(9): 680-683.

60. Hughes V (2016) Safe night-shift work. Nurs Manage 47(8): 30-36.

61. Nasrabadi AN, Seif H, Latifi M, Rasoolzadeh N, Emami A (2009) Night shift work experiences among Iranian nurses: a qualitative study. Int Nurs Rev 56(4): 498-503.