

THE EFFECT OF SHIFT WORK SYSTEMS ON NURSES' PHYSICAL AND
PSYCHOLOGICAL WELL-BEING

SOBIROH BINTI SUHAIL

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To my beloved parents, siblings and friends

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ABSTRACT

Shift work is an important source of disturbances to the health and well-being of nurses. However, nursing services must be available on 24-hour per day considering patients in the hospital need continuous health care making rotating shift work is common and necessary for nurses. In this study, the effect of shift work systems on nurses' physical and psychological well-being such as sleep quality, functional gastrointestinal disorders, fatigue, anxiety and depression were examined in a sample of nurses (n = 303) as well as to compare of such effect. The questionnaire used for data collection consists of sleep quality which assessed by Karolinska Sleep Questionnaire (KSQ) and functional gastrointestinal disorders which employed the Gastrointestinal Symptoms Questionnaire. Meanwhile, fatigue was evaluated by Fatigue Questionnaire (FQ) and anxiety and depression was measured by Hospital Anxiety and Depression Scale (HADS). The results from simple linear regression indicate that rotating shift work has a negative significant effect on sleep quality, functional gastrointestinal disorders, fatigue and anxiety compared to non-shift work but there is no significant effect on depression. Besides, the implications and recommendations of this study were also discussed.

ABSTRAK

Kerja syif adalah merupakan punca gangguan utama kepada kesihatan dan kesejahteraan jururawat. Walaubagaimanapun, perkhidmatan kejururawatan sentiasa diperlukan 24 jam sehari memandangkan pesakit di hospital memerlukan rawatan kesihatan yang berterusan membuatkan pusing ganti kerja syif menjadi kebiasaan dan keperluan bagi jururawat. Oleh itu, dalam kajian ini, kesan sistem kerja syif kepada kesejahteraan fizikal dan psikologi jururawat seperti kualiti tidur, gangguan gastrousus, keletihan, kebimbangan dan kemurungan telah dikaji dalam sampel yang terdiri daripada jururawat ($n = 303$) dan juga untuk membandingkan kesan tersebut. Soal selidik yang digunakan untuk pengumpulan data terdiri daripada kualiti tidur yang dinilai dengan *Karolinska Sleep Questionnaire (KSQ)* dan gangguan gastrousus yang menggunakan *Gastrointestinal Symptoms Questionnaire*. Sementara itu, keletihan telah dinilai dengan menggunakan *Fatigue Questionnaire (FQ)* dan kebimbangan dan kemurungan pula telah diukur oleh *Hospital Anxiety and Depression Scale (HADS)*. Dapatan kajian daripada regresi linear mudah menunjukkan bahawa pusing ganti kerja syif mempunyai kesan signifikan yang negatif terhadap kualiti tidur, gangguan gastrousus, keletihan dan kebimbangan berbanding dengan tiada syif tetapi tiada kesan yang signifikan terhadap kemurungan. Di samping itu, implikasi dan cadangan turut dibincangkan di dalam kajian ini.

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LIST OF ABBREVIATIONS

BDI	-	Beck Depression Inventory
BDQ	-	Bowel Disease Questionnaire
BFI	-	Brief Fatigue Questionnaire
BMI	-	Body Mass Index
CFS	-	Chronic Fatigue Scale
CFS	-	Chronic Fatigue Syndrome
DASS	-	Depression Anxiety Stress Scale
EPS	-	Epigastric Pain Syndrome
FD	-	Functional Dyspepsia
FGIDs	-	Functional Gastrointestinal Disorders
FQ	-	Fatigue Questionnaire
GAS	-	General Adaptation Syndrome
GHQ-28	-	General Health Questionnaire-28
HADS	-	Hospital Anxiety and Depression Scale
IBS	-	Irritable Bowel Syndrome
K-S	-	Kolmogorov Smirnov
KSQ	-	Karolinska Sleep Questionnaire
PDS	-	Postprandial Distress Symptom
PSQI	-	Pittsburgh Sleep Quality Index
SSI	-	Standard Shiftwork Index
VIF	-	Variance Inflation Factor
WHO	-	World Health Organization

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In this chapter, the background of the study and the problem statement is explained. Besides that, this chapter further discussed about the research objectives and significance of the study. At the end of this chapter, conceptual and operational definition is clarified.

1.2 Background of the Study

In modern society, shift work systems are increasingly common characteristic expected in many occupations (Korompeli et al., 2014). Nowadays, a number of workers doing shift as part of their work contract are growing. Several reasons for shift work are because of the business needs, continuous production and also the

need to provide 24-hour services. Therefore, people are required to work at all hours regardless of day and night (Nazri et al., 2008; Rosa and Colligan, 1997).

According to the data released by the Bureau of Labour Statistics in 2004, nearly 15 million Americans work full time on the evening shift, night shift, rotating shift or other irregular work schedules. The report from International Labour Organization (2003) stated that the annual working hours per person in the United States exceed Japan and most of the Western Europe (Caruso et al., 2004). Since it has been practiced in the United States and Europe, the shift work systems in Malaysia is receiving more attention. Rapid changes in technology and market globalization led to the introduction of variety working schedules and hours in contrast to regular 8.00 a.m. to 5.00 p.m. working hours (Rampal et al., 2002).

Generally, shift work systems is used to describe a variety of working schedule that includes (1) working outside daytime hours such as night shift; (2) overtime or longer shift hours; (3) irregular or rotational work pattern (a system that required staff to work a combination of day, evening and night shifts); and (4) non-shift schedule (day work) that refers to the working hours which an office is normally open for business or in other words, following a standard working days/office hours (8.00 a.m. to 5.00 p.m.) or a permanent/fixed hours per day (Akerstedt, 1998; Nazatul et al., 2008). The occupations affected include the military defence, transportation, manufacturing, food services, security personnel, police, firefighter and health care personnel particularly nurse (Blachowicz and Letizia, 2006).

In the health care services, nursing is the biggest sector in term of employees and changes in the work patterns result in a major impact to the nursing profession (Lipscomb et al., 2002; Trinkoff et al., 2006). According to Sveinsdottir (2006), the important aspect in the work environment of nurses is that they are required to provide continuous health care around the clock. Thus, rotating shift work is common and necessary for nurses considering patients in the hospital need 24-hour

care. However, rotating shift work has been found to be associated with a variety of health problems that not only led to the negative effect of nurses' health status but also affect the quality of health care provided (Gong et al., 2014; Tsai and Liu, 2012).

Berger and Hobbs (2006) stated that rotating shift work is the main causes of disruption to the well-being of nurses because rotating shift interfere body's natural circadian rhythms, and nurses have a tendency to experience a condition known as 'shift lag' and desynchronize (Shao et al., 2010). In addition, rotating shift work have been related with various health problems which are cardiovascular disease, gastrointestinal disorders, fatigue, anxiety and depression, cancer, sleep disorder (Harma and Kecklund, 2010), upper respiratory and pulmonary problems, infertility, obesity (Van Cauter and Turek, 1990), diabetes, hypertension and social problems (Keller, 2009).

In addition to health problems, rotating shift workers also facing problem related to their family and social life. They tend to suffer poor family bonding due to their shift schedules and involvement in the family obligations is difficult to achieve (Boisard et al., 2003; Korompeli et al., 2014). Compared to non-shift workers, rotating shift workers spend less time with the family and as a consequence, relationship between the family members becomes less close (Vogel et al., 2012). As for social life, rotating shift workers are having difficulty to participate in social and casual activities because their working hours regularly overlap with daylight activities of the general population. As a result, shift work can lead to social marginalization (Harrington, 2001).

The previous study denoted that numerous negative effect related to rotating shift work are leading to disability that require early retirement. Besides, there is also an increase in the accident while performing tasks, reduced duration and quality of sleep, fatigue and less alertness while on the job (Van der Hulst, 2003). Consequently, rotating shift worker may experience poorer work performance and

decreased in reaction time (Scott et al., 2006). Thus, the investigation of prevalence and effect of shift work systems on workers' physical, psychological and physiological well-being especially among the nurses should be done to find alternative working arrangements in the organization. In order to have knowledge on the signs and symptoms of health problems, the effect of shift work systems should be investigated as the first step.

1.3 Problem Statement

The nursing shortage is a major problem in the health care industry and becomes a global phenomenon. In Malaysia, this phenomenon was proven through a report by the American Society of Registered Nurses (2007) which stated that Malaysia needs 20,000 registered nurses in all specialization. Adding to this shortage, approximately 1,000 of Malaysian' nurses are leaving the nursing profession annually. Apart from that, local nurses also indicated that the demanding work and longer working hours as the reason for their early turnover from the profession (Tang and Ghani, 2012).

According to a statistic from Ministry of Health Malaysia (2015), there are 92, 681 certified nurses in Malaysia for the year 2014 in both public and private sector with the ratio of nurse to population at 1:325. It has been estimated that a total of 130, 000 nurses will be required by the year 2020 to reach a targeted 1:200 nurses to population ratio, in line with the ideal ratio according to the World Health Organization (WHO) (Rusmin, 2015, April 27). But, since from a long time ago, nurses have to work either in 8-hour or 12-hour shift and this scheduling must be maintained regardless of nurse-patient ratio. Thus, the 24-hour scheduling in rotation is the only option for all hospital nurses without exception (Ministry of Higher Education Malaysia, 2010).

In spite of that, rotating shift work is the main sources of disturbances and could adversely affect many aspect of health and well-being of nurses. However, nursing services must be available on the 24-hour basis making shift work is necessary for nurses. In their line of work, nurses frequently have little control over the shift schedule and this work pattern is known to require them to adapt physically, emotionally and socially. Consequently, nurses might experience various types of health problems (Chan, 2009). One of the concern issues is nurses are prone to occupational stress due to their crucial contribution in health care industry (Lua and Imilia, 2011).

Furthermore, shift work is identified as one of the job stressor that makes nurses vulnerable to stress. Shift work typically attracts pay enhancement but can have a significant effect on personal and social life. Nurses who have prolonged shift work especially night shift faced a higher stress level due to the irregular working schedules compared to the day working nurses (Sharifah Zainiyah et al., 2011). The effect of prolonged stress can have a negative impact on nurses' personal or professional life such as their bodies are more susceptible to physical and mental health problems (Lan et al., 2014).

Previous studies showed that people who are required to take rotating shift work had numerous health disorders including poor sleep quality, gastrointestinal problems, emotional disorders and also more prone to have cardiovascular disease, peptic ulcer disease and heart disease (Basner, 2005). In addition, nurses that experience stress are more likely to expose in depression, somatic disturbances, sleep disorders and burnout. All of these will lead to jeopardize the quality of care they provide. Besides, nurses on rotating shift were found to take more sick days and often feel tired and sleepiness compared to non-shift nurses (Chan, 2009).

Akerstedt (2003) stated that in nurses' work schedules that include night work, sleep disturbances are among the most often reported health problems. Several reports have been made that when compared to day workers, rotating shift

workers experiences more fatigue and poor sleep quality which result in frequent daytime sleepiness and experience of physiologic change (Kim et al., 2013). Apart from that, nurses on three shift rotation also experience more gastrointestinal and musculoskeletal symptoms than nurses on regular day shift (Sveinsdottir et al. 2006).

Other than that, nurses in rotating shift work also has been reported to be associated with a variety of mental complaints including anxiety, depression and insomnia relative to day shift nurses (Selvi et al., 2010; Suzuki et al., 2004). The study in Iranian hospital found that nurses who had to do shift work had the highest reported prevalence of anxiety (Ardekani et al., 2008). Gao et al. (2012) stated that anxiety and depression are the most prevalent mental disorders and female nurses are reported with significantly higher prevalence rates while Learthart (2000) concluded that working a combination of day and night shifts can affect workers by causing psychological disturbances of depression and anxiety.

Besides that, nurses worked on night shift also is associated with reduce alertness due to fatigue and sleepiness which can result in needlestick/sharp injuries (Suzuki et al., 2005). In Malaysia, from the year 2000 to 2006, the number of needlestick/sharp injury reported by nurses increased by 50% from 498 to 746. However, nurses are still reluctance to report such injuries due to ignorance or fear of reprisal (Lee and Hassim, 2005). Moreover, nurses are often blamed for declined standards of nursing care rather than the problem in structural factors such as staffing shortage, work scheduling, working conditions and lack of support.

Based on the discussion above, studies on the effect of shift work systems on health problems are clearly discoursed among nurses. However, local studies on the similar risk are still uncommon as it is discussed extensively in other countries. Given the differences in health care systems throughout the world, it is necessary to investigate this issue in Malaysia. Locally, there were two studies conducted in other occupation and population such as the association of shift work and hypertension among factory workers and the other is the prevalence of IBS among ethnic Malays

(Lee et al., 2012; Nazri et al., 2008). Still, there is only one study conducted among nurses on the effect of shift work schedules and sleep disturbances but this study was more focused on one specific health problem only (Nazatul et al., 2008).

Given the importance issues, the researcher intended to study the effect of shift work systems on sleep quality, functional gastrointestinal disorders, fatigue, anxiety and depression among nurses in Malaysia.

1.4 Purpose of the Study

The purpose of this study is to study the effect of shift work systems on sleep quality, functional gastrointestinal disorders, fatigue, anxiety and depression among nurses.

1.5 Research Questions

Based on the extant literature, this research aims to address the following five research questions which are:

1. What is the level of sleep quality, functional gastrointestinal disorders, fatigue, anxiety and depression among nurses working on shift work systems?
2. What is the effect of shift work systems on sleep quality among nurses?

3. What is the effect of shift work systems on functional gastrointestinal disorders among nurses?
4. What is the effect of shift work systems on fatigue among nurses?
5. What is the effect of shift work systems on anxiety and depression among nurses?

1.6 Research Objectives

1. To identify the level of sleep quality, functional gastrointestinal disorders, fatigue, and anxiety and depression among nurses working on shift work systems.
2. To identify the effect of shift work systems on sleep quality among nurses.
3. To identify the effect of shift work systems on functional gastrointestinal disorders among nurses.
4. To identify the effect of shift work systems on fatigue among nurses.
5. To identify the effect of shift work systems on anxiety and depression among nurses.

1.7 Hypotheses of the Study

- H1: There is a negative significant effect of rotating shift work on sleep quality compared to non-shift work among nurses.
- H2: There is a negative significant effect of rotating shift work on functional gastrointestinal disorders compared to non-shift work among nurses.

- H3: There is a negative significant effect of rotating shift work on fatigue compared to non-shift work among nurses.
- H4: There is a negative significant effect of rotating shift work on anxiety compared to non-shift work among nurses.
- H5: There is a negative significant effect of rotating shift work on depression compared to non-shift work among nurses.

1.8 Scope of the Study

The purpose of this study is to study the effect of shift work systems towards physical and psychological well-being among nurses. In this study, two main groups of variables are selected. The four dependent variables consist of four health problems which are sleep quality, functional gastrointestinal disorders, fatigue as well as anxiety and depression. Meanwhile, the selected independent variable is shift work systems.

The research design is quantitative study by using cross-sectional and the information gathering will be done via self-administered questionnaires by respondents. Therefore, this study will focus on nurses who are working on rotating shift and non-shift to compare the effects of health problems. This study also will be carried out at government hospital which is Hospital Sultanah Aminah in Johor Bahru.

1.9 Significance of the Study

Currently, many nurses' shift work schedules exceed the limit regarding shift length and time off between shifts due to extended work hours, on-call requirements and rotating shifts (Trinkoff et al., 2006). Shift work systems has been associated with negative physical and psychological health effects (Costa et al., 2006) as well as increased accidents/injuries and medical errors such as drowsy driving, needlestick injury and musculoskeletal disorders (Akerstedt, 2003). If this problem continues, it will affect the quality of life of nurses and also their well-being.

Previous studies also revealed that rotating shift work is recognized to be a serious risk factor for nurses' health compared to non-shift work because it interferes with basic biological functions, work ability and performance, social relationship and also psycho-physical health (Korompeli et al., 2009). In this study, the researcher will be focusing on the effect that shift work systems has on nurses' physical and psychological well-being. Thus, the potential outcome of this study will be valuable to assist further understanding of the current situations in shift work systems among hospital nurses.

Practically, the research finding will be able to identify and examine the level of health-related problem among rotating and non-shift nurses. The findings will be able to raise awareness on how shift work systems can contribute to negative health effect among nurses. As the work of nurses will always contain elements of stressful, difficult situations and hardship, a stable health conditions is required to help nurses deal with their daily work activities (Othman and Mohd Nasurdin, 2013). Hence, it is very important to determine the level of nurses' health problems because these problems can lead to reduce performance, nurses early turnover and increased patient-care errors. Moreover, the knowledge on sign and symptoms of health problems can be used to either prevent from keeps happening or taking necessary precaution in order to reduce the severity.

Theoretically, this study can contribute to the limited amount of research conducted on the effect of shift work systems among nurses in Malaysia. This is because even though there have been research conducted on shift work systems, most of the studies are specific to industry and situation such as manufacturing industry. So, it is difficult to compare the effect of different studies. Therefore, the significance of this study for nursing practice is it will provide knowledge and information to the hospital nurses about the effect of shift work systems on nurses' physical and psychological well-being in terms of sleep quality, functional gastrointestinal disorders, fatigue as well as anxiety and depression. By understanding the consequences of these problems, it will help and protect nurses from experiencing adverse health effect of such work in the future.

1.10 Limitation of the Study

In this research, there are several limitations that can be identified. Firstly, this study is a cross-sectional design in which the data was collected at one point within the period of study. Consequently, this data may not be able to perfectly capture the issue of causal connections between the variables of interest. Secondly, this study will only be conducted on selected variables such as on certain physical and mental health problems that related to shift work systems and it should be extended to other health problems such as cardiovascular disease, breast cancer, obesity and musculoskeletal problems.

Thirdly, this research will be conducted among nurses in the Hospital Sultanah Aminah. Thus, the results from data collection are not generalized to other groups or professions. Lastly, because of time constraints, the unit of analysis of this study is only focused in the city of Johor Bahru.

1.11 Conceptual and Operational Definition

1.11.1 Shift Work Systems

Shift work systems can be defined as an arrangement of working hours that uses teams (shifts) of workers in order to extend the operation hours of the work environment beyond the conventional office hours (Vogel et al., 2012). Shift workers might work in the evening, in the middle of the night, overtime or extra working hours, and rotating shifts. Other shift workers might have permanent shift and only work at night or in the evening (Rosa and Colligan, 1997).

In this research, rotating shift work is defined as nurses' alternation of shift work schedule that includes working in the day shift, evening shift and night shift. While, non-shift work refers to the nurses' standard working hours or days which are from 8.00 a.m. to 5.00 p.m. or from Sunday to Thursday.

1.11.2 Well-Being

Well-being refers to the presence of positive emotions and moods, the absence of negative emotions, satisfaction with life, fulfilment and positive functioning (Veenhoven, 2008). Well-being also associated with the several aspect of human health. Health is the general condition of a person's mind and body which means free from illness, injury or pain, better immune function, speedy recovery and increased longevity. World Health Organization (WHO) defined health as a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity (Zikmund, 2003).

In this research, only physical and psychological well-being will be highlighted. Physical well-being can be referred as physical health which consists of sleep quality, functional gastrointestinal disorders and fatigue. Meanwhile, psychological well-being is related to the mental health which is anxiety and depression (Vogel et al., 2012).

1.11.2.1 Sleep Quality

The definition of sleep quality refers to the perceived deep sleep and reduced sleep quality leads to disturbance of health and well-being (Chan, 2009). Other than that, sleep quality is when a person's assessment of their sleep-related characteristics and whether these qualities are satisfactory (Lin et al., 2014).

In this research, sleep quality consists of three dimensions which are sleep status, sleep difficulties and day-time distress. Sleep status was related on how well the sleep, sleep difficulties on issues of falling asleep and disturbed sleep while day-time distress concerning issues of difficulty waking up, not feeling refreshed and exhaustion. It will be determined by using the 10 items in Karolinska Sleep Questionnaire (KSQ) (Kecklund and Akerstedt, 1992).

1.11.2.2 Functional Gastrointestinal Disorders

Functional gastrointestinal disorders encompasses both irritable bowel syndrome and functional dyspepsia and can be defined as a group of gastrointestinal disorders that characterized by upper and lower symptoms with no definite organic or biochemical abnormalities that can explain the symptoms (Koh et al., 2014).

In this research, functional gastrointestinal disorders is defined as gastrointestinal symptom complaints as extracted from the Gastrointestinal Symptoms Questionnaire developed by Bovenschen (2006). It consists of 16 prevalence of gastrointestinal symptom and the severity of each symptom.

1.11.2.3 Fatigue

Fatigue is defined as a sense of exhaustion, tiredness, or lack of energy that can result in distress or burnout. Fatigue also is known to impair physical and cognitive functioning (Han et al., 2014). Another study refers fatigue as complex interactions between the biological, psychosocial and behavioural process that have been defined medically as the state of mental or bodily activity characterized by a lessened capacity for work and reduced efficiency of accomplishment. Generally, it is accompanied by feeling of weariness, sleepiness or irritability (Swain, 2000).

In this research, fatigue refers to mental and physical fatigue of nurses during the previous month. The first seven items reflect physical fatigue such as tiredness, sleepy and lack of energy while the last four items assess mental fatigue like difficulty concentrating and memory condition. Thus, the developed Fatigue Questionnaire (FQ) by Chalder et al. (1993) will be employed to measure fatigue.

1.11.2.4 Anxiety and Depression

Anxiety has been defined as psychology and physiological state characterized by cognitive, somatic, emotional and behavioural components which combine to create an unpleasant feeling that associated with uneasiness, apprehension, fear or worry. Meanwhile, depression is defined as a mental state characterized by the feeling of sadness, loneliness, despair, low self-esteem and self-reproach (Gao et al., 2012).

In this research, the definition of anxiety and depression refers to the symptoms of anxiety such as tense, frightened, restless and panic while depression is related to symptoms such as loss of pleasure and lost interest in things. It will be evaluated by employing a developed questionnaire of Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983).

characteristics of individual that potentially contribute to interesting information. Consequently, the significance, reliability and quality of the findings of the study will be increased.

As a recommendation to the hospital, this study should be given more consideration by hospital management when evaluating breaks, rest periods at night and shift work scheduling to improve the work environment of rotating shift nurses. Nurses on all shifts should be encouraged to take regularly schedule breaks including meal periods. Other than that, hospital managers can create a diversity of shift work schedule and flexibility in working time arrangement or provide for nurses to attend the safety needs during non-day shift to reduce the health outcomes. Besides, manager also can provide supportive environment to encourage nurses in rotating shift work to engage in healthy behaviours. By providing such opportunities will likely improve nurses' well-being and decrease health-related outcomes.

5.6 Conclusion

For conclusion, the researcher has conducted a thorough quantitative study to support the stated research objectives. The objectives are identifying the level of sleep quality, functional gastrointestinal disorders, fatigue, anxiety and depression as well as the significant effect between shift work systems and the above mentioned five health-related outcomes. It is because these health problems have been widely mentioned in the literature as the effect for individual working in shift. Therefore, the findings and discussion for this study have shown that there is an association between shift work systems and nurses' physical and psychological well-being. So, the management must do something to make sure this problem can be reduced for the nurses to perform well without being sick.

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