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SHIFT WORK: IT'S ASSOCIATION WITH PHYSICAL AND PSYCHOSOCIAL HEALTH AMONG HUSM STAFF NURSES

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SHIFT WORK: IT'S ASSOCIATION WITH PHYSICAL AND PSYCHOSOCIAL HEALTH AMONG HUSM STAFF NURSES

by

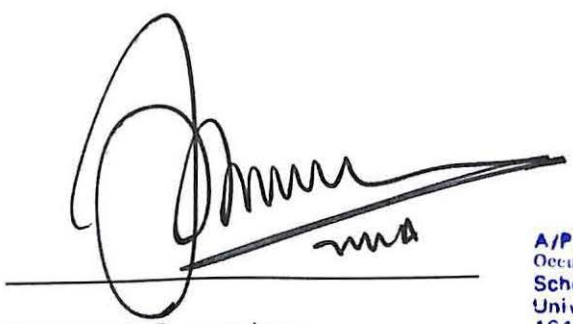
AZLINA BINTI YUSUF

Dissertation submitted in partial fulfillment of the requirements for the degree of Bachelor of Health Sciences (Nursing)

May 2006

DECLARATION

This is to certify that the dissertation entitled **'Shift work: It's association with physical and psychosocial health among HUSM staff nurses'** is a bonafide record of research work done by Miss Azlina Binti Yusuf, Matriculation Number: 77922 during the period of July 2005 until May 2006 under my supervision. This dissertation is submitted in partial fulfillment of the requirements for the Degree of Bachelor of Health Sciences (Nursing). All the achievement and data from this research are hereby declared as the property of University Science Malaysia (USM).



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This manuscript is dedicated to:

My husband:

Mr Adam Abdullah @ Lew Choong Jin

My parent:

Mr Yusuf Bin Ismail

Mdm Zamilah Binti Md Kassim

My mother in-law:

Mdm Thum Moy

And not forgetting to my sisters & brothers

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LIST OF ABBREVIATIONS

HUSM	-	Hospital Universiti Sains Malaysia
WHO	-	World Health Organization
GIT	-	Gastrointestinal Disorder
CVD	-	Cardiovascular Disease
CHD	-	Coronary Heart Disease
BP	-	Blood Pressure
BMI	-	Body Mass Index
DM	-	Diabetes Mellitus
SMS	-	Shift Maladaptation Syndrome
MOH	-	Ministry of Health

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ABSTRAK

TAJUK: KERJA SYIF: HUBUNGANNYA DENGAN KESIHATAN FIZIKAL DAN PSIKOSOSIAL DALAM KALANGAN JURURAWAT DI HUSM

PENGENALAN: Perkhidmatan kesihatan adalah salah satu daripada industri yang menyediakan perkhidmatan yang berterusan sepanjang hari untuk kemudahan masyarakat. Jururawat sebagai sebahagian daripada ahli professional kesihatan dikehendaki untuk bekerja siang dan malam bagi memenuhi keperluan individu yang sakit. Kerja syif biasanya dikategorikan kepada syif giliran, waktu kerja yang berubah masa dan syif yang tidak tetap. Daripada ketiga-tiga kategori kerja syif, syif giliran adalah berkait khusus dengan jururawat. Jadual giliran mereka bekerja mungkin akan mengganggu ritma normal biologi atau sosial mereka atau kedua-duanya sekali. Kerja syif telah dikenalpasti ada kaitannya dengan masalah kesihatan fizikal, psikologikal dan sosial.

OBJEKTIF KAJIAN: Kajian ini dijalankan untuk mengenalpasti hubungkait diantara kerja syif dengan simptom kesihatan fizikal dan psikososial dalam kalangan jururawat HUSM.

KAEDAH KAJIAN: Kajian irisan lintang ini melibatkan 146 orang pekerja syif dan 58 orang pekerja bukan syif dalam kalangan jururawat HUSM. Data diperolehi menggunakan borang soal selidik yang mengandungi enam bahagian termasuk data demografi, suasana bekerja, status kesihatan fizikal dan psikososial dan bahagian terakhir adalah versi Bahasa Malaysia 'Depression, Anxiety and Stress Scale (DASS 21)'. Ujian 'Chi-square' atau Ujian 'Fisher Exact' dilakukan untuk mengenalpasti perbezaan yang signifikan bagi setiap pembolehubah kategori diantara pekerja syif dan bukan syif.

KEPUTUSAN: Dari aspek simptom kesihatan fizikal, terdapat hubungkait diantara kerja syif dengan prevalen masalah reproduktif. Prevalen masalah kardiovaskular, gastrointestinal, ketetapan haid, perasaan ketidakselesaan badan dan sindrom kelesuan yang kronik tidak berbeza secara signifikan bagi kedua-dua kumpulan kerja berkenaan. Prevalen bagi kemalangan dan kecederaan dalam kalangan jururawat syif adalah lebih tinggi berbanding jururawat bukan syif, walau bagaimanapun perbezaannya tidak signifikan secara statistik. Dari aspek kesihatan psikososial, tidak terdapat perbezaan yang signifikan dalam masalah tidur dan gangguan yang menyebabkan susah untuk tidur. Walaupun tidak terdapat perbezaan yang signifikan terhadap tanggapan berkenaan kualiti tidur tetapi nilai kualiti tidur yang rendah adalah lebih banyak terdapat dalam kalangan jururawat syif. Terdapat hubungan yang signifikan antara bekerja syif dengan masalah berkaitan penjagaan anak, hubungan dengan pasangan, simptom depresi dan stress.

KESIMPULAN: Terdapat hubungkait positif kerja syif dengan masalah reproduktif, masalah penjagaan anak, masalah perhubungan antara pasangan begitu juga dengan simptom depresi dan stres dalam kalangan jururawat di HUSM. Isu-isu ini memerlukan tindakan pembetulan yang segera dipihak pentadbiran hospital dan kejururawatan.

Kata-kunci: Kerja syif; Jururawat; Kesihatan fizikal; Kesihatan psikososial

ABSTRACT

TITLE: SHIFT WORK: IT'S ASSOCIATION WITH PHYSICAL AND PSYCHOSOCIAL HEALTH AMONG HUSM STAFF NURSES

INTRODUCTION: Health service is one of the industries which provide a continuous around the clock service, for the benefit of the community. Nurses as part of health care professional are required to work day and night to fulfill the needs of the sick. Shift works are commonly classified into rotating shifts, displaced work-hours and irregular shifts. Of the three categories of shift work, rotating shifts are of particular concern to nurses. The rotating schedule that they work may interfere with their normal biological or social diurnal rhythms or both. Shift work has been found to be associated with physical, psychological and social health problems.

OBJECTIVES: The study was done to determine relationships between shift work with physical and psychosocial health symptoms among HUSM staff nurses.

METHODS: This cross-sectional study involved 146 shift workers and 58 non-shift workers of HUSM nursing staff. Data was collected through self-administered questionnaire consisting of six parts which include demographic data, working condition, physical and psychosocial health status and the last part is a Malay version of Depression, Anxiety, Stress Scale (DASS 21). Chi-square test or Fisher Exact Test was performed to determine the significant difference of categorical variables between shift and non-shift workers.

RESULTS: On physical health symptoms, there was association between shift work with reproductive problems. There was no association between problems of cardiovascular, gastrointestinal, menstrual regularity, general ill feelings and chronic fatigue syndrome among shift and non-shift staff nurses in HUSM. The prevalence of accidents and injuries among shift workers was higher than non-shift workers; however the difference was statistically not significant. On psychosocial health aspect, there was no significant difference in the sleep problems and disturbances that cause sleep difficulty between the shift and non-shift workers. Although there were no significant difference in the perceived quality of sleep among the two workers group but the value of poor sleep quality was higher among shift workers. There was a significant association between shift work and problems of child care, relationship with partners, depression and stress symptoms.

CONCLUSION: There were associations between shift work and reproductive problems, problems with child care and relationship with partner as well as the symptoms of depression and stress among HUSM staff nurses. These issues require immediate remedial actions on the part of hospital and nursing administration.

Keywords: Shift Work; Nurse; Physical health; Psychosocial health

CHAPTER ONE

INTRODUCTION

Generally, a working day with some hours left for recreation activity is considered "normal" hours of work (Harrington, 2001). Shift work is referred to as "other-than-conventional office-hour schedules of work" (Akerstedt et al, 1984; Harrington, 2001). Shift work is a reality for about 25% of North American working population. This figure represents about 15.5 million workers (Morshead, 2002). In Sweden, 8% had fixed hours outside the normal range of working hours, 27% have irregular working hours and 4% work on shift schedules (Madide, 2003). According to the Australian Bureau of Statistics, many people are working the most debilitating, unhealthy and dangerous shifts (Josling, 1999).

Shift works are commonly classified into rotating shifts, displaced work-hours and irregular shifts (Akerstedt et al, 1984). Rotating shift is working alternately between morning, evening and night schedules. Working regularly between 5 pm and 6 am is known as displaced work-hours. Irregular shifts refer to the working hours of those who work based on the demand. Nearly half of the working population is on rotating shifts and the rest are on displaced work-hours or irregular shifts (Josling, 1999). Mining has the highest proportion of workers (43 %) doing shift work, followed by health and community services (33 %), transport and storage (32 %) (Josling, 1999).

Among the full time health care workers in the United States of America (USA), 30.1% are shift workers with 10.8% of them work evening shifts, 9.4% work night shifts, 3.3% work rotating shifts (Hughes & Stone, 2004). Health service is one of the industries which provide a continuous around-the-clock service, for the benefit of the community. Of the three categories of shift work, rotating shifts are of particular

concern to nurses. Nurses as part of health care professional are required to work day and night to fulfill the needs of the sick. Health care professional are responsible for the provision of health care through application of medical knowledge, skills and expertise in the meeting of health care needs.

Night shift has physical, psychological and social effects on the life of an individual including nurses (Knutsson et al, 1999; Akerstedt, 1990). For most nurses, changes that are inherent to night shift affect their normal life and they have no control over it. The rotating schedule that they work will interfere with their health and their safety is compromised. Night work can even be worse for female nurses who also have family responsibilities such as pregnancy and child rearing. Many studies have shown that shift work have negative impact on job performance, sleep, physical and psychological health, social and family life, drug use and level of job-related stress (Scott, 2001; Josling, 1999; Harrington, 2001; Hwang et al, 2004; Akerstedt, 1990). For nurses these negative effects produce consequences not only to the individual, but also to the workplace, as decreased alertness and reduced job performance could endanger lives.

The common effects of shift work on physical health were cardiovascular disorders, gastrointestinal disorders, reproductive health and aggravation of medical disorders (Muecke, 2005; Hughes, 2004; Scott, 2001; Harrington, 2001; Rajaratnam & Arendt, 2001; Nicholson & Auria, 1999; Akerstedt, 1990). A study done by Knutsson et al (1999) confirmed that there are association between shift work and ischemic heart disease. The relative risk of ischemic heart disease in shift workers is in between 1.3 to 1.7 when adjusted for other risk factors. According to Nicholson & Auria (1999), chances of getting ischemic heart disease increases progressively with the time spent in shift working.

Psychosocial health effects related to shift work are sleep disturbances, fatigue, disruption in family and social life and mental health (Scott, 2001; Harrington, 2001; Nicholson & Auria, 1999; Scott & LaDou, 1994). Most shift workers live in a society oriented toward day work, so they face disruption in their social, family and domestic lives (Taylor et al, 1997). Night workers have to stay awake during the night time and sleep during the day time. Because of this deviation, most of them get less sleep and regular night work is associated with chronic sleep deprivation (Scott, 2001). Sleep deprivation problem may also give negative effects to the productivity at work and social functioning (Scott, 2001; Harrington, 2001).

The deviation in the working and rest hours often make shift workers difficult to fulfill their parenting and social responsibilities (Scott, 2001). As the result from prolong rotating work schedule, shift work can be a potential psychosocial stressor (McVicar, 2003; Harrington, 2001). Social and family life factors may interface with biological factors and other coping strategies. This disruption may contribute significantly to intolerance to the shift work (Scott, 2001). Shift workers may be at increased risk of developing affective mood disorders (Scott, 2001) like the shift lag symptoms. It includes symptoms of affective disorders like irritability, fatigue and poor sleep, apathy, poor appetite and psychosomatic complaints (Akerstedt, 1990).

1.1 Overview of Shift Work and Health in Malaysia

Overall, there are about 8.6 million (38.7%) of shift workers in Malaysia (Rampal et al., 2002). The largest employers are manufacturing sector (22.2%), community, social and personal services (20.1%) and hotel and restaurants (18.9%). As a newly developed country, Malaysia has introduced various types of working schedules and working hours.

Shift work is common in the manufacturing sectors including electronics industries, while the three-shift system is a rule in essential services industries like health services. One study has been done to examine the relationship between selected health problems and exposures among women semiconductor workers. Their result found that majority of the workers in Malaysia were on rotating 8-hour shift (60.6%), whereas 30.1% were on a rotating 12-hour shift and others were on fixed shift (Chee and Rampal, 2003 cited from Nazri et al., 2004).

A preliminary study was done by the Occupational Health Unit of Ministry of Health (MOH) in a textile factory with the total work force of 356 (301 females and 55 males). Two hundred and eighty eight of the females did shift work as compared to only 33 of the males. Table 1.1 showed medical complaints reported by the interviewed shift workers. Fatigue was the most frequent complaint by the shift workers (95.8%) followed by indigestion (92.0%) (Mahathevan, 1982 cited from Nazri et al, 2004).

Table 1.1 Medical complaints of workers interviewed

Complaints	Number of workers	Percentage
Fatigue	276	95.8
Indigestion	265	92.0
Leg and foot cramps	176	61.1
Nervousness	173	60.1
Menstrual irregularities	167	58.0
Insomnia	126	43.8
Fever on and off	90	31.3
Chest pain	35	12.2

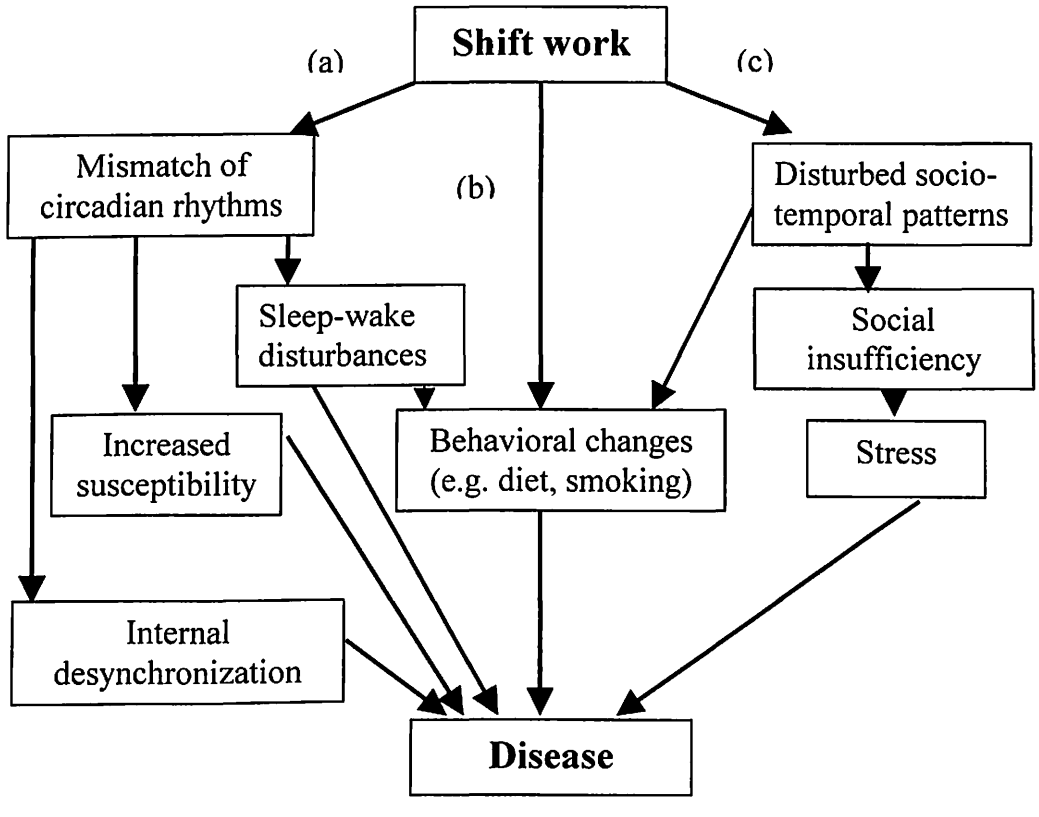
Mahathevan (1982) cited from Nazri et al. (2004)

1.2 Problems statement

This study mainly concerns with shift work and its association with physical and psychosocial health among HUSM staff nurses. According to Josling (1999), shift work

is considered the most dangerous area of employment and previous studies have shown that shift work did affect health. This will further lead to problems of absenteeism, increased level of stress and rapid turn-over of staff. All this problems may give impact to the quality of nursing care. In trying to understand the whole impact of shift work, a model for the mechanisms of cardiovascular disease in shift workers by Knutsson (1989) could help explaining this phenomenon. Therefore, a study has to be conducted to look into the association of shift work to HUSM staff nurses.

Figure 1.1: A model of disease mechanism in shift workers by Knutsson (cited from Scott & LaDou, 1994)



1.3 Purpose of the study

The purpose of the study is to determine whether there are associations of shift work with physical and psychosocial health symptoms among HUSM staff nurses.

1.4 Objectives

1.4.1. To identify and compare common physical health symptoms among HUSM staff nurses doing shift work and non-shift work.

1.4.2. To identify and compare common psychosocial health symptoms among HUSM staff nurses doing shift work and non-shift work.

1.4.3. To examine the association of shift work with physical and psychosocial health symptoms among HUSM staff nurses.

1.5 Hypotheses

1.5.1 There are associations between shift work and physical health symptoms among HUSM staff nurses.

1.5.2 There are associations between shift work and psychosocial health symptoms among HUSM staff nurses

1.6 Research Questions

1.6.1. Are there any association between shift work and physical ill health among HUSM nurses?

1.6.2. Are there any association between shift work and psychosocial problems faced by HUSM nurses in after-work life?

CHAPTER TWO

LITERATURE REVIEW

2.1 Definitions

2.1.1 *Shift*

According to Oxford Advanced Learner's Dictionary (2002) shift refers to "a period of time worked by a group of workers who start work as another group finishes". New Webster's Dictionary (1981) defined it as "the period of time which comprises a person's working hours especially at a concern operating all or most of twenty four hour a day".

The definition of shift work varies depending on how it is defined. Shift work was defined by the National Institute of Occupational Safety and Health as "working outside normal day – light hours" (Hughes and Stone, 2004). Knutsson et al (1999) defines shift work as a "work schedule which includes work hours beyond the standard day time schedule". "Shift work is the particular hours of the day which a nurse is scheduled to work" (Mosby's Medical, Nursing & Allied Health Dictionary, 2002). The shift work implemented to the HUSM staff nurses is rotating schedules which involve three types of shift namely morning, evening and night shift. They work 7 to 10 hours per shift. Morning shift is the work shift from 0700hrs to 1400hrs, the evening shift work from 1400hrs to 2100hrs and the remaining work hours is night shift (2100hrs to 0700hrs).

2.1.2 *Health*

Health was defined by World Health Organization (WHO), (1948) by "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" (WHO, 2005). Renẽ Dubos (1968) defines health as, "a quality of life involving social, emotional, mental, spiritual and biological fitness on the part of the individual, which results from adaptations to the environment" (cited from Kirsten, 2001).

2.1.3 *Physical*

Physical was defined by Stedman Medical Dictionary (2000), as "relating to body, as distinguish from the mind". Ron Kurtus (2002) defines physical health as "the overall condition of the living organism at a given time, the soundness of the body, freedom from disease or abnormality, and the condition of optimal well being".

2.1.4 *Psychosocial*

Mosby's Medical, Nursing & Allied Health Dictionary (2002) defined psychosocial as "(adjective) pertaining to a combination of psychologic and social factors". In this study, the working definition for the psychosocial health is the aspect of health involving mental factors such as stress and depression; and social 'contactness' of a nurse.

2.1.5 *Nurse*

According to American Nurses Association is "a person, educated and licensed in the practice of nursing; one who is concerned with the diagnosis and treatment of human responses to actual or potential health problems" (Mosby's Medical, Nursing & Allied Health Dictionary, 2002).

2.2 Shift work in the Health Service

Shift work is an increasingly widespread practice in industry and services. Health services require shift work to keep activities running 24hrs a day. Nurses as part of the health care professional have to work on rotational shift hours to provide continuity of care to the clients. Nurses on rotating shift experienced the most job-related stress as compared to other shift type (Coffey et al, 1988 cited from Parikh et al, 2004). There is a significant decrease in job performance, satisfaction, quality of patient care and a significant increase in errors, injuries, sick days and accidents among rotating shift nurses (Efinger et al, 1995 cited from Parikh et al, 2004).

A study was done by Smith et al (1998) to compare the effects of 8 hour and 12 hour shifts on fatigue and job performance, safety, sleep, physical and psychosocial health. The result suggests few differences between 8 hour and 12 hour shifts in the way they affect people. There may even be advantages to 12 hour shifts in terms of lower stress level, better physical and psychological well being and improvement in family relations while the negative effects were mainly fatigue and safety.

Josten et al (2003) investigated the effects of 9-hour shifts to the 134 nurses from nursing homes in the Netherlands by using self administered questionnaire on fatigue, health, performance and satisfaction. These nurses are divided into two groups - one group worked 8-hour shifts and the other worked 9-hour shifts. They concluded that the 9-hour shift seemed to combine the negative aspects of 12-hour and 8-hour shift like fatigue and more health complaints. It also suggested that the increase in workload since the 1980s made the current extended shifts in the nursing home more tiring.

2.3 Shift Work and Biological Effect

Normally work is day time activity and rest is a night time activity, but for those on rotating shift work this "normal" activity is being disrupted. Their working, eating and sleeping phases changed and caused disturbances of their biologic rhythms. There is a relationship between biological rhythms and the natural propensity for night-time sleep and day-time wakefulness (Muecke, 2005). Disturbances of normal biologic rhythms may affect shift workers health (Akerstedt, 1990). It is well-established that most human functions follow rhythms and the peaks occur after every 24-hours or so, known as circadian rhythms (Scott, 2001; Harrington, 2001; Scott & LaDou, 1994; Akerstedt et al, 1990). According to Scott (2001), the word circadian comes from the Latin "*circa dies*" which means "about a day". The source of the rhythm is in the lower frontal hypothalamus, above the optic chiasma (Akerstedt, 1990).

Circadian rhythms are partly driven by the internal biological clock and partly synchronized to the external world by cues known as "*zeitgebers*" (in German which means time giver) (Scott, 2001). These rhythms are coordinated to allow for high activity during the day and low activity at night. Normally the body uses cues from its processes and from the environment such as clock time, social activities, light/dark cycle and meal times to keep the various rhythms on track.

Numerous psychological and physiological variables have been found to have a demonstrable 24-hour rhythm for example body temperature, the sleep-wake cycle, cardiovascular parameters, cognitive performance and endocrine factors (Scott, 2001). Most of the research study on the rhythm of melatonin to determine the biological-clock activity (Rajaratnam & Arendt, 2001). In human beings, sleep is normally initiated during the rising phase of melatonin rhythm and declining phase of the body temperature rhythm (Rajaratnam & Arendt, 2001; Scott & LaDou 1994). It is common

among night-shift workers to attempt to sleep at appropriate phases of the circadian cycle. It will usually result in shorter sleep episodes and more frequent waking.

Circadian rhythms are more easily re-trained after a time shift if all the important zeitgebers including light/dark cycle are synchronously shifted such as occurring with transmeridian flights. But for shift workers, zeitgebers shift in a non-synchronized manner (Scott, 2001) and this is one of the reasons why shift workers have incomplete adaptation to night work. The disruption of the circadian system will cause symptoms commonly known as "jet lag" or "shift lag" (Scott & LaDau, 1994).

Table 2.1: COMPARISON OF TYPICAL JET-LAG AND SHIFT LAG SYMPTOMS

JET-LAG	SHIFT-LAG
Daytime sleepiness	Sleepiness/sleeping at work
Insomnia at night	Sleeping disruption during day time sleep
Impaired concentration	Decreased vigilance/attention
Slow physical responses	Impaired performance
Irritability	Irritability
Digestive system disturbance	Gastrointestinal dysfunction
Depressive symptoms	Depression and apathy

(Source: Scott, 2001)

2.4 Shift Work and Health

A research framework in identifying the domain of the study was developed base on the reviewed literatures. From the literature review, due to shift work individuals will experience disturbances in biologic rhythms and socio-temporal patterns. Shift works that include night work always leads to circadian disruption, physiological changes and thus affect physical and psychosocial health of the shift workers. Among the health risks that will affect shift workers are gastrointestinal disorders (GIT), cardiovascular

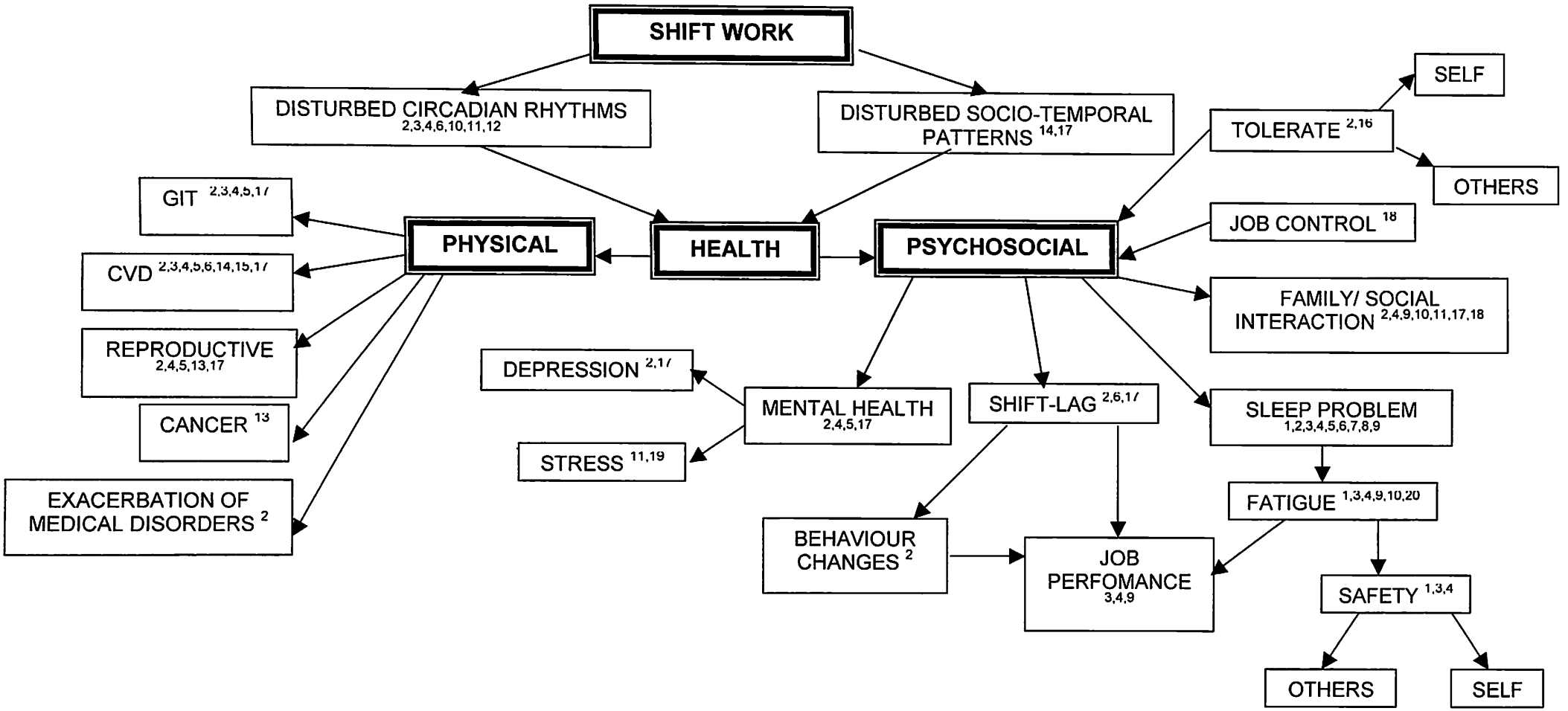
disorders (CVD), reproductive problems, cancer and exacerbation of medical disorders such as asthma, hypertension and diabetes mellitus. Disturbance of circadian rhythms will caused sleep problems and later will induce fatigue to the shift workers. This will also give impact to their job performance and quality of care given to clients. On the psychosocial health, they may experience mental health problems due to disturbance in the family and social interactions. Most of the shift workers regard the social impact to them as negative (Fenwick & Tausig, 2001).

2.4.1 Cardiovascular Disorders

In the late 1970's there was no firm evidence that cardiovascular disease was more prevalent among shift workers than other groups (Harrington, 2001). But a recent review of the data suggests that shift workers have a 40 percent increase in risk of cardiovascular disease (Boggild, 1999; Rajaratnam & Arendt, 2001). The contributing factors include disruption of circadian rhythm, disturbed sociotemporal patterns and social support, stress, smoking, poor diet and lack of exercise but the causal mechanisms are not well defined (Harrington, 2001; Rajaratnam & Arendt, 2001).

A population based case-control study was done by Knutsson et al (1999) to see the association between shift work and myocardial infarction among men and women in Sweden. They noted that shift workers commonly complaint of exposure to high job strain as compared to day workers which could act as a mediator of disease. In the age group 45-55, the relative risk was 1.6 in men and 3.0 in women. The findings indicated that shift work is associated with myocardial infarction in both men (odds ratio 1.3) and women (odd ratio 1.3) and the mechanism could not be explained by job strain, smoking or job education level.

Figure 2.1: A model of association between shift work with physical and psychosocial health symptoms (adapted from Knutsson Model)



1. Muecke (2005) 2. Scott (2001) 3. Josling (1999) 4. Harrington (2001) 5. Nicholson & Auria (1999) 6. Rajaratnam & Arendt (2001) 7. Jirapramukpitak & Tanchaiswad (1996) 8. Ohida et al (2000) 9. Smith et al (1998) 10. Debra (2001) 11. Taylor et al (1997) 12. Glazner (1992) 13. Davis (2001) 14. Chung et al (2005) 15. Knutsson et al (1999) 16. Mina et al (2005) 17. Hughes & Stone (2004) 18. Scott & LaDou (1994) 19. Fenwick & Tausing (2001) 20. McVicar (2003) 21. Josten et al (2003)

A study was done by Mina & Park (2005) in Korea to examine the relationship between shift work duration and the metabolic risk factors of cardiovascular disease among shift workers. The study population consisted of 226 female hospital nurses and 134 male workers at a firm manufacturing diapers and feminine hygiene materials. Duration of shift work was significantly associated with systolic blood pressure or cholesterol level among male workers aged 30 or more. While in female nurses, their waist to hip ratio increased slightly according to increasing duration of shift work. Their results suggested an association between shift work duration and the metabolic risk factors of cardiovascular disease.

Nazri et al (2005) did a study on 148 male factory workers in Kota Bharu, Kelantan to examine the relationships between shift work and coronary heart disease risk (CHD) factors. Risk factors for CHD are high blood pressure (BP), dyslipidaemia (either hypercholesterolaemia, hyper-low density lipoprotein-cholesterolaemia, hypo-high density lipoprotein-cholesterolaemia or hypertriglyceridaemia), high body mass index (BMI), Diabetes Mellitus (DM) and physical inactivity. Their findings indicated that there were positive associations between shift work and high BP, BMI of equal to or more than 25 kg/m^2 and physical inactivity which increases the risk of CHD among shift workers as compared to day workers.

2.4.2 Gastrointestinal Disorders

In the general population, gastrointestinal symptoms are common but it was two or three times more frequent among shift workers as compared to day workers (Josling, 1999; Scott & LaDou, 1994; Angersbach et al, 1980 cited from Scott, 2001). Constipation, diarrhea, excessive flatulence, abdominal pain and heartburn are among the most common gastrointestinal complaints (Josling, 1999; Harrington, 2001).

Flatulence is a condition where there are excessive amount of gas in the stomach and intestines (Stedman's Medical Dictionary, 2000). In long term, many shift workers were at risk of serious diseases such as chronic gastritis, gastroduodenitis, colitis and peptic ulcer.

According to Josling (1999), a rate of peptic ulcer disease among shift workers was eight times higher as compared to day workers. The prevalence of peptic ulcer has been estimated to be two to five times higher among shift workers with night shifts, as compared to day workers or shift workers without night shifts (Costa, 1996). Disruption of biological synchronism, abnormal eating habits and lack of exercise contributes to increase body weight among shift workers as compared to day workers (Muecke, 2005; Josling, 1999).

There are probably multiple factors causing gastrointestinal disorder among shift workers including disruption of circadian rhythm, altered dietary habits and lifestyle factors (Scott, 2001; Nicholson & Auria, 1999). The changes in work schedule and eating habits can interfere with gastrointestinal function because of inadequate timing of food intake with respect to the optimal circadian phases of gastric secretion and enzyme activity. Food quality, which is poor during some shift and increased use of caffeine, nicotine or alcohol and psychological stress, may result in additional interference (Josling, 1999; Costa, 1996). Poor quality food such as fast food which is high in saturated fats was consumed because of constant tiredness and lack of time to prepare healthy food.

2.4.3 Reproductive Health

There was increasing evidence to suggest that shift work and particularly night work, may present special risks to women of child-bearing age. Women of child bearing age

were at risk of having reproductive problems associated to shift work particularly night work (Harrington, 2001). Pre-term birth, low birth weight and spontaneous abortion are associated among pregnant rotating shift workers (Nicholson & Auria, 1999 Scott & LaDou, 1994). This may be due to disruption of the menstrual cycle and stress related to family life conflict as a result from rotating shift work (Harrington, 2001). The conflicts created by rotating shift works will increase stress and the disruptions of the menstrual cycle are the possible factors contributing to these conditions (Harrington, 2001). But the evidence for sub fertility is less convincing.

Chung et al (2005) conducted a study on the association between menstrual function and life style/ working conditions among nurses in Taiwan. The nurses were randomly selected and each subject completed a daily records including life and working conditions during the study period. The results showed that there were statistically significant differences in work years, daily working hours and type of work shift among nurses who worked in different units in the hospital. In the perceived regular cycle group, nurses who worked the night shift only exhibited the shortest menstrual cycles which is the 25-day cycles. Life factors (perceived stress and life satisfaction; passive tobacco exposure) and working factors (perceived work stress and work satisfaction) were not significantly related to menstrual cycle irregularity.

2.4.4 Sleep and Performance

Sleep loss is obviously the most important immediate consequence of night work. Sleep is one of the main reasons why irregular working hours cause disease and disorders. In general, sleep loss result in performance deficits, slowed physical and mental reaction time, increased errors, impaired memory and reduced motivation (Rajaratnam & Arendt, 2001). Extended waking leads to tiredness and reduced

functional capacity. The effects are initially noticeable mostly if the individual is exposed for longer periods to the monotonous situation (Rajaratnam & Arendt, 2001). Rohaya et al (1999) reported that the prevalence of sleep disturbances was higher among shift workers as compared to non shift workers and there was high prevalence of accident and injury among shift workers than non shift workers. The most common injury was injury due to sharp objects such as needle and scalpels blade.

Jirapramukpitak & Tanchaiswad (2001) reported that there was a high prevalence (73%) of poor sleep quality among nurses of Songklanagarind Hospital. The study is a cross-sectional and was carried out in all female nurses (n=461). They answered a Thai version of the Pittsburgh Sleep Quality Index (PSQI) questionnaire and a sleep survey questionnaire. The prevalence of sleep disturbances was more widespread among rotating shift nurses (76.7%) as compared to day nurses (51.1%). Rotating shift work and stressful life events primarily contributed to poor sleep quality among nurses of Songklanagarind Hospital.

Ohida et al (2000) conducted a study on shift work and sleep disorders among young female nurses in Japan. Subjects were 620 female nurses in 11 hospitals in Japan with the mean age 23.9. They did a cross sectional study using self-administered questionnaires of a Japanese version of the Pittsburgh Sleep Quality Index (PSQI). The results indicated significant associations between working night shifts and the use of alcoholic beverages to help induce sleep. Their result suggested that in the Japanese shift-work systems, sufficient sleep hours were needed for nurses who work night shift to ensure good quality of sleep and thus will give better quality of nursing care to the patients.

Disturbance of circadian rhythms can affect concentration, motivation and reaction time (Akerstedt, 1990) particularly at night. Combination of this can result in an

increased risk of accidents and injury. The interaction with the environment will cease if the sleepiness among night shift workers is severe enough. If this interaction coincides with a critical need for action, an accident may occur to them alone or might involve other persons (Akerstedt, 1990). When deprived of sleep, the worker may not be fully aware that performance has deteriorated. Research has shown that the optimum mental performance level for workers occurs between 2 and 4 p.m. and the performance is lowest between 3.30 and 5.30 a.m. (Rajaratnam & Arendt, 2001; Akerstedt, 1990).

2.4.5 Mental Health

To reiterate, shift working can be a potential psychosocial stressor (Harrington, 2001) as it can disturb the balance between psychological and social life needs. Shift workers may be at risk of developing affective mood disorders. Symptoms of shift-lag include disturbances of well-being, resembling symptoms of affective disorders such as irritability, fatigue and poor sleep, apathy, poor appetite and psychosomatic complaints (Scott, 2001; Scott & LaDou, 1994). In addition, changes in mood have been shown to be associated with the irregularity of sleep patterns and with sleep deprivation (Muecke, 2005; Akerstedt, 1990).

2.4.6 Social Impact

Most shift workers live in a society oriented toward day work, so they face distruption in their social, family and domestic lives (Kogi 1985 cited from Tayler et al, 1997). Shift work may have a negative impact on family life as it increases social and family stress (Scott, 2001). Night work, evening work and irregular schedules often make it difficult

for shift workers to fulfill parenting and social responsibilities. Working the second shift (evening and night shift) is usually the most destructive for family interaction (Scott, 2001). Shift work schedules may create a significant strain on marriage relationship and higher divorce rates have been reported for shift workers as compared to normal-hours workers (Scott & LaDou, 1994). Social and family life factors may interface with biological factors by interfering with good sleep hygiene and other coping strategies. This disruption may contribute significantly to the shift work intolerance as seen in individuals with Shift work Maladaptation Syndrome (SMS) which shares much commonly with depressive symptom (Scott, 2001).

Rohaya et al (1999) was study the prevalence of shift work related medical and psychosocial illnesses among nurses working in hospital and health clinics in the district of Kuala Terengganu. A total of 274 nurses were involved in this study, where 225 were working on shift schedules in the hospital. Their result showed that 84% of shift workers like to work on shift for various reasons. There was no significant difference in the prevalence of medical and emotional problems between shift (29.8%) and non shift workers (30.6%). 56% of shift workers do not have regular meals compared to 36.7% of non shift workers. Their study also showed that there was no significant difference in marital status, number of children and breast feeding practices between shift and non shift workers.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Design

The research design used in this study is a cross-sectional study.

3.2 Study Location

The study was conducted at Hospital Universiti Sains Malaysia (HUSM), Kubang Kerian, Kelantan. HUSM was established in 1983 with 731 beds. Until 14th of August 2005, total number of nurses at HUSM is 786. The total number of nurses changes from time to time due to a high turn over of nurses leaving HUSM. The study participants were registered female staff nurses working shift and non-shift work in the wards and outpatient clinics. Classifications of work places were based on current working pattern and units of services as shown in Table 3.1

Work places were divided into categories according to some common characteristics that they shared. Medical-based services include medical, pediatric, oncology, newborn and psychiatric wards. Surgical-based services include surgical, ophthalmic, obstetric, gynecologic, orthopedic, ENT (ear, nose and throat) and burn units. Intensive-based services include Intensive Care Unit (ICU), Neonatal ICU, Neuro ICU, Cardio ICU and A&E (Accident and Emergency) units. Non-shift workers consist of nurses from all out patient clinics.

Table 3.1: Classification of work places

Working pattern	Unit	Ward	Number of nurses
Shift	Medical	1 Selatan	12
		1 Timur Belakang	18
		3 Selatan	17
		5 Utara	8
		5 Selatan	7
		6 Utara	18
		6 Selatan	14
		7 Utara	17
		7 Selatan	18
		8 Selatan	22
		Total: 151 nurses	
	Surgical	1 Utara	13
		2 Utara	9
		2 Selatan	21
		2 Akik	11
		2 Baiduri	11
		1 Berlian	36
		2 Topaz	16
		2 Intan	19
		2 Zamrud	16
		3 Utara	16
		4 Utara	14
		4 Selatan	15
		4 Timur	12
		Burn Unit	12
		Total: 221 nurses	
	Intensive	1 Fairuz	16
		1 Mutiara	42
		1 Nilam	40
		2 Delima	38
		Kristal 1	11
		Kristal 2	15
		A&E	25
		Total: 187 nurses	
Non-shift		Total: 95 nurses	

3.3 Sampling Method

3.3.1 Sampling Technique

Cluster sampling method were used to select the wards according to Medical, Surgical and Intensive based categories and participant were selected proportionately in the simple random manner. Four wards from medical unit were selected through Simple Random Chart. They were ward 1 Timur Belakang, 5 Utara, 6 Utara and 7 Selatan. Wards representing surgical unit were ward 2 Utara, 2 Baiduri, 4 Selatan and 4 Timur. Two wards from intensive unit were selected which was ward 1 Nilam and Accident & Emergency ward. All the nurses in each selected ward were taken as the respondents of the study. Meanwhile, all nurses in the outpatient clinic were included in the study.

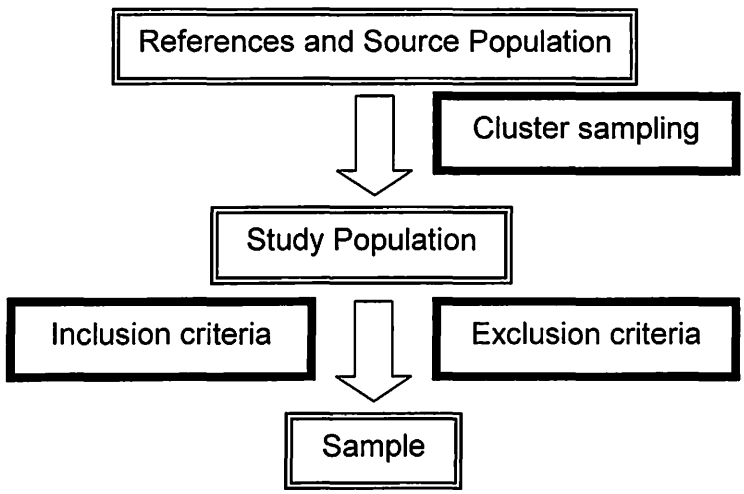
3.3.2 Sample Size

The sample size was calculated using PS Power and Sample Size Calculation software with the level of significance (α) at 0.05 and power of the study is 80%. As found by Harrington (2001) and Rajaratnam & Arendt (2001), the proportion of cardiovascular disorders among non-shift workers was 0.25 and the proportion of cardiovascular disorders among shift workers was 0.4. The ratio of non-shift to shift workers was taken as one.

where,	P_o	=	the event rate among non-shift workers = 0.25
	P_1	=	the event rate among shift workers = 0.4
	m	=	number of non-shift workers per shift workers = 1
	α	=	Type 1 error probability for a 2 tailed test
	power	=	probability of correctly rejecting the null hypothesis that the P_o is equal to P_1

Sample size for each group in this study is 152. We also added 10% from the sample size due to study design effect which is 15 staff nurses. So, the total sample size in this study is 334 respondents.

Figure 3.1: Process of selection subjects into the study



3.4 Criteria of Subjects

3.4.1 Inclusion Criteria

A nurse was selected as a study subject when she fulfills the following criteria:

1. Registered with Malaysian Nursing Board.
2. Working shift (7-10 hrs/shift) or working non-shift ("normal" office hours).
3. Working experience in current working hours for more than one year.

3.4.2 Exclusion Criteria

A nurse was excluded from the sample when (s)he has any one of the following criteria:

1. Has changing working schedules, for example from office hour work to shift work or vice versa.
2. Working experience in current working hours for less than one year.
3. A male nurse.

3.5 Data Collection and Research Instruments

Data collection was carried out in the HUSM wards. Upon registration, all subjects were informed of the purpose of the study and the confidentiality of the data obtained. Each subject answered a questionnaire consisting of six parts which includes demographic data, working condition, physical and psychosocial health status and the last part consisting of a Malay version of Depression, Anxiety, Stress Scale (DASS 21). The questionnaire was constructed and written in Malay language. The subjects were given a short briefing on how the questionnaire is supposed to be answered. The questionnaire required about 30 minutes or less to be completed and the filled up questionnaire were collected by the researcher on the same day.

3.6 Data Collection Period

Data were collected during the period of four weeks, from 05th December 2005 until 2nd January 2006.