THE RELATIONSHIP BETWEEN SHIFT WORK AND QUALITY OF SLEEP AMONG NURSES IN UMMC.

By

RABIATUL ADAWIYAH BINTI ROSLAN

Thesis Submitted to
Othman Yeop Abdullah Graduate School of Business,
Universiti Utara Malaysia,
In Partial Fulfilment of the Requirement for Master of Science (Occupational Safety and Health Management)

Pusat Pengajian Pengurusan Perniagaan
SCHOOL OF BUSINESS MANAGEMENT
Universiti Utara Malaysia

PERAKUAN KERJA KERTAS PENYELIDIKAN
(Certification of Research Paper)

Saya, mengaku bertandatangan, memperakukan bahawa
(I, the undersigned, certified that)
RABIATUL ADAWIYAH BINTI ROSLAN (822468)

Calon untuk Ijazah Sarjana
(Candidate for the degree of)
MASTER OF SCIENCE (OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT)

telah mengemukakan kertas penyelidikan yang bertajuk
(has presented his/her research paper of the following title)

THE RELATIONSHIP BETWEEN SHIFT WORK AND QUALITY OF SLEEP AMONG NURSES IN UMMC

Seperti yang tercatat di muka surat tajuk dan kulit kertas penyelidikan
(as it appears on the title page and front cover of the research paper)

Bahawa kertas penyelidikan tersebut boleh diterima dari segi bentuk serta kandungan dan meliputi bidang ilmu dengan memuaskan.
(that the research paper acceptable in the form and content and that a satisfactory knowledge of the field is covered by the research paper).

Nama Penyelia : **ENCIK SYAZWAN SYAH BIN ZULKIFLY**
(Name of Supervisor)

Tandatangan :
(Signature)

Tarikh : **30 OKTOBER 2019**
(Date)

PERMISSION TO USE

In presenting this thesis / project paper in partial fulfilment of the University of Utara Malaysia (UUM) postgraduate criteria, I accept that this university's library can make it available for inspection free of charge. I also accept that permission to copy this thesis / project paper in any way, in whole or in part, for scholarly purposes may be given by my supervisor or in their absence by the Dean of Othman Yeop Abdullah Graduate School of Business where I did my thesis / project paper. It is agreed that, without my written permission, no copying or publishing or using this dissertation / project paper or parts thereof for financial gain shall be permitted. It is also recognized that in any scholarly use that may be made of any material in my dissertation / project article, due credit shall be given to me and the UUM.

Request for permission to copy or otherwise use materials in this thesis / project paper should be addressed in whole or in part to:

Dean of Othman Yeop Abdullah Graduate School of Business
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Darul Aman

Abstract

This study was carried out with the purpose to investigate the relationship between shift work status and quality of sleep among nurses in Surgery Department at University Malaya Medical Centre. Nurses perform an important role in patient care. They are the first person to detect and noticed any changes in patient condition and patient health status. Nurses also act as a supporter in terms of physical and emotional well -being of the patient during ongoing treatment. Therefore, this study held among nurses to access nurses' quality of sleep. Therefore, to investigate the sleep quality and its relations to shift work a Pittsburgh Sleep Quality Index questionnaire was used. The aim of this study was to investigate the level of sleep quality, differences between demographic factors and the relationship between shift works and sleep quality. Data was collected using a self-reported questionnaire and was analysed using SPSS Statistics Version 23.0. Sample for this study included a total of 97 participants. Findings show that participants whichever doing shift work or not are no significant differences with sleep quality and working in shift work also is not associated with poor sleep quality. From the result also, it can be seen that 87.6% of nurses working in the Surgery Department in UMMC are having poor sleep quality. It is can be concluded that regardless of working in shift work or standard shift nurses still have poor sleep quality. Further research with different variables needs to be carried out to study factors that affected sleep quality among nurses. A higher number of respondents and hospitals will be more significant for future research and could generate more distinct results. To increase the sample size, the inclusion of areas with more multiple disciplines and multiple staff is suggested.

Keywords: Shift work, Quality of sleep,

Abstrak

Kajian ini dijalankan dengan tujuan untuk mengkaji hubungan antara status kerja shift dan kualiti tidur di kalangan jururawat di Jabatan Pembedahan di Pusat Perubatan Universiti Malaya. Oleh itu, untuk menyiasat kualiti tidur dan perhubungannya borang soal selidik Indeks Kualiti Tidur Pittsburgh digunakan. Jururawat melakukan peranan penting dalam penjagaan pesakit. Mereka adalah orang pertama yang mengesan dan melihat sebarang perubahan dalam keadaan pesakit dan status kesihatan pesakit. Jururawat juga bertindak sebagai penyokong dari segi fizikal dan emosi kesejahteraan pesakit semasa rawatan berterusan. Oleh itu, kajian ini diadakan di kalangan jururawat untuk mengakses kualiti tidur jururawat. Untuk menyiasat kualiti tidur dan perhubungannya dengan kerja shif soal selidik Indeks Kualiti Tidur Pittsburgh digunakan. Tujuan kajian ini adalah untuk mengkaji tahap kualiti tidur, perbezaan antara faktor demografi dan hubungan antara kerja shif dan kualiti tidur. Data dikumpul menggunakan soal selidik yang dilaporkan sendiri dan dianalisis menggunakan Statistik SPSS Versi 23.0. Sampel kajian ini seramai 97 peserta. Keputusan menunjukkan bahawa peserta yang melakukan kerja shif tidak mempunyai perbezaan yang signifikan dengan kualiti tidur dan bekerja dalam kerja shif juga tidak dikaitkan dengan kualiti tidur yang kurang baik. Hasilnya juga, dapat dilihat bahawa 87.6% jururawat yang bekerja di Jabatan Pembedahan di UMMC mempunyai kualiti tidur yang kurang baik. Ia dapat disimpulkan bahawa tidak kira bekerja dalam kerja shif atau jururawat shif standard masih mempunyai kualiti tidur yang kurang baik. Kajian lanjut dengan pemboleh ubah yang berbeza perlu dilakukan untuk mengkaji faktor-faktor yang mempengaruhi kualiti tidur di kalangan jururawat. Bilangan responden dan hospital yang lebih tinggi akan menjadi lebih penting untuk penyelidikan masa depan dan dapat menjana lebih banyak keputusan yang berbeza. Untuk meningkatkan saiz sampel, kemasukan kawasan dengan lebih banyak disiplin dan banyak kakitangan dicadangkan.

Kata kunci: Kerja shift, Kualiti tidur.

ACKNOWLEDGEMENT

I would like to express my deepest appreciation to all those who provided me the possibility to complete this research. A special gratitude I give to my internal supervisor Mr. Syazwan Syah bin Zulkifly whose contribution in stimulating suggestions and encouragement to complete this also helped me to coordinate my research for my final year thesis. His challenges brought this work towards a completion. It is with his supervision that this work came into existence. For any faults I take full responsibility. I am so grateful to University Utara Malaysia for making it possible for me to study here.

Also my deepest appreciation to my acquaintances Saidah bt Satderi & Gayathri Naidu a/p Ramakrishnan, for their tremendous encouragement and assistance upon completion of this thesis.

I am also thankful to University Malaya Medical Centre who accepted and allowed for a valuable authorization to conduct this research at their facility. Finally, I thank all who in one way or another contributed in the completion of this thesis.

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURE

LIST OF ABBREVIATIONS

UKMMC	University Kebangsaan Malaysia Medical Center
UMMC	University Malaya Medical Center
ISO	International Organization for Standardization
DOSH	Department of Occupational Safety and Health
OSHA	Occupational Safety and Health Act
EU	European Union
SWD	Shift Work Disorder
PSQI	Pittsburgh Sleep Quality Index
SPSS	Statistical Package for the Social Sciences

LIST OF APPENDICES

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter comprises of the background of the study, problem statement, research question, objective, the scope of the study, significant of study and organization of the thesis.

1.1 Background of the study

Office of Disease Prevention and Health Promotion under the United States' Department of Health and Human Services stated that sleep health is a new subject matter of Healthy People 2020 (Wright, 2012). One of its goals is to raise the public awareness on the positive impacts of the adequacy of sleep and treatments for sleep disorders on the employees' health, productivity, wellness, satisfactory of life, and security on roads and in the place of job which includes the nurse or any paramedic working at the hospitals. This issue is becoming more important as there are increasing cases of fatalities caused by sleep deprivation and exhaustion. Moreover, low productivity is also observed among the shift workers due to their tendency to fall asleep during shift periods or being inactive.

Sleep is defined as the state of mind and body in a state of rest, where the eyes are usually closed and the level of consciousness is in a state of complete unconsciousness or half-consciousness, so the movement of the body and the level of reaction decrease (Houghton., 2004). Many factors influence the amount of sleep a person has, including age. The

quantity of sleep for adults is around seven to eight hours a night. Whereas for infants it takes 16 hours and teens need about 9 hours daily.

According to Owens et al. (2015) sleep is crucial for the health and human well-being as it influences basic behaviour that has a profound effect on family members' health and relationships between one another. Hillman & Lack (2013) also mentioned that all of the disorders as a result of sleep deprivation can affect the community and the surrounding communities, not to the concerned individuals only.

One of the common and complicated health problems is a sleep disorder. Death, mortality, lack of functional capacity and quality of life all are related to sleep disorders and also sleep undoubtedly gives positively to health and welfare. These disturbance leading to an increased risk of cerebrovascular and cardiovascular diseases (Manzar et al 2018). Manzar et al (2018) also stated that daytime performance at work or in social life will be disturbed if lack of sleep. Lack of sleep also will increase the threat of occupational and vehicle accidents, excellent of existence and terrible health.

According to the USA 2012 Bedroom Poll National Sleep Foundation, (2013), 59% of respondents slept 6 hours forty-four minutes on workdays, on average as compared to 7 hours 35 minutes on non-workdays which is 37% less sleep on workdays or weekdays and 17% less sleep on non-workdays or weekend; meanwhile 47% slept less than 7 hours and 14% less than 6 hours per day. Also 27% of the respondents experienced sleep disorders, 26% experienced daylight sleepiness and 32% of them took snoozing pills regularly.

On the order hand, sleep and sleep disorder statistics done by the Institute of Medicine in Washington (2016) stated that 50-70million US adults have a sleep problem. 37% of 20-39 years old reported quick sleep length and 40% 40-59 years olds suggested short sleep duration. Besides, 100,000 deaths show up every year in US hospitals due to medicinal drug blunders and lack of sleep are viewed as contributing factors (Washington,2016).

Various studies have diagnosed that impaired sleep is a widely wide-spread hassle among nurses. Nurses are at higher risk, a single mistake and it will place patients' life in danger. Overworked, fatigued and stressed may also threaten their health (Hasson & Gustavsson, 2010). According to Fallis, McMillan & Edwards (2011) working in shift work and particularly working night shifts is determined as a stress element to nurses. Fallis et al., (2011) states that working up to 8 hours or 12-hour shifts may increase lack of sleep that causes an increase in risk for patient errors, near misses and personal problems such as commuting accidents while driving home.

A nurse must adhere to rules and regulations to implement healthy work: then, self-regulation relies on it. Thus as Montgomery & Geiger-Brown, (2010) stated it is critical for the nursing profession to apply empirical evidence to decision making to ensure a healthy working atmosphere and effective scheduling practices rather than focus on ratios and numbers. Nurses that work in a shift or normal schedule should be suggested to take regularly scheduled breaks, like mealtime (Kunert, et al, 2007). Training or continuing education to improve nurses' input about sleep hygiene and sleep disruption causes are one of the many ways to improve nurses' sleep quality. Reduce sleep deprivation and increase the quality of

psychomotor among nurses can be achieved by improving sleep quality (Johnson, .Brown, & Weaver, 2010).

Meanwhile, according to Weaver, Stutzman, Supnet & Olson, (2016) stated emergency department nurses are one of most disciplines that associate with higher perceived errors if they have poor sleep quality. Nurses with low quality of sleep are more likely to face emotional problems like stress and trouble with problems and issues faced in solving the problems in their life compared to nurses with good sleep quality (Ogunsemi, Afe & Almohandes, 2017).

Nursing has been stated as a stressful profession. Stress conditions will lead to sick leave, high in turnover and the likelihood of leaving the job. Stress also will lead to health problems and diseases (Hasson & Gustavsson, 2010). Stress conditions within nurses are consistent with the study and have reported that tiredness due to lack of sleep is a common problem in nurses.

According to Johnson, Brown & Weaver, (2010), they stated that poor performance of the psychomotor, slowed reaction time, fell of moodiness, a lapse of memory and poor communication skill all are associated with lack of sleep and fatigue. All the above are the characteristics that must not be owned by a responsible nurse.

The study carried out by Eanes (2015) presented that nurses who are working in 12-hour shifts with various additional duties, normally do not get enough sleep and or sleep poorly. It is an irony that their job involves promoting a healthy lifestyle among the patients and

keeping them in good condition but they have to compromise their health to do so by working in long hours. Commonly, most nurses work consecutive days in a row to complete the work and get over it but it is unclear whether this form working hour affects their much-needed sleep. The amount of sleep received needs to be taken into consideration as it will affect the nurses physically, mentally and their success at work (Owens et al., 2015).

Allen et al. (2014) strengthen the fact that working for 12 hours on multiple consecutive days frequently would cause insufficient time to sleep. Most nurses do not get to sleep immediately once they get home after work as they need to tend for their spouse or family members and other responsibilities at home. For one study conducted by Nursing Health and Science, all nursing tasks such as walking, diagramming, patients support, patients change, assessment and drug administration are identified increase their stress level which results in acute fatigue that could put risk on patient's safety (Chen, et al., 2014).

In fact, from the nurses' point of view themselves, they do experience fatigue and sleep deprivation and these consequently grant their job quality a negative effect (Barker & Nussbaum, 2011) and they also note that low work performance has a close connection to risk in patients' safety. It is also noted that extreme fatigue causes the turnover for nurses, particularly junior nurses (Liu et al., 2016).

Poor sleep quality will give an impact on the cardiovascular and immune systems. The impact on the immune system is usually associated with poor quality of sleep and despite age, it is important to keep cardiovascular regulation normal. Changes due to lack of sleep will increase the risk of a cardiovascular problem (Vaara & Koivu, 2010).

According to Hasson and Gustavsson (2010), sleep and stress are variously related to each other. It has been stated, an increase in stress will decrease the sleep. Homeostasis will be disturbed, to restore and maintain it, we need enough rest. Thus, sleep is important as an anti-stress.

A study held at the government hospital at Melaka, Malaysia by Nazatul, Salmy, Moy & Nabila (2008) states that 57.8% shift nurses had sleep problems compared to the non-shift nurse. Besides that, a study in Thailand that has also been conducted among nurses said that 73% of nurses working shift work was in poor sleep quality (Tawanchai J & Waran T., 1997).

Nurses perform an important role in patient care. They are the first person to detect and noticed any changes in patient condition and patient health status. Nurses also act as a supporter in terms of physical and emotional well being of the patient during ongoing treatment. Therefore, this study held among nurses to access nurses' quality of sleep.

1.2 Problem Statement

Extended working hours and working shifts could be considered hazardous to the employees' job and safety. This is one of the aspects under the responsibility of a company, and this includes the working hours for nurses (Rhéaume, 2017). Different individuals tolerate shift work differently, which is influenced by different factors, for example sleeping patterns, age, gender, personality traits, i.e. diurnal type, circadian type, and hardiness.

This fact was affirmed by Vogel et al. (2012) who argued that shift work and extended working hour has a negative impact on the health and well-being of workers. Night shift work is commonly associated with many problems such as sleep deprivation, sleepiness reduced cognitive performance, increased human errors, tiredness, melatonin rhythms, which are caused by sleeping after the end of different night shifts among the nurses.

Despite the various adverse effects of working in shifts, the demand for it, however, keeps increasing due to these unavoidable factors: economic requirement, technological, and social pressure. The number of employees working in shifts increases in line with the higher demands; it was estimated that approximately 20% of the manufacturing population are working in shifts and more than one-third of them are employed in night shifts (Wisetborisut et al., 2014)

The frequency of shift work – long-term or non-static – varies globally. According to Laura et al. (2013), in the United States, shift work, including varied shift times and other factors and non-standard hours, is made up of 15% of the full-time workforce, meanwhile in Japan is about 23%, Australia 16%, United Kingdom 18%, and France 13%. The authors also noted that shift work included various health issues such as cardiovascular disease, diabetes, mood disturbance and intensified mood disorder which eventually leads to an increased rate of depression. Therefore, these conditions should be paid attention to, especially among female shift workers, including nurses who face challenging tasks and occurrences such as during patients' health evaluation processes.

The symbol of this situation is the new 24-hour culture. There are numerous research carried out pertaining to this subject matter and some of them were done by Magerøy et al. (2012) who noted that the census data indicates that a large proportion of the population is working on non-standard schedules, including shift work and as mentioned above, the authors also notified that such work schedules have been associated with a number of health issues such as, cardiovascular disease, obesity, cancer, anxiety, and last but not least sleeping disorder. Different individuals tolerate differently to shift works as the effects on their sleeping patterns and other health parameters vary correspondingly.

Hospital is a place that offers 24 hours service. Malaysia Health Director-General, Datuk Dr. Noor Hisham Abdullah said the government hospitals offered 24 hours of continuous healthcare, so it became common place for their employees to work outside regular working hours. Their employees are including nurses.

According to Senior Executive of Nursing, Department of Nursing Services, Universiti Kebangsaan Malaysia Medical Center (PPUKM), Wan Fatimah Wan Daud, during interviewed by Berita Harian 8th September 2018 the nurse's duties are numerous and heavy. The nurse's job is not a little too much to bear with a lot of workloads so it's time to work over to complete their work. This career field is critical as it relates to one's life. The situation becomes more challenging when a nurse is forced to handle a large number of patients.

Therefore, it is expected that health service personal are healthy and in psychological conditions that can give the best service to citizens. Health care provider not only provides service in hospital but also in the clinic and other health centers to make sure the health needs

of people. To achieve health need for numbers of people in the country, some health care providers are required to work in shift. Nurses are one of the health care providers who are required to work in shift work day and night to meet sick people's needs entirely.

Data on the relationship between shift work and quality of sleep among nurses has never been performed at UMMC. Information on any concerns about shift work cannot be disclosed by the Nurses Department as it is too personal to provide. However, according to several interviews with nurses working in the Surgery Department, their department is one of the busiest departments at UMMC. Surgery wards are the largest number of beds in UMMC at 56 units per unit and they are divided into 2 units. Each ward was cared for by 52 nurses divided into 3 shifts. The surgery ward is also reported to have the longest stay patients according to the UMMC annual report 2016.

Thus, formal interviews were conducted with nurses' manager or called as Matron to find out the relationship between shift work and quality of sleep among nurses in Surgery Department, UMMC. Interviewing is one of the techniques used in the ISO 14001: 2015 audit is some of the techniques used to obtain information. In the interview, the researcher inquire on specific questions about the shift work and quality of sleep of a nurse, so the required facts are gathered in the most efficient manner possible.

According to that interview with Matron, their nurses that working under shift work, sometimes have to take care of more than 8 patients per day means that more than one cubical. In UMMC ward one cubical is 4-bed patients. So, they have to take care of at least 2 cubical and every patient will be divided according to severity, for example, acute, semi

acute or light. Meanwhile, according to interviews also at the surgical ward, they have to take care of at least 7 patients in one shift for non- acute cubical sometimes it can be more than two nurses for semi acute cubical. Also, interviews with the Matron, she suggest that the ideal ratio between a nurse and a patient is 1: 4, but for a nurse in surgery ward is 1:8 and could be 1:11 in the absence of a nurse. It is in line with a statement from the American Nurses Association stating that the ratio between nurses and patients for a surgical unit is 1: 5.

From interviewing also, Matron agreed that their nurses have sleep problems every shift transition especially the shift between evening shifts and the next morning shifts. In an interview with the Sister as their supervisor also, she also acknowledged that there was a sleep problem among the nurses due to the shift work. Sometimes they are late for work because of sleep problems and their stress level also high. As researcher knowledge, there is no specific rule about shift schedule for nurses. Every ward in hospital arrange schedule accordingly and it is vary by hospital.

Previous research has proved that shift-work is affecting the sleep quality of the worker especially healthcare workers like nurses because health service is 24 hours service and most of the nurses have to work in shift work to take care of patients. A study by Chien, Su, Hsieh, Siao, Ling & Jou (2013) said that the most common problem that has reported among nurses is impaired sleep. Attention deficits, cognitive impairment, depression, anxiety, stress and poor control of impulse are among neurocognitive performance problem that will be faced by the person that have sleep disturbance. The nature of the job of a nurse requires nurses to pay

higher attention to the patient because the patient is not in good condition. Hence, the quality of sleep is important to the nurses to give good service.

These issues initiate the researcher to conduct a study about the impact of shift work among nurses on their sleep quality. Being the top teaching hospital in the capital city of Malaysia, UMMC receives a lot of patients. Empirically, to the extent of my knowledge, there is no study about this topic impact of shift work to nurses' quality of sleep in UMMC regardless number of literature worldwide. Thus, this research proposes at UMMC.

1.3 Research Question

1. What is the level of sleep quality among nurses in UMMC?
2. Are there any differences between demographic factors and sleep quality?
3. Is there any relationship between shift work status and quality of sleep among nurses in UMMC?

1.4 Research Objective

In reference to the problem which has been discussed and seen above, the principal question for this study would now be occurrence and extent of the impact of shift work to nurses quality of sleep, but in a more specific sense,

1. To investigate the level of sleep quality among nurses in Surgery Department, UMMC.
2. To determine the differences between demographic factors and sleep quality among nurses in Surgery Department, UMMC.
3. To determine the relationship between shift work and sleep quality among nurses in Surgery Department, UMMC.

1.5 Scope of the study

The scope of these study cover nurses that work in the Surgery Department, University Malaya Medical Centre (UMMC). University Malaya Medical Centre, as a teaching hospital was chosen since a typical teaching hospital will accept various cases including the complicated one as they welcome new or rare cases for study purposes. Shahian et al. (2014) reported that teaching hospital is much more likely to provide care for minorities and patients needing advanced care transfer from other institutions. UMMC annual reported show that every year they received inpatient approximately 40000-60000 per year.

Surgery Department consists of surgical clinics, 2 units of ward and operation theatre surgical. According to the UMMC annual report in 2017, the surgery ward has the most number of beds in UMMC which is 56 beds for each unit. In 2016, the average patient living in the ward of Surgery Department was the longest compared to other departments with 6.791 days per patient.

1.6 Significant of Study

According to the research problem that has been discussed, the quality of sleep is important to health. The administrators and management of the University Malaya Medical Centre (UMMC) would find this research useful in understanding the occurrence and extent of the nature of the work of nurses. As we know that Nurses are the heart of the institution. This research will give contribution to academic knowledge. As far as the researcher knows this kind of research never has been done in UMMC.

On the other hand, contribution to occupational safety and health in UMMC by addressing this issue may enable nurses to use health promotion strategies in their own lives and not only in the lives of their patients. When nurses do not support their own health needs such as quality of sleep then they cannot take care of patients effectively. From the findings of the study, the management would understand that this also leads to safety issues for patients, such as medication errors and missing key assessment results. The findings of this research would be of crucial benefit to the UMMC organization, which intends to make efforts at improving the safety, psychological and physical health of the workers. The finding also gives advantages to management because we can monitor job performance, reduce compensate due to accident and reduce the frequency of incident reporting to the Department of Occupational Safety and Health due to worker accidents.

This research is beneficial because it would attempt to contribute to knowledge, practically and methodologically. This study would also propose an understanding and ideas that will become the foundation for the furthering of upcoming explorations. Regarding its

contribution in the area of practice, the study would attempt to guide other researchers, health care management, the central government in the formation of policies that will lead to a regime where lack of sleep among Nurses issues will not be taken for granted.

1.7 Organization of Thesis

Five chapters are included in this research. The first chapter is about the background of the thesis, problem statement, objectives, research questions, the significance of the study, the scope of the study, and the organization of the thesis. The second chapter then covers the review of literature, quality of sleep, shift work and sleep disorder, the relationship between shift work and to nurses' quality of sleep, the impact of inadequate sleep to safety and health, and shift work.

Previous studies reviewed in this study have link ideas towards instituting a model that describes the relationships. As such, to connect these relationships, the third study describes the methods and techniques suggested, including research paradigms, research frameworks, development of hypothesis, research design, data collection procedures, sampling techniques , and data analysis techniques, among others. This study chapters 4 focuses on describing the analysis of data and findings. While chapter five involves the summary of key findings based on the research objectives. In addition to that, chapter five will highlight the theoretical, methodological and practical implications of the findings. Finally, chapter six will discuss the recommendation and suggestions for future research will be made.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this Chapter, the literatures are discussed upon to find the rationale of the relationship between employees working in shift and the effect of such working hour. Emphasis is given to the nurses in charge of the UMMC.

2.1 Duty of employers

It is outlined by Occupational Safety and Health Act (OSHA) (Act 514, 1994) Part IV: Section 15(1) it shall be the duty of every employer and every self-employed person to ensure, so far as is practicable, the safety, health and welfare at work of all his employees. Poor sleep quality among the workers can contribute to health problems and absences from occupational activities due to sickness. The welfare of employees includes everything from services, facilities, and benefits that are provided by an employer for the advantage of their employees. This is important in order to motivate employees and increase their productivity levels. Examples of employee welfare are housing facility, health insurance, allowance, provision of transportation and food. It is also considered as providing welfare by keeping a close monitoring on the employees' working conditions and arranging necessary actions accordingly.

2.2 Shift Work

Shift work is common among nurses because patients need to be cared for 24 hours a day. According to Giorgi, Mattei, Notarnicola, Petrucci, & Lancia (2018) they stated that sleep disorder causes many problems for nurses, including performance loss, daytime sleepiness, health problems, psychosocial stress and decrease in safety losses for nurses and patients alike.

In Europe, about 20 percent of employees are worked in shift work which consists of night shift and over 5 percent of them have to work in extended hours. Working more than 48 hours a week is considered as extended hours work (Harrington, 2001).

In research done by Kazemi et al. (2018) in the developing countries, approximately 20% of the workforce in developing countries work in shifts and one-third work in the night shift. Due to the rapid industrialization around the world, the reasons behind the growing demand for shift workers are the technological economic and social pressures. American and European studies have shown that adult workers employed in some kind of shift work represent 15-30 percent of the population and about 19 percent of the European population work at least 2 hours between 10 pm and 5 am.

Deficiency and lack of jobs and positions of nurses in certain hospitals and increasing demand in nursing care lead the hospitals to demand the nurses to work in an extended shift up to 12 hours and approximately 60 hours in excess per week. This could cause improper handling of the patients by the nurses due to fatigue and sleep deprivation (Zhang et al., 2016).

According to Li Zhang et al. (2016), 70% of nurses suffer from shift-work related symptoms, due to stress and lack of sleep. A Japanese study also highlighted that nurses who work in shift do not have much time for napping which leads to lower health-related quality of life. While a study conducted in Norway stated that 26.1% of employees work in shift and 32.1% of them work at night and the percentage of nurses that reported the prevalence of shift-work disorder is 32.4% to 37.6%.

It is normal to experience sleep deprivation, excessive sleepiness and shorter duration of sleep due to the conflict between work and their circadian rhythm that most shift workers experience. Approximately 20-30% of shift workers would be affected by symptoms such as insomnia or prolonged daytime sleepiness, known as shift work disorders. Healthcare shift workers are found to make up the largest proportion of shift workers, about 15-20 percent (Booker et al., 2018).

Guo et al. (2013) mentioned that shifting work can be an independent risk factor for the quality of sleep, diabetes, and hypertension of retired workers. Applicable treatment approaches are required for shift workers to prevent loss of sleep, diabetes, and hypertension. The researcher also stated that shifting work mainly affects the quality of sleep during the early shift period (<10years); the impact on the quality of sleep will decrease as the duration of shifts is extended and the risk will reach the baseline after shifting workers leave their shift role for more than 20 years. The chances of diabetes and hypertension among workers who have been employed in shifts for over 20years are significantly increasing.

Von Treuer et al. (2014) stated that the schedule for shift work is usually divided into three periods, which are: day, evening or night.

2.3 Quality of Sleep

The job performance of nurses can be affected by their quality of sleep and fatigue level. Such work performance includes work productivity, efficiency, speed in doing task and assessment. Having quality sleep is also crucial for nurses in order for them to provide optimum care towards the patients during and after hospitalization (Giorgi, Mattei, Notarnicola, Petrucci, & Lancia, 2018).

Lin et al. (2014) have studied the effect of shift work on occupational stress, sleep quality and self-perceived health status of nurses has been investigated. The study result showed that there is actually a distinctive association between shift work and the above-mentioned results. Sadly, nurses have no choice but to work in shifts to provide patient care 24 hours a day.

According to Harrington (2001), long hours of work or shift work have a major effect on sleep. The sleep quantity is reduced by up to two hours a day that implies seep quality. Sleep deprivation would cause sleepiness at work and this effect of shift work is comparable to traveling for a long journey. A Study by Li Zhang et al., (2016) highlighted that current and previous change jobs were correlated substantially with poor quality of sleep.

Boivin & Boudreau (2014) mentioned that sleepiness mostly occurs during night shifts and reaches its maximum level at the end of the night. During this period, vigilance is impaired and job performance level is at the lowest and this could jeopardise the shift workers' health and safety. They may suffer from a shift work sleep-wake condition where they would accidentally fall asleep at work or drive home after a night shift; clearly, this is risky. Operating on atypical shifts had major socio-economic impacts as it leads to increased risk of accidents, injury of workers and exposure to threat, particularly at night.

A review by Mauricio, Almeida, & Malheiro, (2016) highlighted that quality of sleep has always been a problem for shift workers as they need to change their biological rhythm to accomplish their nightly tasks. The chance of getting drowsy and sleepy during the night shift is massive. That is the reason behind sleep deprivation among the shift workers. Worse, sleep deprivation causes issues such as workplace accidents, metabolic disease, cardiovascular diseases, and viral infections.

2.4 Shift Work and Sleep Disorder

Many definitions of shift work and sleep disorders have been provided and produced by different researchers. According to Giorgi et al. (2018), sleep disorder is defined as dyssomnias, which is associated with the 24-hour sleep-wake cycle where the person experiencing it has the inability to sleep or complications while sleeping which is caused by shift work or traveling out of the normal time. An example of dyssomnias is

hypersomnolence or insomnia. Sleep disorder also can be contingent on long shift rotation patterns and can cause fatigue.

According to Kecklund & Axelsson (2016) the concept of change is synonymous with working time schedules beyond normal daytime hours, including early morning, evening and night shifts, as well as roster work and three shift work rotations. This rotational shift work involves workers switching (alternating) between a day, an evening, and a night shift more or less frequently. Approximately 29% of workers in the United States have part-time plans outside the 0600-1800 hours normal work-day, and most of them work at night. Data from the European Union (EU) for 2015 revealed that at least once a month about 19 percent of all workers work at night.

Shift workers claim that the sleeping disorders they experience are related to excessive sleepiness during night shift or early morning shift times or when the recovery time between shifts is shortened (Costa, 2015). When the sleep-wake problems associated with the work-schedule is chronic (symptoms last for at least three months), the employee may be diagnosed as a "shift work sleep disorder" (SWD), which is a circadian sleep cycle medical condition according to the international classification of sleep disorders. This happens due to the force disruption on a normal sleep-wake cycle that causes short sleeping time and fatigue. There is some evidence that a person's long-term health and safety may be affected by shift work, with several reports showing high risks of breast cancer and heart disease. The evidence-based findings, however, also contradict one another, while inconsistent; but it is well known that this shift work is not the only definitive cause of chronic illness. It can be

deduced that the critical problem in this field of study that prevents positive outcomes is the insufficient understanding of the mechanisms and direction in which changing work can lead to chronic diseases.

However, work in shifts, particularly night shifts, is known to have strong psychological and physiological effects on the workers. It is associated with negative effects such as insomnia, reduced alertness, decreased cognitively, exhaustion, disruption of mood, fertility problems, increased injuries, and personal, social and emotional issues. The reason why working on shifts could cause moodiness or mood disturbance is the decrease in the serotonin level, a substance in human bodies that promotes good mood which is released at night. Individuals working at would experience this neurotransmitter's decline in secretion, contributing to changes in mood. Additionally, in these subjects, one electroencephalographic research involving a group of nurses working on shifts showed micro-awakenings that described their sleep as non-repair. The American Academy of Sleep Medicine defined shift work disorder or sleep disorder as the feeling of excessive sleepiness or insomnia, which is strongly connected with working in shift.

Boivin & Boudreau (2014) Defined shift work as a working time that involves work schedules extending beyond the traditional 9-to-5 working hours, and schedules often include early work, shortened work week with 12-hour shifts and night work.

On the other hand, Booker et al. (2018) Defined shift work as any job requiring employees to work outside normal hours of sleep by rotating over permanent or intermittent shift hours. Similarly, a review by Mauricio et al. (2016) described shift work as a person whose normal

working hours are outside the standard working hour between 9 and 5 p.m. Shift work includes rotating shifts at night, morning and night. Offering critical service is common in most occupations and it represents 30 percent of employees worldwide.

Definition of shift work according to Sallinen & Kecklund, (2010) refers to numerous working environments of different types of shift management processes, shift duration, and rest-day structure, and may include sporadic, non-standard, or flexible working hours.

Meanwhile for European Union's Working Time Directive, they define shift work as "any method of organizing work in shifts whereby workers succeed each other at the same work stations according to a certain pattern, including a rotating pattern, and which may be continuous or discontinuous, entailing the need for worker to work at different times over a given period of days or week". Furthermore, they also define night work as any period of no less than seven hours, as specified by national law, which shall, in any case, include the time from midnight to 5.00.

2.5 Relationship between Work Shift and Nurses' Quality of Sleep

In the study done by Giorgi et al. (2018), they concluded that shift work proportionally affects sleep quality and job performance. The fact that work shifts disturb nurses' sleeping pattern was proven by Owens et al. (2015). This is in line with the research result found by Boivin & Boudreau (2014) which stated that night shift workers at times complain of having poor sleep quality. One of the most complained grievances is insufficient sleep during the night shift day among the early shift workers.

Lack of sleep has been shown to adversely affect the judgment of the nurses and assessment which consequently results in accidents and errors while working (Johnson et al., 2014). Symptoms such as exhaustion and falling asleep with intermittent breaks during their shift work are the product of long and erratic work hours. Nurses are also believed to struggle to stay awake during 36% of shift time (Poudel et al., 2014). In Shanghai, China having current and previous shift works are identified as major factors that affect sleep quality.

According to Kecklund & Axelsson, (2016), there is a connection between shifting work and cardiovascular metabolic diseases and injuries that are bound to occur around those experiencing sleep deprivations. The study result showed that the effect of shift work on sleep was mainly due to an acute loss of sleep in connection with night shift and early morning shift.

De Martino et al. (2013) referred to in their study range for evaluating the sleep/wake cycle between shifting nurses as well as their sleep quality and chronotype. The study result showed that they reported low quality of sleep, which was generally attributed to a lack of sporting habits among nurses and changing work habits.

Awareness for safety and health concerns associated with poor sleep health must be taken seriously, therefor state and federal laws should be implemented to address some issues. The American Nurses Association as an example states that as of 2001 Oregon State enacted legislation to avoid nurses from being obliged to work more than 2hours over a normally scheduled shift or 16 hours in a 24 hours period time.

Asian population range from 26.4% to 39.4% is said to have a lack of sleep. A study on sleep quality among nurses focused on the impact of shift work by using and proved that 57% of shift work nurses experienced sleep disorders (Chien et al 2013). The individual that encounters with lack of sleep and fatigue face serious health and safety harms to themselves and other people because lack of sleep will affect the emotional status, cognitive and motor deterioration (Fallis et al., 2011)

According to Fallis et al., (2011) chronic lack of sleep will increase the risk for depression and burnout and may dangerous to the quality of care delivered and also health to the care provider. For example or nurses working in night shift, working at night more likely less alert and a little struggle to stay awake towards the end of the night shift. This condition will affect patient safety. Patient safety is the main goal in the hospital environment.

According to Banks & DInges., 2007; Elisabeth Flo shift work increased the likelihood of nodding or micro sleeps. It can happen to the worker that doing shift work and night work because micro sleeps happen due to increased sleepiness, reduced cognitive and physiological functioning.

Nurses that work in shift work more likely have a family life that interfered with their work especially night shift; it is because normal social activities take place during the day. Family responsibilities may also effect for shift worker's sleep (Wright Jr, et al., 2012)

A study by Chen, Gelaye & Williams, (2014) said the lack of sleep has a major impact on the quality of life for patients, including low mental health and insomnia. National Sleep Foundation's reported that normal adults aged 18 to 64 recommended sleeping in a duration

of 7 to 9 hours per night (Hirshkowitz et al., 2015). Similarly reported by the American Academy of Sleep Medicine and Sleep Research Society recommended sleeping 7 hours or more a night in order to maintain good health (Watson et al., 2015)

Result from a study by Johnson et al (2014) they found that there is an inverse relationship between lack of sleep and error inpatient care. The decrease in sleep will result in increased inpatient care errors.

2.6 Impacts of Inadequate Sleep to Health

Irregular work schedules will result in decreased sleep, resulting in drowsiness, fatigue, mental function deterioration, and nurses' health problems. The job output of the nurses was attributed to sleep deprivation where they would have trouble performing tasks requiring intense and prolonged attention. This results in the commission of errors when the nurses are tending the patients and worse, they are prone to traffic accidents. Other than that, sleep deprived nurses risk obesity, diabetes, gastrointestinal disorders, and cardiovascular disease. The risk factor for breast cancer is 1.79 times higher and the risk for colorectal carcinoma is significantly higher.

Because of this, Von Treuer et al. (2014) highlighted in their report that night shift workers are more likely than day shift workers to suffer health complications. Their study was conducted to investigate the variation in organizational environments between nurses across different types of shift work and health outcomes, and to evaluate the variations in an

organizational environment between shifts account for the variation in health outcomes associated with shift work. Subsequently, it was found that improved unity and participation in the workplace and reduced work stress have been found to mitigate the negative health effects of shift workers, especially nurses.

In the study by Owens et al. (2015), they have proven that nurses who work in shift feel that their quality of life is affected because they experience fatigue and eventually the feel extremely discourage and unenergetic to carry out their domestic obligations or responsibilities. This is in line with the study done by Boivin & Boudreau (2014) who believed that a person who sleeps better at night will perform better during the day, which is the reason for the feeling of exhaustion among nurses in which it decreases cognitive performance and increases the number of lapses of attention.

Deprivation of sleep and combined sleep debts increase the risk of occupational accidents among nurses. This is proven from the answers obtained from post-accident investigation questions among the victims who associated the accidents with lack of sleep, high level of fatigue and tight working schedule. It is also concluded in this study that working in shifts has an adverse effect on the socioeconomic aspect due to increased risk of diseases, concerning medical conditions, occupational errors, and accidents.

According to Li Zhang et al. (2016) the nurses' poor health status and the quality of care that these nurses deliver are directly associated with their poor quality of sleep due to working in shifts. According to Booker et al., (2018) a lot of health issues are caused by the tendency of

shift workers to consume higher intake of alcohol and caffeine, to smoke profusely and eat excessively which all lead to higher body mass index.

During the night shift, working activities such as walking around the ward, talking to colleagues or patients, drinking caffeinated drinks and expose to the lighting will make the workers stay awake and alert. Unfortunately, if used wrongly all of these actions will make the work hard to sleep when the night end (Wright Jr, et al., 2012). These relate to the study by Reinberg & Ashkenazi (2008) that said working during the night which is time preferred for sleep will disturb the sleep-wake rhythm that prone to an imbalance between environmental, circadian clock and also between internal physiological systems. Meanwhile, when it is a transition between night shift to day shift which is started before 07.00 am, the worker will be associated with the feeling of laziness to wake up (Sallinen & Kecklund, 2010).

According to Akerstedt T (2003) non-standard work hours give effect acute and strong to rest and understanding of night and morning work. The effect similar to clinical insomnia and the effect relevant to a fatigue-related accident and the productivity become lessen.

Lack of sleep and circadian directly affect the number and division of sleep, waking time and time circadian. Shift work is said to be one of the causes of circadian disorders and lack of sleep according to the view of (Johnson et al 2014). Durations of sleep less than 7hours per night consider as short sleep and it is associated with negative health and safety outcomes (Wright et al 2013)

2.7 Summary

From the literature review, it can be seen that a lot of studies have been carried out in respect of the health service field, specifically the nursing profession. It is because nursing is one of the important health care providers in the hospital to carry out the services. This is due to the fact that in this 24hours industry, shift work is unavoidable and necessary despite the health of the medical staff and quality care has to be compromised.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter explains research design, research framework, hypothesis, variables that consist of the dependent variable and independent variables, sampling method that involves; a population of the study, sample size, sampling technique and questionnaire design, selection of survey instrument, data collection procedure, analysis of data, data screening and summary.

3.1 Research Design

This study is quantitative research using a cross-sectional approach this enabled the researcher to investigate the occurrence and extent of the research construct. Quantitative research involves data collection which focuses on statistical analysis reporting rather than subjective significance reporting (Creswell, 2014; Polit & Beck 2014). According to Walker (2005) a quantitative research model aimed at advancing information acquisition and collection while improving the delivery of the topic to be addressed in future research.

Quantitative methods are best to measure up data in an efficient way, make generalizations to the entire population or experiment theory with the hypothesis (Creswell & Clark, 2017). The

cross-sectional model offers a ' snapshot ' of data or information from one point in time by measuring quantities and studying ways things occurred (how and why) (Alshehri, 2016). Hence fulfills the intent of the study to investigate the relationship between shift work to nurses and the quality of sleep reporting between nurses.

3.2 Research Framework

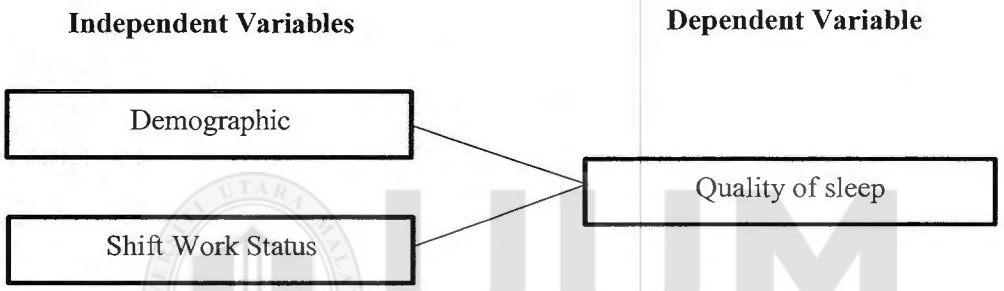

Figure 3.1 Research framework

The framework depicted above has been developed based on previous literature. The design of the framework correlates with this shift may be related to the reliability of the nurses ' sleep. Main indicator emphasize that shift work status affects quality of sleep is from the study by (Li Zhang, Sun, Li, & Tao, 2016) that said working in a shift or previously working in shift were significantly associated with poor sleep quality.

3.2.1 Hypothesis

From the stated framework it can be assumed that demographic factors may be related to the quality of sleep among nurses and there may be a relationship between working in shift work and quality of sleep among nurses. The hypotheses developed for this study are as follow:

a. H1

   The prevalence of sleep quality among nurses working in UMMC is high.

b. H2

   There is a difference between demographic factors (age, gender, marital status, having children, educational level, working experience, shift work status and working in which section in the department) with sleep quality among nurses.

c. H3

   There is an association between shift work and sleep quality among nurses.

3.2.2 Variables

This study is made up of one dependent variable and two independent variables, as described below.

3.2.2.1 Dependent Variable

The dependent variable is a variable that depends on other factors. In this study dependent variable is quality of sleep. Poor sleep quality is due to excessive sleepiness and insomnia due to work shifts according to The American Academy of Sleep Medicine.

3.2.2.2 Independent Variable

Independent variables are variables that are not affected by the other variables that we trying to measure. In this study, there are two independent variables which are demographic factors and shift work status.

a) Demographic factors

Demographics is a variable collected to describe the nature and distribution of the sample. These variables such as age, gender, marital status, children status, educational level, working experience, shift work status and the section of working. In this study, we examine the differences between each variable and the quality of sleep.

b) Shift work status

Shift work is defined as work schedules extending beyond the usual nine to five working days (Boivin & Boudreau , 2014). In this study, shift work status will be divided into three which is never done any shift work, currently doing shift work and previously doing shift work, it is according to research by (Li Zhang et al., 2016).

3.3 Sampling method

3.3.1 Population of the study

The population of the study is known as a collection of individuals with similar characteristics. The population of the data for this study is from the number of nurses that working in the Surgery Department, UMMC. From the data in UMMC portal, there is about 126 populations of nurses that working in the Surgery Department, UMMC. From 126 populations, there is 9 male nurse and 117 are female nurse. Surgery Department consists of one unit of the clinic, two units of wards and one unit of the operation theatre.

3.3.2 Sample size

The sample size is the number of measured individuals used in a survey. According to Krejcie & Morgan, (1970) for analysis, sample size determination parameters have been adopted because it takes into account the level of confidence and reliability to ensure that sampling size error is significantly minimized. The researcher sample size is approximately 97 determined based on Krejie and Morgan 's Table.

Table 3.1

Determination of the sample size of the population

Population (N)	*Sample size* (S)
110	86
120	92

130	97
140	103

Source: Krejie & Morgan (1970)

3.3.3 Sampling Technique

3.3.3.1 Systematic Random Sampling

Random sampling is defined as a technique in which every people have the same opportunity and the likelihood of being selected as a sample. This research applied Systematic Random Sampling as the sampling method. The main characteristic of this sampling is the equal opportunity for each sample to be selected.

The way to do this kind of sampling is:

1) List all members in the selected population and then each member will be labelled with a specific number e.g. 1 to N.
2) Then from the population, the respondents are selected randomly based on random table by Del Seigle (2019).

3.4 Questionnaire Design

The questionnaire is divided into two sections for measurement. Section 1 is a demographic that consists of age, gender, marital status, children status, educational level, working experience, shift work status and section working. This section is important to measure the relationship factor between a dependent variable and independent variables in this study. Section 2 consists of 19 questions for assessments of sleep quality using Pittsburgh Sleep Quality Index. There are 5 questions that participants need to write a short answer and another 14 questions about sleep quality using 4 Forces Porter's Model (0,1,2,3).

The sleep assessment questionnaire is combined into 7 medically based component scores including sleep quality, sleep latency, sleep duration, normal sleep output, sleep disturbance, sleep medication, and daytime dysfunction. The 7 components score are added to obtain a global score ranging from 0 to 21, A PSQI total score greater than 5 is diagnostic as poor sleep quality. (Questionnaire is in APPENDIX A)

Table 3.2

Questionnaire

Variables	**Source**	**Number of instrument**	**Scale**
Demographic	(Li Zhang et al.,2016)	8	Multiple Choice
Sleep Assessments	(Curcio et al., 2013)	5	Short Answer

Sleep Assessments	(Curcio et al., 2013)	14	4 Forces Porter's Model point (0,1,2,3)

3.5 Instrument development

The approached that were used in designing the questionnaire of this study are as follow:

a) The questions were arranged logically and were relevant to the nurses.

b) The information sheet was developed and used as cover page.

c) Similar questions were grouped together in different sections of the questionnaire.

3.5.1 Selection of Survey Instrument

A descriptive, closed-ended questionnaire is the survey tool used in this study. The ability to rapidly capture *prima facie* relevant data are the advantages of using quantitative surveys Alshehri, (2016) though achieving the study objective was deemed most important. To collect descriptive data, surveys are used in the form of questionnaires (Babbie 2016; Hasson & Keeney 2013). The questionnaire used in this study is the Pittsburgh Sleep Quality Index (PSQI) Curcio et al., (2013). In particular, the English questionnaire then translated to Bahasa Malaysia version of to make it as bi-languages were used to detect the presence of sleep quality. According to Manzar et al., (2018) PSQI has an important role to play in medical and academic sleep health assessment. It is because this questionnaire has the advantages of effective in terms of cost, and ease of administration. This questionnaire also

no need for supervision and this will reduce demand for a medical specialist. PSQI is a type of questionnaire that gives an important diagnostic role as a rating scale questionnaire thus, its reliability and validity are established beyond doubt.

3.5.2 Inclusion/ Exclusion Criteria

3.5.2.1 Inclusion Criteria

Inclusion criteria are all U29 nurses working in targeted area which is Surgery Department, UMMC.

3.5.2.2 Exclusion Criteria

Exclusion criteria are nurses U32 and above which is in management area.

3.6 Data Collection Procedure

Data collection is the "precise, systematic gathering of information relevant to the research purpose, or the specific objectives, questions or hypotheses of a study" (Burns & Grove, 2007:41). In this particular study, the data collected are important to the specific objectives developed in response to the research question. Before commencing this research, ethical approval from the University of Malaya Medical Centre Research Ethics Committee (APPENDIX B) has been obtained. The questionnaire is distributed to participants' email by using the google form. Participants are told, apart from their personal information, that the potential health professionals involved in this research will not face any other risks. They

were also taught that all data was stored on a dedicated hard drive and computer electronically and that the researcher knows only about it. When the result is complete, all data will be destroyed.

3.7 Analysis of Data

Data analysis refers to data reduction, structure, and interpretation, with the methods used depending on the research goals and the rate of measurement of the variables (Burns & Grove, 2007). The collected data will be analyzed using the Statistical Package for the Social Sciences (SPPSS) Version 23. SPSS is a software package used for statistical analysis, data manipulation and the creation of data tables and graphs (Greasley, 2007). Before the analysis, a database in the SPSS program will be created by the researcher.

The PSQI total score is presented as means and standard deviations. Demographic data are presented as numbers and percentages. One Way ANOVA and T-test is used to compare the differences between demographic and sleep quality. Meanwhile, the Chi-Square test is used to analyze the relationship between shift works and sleep quality.

3.7.1 Data Screening

Each of the returned questionnaires will be number-coded and invalid responses shall be excluded, before data cleaning conducted. The data will be checked properly should there any missing value or incorrect data entered. The task of screening of data is important before

doing a multivariate analysis because it helps the researcher in recognizing the main rules that guide the use of multivariate techniques for data examination (Saidu & Zabedah, 2014). Hence, data screening was conducted by examining the basic descriptive statistics and frequency distribution.

3.8 Summary

This chapter discusses the research design, measurement to collect data which is using a questionnaire, how to produce data collection which is a time frame to distribute the questionnaire to the sample and how to analyze data using proposed software. This progress of work will help in the analyse of data in chapter four.

CHAPTER FOUR

RESULT

4.0 Introduction

Analyzes of research data and results presented in this section. This presents complete study results and analyzes in the form of graphs, tables or text in order to highlight the key information.

4.1 Response rate

For the study, the questionnaire was distributed to all nurse works in Surgery Department in UMMC. The returned questionnaires were checked for the eligibility before conducting the analysis. Out 113 questionnaires distributed, 102 were returned. However, 5 questionnaires are incomplete. Thus 97 questionnaires were selected. The response rate (Table 4.1) for the study is 90.2%. Babbie (2016) suggested that response bias can be minimized with a high response rate.

Table 4.1
Response rate

Response	**Frequency /Rate**
Number of distributed questionnaires	113
Total returned questionnaires	102
Useable and eligible questionnaires	5
Response rate	90.2%

4.2 Descriptive Analysis

4.2.1 Descriptive Analysis of Demographic Data

The results from questionnaires have been tabulated. Table 4.2 shows that the age distribution of respondents is revealed that a high percentage at the age of 26-30 years old at 45.4%. Our study found that most of the participants were female which is 93.8%. The study also shows that the participants are 61.9% married and 53.6% are not having any children. Regarding their education background, about 91.8% of the participants had a diploma. Moving into working experience, the majority of the respondents had experience of about 5-9 years old which is 49.5% and for respondent shift work status majority are currently doing shift work 82.5%. Finally, as for the section of the working majority, we are working inward which is 77.3%.

Table 4.2

Demographic data (N=97)

No.	Demographic Variables	N	%
1	**Age**		
	18-25 Years old	19	19.6%
	26-30 Years old	44	45.4%
	31-35 Years old	29	29.9%
	36 years old and above	5	5.2%
2	**Gender**		
	Female	91	93.8%

	Male	6	6.2%
3	**Marital Status**		
	Married	60	61.9%
	Single	37	38.1%
4	**Children**		
	No	52	53.6%
	Yes	45	46.4%
5	**Educational Level**		
	Degree	8	8.2%
	Diploma	89	91.8%
6	**Working Experience**		
	Less than 5 years	29	29.9%
	5-9 years	48	49.5%
	10-14 years	18	18.6%
	15 years and above	2	2.1%
7	**Shift Work Status**		
	Currently doing shift work	80	82.5%
	Never do shift work	4	4.1%
	Previously doing shift work	13	13.4%
8	**Section of Working**		
	Clinic	9	9.3%
	Surgery Operation Theatre	13	13.4%
	Ward	75	77.3%

4.2.2 Descriptive Analysis Level of Sleep Quality

Table 4.3 below demonstrates descriptive analysis level of sleep quality. Level of sleep quality have been divided into two levels which is good sleep quality for score 0-5 and poor sleep quality for score above 5. According to PSQI score which scores range is between 0-21 which higher score indicates worse sleep quality and score at 5 or more indicate poor sleep quality (Crucio et al., 2013). The result for age show that good level of sleep quality for18-25 years old, 26-30 years old, 31-35 years old and 36 years old and above are N(%)= 5 (20.8%), 10 (41.7%), 6 (25%), 3 (12.5%) and poor level of sleep quality for 18-25 years old, 26-30 years old, 31-35 years old and 36 years old and above are N(%)=14 (19.2%), 34 (46.6%), 23 (31.5%), 2 (2.7%). On the other hand, result for gender show that, female and male good level of sleep quality are N(%)=23(95.8%), 1(4.2%) and for poor level of sleep quality are N(%)=68 (93.2%) 5 (6.8%). For marital status married and single good level of sleep quality are N(%)=14 (58.3%), 10 (41.7%) and poor level of sleep quality are N(%)=46 (63.0%), 27 (37.0%). The result for having children or not show that, good level of sleep quality are N(%)= 14 (58.3%), 10 (41.7%) and for poor level of sleep quality N(%)= 38 (52.1%), 35 (47.9%).

Furthermore, the result for having degree and diploma are, good level of sleep quality N(%)=2 (8.3%), 22 (91.7%) and poor level of sleep quality are N(%)=6 (8.2%), 67 (91.8%). For working experience, the result show that good level of sleep quality for Less than 5 years, 5-9 years, 10-14 years, 15 years and above are N(%)=7 (29.2%), 9 (37.5%), 7 (29.2%), 1 (4.2%) and for poor level of sleep quality are N(%)=22 (30.1%),

39 (53.4%), 11 (15.1%), 1 (1.4%). Then, good level of sleep quality for shift work status which is currently is doing shift work, never do shift work, previously doing shift work are N(%)=20 (83.3%), 1 (4.2%), 3 (12.5%) and for poor level of sleep quality are N(%)=60 (82.2%), 3 (4.1%), 10 (13.7%). Lastly, for section of working which is at clinic, surgery operation theatre and ward good level of sleep quality are N(%)=2 (8.3%), 3 (12.5%), 19 (79.2%) and poor level of sleep quality are N(%)=7 (9.6%), 10 (13.7%), 56 (76.7%).

Table 4.3

Descriptive analysis level of sleep quality

No	Demographic Variables	Level of Sleep quality		Total
		Good	Poor	N(%)
		N (%)	N (%)	
1	**Age**			
	18-25 years old	5 (20.8%)	14 (19.2%)	19 (19.6%)
	26-30 years old	10 (41.7%)	34 (46.6%)	44 (45.4%)
	31-35 years old	6 (25%)	23(31.5%)	29 (29.9%)
	36 years old and above	3 (12.5%)	2 (2.7%)	5 (5.1%)
2	**Gender**			
	Female	23 (95.8%)	68 (93.2%)	91 (93.8%)
	Male	1 (4.2%)	5 (6.8%)	6 (6.2%)

3	**Marital Status**			
	Married	14 (58.3%)	46 (63.0%)	60 (61.9%)
	Single	10 (41.7%)	27 (37.0%)	37 (38.1%)
4	**Children**			
	No	14 (58.3%)	38 (52.1%)	52 (53.6%)
	Yes	10 (41.7%)	35 (47.9%)	45 (46.4%)
5	**Educational Level**			
	Degree	2 (8.3%)	6 (8.2%)	8 (8.2%)
	Diploma	22 (91.7%)	67 (91.8%)	89 (91.8%)
6	**Working experience**			
	Less than 5 years	7 (29.2%)	22 (30.1%)	29 (29.9%)
	5-9 years	9 (37.5%)	39 (53.4%)	48 (49.5%)
	10-14 years	7 (29.2%)	11 (15.1%)	18 (18.6%)
	15 years and above	1 (4.2%)	1 (1.4%)	2 (2.1%)
7	**Shift work status**			
	Currently is doing shift work	20 (83.3%)	60 (82.2%)	80 (82.5%)
	Never do shift work	1 (4.2%)	3 (4.1%)	4 (4.1%)
	Previously doing shift work	3 (12.5%)	10 (13.7%)	13 (13.4%)
8	**Section of working**			
	Clinic	2 (8.3%)	7 (9.6%)	9 (9.3%)
	Surgery Operation Theatre	3 (12.5%)	10 (13.7%)	13 (13.4%)
	Ward	19 (79.2%)	56 (76.7%)	75 (77.3%)

4.2.3 Descriptive Analysis Frequency Level of Sleep Quality

Result from table 4.4 show that 85 nurses have poor sleep quality which is 87.6% form total 97 nurses and 12 nurses are good in sleep quality which is 12.4%.

Table 4.4

Descriptive analysis frequency level of sleep quality

Level of Sleep Quality	**Frequency (N)**	**Percentage (%)**
Poor	85	87.6%
Good	12	12.4%
Total	**97**	**100%**

4.2.4 Descriptive Statistic for Sleep Quality

Table 4.5 given below demonstrates the descriptive results of sleep quality. The mean of sleep quality is 7.55±2.95. The median is 8.00. According to PSQI score which scores range is between 0-21 which higher score indicates worse sleep quality and score at 5 or more indicate poor sleep quality (Crucio et al., 2013). From the result at least 50% of respondents sleep quality scores 8 and above. Hence, at least 50% of respondents have poor sleep quality.

Table 4.5

Descriptive Sleep Quality

Statement	Mean±SD	Median
Pittsburgh Sleep Quality Index	7.55±2.95	8.00

4.3 Normality test

The normality test was to carry out whether a data set is modeled for normal data distribution. Data distribution should be identified before proceeding with statistical analysis. According to Ghasemi & Zahediasl (2012) said that the data was normally distributed if P values are greater than 0.05 and data are not normally distributed if P values less than 0.05. On the other hand, we also used Skewness and Kurtosis for the measurement of normality. Skewness was measured by the symmetry in distribution. Kurtosis was measured by the combined sizes of the two tails. It measures the amount of probability in the tails. The data was considered approximately normal when the value of skewness and kurtosis is between ± 3 (Garson et al, 2012). The normality test for this study had been tested by using test Kolmogorov-Smirnov, Skewness and Kurtosis. From the result in table 4.6 below the P value in the test of normality was 0.059, which is more than 0.05. Meanwhile, the value of Skewness is 0.022 and the value of Kurtosis is -0.103 which in an acceptable range. Figure 4.1 summarized our reported finding, where it showed that the distribution of sleep quality among nurses normal. Hence the distribution can assume normal.

Table 4.6

Normality test

Skewness	Kurtosis	P Value
0.022	-0.103	0.059

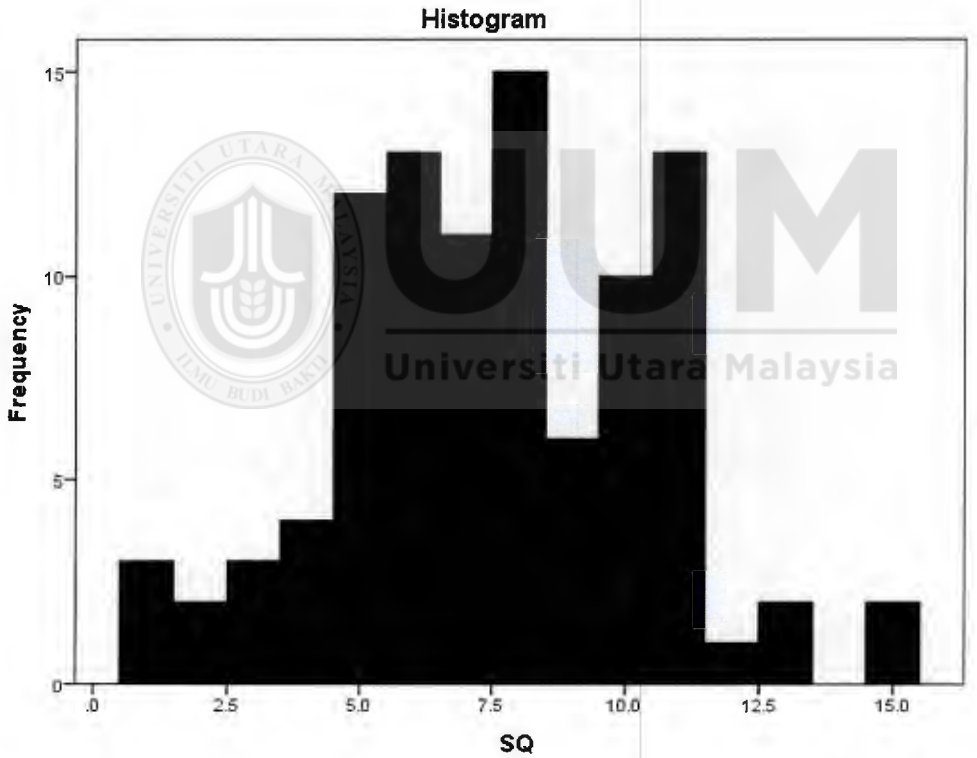

Figure 4.1

Distributions of sleep quality among nurses.

4.4 Inferential statistic

4.4.1 Differences between Demographic Factors and Sleep Quality.

Table 4.7 below demonstrates the inferential statistic result of differences between demographic factors and sleep quality by using a method of analysis T-test and ANOVA. From the T-test, it shows that the mean and standard deviation for gender variable, the female mean and standard deviation is 7.44±2.90 and male is 9.17±3.48 with P value is 0.782 (P>0.05) show that there is no significant difference in sleep quality between gender group. Furthermore for marital status, married come out with 7.25±2.76 and single 8.03±3.21 with P value is 0.210 (P>0.05) shows that there is no significant difference in sleep quality between marital status. The result also, shows that having children 7.49±2.80 and not having any children 7.60±3.09 with P value 0.459 (P>0.05) so that it is no significant difference in sleep quality between this group. For the educational level, the result is degree 7.25±1.98 and the diploma is 7.57±3.03 with P value 0.136 (P>0.05) therefore, there is no significant difference in sleep quality in this group.

Meanwhile by using ANOVA, the result for age is 18-25 years old 8.21±3.17, 26-30 years old 7.91±2.65, 31-35 years old 7.14±2.91 and 36 years old and above 4.20±2.95 with P values is 0.032 (P<0.05). Therefore, there is a significant difference in sleep quality between the age group. On the other hand, working experience result, for less than 5 years is 8.24±3.07, 5-9 years 7.79±2.60, 10-14 years 6.11±3.00 and 15 years and above 4.50±4.95 with P value 0.037 (P<0.05) show that there is a significant

difference in sleep quality between this group. The study also shows that for shift work status the mean and standard deviation currently doing shift work is 7.58±2.98, never do any shift work 6.50±2.89 and 7.69±2.92 for previously doing shift work and their P value is 0.766 (P>0.05) therefore there is no significant difference in sleep quality between the group. Lastly for section working, working in clinic 6.78±3.07, surgery operation theatre 7.77±2.61 and inward 7.60±3.01 with P value for the group is 0.706 and it shows that there is no significant difference in sleep quality between the group.

Table 4.7

Results the differences between demographic factors and sleep quality.

No.	Demographic Variables	Mean±SD	P Value	Test
1	**Gender**		0.782	T-test
	Female	7.44±2.90		
	Male	9.17±3.48		
2	**Marital Status**		0.210	
	Married	7.25±2.76		
	Single	8.03±3.21		
3	**Children**		0.459	
	No	7.60±3.09		
	Yes	7.49±2.80		
4	**Educational Level**		0.136	
	Degree	7.25±1.98		
	Diploma	7.57±3.03		

5	**Age**		0.032	
	18-25 Years old	8.21±3.17		
	26-30 Years old	7.91±2.65		
	31-35 Years old	7.14±2.91		
	36 years old and above	4.20±2.95		
6	**Working Experience**		0.037	
	Less than 5 years	8.24±3.07		
	5-9 Years	7.79±2.60		
	10-14 years	6.11±3.00		
	15 years and above	4.50±4.95		ANOVA
7	**Shift Work Status**		0.766	
	Currently doing shift work	7.58±2.98		
	Never do shift work	6.50±2.89		
	Previously doing shift work	7.69±2.92		
8	**Section of Working**		0.706	
	Clinic	6.78±3.07		
	Surgery Operation Theatre	7.77±2.61		
	Ward	7.60±3.01		

4.4.2 Association between Shift Work and Sleep Quality

Table 4.8 shows the result association between shift work and sleep quality by using a method of analysis Chi-Square. From the result, 12.5% (n=10) doing shift work having good sleep quality and 87.5% (n=70) having poor sleep quality. Meanwhile, never do shift work 25% (n=1) having good sleep quality and 75% (n=3) having poor sleep quality. Lastly previously doing shift work having 7.7% (n=1) having good sleep quality and 92.3% (n=12) having poor sleep quality. The result revealed that there was no significant association between shift work and sleep quality with P value 0.653 which is more than 0.05 (P<0.05).

Table 4.8

Association between shift work and sleep quality.

Shift Work Status	Sleep Quality		P value
	Good n (%)	Poor n (%)	
Currently is doing shift work	10 (12.5)	70(87.5)	
Never do shift work	1 (25)	3 (75)	0.653
Previously doing shift work	1 (7.7)	12 (92.3)	

4.4 Summary

From the result, we can summarize that participants whichever doing shift work or not are no significant differences with sleep quality and working in shift work also is not associated with poor sleep quality. From the result also, it can be seen that 87.6% of nurses working in the Surgery Department in UMMC are having poor sleep quality.

CHAPTER FIVE

DISCUSSION, RECOMMENDATION & CONCLUSION

5.0 INTRODUCTION

This chapter comprises of the discussion, contribution of study, recommendations, and conclusions of the study based on the result findings. The first section, discussion, addresses the findings of the study through its objectives, the second section demonstrates the contribution of the study, followed by the limitation of this study and future studies. The third and last section gives some recommendations arising from this study and the conclusions.

5.1 Summary of Demographic

From the study, the researcher found that most of the respondents were aged between 26-30 years old at 45.5%. Most of the respondents were also female in the percentage of 93.8% rather than male. The study shows that 61.9% are married and 53.6% were not having any children. Of all the respondent 91.8% have a diploma and 8.2% degree holders. Near half of the respondents which is 49.5% working 5-9 years. Furthermore, 82.5% is currently working shift work, 13.4% previously working shift and 4.1% never done any shift work. Finally, 77.5% of nurses are working inward rather than 13.4% is working in the surgery operation theatre and 9.3% working in the surgery clinic.

5.2 Findings of the study through its objectives.

5.2.1 Objective one: To investigate the level of sleep quality.

Result for the level of sleep quality among nurses with mean and standard deviation 7.55±2.95 and median 8.00. This is meeting the PSQI criteria for poorer sleep by Crucio et al (2013) that stated that score for PSQI is between 0-21 as 21 score is the highest while score 5 and more are considered as poor sleep. Meanwhile, from the result analysis frequency level of sleep quality we can conclude that 87.6% of nurses in Surgery Department, UMMC having poor sleep quality with N=85 from the total of N=97 sample. Thus it is in line with various studies by Li Zhang et al. (2016); Giorgi et al (2018); Boivin & Boudreau (2014) stated that nurses have poor sleep quality. It is also a study by Owens et al (2017) that said nursing does have poor sleep quality especially working in shift. It also in line with research by Chien et al (2013) revealed that 75 % of their subjects had a total PSQI score of 5 or above which proved that their participants have poor sleep quality. Research by Nazatul et al (2008) also showed that 57.8% of their nurses had poor sleep quality.

5.2.2 Objective two: To determine the differences between demographic factors and sleep quality among nurses.

The outcome of the study was using the T-test for two groups and ANOVA test for more than two groups. The study shows that gender, marital status, children, educational level, shift work status and working in what section in the department do

not have a significant difference in sleep quality. Regardless of participants female or male, married and having children or not it is no significant difference in sleep quality. We can assume that family or children maybe not lead to factors that affect sleep quality among nurses. Perhaps the variations are less likely to be due to ambiguous job-related factors due to a similar type of work or schedule of work. Working in shift work or not in shift work also not a significant difference in sleep quality, it in line with a research by Zamanian et al (2008) that their result showed no significant difference in sleep quality and shift work even though more than 50% participants reported having poor sleep quality. This is also in line with the research by Nazatul et al (2008) that showed there is not find any significant difference between shift work status with sleep quality. Thus, maybe poor sleep quality having by the participants is related to other reasons that need further investigation.

Age and working experience have a significant difference in sleep quality. Relative to other age groups, age group 36 years and older had the least poor sleep performance. Participants in the age group 36 years old and above normally had working experience at least more than 10 years. It is inversely related to sleep disturbance. This means that the older and higher working experiences you are the least poor sleep quality compared to the young participant. This result is similar to a study by Nazatul et al (2008) which is stated that in poor sleep performance, the age between 50 and 59 years was lower than in other age groups. A study by Suzuki, Ohida, Kaneita et al (2005) also stated that age is inversely related to sleep disturbance.

5.2.3 Objective three: To determine the relationship between shift work and sleep quality among nurses.

A Pearson chi-square test was conducted to examine whether there was an association between shift works and sleep quality. From the result, it is showed that there is no significant association between shift works and sleep quality. The result showed that participants working in shift work, previously doing shift work or never do shift work not contributed to poor sleep quality. Although some previous studies have shown that the shift schedule has led to poor quality of sleep. The result is similar to the study by Chien (2013) that said that sleep quality was not related to shifting work schedule. On the other hand, a study by Chung et al (2009) showed that in their study poor sleep quality is correlated with a group of nurses working in standard schedules compare to nurses working in shift work. It is mean that nurses working in the shift are prone to arrange their sleep time properly. Maybe it is because, according to nurses' schedule in UMMC, in one week they have a maximum two night of night shift and after night shift they will have one night off and one day off then after a day off, they start again the shift with evening shift. It showed that their poor sleep quality is not because of the shift work schedule maybe because of other reasons.

5.3 Summary of the hypothesis

The result of the study based on table 5.1 revealed that the prevalence of sleep quality among nurses working in shift is low indicates by high PSQI score, therefore the hypothesis is rejected. The result from differences between demographic factors and sleep quality by using T-test and ANOVA can be concluded that gender, marital status,

children, educational level, shift work status and working in what section in the department do not have a significant difference in sleep quality. But, age and working experience have a significant difference. The results from the Chi-Square test have shown that there is no significant association between shift work and sleep quality among nurses. It can be concluded that there is no relationship between shift work and sleep quality among nurse thus, the hypothesis rejected.

Table 5.1 *Summary of the hypothesis*

Hypothesis statement		**Result**
The prevalence of sleep quality among nurses working in UMMC high.		Rejected
There is a difference between demographic factors with sleep quality among nurses:		
i.	Age	Accepted
ii.	Gender	Rejected
iii.	Marital status	Rejected
iv.	Children	Rejected
v.	Educational level	Rejected
vi.	Working experience	Accepted
vii.	Shift work status	Rejected
viii.	Working section	Rejected
There is an association between shift work and sleep quality.		Rejected

5.4 Contribution to Research, Limitations, and Future Research

5.4.1 Contribution to research

This research contributed to the current understanding of the work's existence of the frequency and severity of the nurses. This study's systematic approach added to existing work by identifying a group of nurses that should be considered by the management of UMMC to be priorities in term of sleep quality and also to emphasize Department of Occupational Safety and Health in UMMC as a guideline to promote sleep health as an important thing. It is also can be a guideline to Ministry of Health to promote mental health since poor sleep quality can contribute to stress and depression among worker according to Vogel et al (2012) and statistic showed that one out of four-person have mental problem or Ministry of Women, Family and Community Development can use as a guideline as majority of nurses are women. According to the Office of Disease Prevention and Health Promotion under the United States' Department of Health and Human Service, sleep health is a subject matter for Healthy People 2020. Assessment of sleep quality is good for every worker to check their level of sleep quality so that they aware of their sleep health. Awareness of the positive impacts on sleep quality is also important to maintain employee health, productivity, wellness, quality of life and most important things is safety towards patients under their guidance.

This study strengthens the idea that assessment for sleep quality must be done as routine medical check-ups since 50% of the nurses have poor sleep quality. Sleep quality assessment to the nurses at UMMC and Surgery Department specifically can be a guideline or benchmark to other departments do the same thing to their workers. Since that hospital is a place that offers 24 hours service, previous research said that shift work is something that cannot be inevitable. This study found that shift work does not become the reason for poor sleep quality. Thus this study needs to be extended by advancing our understanding of the reason why poor sleep quality happens to the nurses.

5.4.2 Limitations of the study

Our study had several limitations. According to Burns and Groove (1993) limitations of the study are restrictions that result in a negative effect of generalisation of finding. The first limitation was, sampling technique for this study was simple random sampling. Because it is random the sample size was not under researcher control. For example sample for male nurses are very limited. Out of 126 in the population of nurses in the Surgery Department, only 6 are male nurses. So these groups are under-represented. Here, there's the possibility of being biased. Secondly, our study was specific to Surgical Department nurses, and the results may not be generalizable to other departments' areas that have different disciplines and workloads. Finally, our study uses a self-reported questionnaire from PSQI, which could lead to a biased

response from each respondent. It is therefore, necessary to make generalizations cautiously and be restricted only to the population investigated.

5.4.3 Future Studies

Future research should aim at understanding the generalizability of these findings in other contexts. A higher number of respondents and hospitals will be more significant for future research and could generate more distinct results. To increase the sample size, the inclusion of areas with more multiple disciplines and multiple staff is suggested. Furthermore, this study can be held by using multiple sets of different questionnaires to avoid biased. So we can compare the result and make better research to the institutions. Besides that, other researchers may include patient safety as one of the aspects of this research because sleep quality also related to nurses' health and patient safety.

5.5 Recommendation

Sleep health should be evaluated for all nurses and also for all professionals and should include as a routine medical check-up. Sleep health awareness also should be included as one of the annual training programs, as there is a need for compulsory improved education and training for all health professionals. As far as management is concerned, the efforts to promote safety and health and its implementation must be continued and periodically improved to ensure maximum results for all concerned. Besides, a

suggestion to create a sleep clinic or create one session for sleep assessment in occupational safety and health clinic to make sure all nurses and other staff are doing sleep assessment periodically without miss out.

On the other hand, shift schedules should be constructed on the basis of certain ergonomic principles, accepted as ideal for minimizing and restricting adverse sleep disturbance effects. Avoid most consecutive night shifts, such as not more than 2 nights per week in every schedule and must be following with night off, a day off or one-day annual leave. According to Costa (2010) some staff prefers clockwise rotation to counter-clockwise example: morning/evening/night to evening/morning/night. Allow flexible working hours to suit the needs and interests of the worker for example if the worker has a problem with the baby sitter, allow the worker to adjust their schedule according to its suitable time. Last but not least, the number of consecutive working days and not more than that should be limited to 5-7 hours. Each process change should include a free weekend with at least 2 consecutive full days off to provide employee recovery and rest time. (Costa, 2010).

5.6 Conclusion

According to Costa (2010) referring to the WHO's definition of health, shift work is considered as a condition that gives risk to the worker at three levels. First. most medical conditions are a risk factor such as cancer, cardiovascular and psychoneurotic. Second, risk factors for sleep disturbance and lastly, shift work was disturbed family

and social life. In our findings showed that 50% or the participants have poor sleep quality. While 50% have a poor quality of sleep, our result has shown that there is no correlation between shift work and quality of sleep. It is can be concluded that regardless of working in shift work or standard shift nurses still have poor sleep quality. Further research with different variables needs to be carried out to study factors that affected sleep quality among nurses.

REFERENCES

Allen, B. A. J. H., Park, J. E., Adhami, N., Tholin, H., Dodek, P., & Rogers, A. E. (2014). W s s d c c n, *23*(4), 290–295.

Alyaemni, A., & Alhudaithi, H. (2016). Workplace violence against nurses in the emergency departments of three hospitals in Riyadh, Saudi Arabia: A cross-sectional survey. *NursingPlus Open*, *2*(August), 35–41.

Akerstedt T , Kecklund G, Johansson SE Shift work and mortality. *Chronobiol Int* 2004;21:1055–61

Barker, L. M., & Nussbaum, M. A. (2011). Fatigue, performance and the work environment: A survey of registered nurses. *Journal of Advanced Nursing*, *67*(6), 1370–1382.

Bjorvatn, B. (2013). Shift Work Disorder in a Random Population Sample – Prevalence and Comorbidities, *8*(1), 4–11.

Boivin, D. B., & Boudreau, P. (2014). ScienceDirect ′ sur le sommeil et les rythmes circadiens. *Pathologie Biologie*, *62*(5), 292–301.

Booker, L. A., Magee, M., Rajaratnam, S. M. W., Sletten, T. L., & Howard, M. E. (2018). SC. *Sleep Medicine Reviews*.

Chen, J., Daraiseh, N. M., Davis, K. G., & Pan, W. (2014). Sources of work-related acute fatigue in United States hospital nurses. *Nursing and Health Sciences*,

16(1), 19–25.

Chung M-H, Chang F-M, Yang CH, Kuo BJ, Hsu N (2007). Sleep Quality and Morningness-eveningness of Shift Nurses. *Journal Clinical Nursing,* 18: 279-284

Chien P-L, Su H-F, Hsleh P-C, Siao R-Y, Ling P-Y and Jou H-J (2013). Sleep Quality among Female Hospital Staff Nurse. *Hindawi Publishing Corporation.*

Çıkrıklar, H., Yürümez, Y., Güngör, B., Aşkın, R., Yücel, M., & Baydemir, C. (2016). Violence against emergency department employees and the attitude of employees towards violence. *Hong Kong Medical Journal*, *22*(5), 464–471.

Costa, G. (2010). Shift Work and Health : Current Problems and Preventive Actions. *Safety and Health at Work*, *1*(2), 112–123.

Costa, G. (2015). Sleep deprivation due to shift work. *Occupational Neurology* (1st ed., Vol. 131). Elsevier B.V.

De Martino, M. M. F., Abreu, A. C. B., Barbosa, M. F. D. S., & Teixeira, J. E. M. (2013). The relationship between shift work and sleep patterns in nurses. *Ciência & saúde coletiva*, *18*(3), 763-768.

Eanes, L. (2015). The Potential Effects of Sleep Loss on a Nurse's Health. *AJN, American Journal of Nursing*, *115*(4), 34–40.

Educational Research Basic. Retrieved Novermber, 22, 2019, from http:// https://researchbasics.education.uconn.edu/random-number-table/

Fernandez, R. C., Marino, J. L., Varcoe, T. J., Davis, S., Moran, L. J., Rumbold, A. R., & Moore, V. M. (2016, March). Fixed or rotating night shift work undertaken by women: implications for fertility and miscarriage. In *Seminars in reproductive medicine* (Vol. 34, No. 02, pp. 074-082). Thieme Medical Publishers.

Foundation, N. S. (2013). 2013 Sleep in America ® Poll Table of Contents, (703).

Gan, Y., Yang, C., Tong, X., Sun, H., Cong, Y., Yin, X.,& Shi, O. (2015). Shift work and diabetes mellitus: a meta-analysis of observational studies. *Occup Environ Med*, *72*(1), 72-78.

Giorgi, F., Mattei, A., Notarnicola, I., Petrucci, C., & Lancia, L. (2018). Can sleep quality and burnout affect the job performance of shift-work nurses ? A hospital cross-sectional study, (October 2017), 698–708.

Guo, Y., Liu, Y., Huang, X., Rong, Y., He, M., Wang, Y., & Chen, W. (2013). The effects of shift work on sleeping quality, hypertension and diabetes in retired workers. *PloS one*, *8*(8), e71107.

Harrington, J. M. (2001). Health effects of shift work and extended hours of work, 68–72.

Hillman, D. R., & Lack, L. C. (2013). Public health implications of sleep loss: the community burden. *Medical Journal of Australia,* 199, S7-S10.

Houghton M. The American Heritage Medical Dictionary. *Boston: Houghton Mifflin Company;* 2004.

Institute of Medicine. *Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem. Washington, DC: The National Academies Press;* 2006.

Johnson, A. L., Jung, L., Brown, K. C., Weaver, M. T., & Richards, K. C. (2014). Sleep deprivation and error in nurses who work the night shift. *Journal of Nursing Administration*, *44*(1), 17-22.

Kazemi, R., Motamedzade, M., Golmohammadi, R., Mokarami, H., Hemmatjo, R., & Heidarimoghadam, R. (2018). Field Study of Effects of Night Shifts on Cognitive Performance , Salivary Melatonin , and Sleep. *Safety and Health at Work*, *9*(2), 203–209.

Kecklund, G., & Axelsson, J. (2016). Health consequences of shift work and insufficient sleep. *Bmj*, *355*, i5210.

Krejcie, R. V, & Morgan, D. W. (1970). Determining Sample Size for Research Activities Robert. *Educational and Psychological Measurement*, *38*(1), 607–610. https://doi.org/10.1177/001316447003000308

Laura, K., Rowan, P., Christopher, L., Conor, S., Kim, T., & Shantha, M. . (n.d.). Validation of a Questionnaire to Screen for Shift Work Disorder 1.

Leyva-Vela, B., Llorente-Cantarero, F. J., Henarejos-Alarcón, S., & Martínez-Rodríguez, A. (2018). Psychosocial and physiological risks of shift work in

nurses: a cross-sectional study. *Central European journal of public health*, *26*(3), 183-189.

Liu, Y., Wu, L. M., Chou, P. L., Chen, M. H., Yang, L. C., & Hsu, H. T. (2016). The Influence of Work-Related Fatigue, Work Conditions, and Personal Characteristics on Intent to Leave Among New Nurses. *Journal of Nursing Scholarship*, *48*(1), 66–73. https://doi.org/10.1111/jnu.12181

Lin, S. H., Liao, W. C., Chen, M. Y., & Fan, J. Y. (2014). The impact of shift work on nurses' job stress, sleep quality and self-perceived health status. *Journal of nursing management*, *22*(5), 604-612.

Magerøy, N., Moen, B. E., Grønli, J., Hilde, I., & Flo, E. (2012). Shift Work Disorder in Nurses – Assessment , Prevalence and Related Health Problems, *7*(4), 1–10.

Mauricio, C., Almeida, O. De, & Malheiro, A. (2016). Sleep , immunity and shift workers : A review ☆, *9*(1777), 164–168.

Nazatul SM, Salmy I, Moy FM, Nabila AS (2008). Prevalence of Sleep Disturbance among Nurses in a Malaysian Government Hospital and its Association with Work Characteristic. *Journal UMMEC* 2008:11(2)

Owens, B., Allen, W., & Moultrie, D. (2015). The Impact of Shift Work on Nurses' Quality of Sleep.

Poudel, G. R., Innes, C. R., Bones, P. J., Watts, R., & Jones, R. D. (2014). Losing the struggle to stay awake: divergent thalamic and cortical activity during microsleeps. *Human brain mapping*, *35*(1), 257-269.

Rhéaume, A. (2017). The impact of long work hours and shift work on cognitive errors in nurses, (May), 1–7.

Suzuki K, Ohida T, Kaneita Y, Yokoyama E, Miyake T, Harano S (2005). Mental Health Status, Shift Work, and Occupational Accidents among Hospital Nurses in Japan. *J Occupational Health* 2004;40: 448-454

Sofianopoulos, S., Williams, B., & Archer, F. (2012). Paramedics and the effects of shift work on sleep: a literature review. *Emerg Med J*, *29*(2), 152-155.

Talas, M. S., Kocaöz, S., & Akgüç, S. (2011). A survey of violence against staff working in the emergency department in Ankara, Turkey. *Asian Nursing Research*, *5*(4), 197–203.

Tawanchai J, Waran T. Sleep disturbance among nurses of Songklanagaring Hospital. *J Psychiatr Assoc* Thailand. 1997; 42, (3):123-132.

Treuer, K. Von, Fuller-tyszkiewicz, M., & Little, G. (2014). The Impact of Shift Work and Organizational Work Climate on Health Outcomes in Nurses, *19*(4), 453–461.

Von Treuer, K., Fuller-Tyszkiewicz, M., & Little, G. (2014). The impact of shift work and organizational work climate on health outcomes in nurses. *Journal of occupational health psychology*, *19*(4), 453.

Vogel, M., Braungardt, T., Meyer, W., & Schneider, W. (2012). The effects of shift work on physical and mental health. *Journal of neural transmission*, *119*(10), 1121-1132.

Wisetborisut, A., Angkurawaranon, C., Jiraporncharoen, W., Uaphanthasath, R., & Wiwatanadate, P. (2014). Shift work and burnout among health care workers. *Occupational Medicine*, *64*(4), 279-286.

Wright Jr, K. P., Bogan, R. K., & Wyatt, J. K. (2013). Shift work and the assessment and management of shift work disorder (SWD). *Sleep medicine reviews*, *17*(1), 41-54.

Yamoah, E. E. (2013). Relationship between compensation and employee productivity. *Singaporean Journal of Business, Economics and Management Studies*, *51*(1115), 1-5.

Zhang, L., Sun, D., Li, C., & Tao, M. (2016). In fl uencing Factors for Sleep Quality Among Shift-working Nurses : A Cross-Sectional Study in China Using 3-factor Pittsburgh Sleep Quality Index. *Asian Nursing Research*, *10*(4), 277–282. https://doi.org/10.1016/j.anr.2016.09.002

Zhang, L., Wang, A., Xie, X., Zhou, Y., Li, J., Yang, L., & Zhang, J. (2017). Workplace violence against nurses: A cross-sectional study. *International Journal*

of Nursing Studies, *72*(October 2016), 8–14.

https://doi.org/10.1016/j.ijnurstu.2017.04.002

APPENDIX A RESEARCH QUESTIONNAIRE

UNIVERSITY OF MALAYA MEDICAL CENTRE

PARTICIPANT INFORMATION SHEET

Study Title: The Relationship Between Shift Work And Quality Of Sleep Among Nurses In Ummc.

Version No: 1

Version Date: 12/2/2019

Name of investigator:

Rabiatul Adawiyah bt Roslan

Telephone number :

0133314849

We would like to invite you to take part in a research study. Before you decide whether to participate, you need to understand why the research is being done and what it would involve. Please take time to read the following information carefully; talk to others about the study if you wish.

Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of this study?

i. To investigate level of sleep quality.

ii. To determine the relationship between shift work and sleep quality.

Why is this study important?

The administrators and management of University Malaya Medical Centre (UMMC) would find this research useful in understanding occurrence and extent of nurses nature of job.The findings of this research would be of crucial benefit to UMMC organization, which intend to make efforts at improving safety, mental and physical health of the workers.

Who Is looked for?

Nurses in UMMC.

Time & Place of research study:

1 march 2019 - 1 march 2020

Wards In UMMC

What will be the role of you in this study?

You will be participating in answering questionnaire to get the data to analyze.

Are there any risks? Do you have side effect?

There is no risk and side effect.

What will the data be used for?

The data will analyze to study the relationships of shift works towards quality of sleep among nurses.

What will happen if I agree now and withdraw later from the study?

Some of the research data will be invalid.

Who should I contact if I am unhappy with how the study is being conducted?

Medical Research Ethics Committee
University of Malaya Medical Centre
Telephone number: 03-7949 3209/2251

BK-MIS-1116-E03

Version no: 1

Version date: 12/2/2019

Consent Form

Research Tittle

The Relationship Between Shift Work And Quality Of Sleep Among Nurses In Ummc.

Name of the Principle Investigator

Rabiatul Adawiyah binti Roslan

Please tick the box if you agree with the statement given below:

1. I have read and understood the information provided in Participant Information Sheet for this study. ☐
2. I have had the opportunity to ask questions about this study and these have been answered to my satisfaction. ☐
3. I understand that my participation is voluntary and that I can notify the examiner to withdraw from the study at any point of time without my legal right being affected. ☐
4. I understand that any information recorded during the study will be kept confidential and will only be used for the purpose of this study. ☐
5. I give my written consent to take part in this study. I agree/ do not agree (delete as appropriate)

(if you haven't ticked any of the boxes please do not sign this form)

_____	_____	_____
Name of Participant	Date	Signature

The Pittsburgh Sleep Quality Index (PSQI) is an effective instrument used to measure the quality and patterns of sleep in adults. It differentiates "poor" from "good" sleep quality by measuring seven areas (components): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications and daytime dysfunction over the last month.

SECTION A: Demographic

Please state the actual answer and tick (/) in the box provided.

1. Age?

	18-25 years old
	26-30 years old
	31-35 years old
	36-40 years old
	41 years old and above

2. Gender?

	Male
	Female

3. Marital Status

	Married
	Single
	Divorced/widowed

4. Do you have children?

	Yes
	No

5. Educational level

- [ ] Diploma
- [ ] Degree
- [ ] Master and above

6. Working experience

- [ ] Less than 5 years
- [ ] 5-9 years
- [ ] 10-14 years
- [ ] 15-19 years
- [ ] 20 years and above

7. Your shift work status:

- [ ] Currently is doing shift work
- [ ] Never do shift work
- [ ] Previously doing shift work

8. Your work in which section in Department of Surgery?

- [ ] Ward
- [ ] Clinic
- [ ] Surgery Operation Theatre

SECTION B: SLEEP QUALITY ASSESSMENT

INSTRUCTIONS:

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

During the past month,

1. When have you usually gone to bed? (leave this question to answer as last question)	
2. How long (in minutes) has it taken you to fall asleep each night?	
3. What time have you usually gotten up in the morning?	
4. A. How many hours of actual sleep did you get at night?	
B. How many hours were you in bed?	

5. During the past month, how often have you had trouble sleeping because you:	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
A. Cannot get to sleep within 30minutes				
B. Wake up in the middle of the night or early morning				
C. Have to get up to use the bathroom				
D. Cannot breathe comfortably				
E. Cough or snore loudly				
F. Feel too cold				
G. Feel too hot				
H. Have bad dreams				
I. Have pain				
J. Others reason(s), please describe, including how often you have had trouble sleeping because of this reason (s)				
6. During the past month, how often have you taken medicine (precribed or "over" the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals , or engaging in social activity?				
8. During the past month, how much if a problem hat it been for you to keep up enthusiasm to get things done?				

9. During the past month, how would you rate your sleep quality overall? (place score for this question in question number 1)	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)

Scoring

Component 1	Score at question no.9	C1 _____
Component 2	Score no.2 (<15min (0), 16-30min (1), 31-60min (2), >60min (3))	
	+ score no.5A (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3	C2 _____
Component 3	Score (>7(0), 6-7(1), 5-6 (2), <5 (3)	C3 _____
Component 4	(total number of hours sleep) / (total number of hours in bed) x100	
	>85%=0, 75%-84%=1, 65%-74%=2, <65%=3	C4 _____
Component 5	Sum of scores 5b to 5j (0=0; 1-9=1; 10-18=2; 19-27=3)	C5 _____
Component 6	Score no.6	C6 _____
Component 7	Score no.7 + score no.8 (0=0; 1-2=1; 3-4=2; 5-6=3)	C7_____

APPENDIX B ETHIC APPROVAL FORM

UNIVERSITY OF MALAYA MEDICAL CENTRE

MEDICAL RESEARCH ETHICS COMMITTEE
(Formerly known as Medical Ethics Committee)
UNIVERSITY OF MALAYA MEDICAL CENTRE
ADDRESS : LEMBAH PANTAI, 59100 KUALA LUMPUR, MALAYSIA
TELEPHONE . 03-79493209/2251 FAXIMILE : 03-79492030

NAME OF ETHICS COMMITTEE/IRB Medical Research Ethics Committee, University Malaya Medical Centre	**MREC ID NO.** 2019122-7029
ADDRESS . LEMBAH PANTAI, 59100 KUALA LUMPUR, MALAYSIA	
PROTOCOL NO(if applicable) :	
TITLE: The Relationship Between Shift Work and Quality of Sleep Among Nurses in UMMC.	
PRINCIPAL INVESTIGATOR : puan rabiatul adawiyah binti roslan	**SPONSOR** -

The following item [✓] have been received and reviewed in connection with the above study to conducted by the above investigator.

[✓] Application to Conduct Research Project(form)	Ver.No :	Ver.Date : 22-01-2019
[✓] Study Protocol	Ver.No : 001	Ver.Date : 12-02-2019
[✓] Patient Information Sheet	Ver.No : 1	Ver.Date : 12-02-2019
[✓] Consent Form	Ver.No : 001	Ver.Date : 12-02-2019
[ ] Questionnaire	Ver.No :	Ver.Date :
[✓] Investigator's CV / GCP (puan rabiatul adawiyah binti roslan,Syazwan Syah bin Zulkifly,)	Ver.No :	Ver Date :
[ ] Insurance certificate	Ver.No :	Ver.Date :
[✓] Other documents		
1) The pittsburgh Sleep quality index questionaire	Ver.No : 001	Ver.Date : 12-02-2019
2) Shift Work disorder Questionnaire	Ver.No : 001	Ver.Date : 12-02-2019

and the decision is [✓]

[ ] Approved (Full Board)
[✓] Approved (Expedited)
[ ] Rejected(reasons specified below or in accompanying letter)

Comments:

Questionaire study. Ethical issues addressed

The Investigators are required to:

1) *follow instructions, guidelines and requirements of the Medical Research Ethics Committee.*
2) *report any protocol deviations/violations to Medical Research Ethics Committee.*
3) *provide annual and closure report to the Medical Research Ethics Committee.*
4) *comply with International Conference on Harmonization – Guidelines for Good Clinical Practice (ICH-GCP) and Declaration of Helsinki.*
5) *obtain a permission from the Director of UMMC to start research that involves recruitment of UMMC patient.*
6) *ensure that if the research is sponsored, the usage of consumable items and laboratory tests from UMMC services are not charged in the patient's hospital bills but are borne by research grant.*
7) *note that he/she can appeal to the Chairman of Medical Research Ethics Committee for studies that are rejected.*
8) *note that Medical Research Ethics Committee may audit the approved study.*
9) *ensure that the study does not take precedence over the safety of subjects.*

Date of expedited approval : 14-03-2019
Approval By : LOOI LAI MENG (Chairman,MREC)

This is a computer generated letter. No signature required.

APPENDIX C DUTIES OF EMPLOYERS TO THEIR EMPLOYEES

[Occupational Safety and Health Act (OSHA) (Act 514, 1994) Part IV: Section 15(1)]

Every employer have their duty to taking care of the employees regarding their safety, health and welfare. It is compatible with Occupational Safety and Health Act (OSHA) (Act 514, 1994) Part IV: Section 15(1) " it shall be the duty every employer and every self-employed person to ensure, so far as is practicable the safety, health and welfare at work for all of their workers. It is also compatible with: Section 15(2) "Without prejudice to the generality of subsection (1), the matters to which the duty extends include in particular" :-

(a) the provision and maintenance of plant and systems of work that are, so far as is practicable, safe and without risks to health;

(b) the making of arrangements for ensuring, so far as is practicable, safety and absence of risks to health in connection with the use or operation, handling, storage and transport of plant and substances;

(c) the provision of such information, instruction training and supervision as is necessary to ensure, so far as is practicable, the safety and health at work of his employees;

(d) so far as is practicable, as regards any place of work under the control of the employer or self-employed person, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of the means of access to and egress from it that are safe and without such risks;

(e) the provision and maintenance of a working environment for his employees that is, so far as is practicable, safe, without risks to health, and adequate as regards facilities for their welfare at work.