THE IMPACT OF HOSPITAL NURSE STAFFING, WORK ENVIRONMENT AND PATIENT-CENTEREDNESS ON THE QUALITY OF CARE AND PATIENT SAFETY

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ABSTRAK

Industri penjagaan kesihatan mempunyai banyak persoalan yang kompleks. Kualiti penjagaan dan keselamatan pesakit kini menjadi keutamaan di peringkat kebangsaan dan juga antarabangsa. Namun, amat sedikit usaha dilaksanakan terhadap peningkatan penjagaan rawatan bagi mengoptimumkan hasilnya. Kajian ini menyelidik secara empiris kesan daripada perjawatan jururawat dan persekitaran kerja mereka ke atas kualiti penjagaan dan keselamatan pesakit di wad-wad perubatan dan pembedahan hospital swasta di Malaysia. Selain itu, kajian ini juga mengkaji kesan pengantara jagaan berorientasikan pesakit (*patient-centeredness*) melalui pengaruh perjawatan dan persekitaran kerja ke atas kualiti penjagaan dan keselamatan pesakit. Tinjauan berbentuk keratan lintang (*cross-sectional*) telah dijalankan di dua belas (12) buah hospital swasta. Data diperoleh melalui borang soal selidik daripada 652 orang jururawat yang mewakili 61.8% kadar respons. Persampelan rawak mudah berstrata telah digunakan bagi membolehkan jururawat daripada semua syif kerja mengambil bahagian dalam kajian ini. Analisis regresi dan makro *PROCESS Hayes* telah dijalankan bagi menguji hipotesis kajian. Keputusan analisis menunjukkan bahawa perjawatan mempunyai kesan negatif yang tidak signifikan ke atas hasil penjagaan, manakala persekitaran kerja pula mempunyai kesan positif yang signifikan. Tambahan pula, jagaan berorientasikan pesakit (*patient-centeredness*) mempunyai kesan pengantara yang signifikan ke atas hubungan kedua-dua perjawatan dan persekitaran kerja dengan hasil penjagaan. Model untuk meningkatkan kualiti penjagaan dan keselamatan pesakit telah dicadangkan. Implikasi praktikal kajian menunjukkan bahawa jagaan berorientasikan pesakit (*patient-centeredness*) mengurangkan kesan negatif kekurangan jururawat dan tempoh syif, serta memperkukuhkan kesan positif daripada persekitaran kerja ke atas hasil penjagaan. Sebagai cadangan, faktor pengantara lain diperlukan untuk kajian masa hadapan bagi mengkaji kesan perjawatan dan persekitaran kerja jururawat ke atas kualiti dan keselamatan penjagaan pesakit.

Kata kunci: kualiti penjagaan keselamatan pesakit, perjawatan, persekitaran kerja, jagaan berorientasikan pesakit (*patient-centeredness*).

ABSTRACT

The healthcare industry is complex in nature. The quality of care and patient safety has become a national and international priority. Limited efforts have been made on improving nursing care in order to optimize the outcomes of care. This study empirically investigated the impact of hospital nurse staffing and work environment on the quality of care and patient safety in the medical and surgical wards in Malaysian private hospitals. The mediating effect of patient-centeredness on the effect of both hospital nurse staffing and work environment on the quality of care and patient safety was also investigated. A cross-sectional survey was conducted on 12 private hospitals. Data was collected, through questionnaires, from 652 nurses, with a 61.8 % response rate. The stratified simple random sampling was used to allow nurses from all shifts to participate in the study. Regression analyses and the Hayes PROCESS macro were conducted to test the hypotheses. The results showed that staffing had an insignificant negative impact on the outcomes of care, whereas work environment had a significant positive impact. Moreover, it was found that patient-centeredness significantly mediated the effect of both staffing and work environment upon the outcomes. A model for improving the quality of care and patient safety was proposed. The practical implications indicated that patient-centeredness suppresses the negative impact of nursing shortage and shift length, and complements the positive impact of work environment on the outcomes of care. Further mediators are recommended for future research on the impact of both hospital nurse staffing and work environment on the quality of care and patient safety.

Keywords: quality of care, patient safety, staffing, work environment, patient-centeredness.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

GLOSSARY OF TERMS

Adverse events: the unexpected patient harm or negative effect related to patient hospitalization other than his disease process, and this also called hospital acquired conditions.

Continuous quality improvement: advanced process approach focused on efficiently improvement of the complex processes in order to improve patient safety.

Health: a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Healthcare quality improvement: the tools, process and strategies of maintaining patient safety to deliver the best care.

Inappropriateness: happened when the negative consequences more than the positive consequences of care.

Magnet hospital: concept reflects those hospitals fulfilling the requirements of the magnetism program, which is surveyed by the American Nurses Credentialing Center.

Misuse: the failure to deliver the planed care.

Nosocomial infection: hospital acquired infection.

Outcome quality: indicators reflect the end result of treatment and interventions, for example the actual number of patients who fall or develop bed sore as a result of hospitalization.

Overuse: delivering inappropriate care.

Patient-centeredness: considering patient needs, expectations and preferences to ensure delivering care upon to these needs, and actively involving the patient and his/her family in the care process.

Patient safety: prevent any potential harm or adverse events for hospitalized patient.

Process quality: indicators reflect what is actually done during the treatment process

Quality improvement: complicated phenomenon with many domains, affected by political, social, economical and cultural factors for satisfying a patient's need.

Quality indicator: the best tool for measuring and monitor the effectiveness and performance of care.

Quality of care: the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.

Structural quality: indicators used to measure the feature of care setting, for example, Resources (materials, facilities and human), staff qualifications and organizational structure.

Underuse: the failure of delivering necessary care.

Work environment: the organizational characteristics of a work setting that facilitate or constrain professional nursing practice.

LIST OF ABBREVIATIONS

ANCC	American Nurses Credentialing Center
CMS	Center of Medicare and Medicaid Standards
CQI	Continuous quality improvement
ENT	Ear, nose and throat treatment
IOM	Institute of Medicine
JCAHO	Joint Commission Accreditation of Healthcare Organization
JCIA	Joint Commission International Accreditation
KMO	Kaiser Meyer Olkin
MOH	Ministry of Health Malaysia
PES-NWI	Practice Environment Scale of the Nursing Work Index
TQM	Total quality management
WHO	World Health Organization

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter discusses the background of the study, highlighting the gaps in improving the quality of care and patient safety, which in turn leads to the problem statement. This chapter also discusses the research questions and objectives, followed by the significance, scope and limitations of the study, as well as the organization of the thesis.

1.2 Background

During the last decade, the demand for healthcare services has significantly increased. Healthcare quality has become a national and international priority. The environment has rapidly changed within a short time period, creating a challenge for leaders to cope with environmental uncertainty. Managers in the healthcare industry are not the exception. They have to focus on the quality improvement in all its aspects to deliver efficient, timely, effective, patient-centered and safe healthcare services (IOM, 2003).

Managers face challenges in ensuring patient safety and improving the quality of healthcare. Many variables affect the performance of healthcare services and processes. Staff competency, leadership style, organizational culture, work environment, team cohesiveness, compliance with international standards, etc., are all considered as variables affecting the outcomes of healthcare.

Delivering safe healthcare is a challenge for healthcare managers. In addition, sustaining the work environment is essential for attracting and retaining employees (Van Bogaert, Clarke, Vermeyen, Meulemans & Van de Heyning, 2009). The following sections discuss the healthcare status and the quality of care, followed by the differentiations between industrial versus healthcare quality. Then, the quality of care in Malaysia is discussed. Finally, the known and unknown aspects regarding the quality of healthcare are highlighted, which help to focus on the issues raised in this study.

1.2.1 Healthcare

The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). Thus, delivering healthcare is not merely treatment, but should also take into account the social and mental status of patients. Increasing demands and costs and hospital overcrowding are some of the main challenges for countries in delivering comprehensive healthcare to their citizens. Cost containment in healthcare has had negative consequences on the quality of care and patient safety (Aiken *et al*., 2012). Similarly, Steiger (2007) found that the lack of money and resources is negatively associated with patient safety. Further, other obstacles to patient safety are lack of patient awareness, compliance and poor nurse-physician relationship (Steiger, 2007). These raise challenges for improving the quality of care and reducing costs without harming hospitalized patients, and show the importance of developing strategies to enhance the work environment in a developing country,

like Malaysia. Improving nursing work environment is considered as one of the low-cost strategies to optimize the quality of care (Aiken *et al*., 2012). According to the Annual Report (2011) of the Ministry of Health (MOH) Malaysia, the mission of the MOH is to facilitate and support the population's health and provide high quality of care, characterized as patient-centered, equitable, efficient, affordable and environmentally adaptable, with emphasis on the aspect of human dignity (MOH, 2011a). This shows that the MOH's goals are comprehensive and focused on the quality of care, work environment, patient-centeredness and employees' support.

Life expectancy of Malaysians has increased, and Malaysians today live longer, as shown in Figure 1.1. The MOH delivers healthcare for 28.96 million people (MOH, 2011a): 36.6% of the total population are youths (below 20 years), with a higher proportion of males (51.5%) than females (48.5%) (MOH, 2011a). The State of Selangor records the highest population (5.58 million) compared to other states in Malaysia (MOH, 2011a).

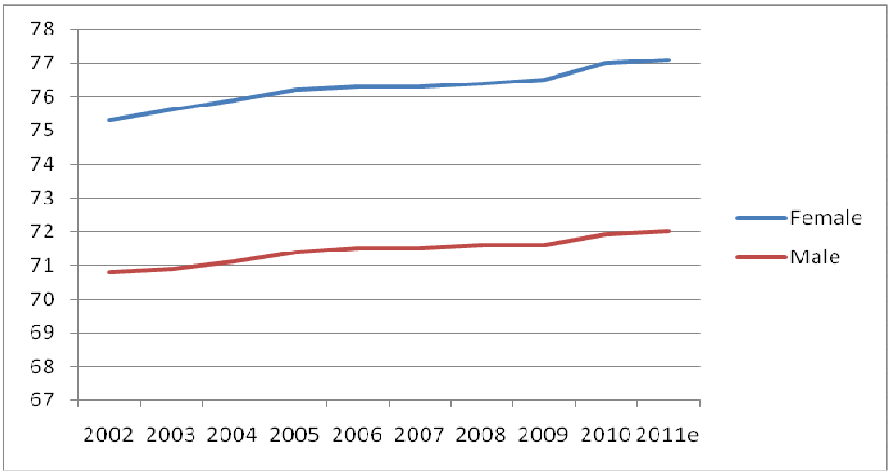

Figure 1.1
Life expectancy in Malaysia
Source: Annual Report of MOH Malaysia as obtained from the Department of Statistics MOH, 2011a

As the population is increasing at a rate of 1.3 per thousand people annually (MOH, 2011a), the demand for healthcare in Malaysia is increasing as well (MOH, 2011b). The total bed occupancy rate in hospitals has also increased, as shown in Figure 1.2. This increase in the demand for care and bed occupancy rate of hospitals is a challenge to realizing the mission of delivering high quality healthcare.

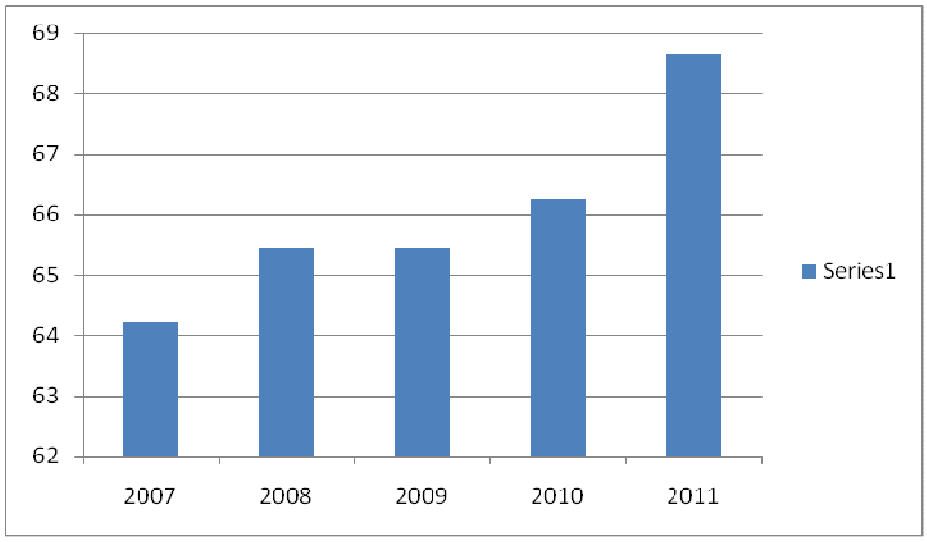

Figure 1.2
Bed occupancy rate (%) in Malaysian hospitals
Source: Annual Report of the MOH Malaysia as obtained by the Health Informatics Center MOH, 2011a

1.2.2 Quality of care

The Institute of Medicine (IOM) defines the quality of care as ‘‘the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge’’ (IOM, 2000). The quality of care is defined differently among providers, insurers and patients (Montgomery, Todorova, Baban & Panagopoulou, 2013). Insurers and providers define the quality of care as the effectiveness of care by using the

appropriate clinical guidelines and standards for patient care; whereas from the patients' perspective, the quality of care is effective, accessible, available and consistent information (Campmans-Kuijpers *et al*., 2013). Quality gurus define quality differently. For example, Joseph Juran defined it as "Fitness of use" (Pelletier & Beaudin, 2005); while Philip B. Crosby defined it as "Doing it right the first time" (McLaughlin & Kaluzny, 2004). Generally, it could be concluded that the term quality of care is the excellence of care (Gillespie, 2007). The excellence of care is more subjective and varies from one individual to another. Thus, the quality of care is defined differently by various individuals and countries, as well as in contexts. The next section compares quality in the industrial sector compared to the healthcare sector.

1.2.3 Industrial versus healthcare quality

Donabedian (1993) differentiated industrial and healthcare quality. He pointed out that industrial quality is limited and ignores the client-provider relationship; whereas healthcare quality requires more attention to client needs and to his/her expectations. Satisfying client expectations may require medical and healthcare staff to have better education and training. Donabedian also argued that industrial processes are routine, require standardized input and output, making workflow linear and repetitive (McLaughlin & Kaluzny, 2004). On the other hand, it is impossible to guarantee standardized inputs and outputs in healthcare because the same diseases and symptoms produce a variety of outputs which depends on many variables. These variables could be patient-related variables; staffing-related variables; or

environmental variables. This is why the healthcare environment is more complex and dynamic. So, in order to reduce the variation in care outcomes and to optimize healthcare services, healthcare organizations have to deliver care consistent with current professional knowledge.

Healthcare quality compared to other disciplines and healthcare institutions and the manufacturing companies also varies in point of product type. Manufacturing companies deliver tangible goods, and any defect in a product can simply be returned by the customer, and the issue will be resolved (Guo & Hariharan, 2012). On the other hand, Guo and Hariharan (2012) demonstrated that healthcare organizations deliver services to their customers, and service defect is irreversible in some circumstances. For instance, injury and loss of function of body parts or loss of life threaten the survival of the organization by increasing the number of lawsuits and lost customers. This is why leaders in healthcare organizations must play a greater role to improve the quality of care and patient safety. This shows the importance of focusing on the medico-legal complaints, patient safety and healthcare quality in Malaysia.

1.2.4 Quality of healthcare in Malaysia

The Malaysian government aims to achieve Vision 2020 to become a “high income nation”, by an agenda which involves five mission thrusts (MOH, 2011b). The fourth thrust focuses on transforming healthcare, improving quality and sustaining the population’s quality of life (MOH, 2012). The MOH has set four strategies to achieve this thrust: transform the healthcare system comprehensively; maintain

health awareness; empower the community; and ensure universal access to healthcare for achieving the status of a high income economy (MOH, 2011b). The lack of money and inadequate resources are both negatively associated with patient safety (Steiger, 2007), and can be obstacles for the MOH to improve the quality of care and reduce costs without causing harm to hospitalized patients.

The 10th Malaysia Health Plan promoted the theme, "1 Care for 1 Malaysia" in order to establish a universal coverage of healthcare for the population and sustain the quality of care (MOH, 2011b). On the other hand, according to the Annual Report of the MOH in Malaysia, complaints received by the medico-legal section have increased, as shown in Figure 1.3. This increase in the total number of complaints raises the bar to investigate the factors affecting the quality of care to deliver efficient, equitable and patient-centered care.

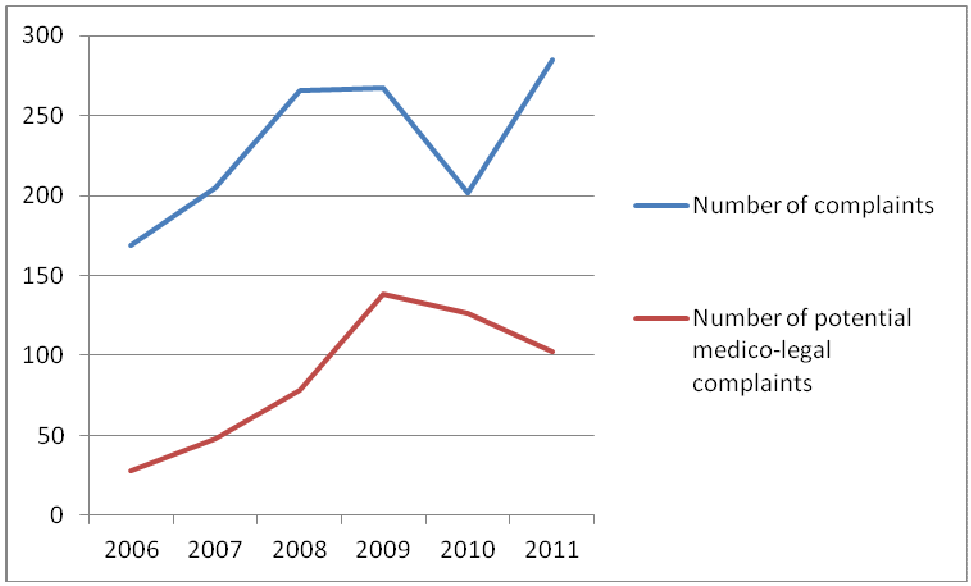

Figure 1.3
Number of complaints and the number of potential medico-legal complaints
Source: Annual Report of MOH Malaysia as obtained from the medico-legal section MOH, 2011a

These medico-legal complaints match the payment of compensation for the wronged party. Figure 1.4 shows the seriousness of the overall situation. The total number of compensations paid to the injured parties has sharply increased. As reported by the Annual Report of MOH (2011), the total compensation between 2006 to 2011 was RM 21,583,168 (MOH, 2011a). This increase in the number of complaints and amount of compensation raise concerns on the multidisciplinary interventions and factors affecting patient safety. Thus, maintaining a healthy work environment, ensuring adequate staffing, employee training in medico-legal prevention and other interventions are required to maintain quality of care and patient safety.

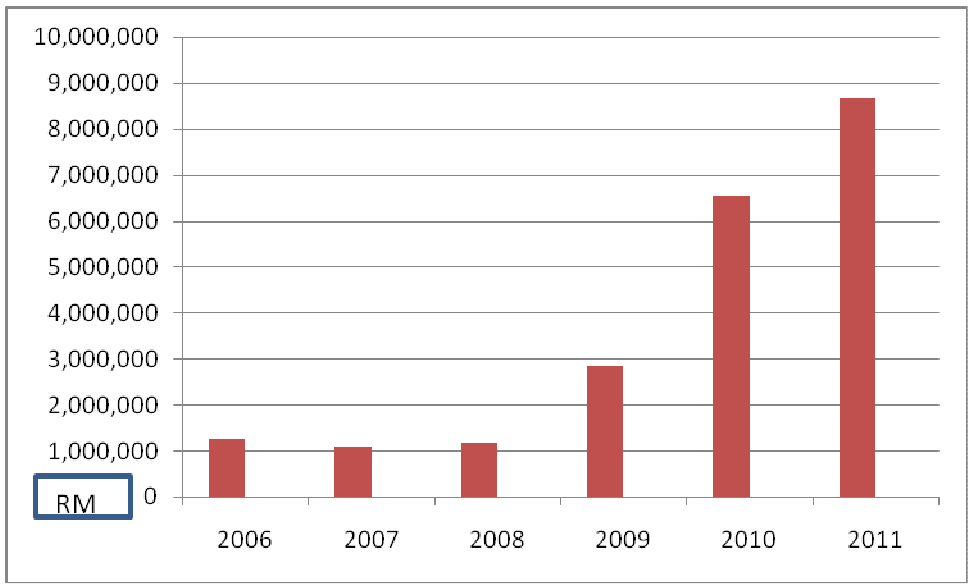

Figure 1.4
Total amount of compensation paid by court order and out of court (Ex Gratia Payment)
Source: Annual Report of MOH Malaysia as obtained from the medico-legal section MOH, 2011a

According to MOH's Annual Report (2011a), based on the data obtained from the medico-legal section of the medical practices division, the sharp decrease in medico-legal complaints in 2009, as shown in Figure 1.3, is due to the segregation of complaints related to the private healthcare sector and complaints reported by the private medical practice control section (MOH, 2011a). In 2011, the number of recorded complaints increased again, while the potential medico-legal complaints continued to decrease after the segregation of complaints received by the private healthcare sector. This indicates that private healthcare has more potential for medico-legal complaints compared to the public sector, highlighting the importance of investigating factors affecting the quality of care and patient safety in the Malaysian private sector rather than the public sector in this study.

The total complaints that the private medical practice control section received in 2011 was 312 complaints (MOH, 2011a). These complaints are distributed among the private healthcare facilities, as shown in Figure 1.5. The most prominent complaints are on private hospitals, with 154 records, followed by private medical clinics, hemodialysis centers, dental clinics, hospices and maternity homes. Due to the majority of complaints in Malaysian private healthcare facilities being on hospitals, the study focuses on private hospitals in order to develop strategies to improve the delivered care and to reduce the harm to patients.

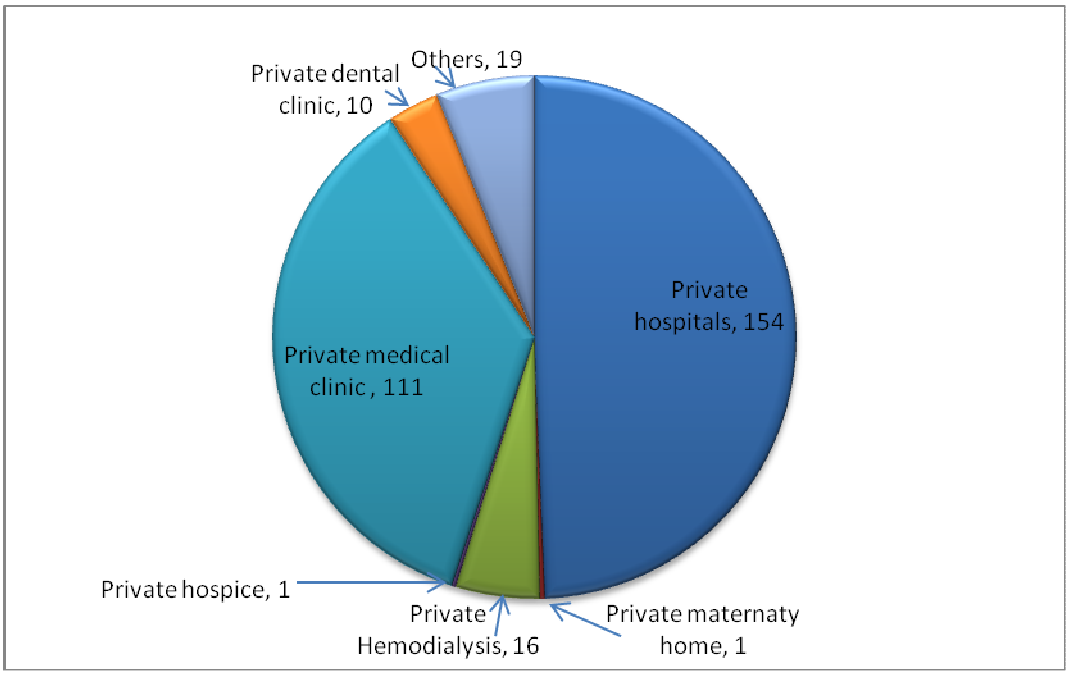

Figure 1.5
Number of complaints received according to the private healthcare facilities
Source: Annual Report of MOH Malaysia as obtained from the private medical practice control section MOH, 2011a

A national nursing audit has found that nurses working in public hospitals perform better than those working in private Malaysian hospitals (MOH, 2011a). This national nursing audit is conducted in two phases annually by the Department of Research and Quality Development under the nursing division of the MOH. The performance of nurses is evaluated under four main competencies: administration of oral medication; administration of IV infusion; aseptic wound dressing; and blood component transfusion. The result of the audit is illustrated in Table 1.1, reflecting that nurses working in private hospitals have lower levels of performance than nurses working in public hospitals.

Table 1.1
Nurses' competencies in private and public hospitals in Malaysia

Phase per year	Indicators	Private hospitals (%)	Public hospitals (%)
Phase 1	Administration of oral medication	80.8	94.5
	Administration of IV infusion	72.7	86.9
	Aseptic wound dressing	66.9	88.1
	Blood component transfusion	80.3	93.2
Phase 2	Administration of oral medication	94.0	94.4
	Administration of IV infusion	90.0	90.9
	Aseptic wound dressing	59.7	89.2
	Blood component transfusion	61.4	91.7

Source: Annual Report of MOH Malaysia as obtained from nursing division MOH, 2011a

All in all, because the private hospital nurses have lower competencies and the private healthcare facilities are more prone to medico-legal complaints, the study focuses on the Malaysian private hospitals. Further, factors affecting the performance, patient safety and the quality of care are investigated. The next part discusses what is already known and unknown regarding patient safety and the quality of care and patient safety, in order to prevent patient harm.

1.2.5 What is already known and not known regarding quality of care and patient safety

Several factors are affecting the quality of care and patient safety. Leaders must direct the efforts and empower the employees in order to improve quality of care and patient safety (LeBrasseur, Whissell & Ojha, 2002; Nwabueze, 2011; Xirasagar, Samuels & Stoskopf, 2005). In addition, multidisciplinary teamwork also helps in enhancing the vision communication, quality of care and patient safety (Deneckere *et*

al., 2012; Ferguson *et al*., 2007; Franx *et al*., 2008; Kaplan & Ballard, 2012; Scott, Poole & Jayathissa, 2008). Learning organizations and teaching hospitals are positively associated with staff satisfaction, quality of care and patient safety (Chen & Kuo, 2011; Cramer, Jones & Hertzog, 2011; Pantouvakis & Mpogiatzidis, 2013; Scott *et al*., 2008; Siriwardena, 2006; Valero *et al*., 2009). Similarly, using technology and electronic recording system is positively associated with decreasing medical errors, enhancing the continuity of care and improving quality of care (Casalino *et al*., 2003; Hyde & Murphy, 2012; Kaplan & Ballard, 2012; Le Duff, Daniel, Kamendjé, Le Beux & Duvauferrier, 2005; Morag *et al*., 2012; Scott *et al*., 2008; Virga, Jin, Thomas & Virodov, 2012). A qualitative study conducted in a large Malaysian hospital with 895 beds has found that a healthy work environment is important to improve job satisfaction among hospital nurses (Atefi, Abdullah & Wong, 2014).

In addition to leadership, teamwork, learning capabilities and technology, cultural strength and patient-centeredness is the other predictor for improving the outcomes of care. Cultural strength and commitment are required for maintaining efforts to improve patients' care outcomes (Ballard, 2003; Mallak, Lyth, Olson, Ulshafer & Sardone, 2003; Webster *et al*., 2011), by shifting from blaming individuals to system blaming and patient-centered approaches (Forster, Tugwell & van Walraven, 2000; Patel & Mitera, 2011). Patient-centeredness can help improve patient safety, quality of care, prevent adverse events (Tappenden *et al*., 2013; Weingart *et al*., 2011; Woodard *et al*., 2012) and strengthen the patient-provider relationship, which in turn

can lead to increased patient compliance with treatment (Da Silva *et al*., 2012; Fischman, 2010; Muntlin, Gunningberg & Carlsson, 2006; Sriram *et al*., 2011).

All aforementioned variables have a consistently positive effect on improving patient safety and the outcomes of care. On the other hand, there are three predictors with inconsistent effect on delivering best care practices:

1. Adherence to policy, standards and guidelines.
2. Work environment.
3. Staffing.

Adherence to international accreditation standards (Center of Medicare and Medicaid Standards (CMS), Joint Commission on Accreditation of Healthcare Organizations (JCAHO), Joint Commission International Accreditation (JCIA) for hospitals) and clinical guidelines improve the outcomes of care and patient safety and help bridge the gap between the evidence-based practices and the current practices (Abilleira, Gallofre, Ribera, Sanchez & Tresserras, 2009; Fritz, Cleland & Brennan, 2007; Ibrahim, Jeffcott, Davis & Chadwick, 2013; Jaber & Holmes, 2007; Rogers, 2006; Scott *et al*., 2008). However, there are two inconsistent findings of previous studies regarding the adherence to standards, policies and guidelines. First, certain circumstantial adherence to regulations and policies lead to poor quality of care rather than improvement. For instance, contact isolation negatively affects the healthcare delivery process by creating barriers between patient and healthcare providers (Morgan *et al*., 2011), but this phenomenon is excluded from this study. Second, certain studies have found that implementing practice guidelines have

resulted in a mixed effect on patient care outcomes (Franx *et al*., 2008). For instance, adherence to guidelines is not necessary to improve the care outcomes at the patient level, but is associated with improving quality of care at the hospital level, as there are many other patient-related factors affecting the care outcomes than process indicators alone (Kolfschoten *et al*., 2012); others have found that the relationships between indicators and the care outcomes at individual levels could not exist at higher levels (team or hospital level), because there are many other variables affecting the organization and group levels (Sidorenkov, Haaijer-Ruskamp, de Zeeuw, Bilo & Denig, 2011). Thus, the level of analysis in the study is specified, as discussed in Chapter Three.

A stable and well-managed care environment is positively associated with the outcomes of care and lowers the adverse effects (Chehab *et al*., 2001; Meraviglia *et al*., 2008; Nantsupawat *et al*., 2011; Newhouse, Himmelfarb & Morlock, 2013; Webster *et al*., 2011). In addition, there is an inconsistent relationship between clinical case complexity and the quality of patient care. Some have found that patients who have more complicated cases receive higher quality care (Baron, Morris, Dye, Fielding & Goulden, 2006; Woodard *et al*., 2012), while others have found that higher case severity is related to poor quality of care (Young, Sullivan & Duan, 1999). The healthcare work environment is complex, dynamic and uncertain, showing the importance of exploring the work environment as a predictor affecting the quality of care and patient safety in Malaysian private hospitals, by selecting one ward to investigate and control the variations in the case's complexity.

Adequate staffing and employing additional assigned specialist staff for procedures positively affect the outcomes of care, the quality of care and patient safety (Brooten, Youngblut, Kutcher & Bobo, 2004; Newhouse *et al*., 2013; Olson *et al*., 2013; Zeng, Ma, Hu, Li & Bryant, 2012), while understaffing increases workload and is negatively associated with the quality of care and patient safety (Boyer *et al*., 2012; Ferguson *et al*., 2007). On the other hand, staff duty hour limit has a mixed effect on the quality of care and patient safety (Estabrooks *et al*., 2009; Philibert, Nasca, Brigham & Shapiro, 2013; Stone *et al*., 2006). Some have found that duty hour restriction (working eight hours) is negatively associated with the outcomes of care, decreases the continuity of care and lowers job satisfaction (Philibert *et al*., 2013; Stone *et al*., 2006). Others have found that limited working hours (working eight hours) is positively associated with the outcomes of care and reducing burnout and fatigue of staff (Bhavsar *et al*., 2007). This shows the importance of investigating the effect of the length of working duty hours and workload on the quality of care and patient safety in Malaysian private hospitals.

In summary, sustaining the performance of care and quality of life has become a key success factor and national thrust in Malaysia. The MOH Malaysia has developed strategies for achieving this mission. The nursing division of MOH researched on sustained performance of nurses and found that nurses in private hospitals have lower performance levels than nurses in public hospitals. Malaysian private hospitals have more potential for medico-legal complaints as opposed to public hospitals. Thus, the issue of delivering safe and high quality of care in this study is focused on Malaysian private hospitals. Moreover, because the issue of delivering safe and high

quality of care for patients is a challenge for healthcare managers; and because delivering safe care is inconsistently affected by hospital nurse staffing or care environment, it is necessary to maintain the quality of care and patient safety needs in Malaysian private hospitals, as pointed out in the problem statement below.

1.3 Problem statement

Healthcare quality has become a national and international priority, and the healthcare manager has to focus on the quality improvement and all its aspects to deliver efficient, timely, effective, patient-centered and safe healthcare (IOM, 2003). The IOM's (2000) report, "To Err Is Human", states that 98,000 deaths in the United States (US) have occurred annually as a result of medical errors (IOM, 2000). One study conducted in Australia states that adverse events occurred for 17.0% of all admitted patients, most of them regarded as preventable (Wilson *et al*., 1995). Recently, 400,000 adverse events and 210,000 deaths annually have been associated with preventable harm in the US hospitals (James, 2013). In the 15 years since the IOM Report, there have been multidisciplinary interventions and system reform to prevent patient harm. Despite all these efforts, preventable harm in the hospitals is still substantial (Leape, 2015). In European countries, there are not enough nurses in the healthcare facilities to fulfill increasing demands, which in turn is negatively associated with the quality of care and patient safety (Hinno, Partanen & Vehviläinen-Julkunen, 2011). In Malaysia, there are increases in the demand for and cost of care coupled with the lack of resources, which in turn, threaten the sustenance of the performance of the Malaysian health system (MOH, 2011b). Additionally, the

lack of money and resources is negatively associated with patient safety and the quality of care (Steiger, 2007). So, increasing demand for care and longer working hours, combined with limited budgets, have made it crucial to sustain the outcomes of care (Drake, 2013). Thus, the main purpose of the study is to explore the factors affecting the quality of care and patient safety in Malaysian private hospitals.

Based on the previous discussion, there are many issues that threaten the quality of care and patient safety in Malaysia. The Malaysian government has set an agenda to realize Vision 2020 to become a "high income nation", by transforming healthcare, improving quality and sustaining quality of life (MOH, 2012). The MOH has set four strategies to realize these objectives, and the 10th Malaysia Health Plan promotes the theme "1 Care for 1 Malaysia" in order to sustain the quality of care (MOH, 2011b). Along with these efforts, the total number of complaints received by the medico-legal section of the MOH is increasing, and the amount of compensation is sharply increasing as well (MOH, 2011a). This indicates that it is pertinent to explore factors affecting the quality of care and patient safety in Malaysia. Based on the previous discussion, it is clear that private hospitals have greater potential for receiving medico-legal complaints, and the performance of nurses working in private hospitals is lower than nurses working in public hospitals (MOH, 2011a). Thus, the purpose of the study is to explore the factors affecting the quality of care and patient safety in Malaysian private hospitals.

The most crucial factors affecting the outcomes of care are staffing and work environment (Aiken *et al*., 2012). Additionally, sustaining the work environment is essential for attracting and retaining employees (Van Bogaert *et al*., 2009). The 10th

Malaysia Health Plan Report states that issues threatening the quality of care and patient safety are the lack of individual empowerment and a supportive environment (MOH, 2011b). A stable and well-managed care environment is positively associated with the outcomes of care and can lower the occurrence of adverse events (Chehab *et al*., 2001; Meraviglia *et al*., 2008; Nantsupawat *et al*., 2011; Newhouse *et al*., 2013; Webster *et al*., 2011). Moreover, improving the nursing work environment is considered as a low cost strategy towards optimizing the quality of care (Aiken *et al*., 2012). Further, there is no single intervention in preventing the adverse events and optimizing the outcomes of care (Greene, Pagliari, Cunningham, Donnan & Evans, 2009). Thus, the study focuses on multidisciplinary dimensions in order to improve the quality of care and patient safety in Malaysian private hospitals.

Many studies have investigated staffing as a human factor leading to adverse events (Boyer *et al*., 2012; Ferguson *et al*., 2007; Newhouse *et al*., 2013; Olson *et al*., 2013; Sheppard, Franks, Nolte & Fantz, 2008; Zeng *et al*., 2012), while other studies have considered the work environment as a main predictor of the outcomes of care; and the quality of care and patient safety (Abilleira *et al*., 2009; Chehab *et al*., 2001; Dyer, Monson & Cope, 1975; Gok & Sezen, 2013; Nantsupawat *et al*., 2011; Van Bogaert, Meulemans, Clarke, Vermeyen & Van de Heyning, 2009; Webster *et al*., 2011). There are only a few studies which have investigated staffing and work environment separately on the outcomes of care, the quality of care and patient safety. According to Stimpfel, Rosen and McHugh (2014), limited efforts have been focused on improving nursing care in order to optimize the outcomes of care, including the current nurse-related factors, such as nurses' work environment, shift

length and staffing. Moreover, there are limited evidences of the effect of the work environment on the outcomes compared to staffing (Aiken, Clarke, Sloane, Lake & Cheney, 2009). There is also insufficient evidence on the effect of shift length on the quality of care and patient safety (Estabrooks *et al*., 2009). This indicates that it is necessary to investigate the impact of hospital nurse staffing and work environment on the quality of care and patient safety. Moreover, there are inconsistencies in the findings on the effect of staffing and work environment on the outcomes of care, as mentioned previously in the background of the study (Estabrooks *et al*., 2009; Philibert *et al*., 2013; Stone *et al*., 2006). Thus, a variable is required to intervene or adjust the relationship between the variables (Sekaran & Bougie, 2010).

The variable used to adjust or intervene in the effect of hospital nurse staffing and work environment on the quality of care and patient safety is patient-centeredness. Patient-centered care considers patient needs, expectations and preferences to ensure catering to these needs (Frampton *et al*., 2008), and actively involving the patient and his/her family in the care process (Tappenden *et al*., 2013). The culture of patient-centeredness is used because it helps maintain the efforts towards improving the outcomes of patient care (Ballard, 2003; Mallak *et al*., 2003; Webster *et al*., 2011). For instance, cultural compliance is the key success factor in delivering best care practices (Ballard, 2003). Patient-centeredness helps to mitigate the negative impact of working processes on the outcomes of care (Chandrasekaran, Senot & Boyer, 2012). For instance, patients who are involved and who participated in care decisions are more likely to prevent adverse events (Tappenden *et al*., 2013; Weingart *et al*., 2011). Studies have proposed shifting to patient-centered approach

in order to improve the quality and patient safety (Patel & Mitera, 2011). Patient and family engagement in the care process help deliver care that is consistent with their expectations in the Malaysian palliative care settings (Namasivayam, Lee, O'Connor & Barnett, 2014). Thus, the power of patient-centeredness will affect the impact of hospital nurse staffing and work environment on the quality of care and patient safety.

The underlying theories of the study are the social cognitive theory of Bandura (1977); and the Donabedian theory (1988). The social cognitive theory states that "behavior, personal quality and environmental characteristics are mutual determinants of each other in different strengths at different times" (Dohan, Xenodemetropoulos & Tan, 2012) to affect the outcomes of care. This theory covers the variables of the study. Personal quality is matched with nursing staff perception; while the environmental characteristics are matched with the nursing work environment variable. In addition to the social cognitive theory, the Donabedian theory (1988) is used as the underlying theory, focusing on the workflow, structure, process and outcome (Stone *et al*., 2006). This helps to investigate the effect of hospital nurse staffing and work environment as structural factors on the quality of care and patient safety as an outcome factor. Investigating the mediating effect of patient-centeredness is a process factor on the impact of hospital nurse staffing and work environment on the quality of care and patient safety.

All in all, because the issue of delivering safe and high quality of care for patients is the current challenge of healthcare managers, the factors affecting the quality of care and patient safety are investigated. Further, due to the fact that delivering safe care is

inconsistently related to hospital nurse staffing or care environment, an appropriate model and strategy of developing and supporting a healthy work environment is also explored and formulated for Malaysian private hospitals.

In summary, there are increasing demands on Malaysian healthcare facilities. However, with regards to the cost of healthcare, there are lack of resources, individual empowerment and supportive environment, all of which threaten the quality of care and patient safety. The adverse events are related to defects in the structure or process, which in turn threaten the quality of care and patient safety (Forster *et al*., 2000). Thus, the study investigates the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety in Malaysian private hospitals. Moreover, it describes how patient-centeredness impacts hospital nurse staffing and work environment on the quality of care and patient safety. This will help to identify the most preventable adverse events in Malaysian private hospitals through the understanding of the main factors affecting the quality of care and patient safety.

The next section discusses the research questions, objectives and significances of the study.

1.4 Research questions

The study aims to answer the following questions:

1. What are the most common adverse events in Malaysian private hospitals?
2. Do hospital nurse staffing variables affect the quality of care and patient safety?

3. Do nurse work environment variables affect the quality of care and patient safety?
4. Does patient-centeredness mediate the effect of hospital nurse staffing on the quality of care and patient safety?
5. Does patient-centeredness mediate the effect of the nurse work environment on the quality of care and patient safety?
6. Do hospital nurse staffing, work environment and patient-centeredness influence the quality of care and patient safety?

1.5 Research objectives

The study aims to achieve the following objectives:

1. To determine the most common adverse events in Malaysian private hospitals in the medical and surgical wards.
2. To investigate whether hospital nurse staffing affects the quality of care and patient safety.
3. To investigate whether nurse work environment affects the quality of care and patient safety.
4. To examine whether patient-centeredness mediates the effect of hospital nurse staffing on the quality of care and patient safety.
5. To examine whether patient-centeredness mediates the effect of the nurse work environment on the quality of care and patient safety.
6. To propose a model of hospital nurse staffing, work environment, patient-centeredness and quality of care outcomes in Malaysia.

1.6 Significance of the study

The study focuses on the quality of care and patient safety by investigating predictors, such as staffing and work environment among nurses working in the Malaysian private hospitals. This can contribute to the theoretical and practical levels of the quality of care and patient safety.

1.6.1 Theoretical contribution

The study is among the earliest to investigate hospital nurse staffing, work environment and patient-centeredness and their respective association with the quality of care and patient safety in Malaysia. The study is among the few studies to investigate both staffing and environmental factors as separate predictors affecting patient safety and the quality of care. The study applies the Donabedian theory (1988) and expands the body of knowledge by focusing on the structure, process and outcomes, unlike other studies that have focused only on process-outcome, structure-outcome or structure-process relationships. This in turn helps to explore the effect of structure (staffing and work environment) on the process (patient-centeredness) and the outcomes (quality of care and patient safety). This study also expands the body of knowledge by exploring the effect of patient-to-nurse ratio (workload) on the degree of patient-centeredness, quality of care and patient safety in Malaysian private hospitals. Additionally, the study adds to literature through the empirical impact of the shift length and work environment on the degree of patient-centeredness, quality of care and patient safety. The study also adds empirical evidence on the effect of the power of patient-centeredness between the effect of

hospital nurse staffing and work environment on the quality of care and patient safety. The study expands the body of knowledge by applying the social cognitive theory for understanding the predictors of patient safety and quality of care, and to check whether or not nurse staffing and the work environment characteristics are mutual determinants. Hence, this can help to identify the predictive power of staffing and work environment on the outcomes of care.

1.6.2 Practical contribution

The findings of the study can help the decision-makers to understand the predictors of the quality of care and patient safety at the individual level. It will also help policy-makers adjust the work environment and staffing patterns to improve patient safety and the quality of patient care. For example, identifying the optimal nurse-patient ratio, the optimal duty working hours (8-hour or 12-hour shifts) and percentage of registered nurses, which are associated with higher quality of care and lower adverse events. Managers will also be able to establish policy guidelines of nurse-physician and nurse-patient relationship. Moreover, the study will help Malaysian managers to understand the importance of the work environment, nurses and patients involvement towards improving quality of care and patient safety. This in turn can help managers understand preventable adverse events and causes of patient harm. All in all, the findings of the study can strengthen the requirements of the magnetism program, which is a survey conducted by the American Nurses Credentialing Center (ANCC), which in turn can help Malaysian private hospitals to overcome their weaknesses by implementing the proposed model for improving the

quality of care and patient safety. The proposed model can help the decision-makers and financial managers to improve the quality and reduce costs without inducing harm to hospitalized patients.

1.7 Scope and limitations of the study

The study investigates the effect of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety in Malaysian private hospitals. Private hospitals are selected for the study because private healthcare facilities are more prone to medico-legal complaints, and because nurses working in private hospitals have lower performance levels than nurses working in public hospitals (MOH, 2011). The respondents of the study are nurses working in medical and surgical wards who deliver direct in-patient care in Malaysian private hospitals. Medical and surgical wards are chosen because these wards deliver a multidisciplinary level of care. For instance, Coetzee, Klopper, Ellis and Aiken (2013) chose the medical and surgical wards because they deliver medical cardiology, oncology, gastroenterology, nephrology, urology, orthopedics and Ear, Nose and Throat (ENT) treatments. Data is collected from the respondents in the medical and surgical wards to investigate the effect of patient-centeredness on the effect of hospital nurse staffing and work environment on the quality of care and patient safety.

The limitations of the study are mainly in data access. These limitations of accessibility of data are due to three main reasons: limited resources; patient confidentiality; and access to the patients. First of all, the shortage in resources

prevented the author from collecting data from nurses working in medical and surgical wards in the Malaysian private hospitals. Thus, an appropriate sampling technique was chosen to ensure that the sample is a "mirror image of the population" (Sekaran & Bougie, 2010; Zikmund, Babin, Carr & Griffin, 2013), as discussed in Chapter Three.

Secondly, patient confidentiality prevented the author from collecting data from electronic records of private hospitals, or reviewing the medical files of patients. Thus, the cross-sectional survey was done by adapting questionnaires from previous literature to investigate the relationship between the variables (the research design, sampling, and questionnaire design are discussed in Chapter Three). Finally, due to limited access to patients and the difficulty in talking to them, the study investigated the perception of medical and surgical ward nurses to identify the effect of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety.

Nurses are chosen as respondents of the study because they are more likely to implement interpersonal interventions in order to improve the quality of care; compared to physicians who mainly implement technical interventions in order to improve healthcare outcomes (Conry *et al*., 2012). The fact that the variables in the study are more interpersonal than technical, renders the nurses as suitable respondents in this study. The staff nurses and practical nurses are chosen to participate in the study. The staff nurses (registered nurses) are nurses who hold a bachelor's degree in nursing (Boumans, Landeweerd & Visser, 2004); while

practical nurses (assistant nurses) are those who hold a diploma in nursing, with two years of intermediate vocational education (Boumans *et al*., 2004).

1.8 Organization of the thesis

This thesis contains five chapters. Chapter One is the introduction, discussion on the background of study, problem statement, research questions and objectives, scope, and the significance of the study. Chapter Two is the literature review on the current practices; it reviews the latest literature, beginning with the introduction and theories, followed by the discussion of factors affecting the quality of care and performance measurements. Chapter Three involves the research framework and methodology in conducting the research. This chapter begins by introducing the research framework, followed by the hypothesis, research design and operational definitions and the instruments of measurement. Data collection, sampling and analyses are discussed as well. Chapter Four discusses the analysis and findings of the study, while Chapter Five discusses the findings and illustrates the limitations of the study, followed by suggestions for future research.

1.9 Summary

This chapter introduces and discusses the background of the study and problem statement, which shows an increase in the medico-legal complaints and sharp increase in the total compensation paid by Malaysian private hospitals, which threaten the outcomes of care. The research questions and objectives are discussed followed by the significance, scope and the limitations of the study. The next chapter

(Chapter Two) reviews the current practices towards improving the quality of care and patient safety. It also provides the overall picture of the variables affecting the quality of care and patient safety by introducing, defining the major concepts and discussing the theoretical development. It then highlights the factors affecting the quality of care, followed by performance improvement and cost issues of improving the quality of care and patient safety. The gaps in improving the quality of care and patient safety and the Malaysian healthcare system are discussed which helped to develop the theoretical framework of the study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Nowadays, healthcare managers face challenges to ensure patient safety and improve the quality of healthcare. There are many determinants affecting the quality of healthcare service and processes. Staff competency, leadership style, organizational culture, work environment, team cohesiveness, compliance with international standards, etc., have all been considered as variables affecting the outcomes of hospitals.

Research on quality improvement can help professionals and healthcare providers to grow within their organization, by changing and optimizing the current practices. This chapter reviews the extant literature on: the theories and the major factors affecting the quality of care and patient safety; the cost issues; the gaps in improving the quality of care and patient safety; and the quality of care and patient safety in Malaysia. These in turn can help to identify the theoretical framework to improve the quality of care and patient safety.

2.2 Concepts

Quality of healthcare is defined differently by providers, insurers and patients (Montgomery *et al*., 2013). Insurers and providers define the quality of care as the effectiveness of care by using the appropriate clinical guidelines and standards for patient care; while from the patients' perspective, the quality of care is effectiveness,

accessibility, availability and consistency of care (Campmans-Kuijpers *et al*., 2013). Researchers have also defined the quality of care differently. For example, Joseph Juran defined it as, "Fitness for use" (Pelletier & Beaudin, 2005), whereas, Philip B. Crosby defined it as "Do it right the first time" (McLaughlin & Kaluzny, 2004). Generally, it could be concluded that the term 'quality of care' is the excellence of care (Gillespie, 2007), while the 'excellence of care' is more subjective and differs from one individual to another. Thus, the quality of care is defined differently by various individuals and countries or contexts.

The IOM defines quality of care as ''the degree to which health services for the population increase the likelihood of desired health outcomes and are consistent with current professional knowledge'' (IOM, 2000). The current professional knowledge reflects the concept of evidence-based practices by which the hospital achieves the best care practices (Ballard, 2003); whereas best practice is the best possible care, which requires concerted efforts, first from the provider by adhering to evidence-based guidelines; and second, by the manager's incentives and support (Finney, Willenbring & Moos, 2000). The provider's adherence is called the "bottom-up process", while the manager's incentives is called the "top-down process" (Finney *et al*., 2000). Thus, the effectiveness of care could be achieved by the best use of evidence-based practices to eliminate the overuse, underuse and misuse of care (Seddon & Buchanan, 2006). The IOM (2001) defines underuse as the "failure to deliver necessary care"; misuse as the "failure to deliver the planned care"; and overuse as the delivery of inappropriate care. Inappropriateness happens when the negative consequences exceed the positive consequences of care (Ballard, 2003).

Quality improvement concepts in terms of healthcare, refer to tools, processes and strategies to maintain patient safety and the best of care (Groene *et al*., 2010). In addition, it contains two main popular concepts of quality improvement: Total Quality Management (TQM) and Continuous Quality Improvement (CQI) (Linwood, Day, FitzGerald & Oldenburg, 2007). TQM and CQI are both seven-step processes of measuring, assessing and investigating the current trends, knowledge and best practices, which were adapted from the field of business management to healthcare in the 1980s (Edward *et al*., 2008). Additionally, quality performance is the end result and outcome of the treatment process, whereas, care performance is not merely the adherence to treatment guidelines, but also the delivery of timely, safe and patient-centered care (Jaber & Holmes, 2007). The patient-centeredness concept is used by scholars to put patients' interest first (patient-focus approach); it is called customer-oriented behavior in the marketing field (Lanjananda & Patterson, 2009). In addition, patient-centeredness is not merely the involvement of patients in the care process, but also the deliverance to the patient, proper nutrition, treatment and education to prevent adverse events (Tappenden *et al*., 2013). The adverse events are unexpected patient harm or negative effects related to patient hospitalization, other than the disease process (Weingart *et al*., 2011), also called hospital-acquired conditions. For instance, adverse events could be a hospital-acquired infection or nosocomial infection. In addition, pressure ulcer, patient fall, medication errors and readmission are all also considered as adverse events (Weingart *et al*., 2011; Welton, 2008).

Other concepts used throughout the thesis are the staff nurse versus practical nurse terms. The staff nurses are those nurses who hold a bachelor's degree in nursing, or are registered nurses (RN), and have four years of education (Boumans *et al*., 2004). The practical nurses are those holding a diploma in nursing and have two years intermediate vocational education (Boumans *et al*., 2004). In addition, the concept of 'accredited hospital' is used frequently throughout the study, and reflects those hospitals that have been reviewed by international organizations and certified as accredited hospitals. For instance, hospitals receive accreditation from the Joint Commission International (JCI) Organization or from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). In Malaysia, 13 healthcare institutes have been accredited by JCI (10 hospitals, one laboratory center, one eye center and one laboratory clinic) (JCI, 2014). The magnet hospital concept refer to those hospitals which fulfill the requirements of the magnetism program, which is surveyed by the ANCC (Van Bogaert *et al*., 2014). The result of the study is expected to support the magnetism program requirements.

2.3 Theories on the quality of care and patient safety

Leaders and scholars define quality in different ways, depending on their field and perspectives. Wicks and Roethlein (2009) defined quality based on patient satisfaction as "the summation of the affective evaluations by each customer of each attitude or object that creates customer satisfaction". Also, the definition of quality has been fluctuating from the past, present and future, and the following are the theories of pioneers in quality management and their definition of quality.

2.3.1 Shewhart

Shewhart is a statistician and the founder of quality improvement cycle in the 1920s. The Shewhart cycle is the Plan, Do, Check, Act (PDCA) Cycle (Pelletier & Beaudin, 2005). Figure 2.1 shows the Shewhart cycle used by many scholars to identify gaps and improve quality. For example, Benneyan (2001) conducted a study to control infection acquired by hospitals (nosocomial infection) by adapting Shewhart's cycle to the statistical control model. In addition, he defined quality as "meeting or exceeding customer expectations, decreasing process variations and increasing productivity" (JCI, 2008). Thus, he focused on the developing processes to improve the quality outcomes, as illustrated in Figure 2.1.

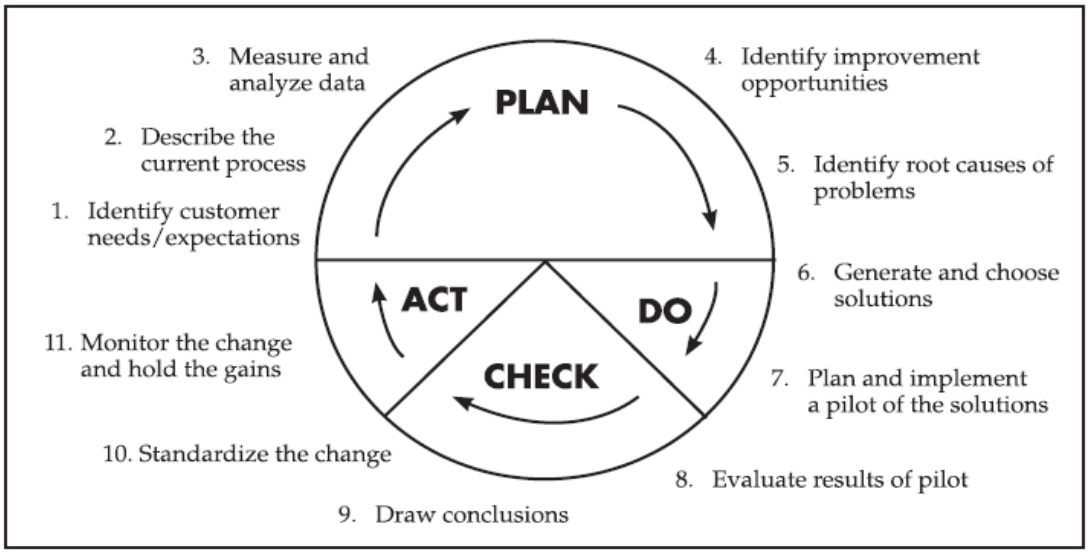

Figure 2.1
Shewhart Cycle
Source: Pelletier and Beaudin, 2005

2.3.2 Deming

W. Edwards Deming was also a statistician, and he adapted the Shewhart cycle into the Plan, Do, Study, Act (PDSA) Cycle. Deming was the founder of statistical process control model, which he proposed at Harvard University while they were studying the motivation of workers in the 1950s. He proposed the switch from traditional management to statistical process control. Deming focused on systems and processes, and said that 85.0% of problems are system-related, while only 15.0% are individual-related (Pelletier & Beaudin, 2005).

2.3.3 Juran

Joseph Juran was also another pioneer of organizational leadership and quality process. He defined quality as product performance and " fitness for use" (Pelletier, & Beaudin, 2005). Juran discussed quality in three dimensions: quality planning, quality control and quality implementation.

2.3.4 Crosby

Philip B. Crosby focused on improvement based on changing the corporate culture and attitude. He developed a concept of "Cost of Poor Quality". Further, he focused on defect prevention and developed a concept of "Zero Defect". He defined quality as "Do it right the first time" (McLaughlin & Kaluzny, 2004). Table 2.1 shows the summary of quality definitions according to the pioneers in quality management.

Table 2.1
Summary of quality definitions

Quality management pioneers	Quality definitions	Comment
Shewhart, 1920s	Meeting or exceeding customer expectations. Decreasing process variations. Increasing productivity.	Outcome focus
Deming, 1950s	System and process improvement. Statistical process control.	Process focus
Juran, 1970s	Product performance. Fitness for use.	Outcome focus
Crosby, 1979s	Changing the corporate culture. Defect prevention - "Zero Defect". Do it right the first time.	Outcome focus

In summary, Shewhart (1920) mainly focused on the expectation of the customers and staff productivity, reflected in the outcome of care. Juran and Crosby focused on the end outcome (performance and zero defects, respectively). In addition, the Deming theory of 1950 focuses on strategies of improving the process. However, these theories are limited and more theories are required to focus on structure, process and outcome for sustaining the delivered care.

Nicole (2013) reviewed the literature in quality management and suggested further research. He demonstrated that previous research has attempted to bridge the gap between quality management theories and practical application, and this task has been achieved. He proposed improving production quality through leadership. He also proposed that future research identify the link between the voice of customer and service quality in achieving customer satisfaction. So, interpersonal and

behavioral theories are required for better understanding of the predictors affecting the quality of patient care.

2.3.5 The underlying theories

The underlying theories of the present study are the social cognitive theory and the Donabedian theory (1988), which encompass the variables affecting the quality of care and patient safety of the study.

2.3.5.1 Social cognitive theory

The gap between the clinical research implications and the daily clinical practices of healthcare professionals is very critical (Godin, Bélanger-Gravel, Eccles & Grimshaw, 2008). Clinical researchers have found a wide range of factors affecting the quality of care and patient safety, including organizational, individual and environmental factors. However, there are limited studies which have investigated the behaviors of healthcare professionals to better understand these factors and to change their behaviors towards delivering the best care, consistent with the current evidence-based practices (Godin *et al*., 2008).

Cognitive processes play an important role in the possession and retention of new behavior patterns (Bandura, 1977). Personal cognitive, behavioral and environmental factors all operate as interacting determinants that influence each other bidirectionally (Bandura, 2001). The social cognitive theory states that "behavior, personal quality and environmental characteristics are mutual determinants of each other in different strengths at different times" (Dohan *et al*., 2012). This theory has

the potential to cover the variables of the study. Personal quality is matched with staffing variables, while the environmental characteristics are matched with work environment variables. Thus, the social cognitive theory is used throughout the study.

Investigating the intervening self-efficacy link can best provide validity to the theory and better understanding of the relationship between cognitive, behavior and the environment (Bandura, 1977). Thus, this theory can be strengthened by adding one intervening process factor, as discussed under the Donabedian theory.

2.3.5.2 Donabedian theory

The Donabedian theory is a well-known quality and safety model in healthcare (Carayon *et al*., 2014). The Donabedian theory covers the total workflow in the hospital and focuses on the structure, process and outcome (Donabedian, 1988). Researchers have used this theory to develop a model for delivering better quality and safer care. For instance, Carayon *et al*. (2014) adopted the Donabedian theory to develop a model for improving quality of care and patient safety. Figure 2.2 shows the work system model in healthcare, developed by Carayon *et al*. (2014). This model focuses on the work system and on the technical intervention of delivering best care practices. The strength of Carayon's model is its focus on the system in totality, including the organizational factors. However, his model is limited to the interpersonal factors affecting the outcomes of care. Thus, the study uses the Donabedian theory to develop a proposed model for further understanding of predictors affecting the quality of care and patient safety in Malaysian hospitals.

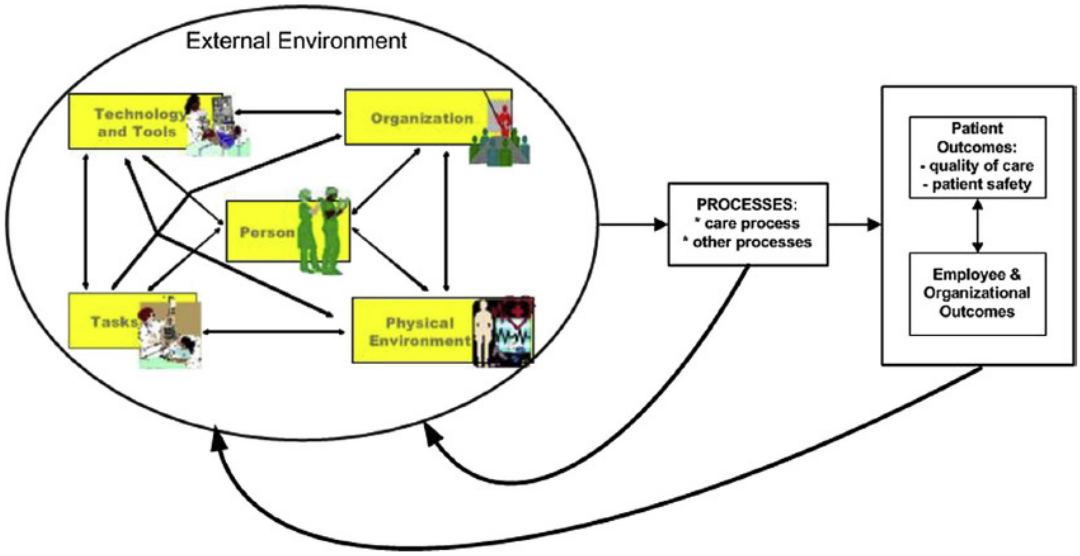

Figure 2.2
Work system model for improving the outcomes of care
Source: Carayon *et al*. (2014)

The Donabedian theory is used in the study to organize the flow of the literature review chapter, by focusing on structural and process factors affecting the outcome of care. Structural quality refers to the features of care setting, for example, resources (materials, facilities and human); staff qualifications; and organizational structure (Gok & Sezen, 2013; Sidorenkov *et al*., 2011), which are relevant to the first part of the literature review which is on the structural factors affecting quality of care. Process quality reflects what is actually being done during the treatment processes (Gok & Sezen, 2013; Sidorenkov *et al*., 2011), which are relevant to the second part of the review by focusing on the process factors affecting the outcomes of care. The process and structure indicators provide good evidence of the performance of healthcare (Brand *et al*., 2011). Thus, the outcome of quality needs to be focused on in the review chapter. The outcome quality indicators reflect the end result of

treatment and interventions (Harvey, 2004), which are discussed vis-a-vis quality performance throughout this chapter, as shown in Figure 2.3.

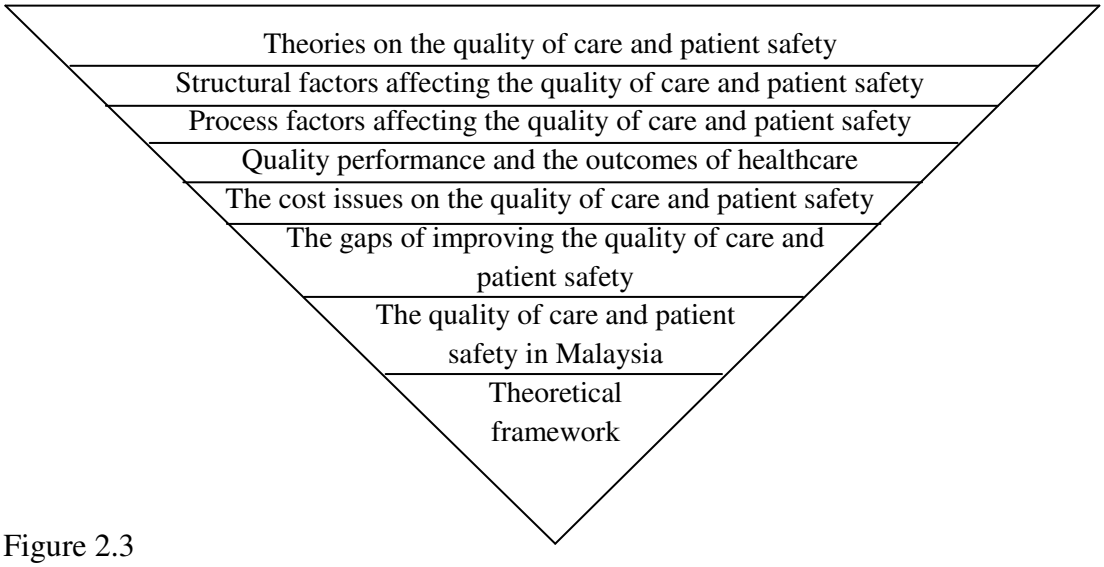

Figure 2.3
The flow of sections in the literature review chapter

2.4 Structural factors affecting the quality of care and patient safety

Today, the quality of care and patient safety has become both a national and international priority. Structural quality reflects the care setting features, resources, staff qualifications and organizational structure (Gok & Sezen, 2013; Sidorenkov *et al*., 2011). A review of the latest research shows the most salient structural factors affecting the quality of care and patient safety are staffing and work environment (Aiken *et al*., 2012). This part of the review discusses those factors to identify the gaps for improving the quality of care.

2.4.1 Staffing

Staffing refers to the hospital nurses who deliver direct in-patient care (Aiken *et al*., 2012). Many factors affect the performance of the hospital nurses on the quality of care and patient safety, such as patient-to-nurse ratio, nurses' level of education and length of nurses' duty hours. The current literature review aims to provide understanding on the effect of these factors on the quality of care and patient safety.

2.4.1.1 Patient-to-nurse ratio

Patient-to-nurse ratio refers to the adequacy of the hospital nurse staffing. A lower ratio indicates a more favorable staffing (Aiken *et al*., 2012). Adequate staffing leads to higher patient's compliance with discharge instructions (Newhouse *et al*., 2013). For instance, when a new specialist nurse for taking blood samples (Phlebotomist) was appointed, the quality of care in the emergency department improved (time of reporting the result decreased, blood culture contamination rate decreased), resulting in savings of USD 400,000 (Sheppard *et al*., 2008). In addition, one study in Malawi aimed to improve the quality of care for a crowded hospital by assigning designated staff to take vital signs and implement an in-patient triage program. This resulted in a better controlled patient flow, decreased mortality rate and improved the overall quality of care and patient safety (Olson *et al*., 2013). The performance of a decentralized HIV center was better than an accredited centralized center in Cameroon, due to lower workloads (Boyer *et al*., 2012). On the other hand, inadequate staffing and overloading lead to poor teamwork, quality and patient safety (Ferguson *et al*., 2007). Controlling the patient flow to the emergency

department and managing the input of care (number of nurses and physicians, adding extra CT scanner) can lead to improved quality of care by decreased waiting time, length of stay and patient elopement (Zeng *et al*., 2012). Additionally, changing nursing assignment policy from one nurse assigned for three rooms to two nurses sharing six rooms led to improved quality in a study by Zeng *et al*. (2012). These findings show the importance of maintaining adequate staffing levels in order to improve the quality of care and patient safety.

Mismatches between patient flow and staffing lead to increased workload, which in turn, lower the performance of care (Boyer *et al*., 2012). High patient-to-nurse ratio is negatively associated with the quality of care and job outcome, but is not associated with patient care outcomes (You *et al*., 2013). One study found that more and more nursing staff in the department are increasing the time they spend with patients, which in turn, affects the outcomes of care (Brooten *et al*., 2004). In addition, staff empowerment mediated the relationship between high performance work system and staff rating of quality of patient care in a study by Bonias *et al*. (2010); they stated that high performance work system does not lead to improved quality of patient care if the staff are not empowered.

Increasing patient flow at the peak time led to an increased workload, waiting time and malpractice suits (Thuemmler & Morris, 2005). In addition, workflow using paper work had potential safety concerns, poor security of patient data and quality of care (Medverd, Cross, Font & Casertano, 2013). One of the remedies for this issue is using information technology to identify the actual patient flow and bed availability (Thuemmler & Morris, 2005). Medverd *et al*. (2013) found that automated web-

based electronic solution improves productivity, workflow, quality of care and patient safety; whereas improving the hospital work environment and staffing help mitigate the negative impact of nursing shortage and burnout on the quality of care and patient safety (Coetzee *et al*., 2013). These findings show the importance of investigating the impact of hospital nurse staffing and work environment on the quality of care and patient safety. Section 2.4.2 discusses the nurses' working environment and its effect on the quality of care and patient safety.

Implementing rapid response team protocols can lead to the prevention of adverse events, improved patient safety and decreased stress levels of employees (Kirk, 2006). Studies have shown that nursing staff are more likely to implement interpersonal interventions in order to improve patient satisfaction; whereas physicians mainly implement technical interventions in order to improve the outcomes of healthcare (Conry *et al*., 2012). Moreover, technical interventions have a higher impact on quality of care than interpersonal interventions (Conry *et al*., 2012). Patient and family complaints in the Malaysian private hospitals result from miscommunications (MOH, 2011a). Thus, the study focuses on the interpersonal rather than the technical interventions.

Finally, patient-to-nurse ratio has a mixed effect on the outcomes of care. Some studies have found that adequate staffing positively affects the quality of care and patient safety (Brooten *et al*., 2004; Newhouse *et al*., 2013; Olson *et al*., 2013; Zeng *et al*., 2012). Others have found that staff adequacy is significantly associated with quality and job outcomes, but not associated with patient care outcomes (You *et al*., 2013). Similarly, a meta-analysis conducted by Needleman *et al*. (2002) found that

patient-to-nurse ratio is inconsistently associated with the quality of care and patient safety. These inconsistent findings in the previous studies show the importance to investigate the impact of patient-to-nurse ratio on the quality of care and patient safety for better understanding of these relationships.

2.4.1.2 Nurse level of education

Nurses are classified according to their education into staff or practical nurse categories (You *et al*., 2013). Staff nurses or registered nurses (RN) are those nurses who hold a bachelor's degree in nursing and have four years of education (Boumans *et al*., 2004); while practical nurses (assistant nurses) are those who hold a diploma in nursing, and have two years of intermediate vocational education (Boumans *et al*., 2004).

Many studies have found that higher educated nurses have a better association with patient safety and quality of care (Aiken, Clarke, Cheung, Sloane & Silber, 2003; Cramer *et al*., 2011; Estabrooks, Midodzi, Cummings, Ricker & Giovannetti, 2005; Orsolini-Hain & Malone, 2007; Orsolini-Hain, 2011; Tourangeau *et al*., 2007; Tourangeau, Cranley & Jeffs, 2006). For instance, Tourangeau *et al*. (2007) found that increasing the proportion of nurses with a bachelor's degree by 10% leads to decreasing the mortality by nine cases among 1,000 discharged patients annually. So, a highly educated provider can enhance the outcomes of care (Aiken *et al*., 2012; Estabrooks *et al*., 2005). Additionally, patient education and support improve overall perception of service quality (Rose, Uli, Abdul & Ng, 2004). Thus, leaders should

prepare educated nurses in order to deliver care consistent with the current evidence-based practices.

However, others have found that newly appointed medical practitioners (junior doctors) or fresh graduates have up-to-date knowledge and are more flexible than experienced long-term staff. These traits of junior staff increase the ease with which new ideas are implemented. These junior staff are frontline workers who better understand day-to-day needs (ward and patient needs); they are more willing to share their concerns with other staff which helps to improve teamwork and prevent errors as they are more willing to understand best practices compared to senior staff (Ibrahim *et al*., 2013). These unique attributes show the importance of how to best involve junior staff in quality improvement and patient safety in order to sustain patient care outcomes (Ibrahim *et al*., 2013). On the other hand, care provided by experienced and expert nurses increases patient satisfaction, compliance with treatment, reduces length of stay, decreases readmission rates, positively improves patient care outcomes and lowers cost of care (Brooten *et al*., 2004). Also, patients treated in both primary clinics (by general practitioner) and by specialists have higher quality of care performance than those treated by specialists per se (Kerr *et al*., 2012). These findings show that healthcare providers working together in inter-professional teams can accomplish better outcomes than working alone in silos, especially across care settings. This shows the importance of enhancing the communication on care among healthcare providers (Kerr *et al*., 2012).

A key for optimizing the quality of care and patient safety is training and learning through the provision of skills for healthcare professionals (Scott *et al*., 2008;

Siriwardena, 2006). In addition, education, reporting and monitoring improve the quality of care and patients' compliance with instructions (Nolan *et al*., 2003). For instance, training clinics lead to improved adherence to clinical guidelines and reduction of sexually transmitted diseases, high risk sexual behavior and unsafe sex (Tao & Irwin, 2006). Therefore, all new staff should take part in the general orientation program and training to understand the policies and procedures and their respective role and responsibilities in order to improve the quality of care and patient safety (Scott *et al*., 2008). The implementation of training programs for staff and patients can lead to improved quality of life for patients with chronic obstructive pulmonary disease (Valero *et al*., 2009). On the other hand, education and sharing of information alone is not effective to change practices and sustain the outcomes of care (Kaplan & Ballard, 2012). Thus, multi-level interventions are required in order to improve quality of care and patient safety.

Learning organizations are creating, acquiring and transferring knowledge (Wheelen, Hunger, Hoffman, & Bamford, 2015), and have high service quality and staff satisfaction (Pantouvakis & Mpogiatzidis, 2013). Research conducted in Taiwan by Chen and Kuo (2011) showed that there is a significant relationship between learning organizations and the quality of care; they stated that group learning affects quality of care and improves the care of a hospital. So, leaders should maintain trained and educated nurses in order to optimize the care of patients (Cramer *et al*., 2011).

Finally, staff nurses with four years education deliver higher quality of care and patient safety (Aiken *et al*., 2003; Cramer *et al*., 2011; Estabrooks *et al*., 2005; Orsolini-Hain & Malone, 2007; Orsolini-Hain, 2011; Tourangeau *et al*., 2007, 2006).

Others have found that front-line practical nurses better understand day-to-day needs (ward and patient needs); they are more willing to share their concerns with other staff which helps to improve teamwork practices and prevent errors. They are also more willing than senior staff to understand best practices (Ibrahim *et al*., 2013). These inconsistent findings show the importance of investigating the impact of nurses' level of education on the quality of care and patient safety for better understanding of these relationships.

2.4.1.3 The length of nurses' duty hours (shift length)

Length of nurses' duty hours is significantly associated with the nurses' perceived quality of care and patient safety (A. Stimpfel & Aiken, 2013). There is a lack of clear evidence that can guide decision-makers regarding the optimal shift length (Stone *et al*., 2006). Thus, this study investigates the impact of the length of nurses' duty hours on the quality of care and patient safety for better understanding of these relationships.

Restructuring working hours can improve care outcomes and decrease length of stay for patients with coronary heart disease (Bhavsar *et al*., 2007). Gajic *et al*. (2008) illustrated that by implementing a new duty program, satisfaction of patients, families and staff increased, the quality of care improved and the length of stay decreased. On the other hand, longer shifts are associated with fatigue, medical errors and greater risk of staff over-abusing alcohol and cigarettes (Estabrooks *et al*., 2009). These findings illustrate the importance of investigating the impact of the

length of nurses' duty hours on the quality of care and patient safety (Estabrooks *et al*., 2009).

Many studies have illustrated that the length of nurses' duty hours has a mixed effect on patient safety and quality outcomes (Estabrooks *et al*., 2009; Philibert *et al*., 2013; Stone *et al*., 2006). For instance, some studies have found that limiting duty hours leads to decreased continuity of care and increased workload, which in turn negatively affect patient safety and staff performance (Philibert *et al*., 2013). Others have found that nurses working 12-hour shifts had higher job satisfaction and are less fatigued than those working 8-hour shifts (Stone *et al*., 2006). On the other hand, limiting working hours reduces burnout and fatigue, and enhances staff mood and sleeping hours, which in turn lead to improved performance (Philibert *et al*., 2013). Similarly, Estabrooks *et al*. (2009) found contradictory results regarding shift length and the quality of patient care, as shown in Table 2.2. Bhavsar *et al*. (2007) found that duty hours limit improve the process quality, but does not significantly affect the clinical quality outcome (mortality rate and adverse events). These findings show the importance of investigating the contribution of structural and process factors, which affect the outcomes of care (Bhavsar *et al*., 2007). Thus, the study includes staffing as a separate variable that affects the outcomes of care. Additionally, a study in seven Malaysian hospitals has found that increasing demands for care and long working hours, combined with limited budgets, have made it crucial to sustain the outcomes of care (Drake, 2013).

Table 2.2
Estabrooks' summary of the significance of previous studies of the impact of shift length on the outcome and quality of care

Main category /First author, year	**Outcomes**	**Significance**
Quality of patient care		
Bollschweiler (2001)	Patient recovery Mortality Length of stay	Significant (p = 0.05)
Mills (1983)	Documentation of patient care (chart, progress notes, care plan), observation of care relative to prevention of injury, protection from infection, special treatments, and emotional needs and special procedures	Not significant (p = 0.05)
Stone (2006)	Quality of patient care (incident reports, risk-adjusted patient safety indicators, and nurses perceptions of quality)	Not significant (p = 0.05)
Reid (1993)	Activity analysis (continuous observations of nursing activities). Activities categorized as: (1) patient care activities (e.g., dressing change); (2) indirect care activities (e.g., report writing); (3) routine care activities (e.g., cleaning); (4) non-care activities (e.g., work breaks)	Significant (p = 0.0125)
Scott (2006)	Errors and near errors	Significant (p = 0.001)
Rogers (2004)	Errors and near errors	Significant (p = 0.001)
Health provider outcomes		
Shift length and fatigue		
Roberson (1986)	Fatigue	Significant (p = 0.05)
Shift length and drug and alcohol use		
Trinkoff (1998)	Drugs and alcohol consumption	Significant (p = 0.01)

Table 2.2 (Continued)

Main category /First author, year	Outcomes	Significance
Shift length and job satisfaction		
Stone (2006)	Job satisfaction	Significant (p = 0.001)
Todd (1993)	Job satisfaction	Significant (p = 0.05)
Hoffman (2003)	Job satisfaction	Not significant (p = 0.05)
Stanton (1983)	Job satisfaction	Not significant (p = 0.05)
Roberson (1986)	Job satisfaction	Not significant (p = 0.05)

Source: Estabrooks *et al*. (2009)

According to Stone *et al*. (2006), there are two types of work shifts: 8-hour shifts (A shift, B shift and C shift); and 12-hour shifts (day shift and night shift). Surgical procedures performed at night lead to increasing the length of stay and readmission, although it is not significantly related to mortality and morbidity rate (Turrentine *et al*., 2010). Turrentine *et al*. (2010) stated that non-emergent surgical procedures conducted at night solves overcrowding during the day at peak times. This shows the importance to highlight hospital-related factors affecting the quality of care and patient safety.

However, length of nurses' duty hours is inconsistently associated with the quality of care and patient safety as shown in Figure 2.2 above. These inconsistent findings show the importance to investigate the impact of the length of nurses' duty hours on the quality of care and patient safety for better understanding of these relationships.

2.4.2 Work environment

Safe work environment and supervisor support can significantly affect service quality and nursing commitment (Turner & Leonard, 2011). The environment is classified as internal and external environments, as shown in Figure 2.4. The environmental factors, such as customers, employees, suppliers and providers are the internal environment. Other factors like legislation, economy, legal and social values and research are considered as external environment, which affect the quality improvement in healthcare organizations. A qualitative study conducted in a large Malaysian hospital with 895 beds found that a healthy work environment is important to improve job satisfaction among the hospital nurses (Atefi *et al*., 2014).

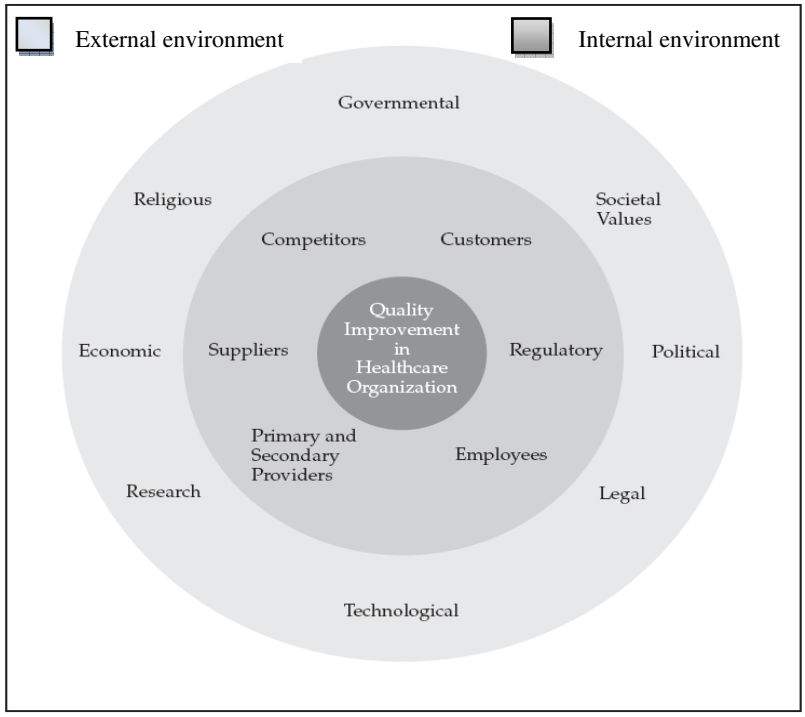

Figure 2.4
Environmental factors affecting healthcare quality improvement
Source: Pelletier and Beaudin, 2005

Physical environment, patient satisfaction, organizational constraints and teamwork cohesiveness are associated with the nurses' rating of quality of care (Djukic *et al*., 2013). Rating quality of care among staff working in magnet hospitals is considered high (Djukic *et al*., 2013). Thus, managers have to focus on the work environment in order to improve quality of patient care.

Work environment is the factor most associated with staff burnout, exhaustion and job dissatisfaction, which lead to poor patient care (Van Bogaert *et al*., 2009). Nurses working in a favorable work environment in China delivered safe care with low dissatisfaction or work burnout (You *et al*., 2013); while others found job burnout to be a mediating factor in the relationship between work environment and staff perception of job outcomes and the quality of patient care (Van Bogaert *et al*., 2009). In order to increase an organization's superior performance, one should anticipate environmental challenges in an effective manner (Webster *et al*., 2011). In addition, the better educated nursing manager had a positive effect on the quality of patient care (Dyer *et al*., 1975). So, top performing organizations should have a culture of maintaining the communication and teamwork among care providers in order to sustain the performance (Webster *et al*., 2011). Poor nurse-physician relationship is regarded as an obstacle towards sustaining quality performance and patient safety (Steiger, 2007).

A stable work environment with small staff turnover can lead to improved quality of care among patients with heart failure; better work environment leads to lower patients' risk of death (Newhouse *et al*., 2013). Well-performing hospitals have the ability to deal with environmental pressure to enhance improvement initiatives

(Webster *et al*., 2011). For instance, the adjusted work environment project conducted in 30 hospitals in Texas led to improved nursing retention, nurse staffing and the quality of care (hospital acquired infection, falling down, urinary tract infection, pressure ulcer and pneumonia all decreased) (Meraviglia *et al*., 2008). In another study, surgical procedures conducted at night increased the length of stay and return cases to the operation room, compared to cases in day shift with similar complexity (Turrentine *et al*., 2010). These findings show the importance of considering the environmental factors as predictors of quality of care and patient safety.

The work environment in the study is defined as "the organizational characteristics of a work setting that facilitate or constrain professional nursing practice" (Lake, 2002, p.178). Lake (2002) labeled five dimensions which contribute significantly to building a healthy work environment for nurses: "nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; staffing and resource adequacy; and nurse-physician relationship". The current literature is reviewed to understand the effect of these factors on the quality of care and patient safety. The fourth dimension, "staffing and resource adequacy" is omitted as it is considered as a separate construct affecting the quality of care and patient safety.

There is mixed effect of the impact of nurse work environment dimensions on the outcomes of care. Some studies have found a significant effect of the nurse work environment on the quality of care and patient safety (Aiken *et al*., 2012; Van Bogaert *et al*., 2014). Other studies have found that the nurse work environment is

positively associated with the quality of care, but not with patient safety metrics: nosocomial infections, medication errors, patient and family satisfaction and pressure ulcer (Gardner & Thomas-Hawkins, 2007; Manojlovich, Antonakos & Ronis, 2009; Manojlovich & DeCicco, 2007). Similarly, in a meta-analysis study, the nurse work environment dimensions are inconsistently associated with the quality of care and patient safety (Warshawsky & Havens, 2011). These inconsistent findings show the importance to investigate the impact of work environment dimensions on the quality of care and patient safety for better understanding of these relationships.

2.4.2.1 Nurse participation in hospital affairs

Staff involvement is essential for the provision of high quality of patient care (Van Bogaert *et al*., 2009, 2014). Documenting mutual staff-manager goals increases staff motivation towards improving patient care, which in turn, improves performance (Dyer *et al*., 1975). Staff who provide the best care reported higher levels of career satisfaction. Staff involvement enables them to establish mutual goals, take part in decision-making and influence circumstances (Kurland, Peretz, & Hertz-Lazarowitz, 2010).

Leaders in healthcare should involve clinicians and encourage them to adopt the evidence-based practices of the current clinical research into their clinical practices (Walshe & Rundall, 2001). Nurse leaders should involve nurses in new policies and procedures; this will help to decrease the resistance to changing the work environment and decreasing their burnout (Spence Laschinger & Leiter, 2006). Involvement of nurses in the hospital policies is associated with their satisfaction and

enhanced efficacy (Van Bogaert *et al*., 2009). Many studies have shown that healthcare providers' fear of punishment prevents them from reporting incidences in hospitals. For instance (Morag *et al*., 2012) found that a limited number of reported incidences by physicians and nurses involve human errors. This poor reporting of error prohibits organizational growth. Thus, healthcare managers should change the culture of blaming individuals to blaming the system in order to increase the incidences of reporting (Forster *et al*., 2000).

The culture of involving the staff in the rapid response team can help to decrease the adverse events and improve the outcomes of care (Kirk, 2006; Leach, Kagawa, Mayo & Pugh, 2012). Culture strength improves the organizational performance level (Mallak *et al*., 2003). Additionally, group culture can lead to improved health status and decreased intubation time for patients after graft surgery (Coronary Artery Bypass), which in turn lead to increased patient satisfaction (Shortell *et al*., 2000). Shortell *et al*. (2000) found that patients are more satisfied with the treatment in hospitals implementing the TQM program. The main reason for successful implementation of a quality improvement program is the total employee involvement and teambuilding (Dahlgaard, Pettersen, & Dahlgaard-Park, 2011). Therefore, nurse managers, nurses and physicians should participate and recognize the relationship for successfully implementing a quality improvement program.

2.4.2.2 Nurse foundation for quality of care

The nurse foundation for quality of care refers to a clear philosophy and standards of nursing that pervades the environment of patient care (Desmedt, De Geest, Schubert,

Schwendimann & Ausserhofer, 2012). Nurse foundation for quality of care "deals primarily with issues of staff development and quality management" (Aiken *et al*., 2009). The nurse manager should support and provide a foundation for high quality nursing care to maintain a positive work environment and to attract and retain professionals (Van Bogaert *et al*., 2009). Additionally, the nurse manager should develop ongoing programs to support nurse foundations for quality of care (Nantsupawat *et al*., 2011). Training and learning through the provision of skills for healthcare professionals is required for improving the quality of care and patient safety (Scott *et al*., 2008; Siriwardena, 2006). The implementation of training programs for staff has led to improved quality of life for patients with chronic obstructive pulmonary disease (Valero *et al*., 2009).

The implementation of an integrated program can lead to improved quality of care and decreased waiting time for patients with head and neck cancer (Ouwens *et al*., 2009). For instance, Browne *et al*. (2000) stated that by implementing a seamless program, patients' waiting time will be decreased, patient satisfaction enhanced, staff morale promoted and the performance of critical care improved. Moreover, the positive impact of implementing Canadian accreditation program on patient safety and quality of care, mortality rate, medication errors and hospital acquired infection were significantly sustained (Awa, Wever, Almazrooa, & Habib, 2011).

Participating hospitals in quality improvement initiative programs have higher quality improvement measures for treating patients with heart failure and acute myocardial infarction than non-participating hospitals (Brush *et al*., 2009). Thus, implementing collaborative interventions lead to improved quality of care (increased

patients' compliance with discharge instructions and to stop smoking) (Newhouse *et al*., 2013). For instance, implementing a new care system by early use of pressure ventilator, diaphragm pacemaker, tube placement, telemedicine consultation and the reutilization of resources can lead to improved quality of life for patients with amyotrophic lateral sclerosis (McClellan *et al*., 2013).

Multiple quality improvement interventions improve discharge documentation (Gandara *et al*., 2010). For example, implementing quality improvement program, upgrading equipment and excessive training can lead to improvement in structure (utilization of resources and availability of staff); process (continuity of care and patient focus); and the outcome of quality (develop management skills and teamwork) (Clapham *et al*., 2004). Scott *et al*. (2008) stated that all hospital departments should provide collaborative quality improvement, safety plans and practical interventions to ensure continuous improvement. For example, one study conducted by Tillman *et al*. (2013) in the US to ensure the implementation of an integrated surgical improvement project and compliance with the surgical safety checklist, has led to improved quality performance (awareness to manage patient body temperature, significant improvement in the selection and timing of antibiotics). In addition, it also has led to increased compliance with surgical site guidelines and improved patient outcomes (reduced mortality rate and surgical site infection).

Organizations committed to the quality programs have higher scores on the nurse foundation for quality and higher levels of nurse job satisfaction (Warshawsky & Havens, 2011). General orientation program and training to outline the policies and

procedures and their respective role and responsibilities improve the quality of care and patient safety (Scott *et al*., 2008). Leaders should maintain trained and educated nurses in order to improve the quality of care and patient safety (Cramer *et al*., 2011). This helps to create a healthy work environment for improving the quality of care and patient safety.

2.4.2.3 Nurse manager's ability, leadership and support

Nurse manager's ability is significantly associated with improving the quality of care and patient safety (Aiken *et al*., 2012; Van Bogaert *et al*., 2014). Nurse manager's ability is higher in the Magnet Hospitals than other hospitals in Switzerland (Desmedt *et al*., 2012). Nurse managers in the Magnet Hospitals have higher support of nurses in conflict situations (Desmedt *et al*., 2012). Another study found that nurses working in lower mortality rate hospitals have less supportive leaders (Tourangeau *et al*., 2007). This inconsistent finding shows the importance to investigate the impact of nurse manager's ability, leadership and support on the quality of care and patient safety for better understanding of these relationships.

The leaders in healthcare organizations play a fundamental role in implementing quality initiative programs (Nwabueze, 2011). Nwabueze (2011) studied the impact of leadership traits on leading TQM program and the impact of situational leadership style on the quality of care. He argued that TQM is not situational, and it is varied and diversified. In addition, he demonstrated that organizational failure in implementing TQM program is due to the thinking that quality management is situational. He also stated that TQM is transformational and visionary. This point of

view is also supported by LeBrasseur, Whissell and Ojha (2002); they illustrated that transformational leadership and learning organizations affect the continuous quality improvement program. In addition, transformational leadership style affects executive effectiveness, empowers the employees and leads to improved quality and control of expenses (Xirasagar *et al*., 2005). This shows the importance of leadership for sustaining the outcomes of healthcare.

Leadership, communicating the vision, strong organizational structure and learning from experiences are key success factors in the implementation of quality improvement programs (Siriwardena, 2006). For instance, clinical performance in caring for diabetic patients (advice on weight management, self-management and general education) is associated with their supervisors' participatory decision, respect, clear information and procedural justice, mediated by employees' attitude (organizational citizenship behavior) (Elovainio *et al*., 2013). Leadership training program enhances teamwork, patient-centeredness and the quality of care and patient safety (Ferguson *et al*., 2007). These findings show the importance of investigating the role of leadership in a work environment in order to increase patient safety and reduce medical errors (Rogers, 2006). Thus, the study investigates the effect of the nurse manager's ability, leadership and support on the quality of care and patient safety.

2.4.2.4 Nurse-physician relationship

Nurse-physician relationship refers to the adequacy of their communication and interactions related to the process of patient care (Tourangeau *et al*., 2006). High

nurse-physician collaboration leads to decrease in mortality rates (Tourangeau *et al*., 2006). Magnet hospitals have higher nurse-physician relationship (Kelly, McHugh, & Aiken, 2012).

A nurse-physician-administrative interdisciplinary leadership model aimed to shift from a hierarchic leadership to a cross-functional approach (Ponte & Peterson, 2008). This can help to deliver integrated patient care and improve the quality of care and patient safety (Ponte & Peterson, 2008). A well-managed care environment requires delivering integrated patient care. A well-managed care environment affects the perception of physicians on the quality of care and increases their satisfaction (Chehab *et al*., 2001). Poor work environment leads to poor quality of nursing care (Nantsupawat *et al*., 2011); whereas, satisfied nurses provide higher quality of care (Nantsupawat *et al*., 2011). Nursing shortage can lead to increased infection rate, mortality rate, patients falling, accidental ventilator-associated pneumonia and decreased quality of care (Versa & Inoue, 2011). Moreover, nurses who have high workloads provide poor quality of care (Nantsupawat *et al*., 2011). Non-physicians (nurses, pharmacists and physician's assistants) can work as substitutes and complement the role of a physician, which could lead to decreased workloads for the physician, increased hospital capacity and also decreased cost of care (Laurant *et al*., 2009). The findings show the importance to study the impact of the clinical work environment on the quality of care and patient safety.

Communicating vision between team members leads to improved quality of care and team work (Deneckere *et al*., 2012). Vision, support for innovation, safety and task-orientation significantly affect team effectiveness (Strating & Nieboer, 2009). In

addition, a proactive team and team leader's emotional intelligence significantly affect team empowerment (Erkutlu, 2012). Manukyan, Eppstein & Horbar (2013) found that larger teams are more homogeneous and perform better than smaller teams. Clinical supervision of the healthcare team is associated with improved quality of care (Hyrkäs & Paunonen-Ilmonen, 2001). This shows the importance to maintain a cohesive multidisciplinary team for sustaining the outcomes of healthcare.

Communication effectiveness and teamwork lead to improved patient safety and quality of care (Kaplan & Ballard, 2012). Many studies have found that a multidisciplinary team and an integrated care model improve the quality of care for patients with mental disorders (Franx *et al*., 2008). Further, a multidisciplinary team can reduce the incidence of hospital acquired conditions and promote safety training and education programs (Scott *et al*., 2008). Thus, all departments should conduct periodical multidisciplinary meeting to improve the quality of care (Scott *et al*, 2008). Quality improvement programs enhance teamwork and improve leaders' skills to enhance quality and patient safety (Ferguson *et al*., 2007). For instance, Ferguson *et al*. (2007) used patient-focus observation as the tool for improving multidisciplinary teamwork and the quality of care. This shows the importance of multidisciplinary teams for improving the quality of care and patient safety.

2.4.3 Other structural factors

Other structural factors refer to the nurse, patient and hospital demographic data. Knowledge gained is not limited to the demographic variables; it is used for the fit of

the topic and for the comparison of the problem of concern (Melnyk & Fineout-Overholt, 2011). These factors are included to maintain the representativeness of the study sample.

2.4.3.1 Nurse demographics

Nurse demographics refer to their age, sex, marital status, income, nationality, ethnicity, employment status and years of experience (Desmedt *et al*., 2012). Staff demographics affect the outcome of delivering care (Ibrahim *et al*., 2013). These demographic data are included to describe the characteristics of the respondents who participated in the study.

2.4.3.2 Patient demographics

Patient demographics refer to their age, sex, marital status, income, nationality, ethnicity, education and clinical case complexity (Virga *et al*., 2012). Many studies have supported the position that more complicated patient cases or procedures receive a higher quality of care. For instance, Woodard *et al*. (2012) stated that the complicated diabetic patient cases receive higher quality of care compared to their less severe counterparts. In addition, Baron *et al*. (2006) argued that older patients receive better treatment than younger ones; whereas, others like Greenfield *et al*. (2002) found that younger educated patients had better health conditions when they are treated by a specialist rather than a generalist. In contrast, Young, Sullivan and Duan (1999) pointed out that elderly and severely ill patients are at a higher risk of poor quality of care. They concluded that poor quality of care for patients with

schizophrenia is associated with the patients' compliance with treatment. Baron *et al*. (2006) concluded that an increase in the severity of cases improves the quality of life for patients with severe eczema. These findings demonstrate the importance of patients' demographic data and case complexity in the quality of healthcare. Thus, medical and surgical wards are selected in this study in order to control the clinical case complexity on the outcomes of care.

2.4.3.3 Hospital demographics

Hospital demographics refer to hospital size, teaching status, accreditation status and use of information and communications technology (ICT). Hospital size affects the quality of care and patient safety. For instance, patients treated in smaller hospitals are treated appropriately with higher adherence to guidelines than patients in larger hospitals (Abilleira *et al*., 2009). Patient satisfaction and hospital efficiency are higher among smaller hospitals (Gok & Sezen, 2013). On the other hand, smaller hospitals with high occupancy, experience higher workloads and are more prone to medical errors (Forster *et al*., 2000). In addition, Forster *et al*. (2000) found that increasing hospital occupancy led to increased workload and poor performance; whereas, the performance of an employee was better in a hospital with high occupancy, due to procedure repetition on a constant basis (Hannan *et al*., 1992). However, it is difficult to identify the causal effect of the hospital size on the quality of care and patient safety, because there are other patients and providers who affect the treatment process and outcomes of care (Hillner, Smith & Desch, 2000). Thus, the study does not regard the hospital size as predictor in the study.

Teaching hospitals refer to hospitals awarding a degree in the medical field (Khoo & Richard, 2002). Teaching hospitals have higher staff satisfaction, quality of care and patient safety compared to non-teaching hospitals (Chen & Kuo, 2011; Cramer *et al*., 2011; Pantouvakis & Mpogiatzidis, 2013; Scott *et al*., 2008; Siriwardena, 2006; Valero *et al*., 2009). Teaching hospitals are committed to teach and train their staff (Ludin, Parker & Arbon, 2014). In teaching hospitals, all new staff should take part in a general orientation program and training that will outline the policies, and procedures and their respective roles and responsibilities in order to improve the quality of patient care (Scott *et al*., 2008). The teaching status of the hospitals is considered to maintain the representativeness of the study sample.

Accreditation status of the hospitals is associated with the quality of care and patient safety. Nurses working in accredited hospitals have a higher perceived quality of care and patient safety. Adherence to external accreditation standards leads to improved quality and patient safety, and enhances the care process and outcome (Scott *et al*., 2008). Patient harm is mostly caused by variations in practice and noncompliance with evidence-based guidelines (Ibrahim *et al*., 2013). In addition, compliance with standards and guidelines lead to improved clinical outcome and lower charges for patients with lower back pains (Fritz *et al*., 2007). Thus, the cost of health service for patients receiving adherent care is lower than the ones not receiving adherent care (Fritz *et al*., 2007), such as breast cancer patients treated by certified and compliant centers with guidelines have higher rates of prognoses and survival than those treated in uncertified breast cancer centers (Beckmann *et al*., 2011). Thus, organizational and cultural compliance are the key success factors for

implementing quality indicators as a baseline performance and using them to identify the best practices (Ballard, 2003). Quality indicator is the best tool for measuring and monitoring the effectiveness and performance of care. Thus, indicators should be developed to strengthen the relationship between the process and outcome of care (Harvey, 2004). For example, if the proportion of the risk of falling down assessment decreases, then the total number of patients who are expected to fall will increase (Harvey, 2004). Implementing standards of MCS leads to improved patient outcome, which in turn leads to improved quality performance (Rogers, 2006). Hospitals accredited by the JCAHO and which adhere to the Center of MCS have a high quality of care (Rogers, 2006). Finney *et al*. (2013) found that the lack of clinical awareness of practitioners prohibits the implementation of clinical guidelines. Wood *et al*. (2011) discovered that the implementation of care process standards (accurate documentation from the attending physician, allergies, age, sex and medication name, dose, route and site of administration) lead to improved quality of care and patient safety. It also leads to enhanced teamwork and staff satisfaction (Wood *et al*., 2008). These findings show the importance of investigating the impact of education, training, and monitoring of compliance at all organizational levels to improve the quality of care (Nolan *et al*., 2003).

ICT helps to improve quality of care and patient safety. For instance, through the implementation of a new information system and providing a structured handover in hospitals, variations have been reduced, leading to decreased errors in handover information (Pickering, Hurley & Marsh, 2009). Providing a standardized and structured handover reduces the variations and improves the quality of care for

patients in an intensive care unit (Pickering *et al*., 2009). In addition, Aslaksen (2005) stated that redesigning patients' appointment schedule, simplifying the process of care and using automated blood test resulted in decreased patient flow, waiting time and increased patient satisfaction. Thus, electronic laboratory reporting system leads to enhanced communication and monitoring laboratory results, improved quality of patient care and controlled workflow (Blaya *et al*., 2007).

Improving the quality of care and ensuring patient safety require structured reporting systems and the encouragement to employees to report incidents (Morag *et al*., 2012). Others stated that using electronic medical order are not significantly associated with decreasing length of stay or decreased falling down ratio (Groshaus *et al*., 2012); whereas using intranet reporting system leads to improved incident reporting and the report being sent to the correct manager to take corrective action (Le Duff *et al*., 2005). For instance, using the patient's identifier smart card in order to access patient information effectively can reduce lab test duplication and medical errors (Scott *et al*., 2008). Live Data software solutions can lead to improved patient safety and workflow in the operating room (Robbins, 2013).

Implementing clinical information technology and external incentives lead to physicians using organized care management processes and the improvement of quality of care (Casalino *et al*., 2003). Using electronic medical records and multi-level interventions also reduces medical errors and pre-term delivery (Kaplan & Ballard, 2012). For instance, Gunningberg, Fogelberg-Dahm & Ehrenberg (2009) stated that after implementing electronic medical records, there was a significant improvement in recording pressure ulcer (size, location, grade and nursing diagnosis,

planning and intervention). This is supported by Hyde and Murphy (2012) who found that electronic care plan increases staff satisfaction, enhances continuity of care and patient-centeredness, supports multidisciplinary teamwork and controls workflow.

Collaborative quality improvement, when supported by health information system, leads to improved healthcare outcomes, quality of care and commitment to the performance standards (Virga *et al*., 2012). Thus, further studies need to consider the impact of contextual factors (e.g., leadership and nurses' perception) to gain a better understanding of the complexity in the implementation of new technology and guidelines for documentation (Gunningberg *et al*., 2009). However, the study is limited in terms of access to the hospital records. Thus, this dimension is not regarded in the study.

Using information technology as a tool for quality improvement helps enhance the performance and outcomes of care (Virga *et al*., 2012). Moreover, the purpose of using technology for documentation is to ensure the continuity of care and communication among providers (Margaret, 2001). For instance, the use of computerized databases helps monitor the performance of patient care (Kerr *et al*., 2012). On the other hand, under certain circumstances, the physicians forget to update patients' records, leading to missing data (Kerr *et al*., 2012). The least favorable way to gather data is through medical records (secondary data), especially if there are no treatment guidelines or standards (Hillner *et al*., 2000). So, the medical records might be underestimating the outcomes of care (Bergman *et al*.,

2013). Thus, the study does not regard this variable as a dimension affecting the performance of patient care, or as a tool of data collection.

2.4.4 Measuring the structural factors

The study is motivated to investigate the effect of the hospital nurse staffing and work environment as structural factors on the quality of care and patient safety. The staffing construct includes three dimensions: patient-to-nurse ratio; level of education; and length of nurses' duty hours. The data of patient-to-nurse ratio is determined by asking the staff how many patients and nurses were present in their unit in the previous shift (Aiken *et al*., 2012; Coetzee *et al*., 2013; You *et al*., 2013). A lower ratio indicates a more favorable staffing (Aiken *et al*., 2012). The level of education is determined by inquiring as to whether the correspondent holds a diploma or bachelor degree's in nursing (You *et al*., 2013). In terms of their shift length, they are asked to determine "how many hours they worked in the last working day", whether it was 12-hour, 10-hour, 8-hour or 7-hour shifts (Stone *et al*., 2006).

The work environment construct is measured using the Practice Environment Scale of the Nursing Work Index (PES-NWI). This index is internationally validated (Aiken *et al*., 2012; Coetzee *et al*., 2013; Lake, 2002; Van Bogaert *et al*., 2009; Warshawsky & Havens, 2011; You *et al*., 2013). The PES-NWI includes five subscales: "nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; staffing and resource adequacy; and nurse-physician relationship" (Aiken *et al*., 2012; Lake, 2002). However, the

study uses only four subscales out of the five; the fourth subscale is omitted (You *et al*., 2013). The staffing and resources adequacy subscale is considered in a separate construct in this study, which is under the staffing construct (patient-to-nurse ratio).

In summary, several factors affect the quality of care and patient safety. Staffing adequacy by maintaining an optimal nurse-to-patient ratio, nurse level of education and length of nurses' duty hours need to be optimized in order to improve the quality of care and patient safety. Work environment, nurse participation, nurse foundation for quality, leadership support, nurse-physician relationship and teamwork are the key factors affecting the quality of care and patient safety. However, there are inconsistencies in the effect of hospital nurse staffing and work environment dimensions on the quality of care and patient safety. Thus, based on these evidences, the study is motivated to investigate the effect of hospital nurse staffing and work environment on the quality of care and patient safety for further understanding of these relationships. Figure 2.5 summarizes these structural factors affecting the quality of care and patient safety.

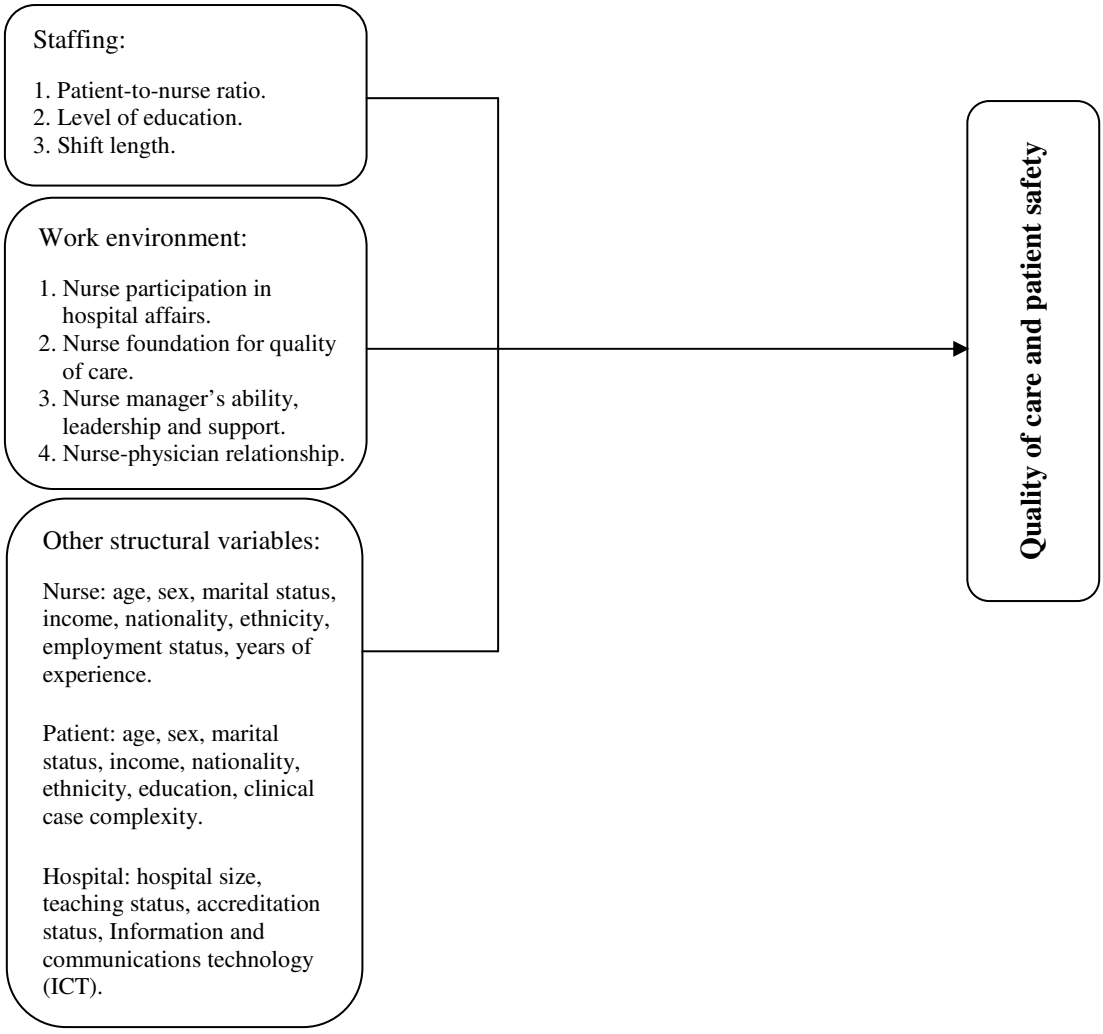

Figure 2.5
Structural factors affecting the quality of care and patient safety

2.5 Process factors affecting the quality of care and patient safety

Process factors refer to what is actually being done during the care process (Gok & Sezen, 2013; Sidorenkov *et al*., 2011). The process factors include patient-centeredness, regulations, policies and adherence to standards. This section discusses the current challenges facing healthcare organizations in improving the quality of the care process. The study is motivated to investigate patient-centeredness because patient care is the focal point of the caring process.

2.5.1 Patient-centeredness

Patient-centered care considers a patient's needs, expectations and preferences to ensure delivering care for these needs (Frampton & Charmel, 2009). Patient-centeredness refers to putting the patient's interest ahead (Lanjananda & Patterson, 2009). Patient-centeredness is not merely the involvement of patients in the care process, but also delivery of proper nutrition, treatment, communication and education to prevent adverse events (Tappenden *et al*., 2013). The Planetree and Picker Institutes have labeled five process dimensions of patient-centeredness:

1. Patient-centered continuity of care.
2. Patient-centered documentation and access to the information.
3. Patient-centered communication and education.
4. Family involvement.
5. Personalization of care.

The continuity of care is a key success factor of the model of healthcare (Melnyk & Fineout-Overholt, 2011). Inaccessible healthcare (regional, cultural, financial) and the complexity of the system lead to poor quality of patient care (Drabo *et al*., 2007). Thus, all hospitals should provide a document during admission and discharge in order to inform the patient of the procedure, educate him/her regarding his/her rights and responsibilities and explain his/her overall health condition (Scott *et al*., 2008). Tappenden *et al*. (2013) stated that patients receiving optimal nutrition and proper education care have lower length of stay, mortality rate, readmission rate and clinical complications (hospital acquired infection, pressure ulcer, anemia, gastric and cardiac problems). Strengthening patient-physician relationship leads to improved

treatment plan and increased patient compliance with treatment (Fischman, 2010). Surveys conducted in Swedish hospitals by Muntlin *et al*. (2006) found that the most prominent areas for improvement are emergency department environment, pain relief and patient involvement (regarding his/her health condition and responsible physician); they stated that these areas for improvement are mostly related to nursing care. Similarly, other studies have found that successful palliative care depends on the provider's role in respecting patient culture and keeping patients and families involved in the treatment process (Griffin, Koch, Nelson & Cooley, 2007). Further, a qualitative study on Malaysian palliative care found that patient and family engagement in the care process help deliver care consistent with their respective expectations (Namasivayam *et al*., 2014). Moreover, nurses in Malaysian teaching hospitals are more aware of the importance of patient education on the outcomes of care (Ludin *et al*., 2014). Thus, these findings show the importance of taking into account patient-centeredness as a study predictor to improve the quality of care and patient safety in Malaysian hospitals.

Quality of care and patient satisfaction are the keys to the success of a healthcare organization's performance (Naidu, 2009). Patients who are involved and participate in their care are more likely to prevent adverse events (Weingart *et al*., 2011). The quality of care is only fair and poor among patients with low participation rates (Weingart *et al*., 2011). For instance, the implementation of a pharmaceutical program (educating patients regarding prescribed medication and instruction regarding life style) has led to improved clinical outcome and the quality of life for patients with diabetes mellitus type two (Sriram *et al*., 2011). It has also led to

increased patient satisfaction and controlled levels of blood sugar. This point of view is supported by da Silva *et al*. (2012); they illustrated that patients who receive both standard and pharmaceutical care have a higher quality of life than patients who receive only standard care among patients with heart failure. They found that patients who are involved and educated about their medication have higher compliance in actually taking prescribed medication. These findings show the importance of patient-centeredness in healthcare organizations (Woodard *et al*., 2012).

In addition, a study conducted in 12 European countries and the US found that better work environment and low patient-to-nurse ratio enhance the quality of care, patient safety and patient satisfaction (Aiken *et al*., 2012). On the other hand, a study conducted in China found that nurse-to-patient ratio is not associated with patient satisfaction, due to nursing being task-oriented and patient and family involvement in care (You *et al*., 2013). Thus, they proposed shifting to patient-centered approach to help mitigate the negative impact of nursing shortage and job burnout (You *et al*., 2013). The study includes the work environment and patient-centeredness as predictors affecting the outcomes of care. This shows the importance of restructuring the healthcare systems to be more patient-centered for delivering personalized care.

By restructuring the department work processes, healthcare can improve (Browne *et al*., 2000). Ronellenfitsch *et al*. (2012) conducted a new clinical pathway for bariatric surgery in US hospitals; they found that patients' length of stay actually decreased. Foley catheters were removed earlier and the patients could begin walking again on the day of surgery (process quality improved). On the other hand, Ronellenfitsch *et*

al. (2012); and Schwarzbach *et al*. (2008) found that the outcome of quality have not changed (mortality, morbidity and readmission) through the implementation of new clinical pathway. Thus, by implementing a new clinical pathway process, quality has improved; "Foley catheter and venous catheter removed early, pain and cyclosporine level more controlled" (Schwarzbach *et al*., 2008). These findings show the importance of redesigning the system for improving the quality of care and patient safety.

Redesigning the system can lead to improved quality of care and patient safety (Carayon *et al*., 2014). For instance, Chandrasekaran *et al*. (2012) studied the impact of process management on clinical and experiential quality. Clinical quality refers to task focus quality (for example, adherence to guidelines, staff performance and minimizing variation); whereas, experiential quality refers to the patient-oriented quality to achieve the preferences of patients (Chandrasekaran *et al*., 2012). They found that an organizational focus on process management led to improved clinical quality and patient safety and increasing staff compliance with standards; whereas, it led to decreased experiential quality (Chandrasekaran *et al*., 2012). This stand-off between these two outcomes requires a balance between process standardization and patient preferences. So, hospital leaders should be more patient-centered, which can help to decrease the negative impact of process management in experiential quality (Chandrasekaran *et al*., 2012). Managers have to balance between task-oriented and patient-oriented leadership in order to improve both staff and patient care outcomes simultaneously. These findings show the importance of developing new clinical

pathways and process reengineering, since a small workflow change has the potential to greatly improve the quality of care.

The culture of patient-centeredness helps to maintain the efforts of quality improvement and patient safety (Webster *et al*., 2011). Well-performing hospitals have leadership and a team support culture (Webster *et al*., 2011). Thus, healthcare managers have to focus on process and teamwork culture and shift to a patient-centered approach and staffing structure in order to improve the quality of care and patient safety (Patel & Mitera, 2011). On the other hand, the culture of blaming individuals limits newly appointed staff from improving and increases errors (Ibrahim *et al*., 2013). Thus, for safety, organizational culture requires transformational and evidence-based leaders having the ability to develop teamwork, learning and involving healthcare providers to be more patient-centered in order to improve the quality of care and patient safety (Ferguson *et al*., 2007). Moreover, cultural commitment is required to deliver best care practices for patients (Ballard, 2003). According to Ballard (2003), organizational and cultural compliance is the key success factor for implementing quality as a baseline performance, and using quality indicators to identify the best practices.

2.5.2 Adherence to standards

Adherence to standards and quality indicators help monitor the variations and measure quality performance (Brand *et al*., 2011; Kerr *et al*., 2012). Implementing quality improvement initiatives (quality improvement projects, feedback, multidisciplinary interventions and admission and discharge form) helps bridge the

gap between evidence-based guidelines and actual current practices in delivering the best care outcome (Jaber & Holmes, 2007). For instance, the implementation of Medicare and Medicaid standards ensures the provision of the best practice and opportunity to improve quality performance (Rogers, 2006). Due to continuous changes in treatment guidelines, monitoration of quality and updating quality standards are required to ensure top performance in treating HIV patients (Kerr *et al*., 2012). So, in order to monitor quality performance, it should be ensured that current evidence-based practices and knowledge are available for everybody in an organization to standardize the procedures and ensure best practices (Abilleira *et al*., 2009).

Many studies have aimed to implement evidence-based practices of care process guidelines in their daily practices (Franx *et al*., 2008; Kolfschoten *et al*., 2012). Some studies have found that implementing practice guidelines has a mixed effect on patient care outcomes (Franx *et al*., 2008). For instance, adherence to guidelines do not necessarily lead to improved care outcome at the patient level, but is associated with improving the quality of care at the hospital level, because there are many other patient-related factors affecting the care outcomes than just process indicators (Kolfschoten *et al*., 2012). Others have found the relationship between indicators and care outcomes at an individual level could not be higher, e.g., at team or hospital level, because there are many other variables affecting the organizational and group levels (Sidorenkov *et al*., 2011). In some circumstances, regulations and polices lead to poor quality of care rather than improvement. For instance, contact isolation negatively affects the healthcare delivery process by creating barriers between

patients and healthcare providers (Morgan *et al*., (2011). The purpose of contact isolation policy is to prevent the spread of infection among hospitalized patients by placing high risk patients in private rooms with negative pressure (Siegel *et al*., 2007). Any care provider who wants to contact a patient is obliged to wear a gown and gloves, which block the normal provider-patient contact and poor patient care outcome (Morgan *et al*., 2011). Also, one of the factors leading to poor adherence to the guidelines is limited awareness of the current evidence-based practices (Jaber & Holmes, 2007). Thus, due to the low awareness of evidence-based guidelines and standards, this variable is not considered as a separate predictor of care outcome. It is included in the respondents' demographic data, and inquires as to whether they are working in an accredited hospital or otherwise, as discussed in Chapter Four.

In addition, the main issue of the study is the increasing patient and family complaints in Malaysian private hospitals. The annual report of MOH (2011a) indicated that miscommunication contributed to the most medico-legal complaints in the hospitals. Thus, the study regards patient-centeredness as an interpersonal process factor affecting the quality of care and patient safety. The adherence to clinical guidelines, standards, regulations and policies are more technical. Thus, these technical process factors are not regarded in the model to improve the quality of care and patient safety.

2.5.3 Measuring the process factors

Patient-centeredness is the process factor considered in the study for improving the quality of care and patient safety. There are very few instruments for measuring patient-centeredness (Terrien, Anthoine & Moret, 2012). According to Terrien *et al*. (2012), patient-centeredness is measured by three dimensions: "respect; organization and patient; and family information". However, patient-centeredness is not merely the respect and involvement of patients in the care process, but also delivery to the patient, proper nutrition, treatment, communication and education to prevent adverse events (Tappenden *et al*., 2013). The Planetree and Picker Institutes labeled five dimensions of patient-centeredness: "patient-centered continuity of care; patient-centered communication and education; patient-centered documentation and access to the information; family involvement in patient care; and personalization of care" (Frampton *et al*., 2008). Planetree and Picker Institutes adapted the questionnaire developed by the AHRQ to assess the Consumer Assessment of Healthcare Providers and Systems (CAHPS) for hospital survey (You *et al*., 2013). The CAHPS is an internationally validated instrument. Thus, the self-assessment tool of Planetree and Picker Institutes for measuring the degree of patient-centeredness is considered in the study (Frampton *et al*., 2008).

This section illustrates the process factors for improving the quality of care and patient safety. The next part of this chapter focuses on the performance and the outcomes of healthcare. The tool for measuring the quality of care and patient safety is discussed.

2.6 Quality performance and the outcomes of healthcare

Quality performance in healthcare organizations is a national and international priority. The quality performance and the outcomes of healthcare refer to the end result of interventions and the care process (Harvey, 2004). The outcomes of care in the study are the quality of patient care and safety. Thus, this part of the review discusses these variables and the tools for measuring the performance of healthcare delivery.

2.6.1 Quality of care and patient safety

The IOM report entitled, "To Err Is Human", stated that 98,000 deaths have occurred annually as a result of medical errors (IOM, 2000). Recently, 400,000 adverse events and 210,000 deaths annually have been associated with preventable harm in the US hospitals (James, 2013). Thus, the quality of care and patient safety is a national and international priority.

The concept of quality of care is defined differently among healthcare providers and insurers, depending on their experiences and challenges they face when delivering healthcare (Montgomery *et al*., 2013). According to healthcare providers and insurers' perspective, quality is the effectiveness of care, along with the usage of appropriate standards for patient care (Campmans-Kuijpers *et al*., 2013). The definition, according to patients' perspective, mainly depends on the access to care, its effectiveness and the availability of consistent information (Campmans-Kuijpers *et al*., 2013). Generally, it can be concluded that the term 'quality of care' means the 'excellence of care' (Gillespie, 2007).

The IOM defined quality of care as ‘‘the degree to which health services for the population increase the likelihood of desired health outcomes and are consistent with current professional knowledge’’. Care performance is not merely the adherence to treatment guidelines, but also the delivery of timely, safe and patient-centered care (Jaber & Holmes, 2007). The IOM has defined six areas for optimizing care performance: “safe; effective; patient-centered, timely; efficient; and equitable” (IOM, 2003). However, there are variations regarding the best tools for performance measurement (Margaret, 2001).

Quality improvement is a complicated phenomenon with many domains, affected by political, social, economical and cultural factors, for satisfying the patients’ needs (Montgomery *et al*., 2013, P: 658). Montgomery *et al*. (2013) proposed that the quality of care is not merely affected by staff commitment and work environment, but also patient-centeredness policy and social factors affecting the quality of care.

Patient safety refers to preventing any potential harm or adverse events for hospitalized patients (Groene *et al*., 2010). An adverse event is an unexpected patient harm or negative effect related to patient’s hospitalization other than the illness (Weingart *et al*., 2011). For instance, adverse events could be a hospital-acquired infection, also termed nosocomial infection. In addition, pressure ulcer, patient fall, medication errors and readmission are all considered as adverse events (Weingart *et al*., 2011; Welton, 2008).

Optimizing quality means how to best use clinical evidences and decrease the variations in order to improve the quality of care (De Lusignan *et al*., 2005). In

addition, optimizing quality of care should be a multidimensional improvement intervention and measurement at individual, team and organization levels (Franx *et al*., 2008). This point of view is supported by Greene *et al*. (2009), who stated that providing best practice by everyone in the organization requires continuous multidimensional efforts at all levels over a long period. Thus, there is no single intervention that guarantees quality improvement. For instance, at a professional level, measuring adherence to clinical guidelines; and at an organizational level, measuring the performance of ensuring the continuity of care and control of patient flow, allows to improve the quality of care by decreasing the waiting time and workload (Franx *et al*., 2008). Thus, the study focuses on multiple domains of improving the quality of care (staffing, work environment and patient- centeredness).

Two approaches to improving the quality of care are: TQM and CQI (Linwood *et al*., 2007). TQM culture improves interdisciplinary teamwork and equity through the hospital to enhance CQI strategies that will improve the quality of care and patient safety (Patel & Mitera, 2011). In addition, Linwood *et al*. (2007) suggested shifting the focus from quality assurance to continuous quality improvement and applying continuous quality improvement initiatives from other fields in healthcare.

The CQI approach is an advanced process focused on efficient improvement of complex processes in order to improve patient safety (Pincus *et al*., 2007). It is a new methodology to measure quality improvement compared to traditional clinical trials or clinical research, and conducting PDSA Cycle to measure the quality of care and improve healthcare performance (Pincus *et al*., 2007).

The care bundle strategy can help to improve the quality of care and patient safety. Care bundle is a strategy of improving healthcare quality, developed in the US by the Institute of Healthcare Improvement, which aims to improve quality by implementing groups of interventions from evidence-based practice, which help assess the outcomes of care objectively, such as: central line bundle, surgical site infection bundle, ventilator care bundle and sepsis care bundle (Gillespie, 2007). Each bundle consists of practical guidelines and steps for providing the best possible care. Thus, quality indicators help identify the best practices (Ballard, 2003). The best practices require dual effort from providers and managers, for example, "bottom-up process" of adherence to guidelines from the manager through the provision of incentives for the "top-down process" (Finney *et al*., 2000). The effectiveness of care can be achieved by the best use of evidence-based practice to eliminate overuse, underuse and misuse of care (Seddon & Buchanan, 2006). The IOM (2001) defines underuse as the "failure to deliver necessary care"; misuse as "failure to deliver the planned care"; and overuse as delivering inappropriate care. Inappropriateness occurs when the negative consequences exceed the positive consequences of care (Ballard, 2003). According to the literature, quality improvement in healthcare organizations is classified into two categories. The first category is structure-process-outcome quality (Gillespie, 2007; Hearld, Alexander, Fraser, & Jiang, 2008); while the second category is organizational-technical-patient-oriented quality (Ouwens *et al*., 2009). The study uses the structure-process-outcome quality category by adapting the Donabedian theory. This category is used to help in maintaining the causality between the study variables. Structural quality refers to the hospital nurse staffing and work environment. Process quality refers to the patient-

centeredness and reflects the current initiatives for improving the quality of care and patient safety. The outcome quality refers to the quality of care and patient safety.

2.6.2 Measuring quality performance

Measuring the quality of care is a prerequisite of performance improvement. Also, performance measurement should be accurate, reliable and reflect the outcomes of a patient's care (Jaber & Holmes, 2007). A quality indicator is the best tool for monitoring the variations and measuring quality performance (Brand *et al*., 2011; Kerr *et al*., 2012). As illustrated in Table 2.3, quality indicators are defined differently by providers, patients and payers (Brooten *et al*., 2004). According to the current literature, measuring the quality of care could be done by measuring patients' or staff perceptions of the quality of care; or by measuring the structure, process and outcome indicators. This section discusses the instruments used to measure the quality of care and patient safety.

Table 2.3
Summary of quality indicators as defined by international institutes

Indicator	**Creator**	**Target organization**	**Examples of performance measures**
HEDIS (Health Plan Employer Data and Information Set)	National Committee for Quality Assurance (NCQA)	Managed Care Organizations	Access or availability of services, health plan stability, provider qualifications
ORYX (performance measurement)	Joint Commission for Accreditation of Healthcare Organizations (JCAHO)	Hospitals	Core measures for hospitals, e.g., acute myocardial infarction, heart failure, pregnancy
Prevention Quality Indicators, In-patient Quality Indicators	Agency for Healthcare Research and Quality (AHRQ)	Hospitals	Prevention quality indicators, e.g., early and appropriate treatment. In-patient quality indicators, e.g., mortality, volume of procedures.
OASIS (Outcome and Assessment Information Set)	Center for Medicare and Medicaid Services	Home health agencies	Patient health and functional status, health services use, living conditions, social support.
MDS (Minimum Data Set)	Center for Medicare and Medicaid Services	Nursing homes	Residents' physical, mental, emotional, cognitive and functional limitations and strengths.
Quality Health Outcomes	American Academy of Nursing Expert Panel on Quality Care	Multiple systems	System, client, intervention and outcome variables

Source: Brooten *et al*. (2004)

2.6.2.1 Measuring patients' and staff perception of quality of care

The first tool for measuring the performance of patient care is patients' or staff perception of the outcomes of care. Measuring patient satisfaction and perception of the performed care is a reliable measure of quality outcomes (Bonias *et al*., 2010). For instance, indicators used by Boyer *et al*. (2012) to investigate patients'

perception of HIV care performance were trust, staff-patient attention, waiting time, access to consultation and the availability of treatment in the pharmacy. Further, the quality of life index indicators used to measure patient's quality of life of dermatologist consultation include: feeling and symptoms, daily activities, treatment, personal relationship, work or study and leisure (Baron *et al*., 2006). On the other hand, the performance of delivering care can be sustained by enhancing the employees' skills, knowledge, abilities and commitment (Bonias *et al*., 2010). So, measuring staff satisfaction, attitudes, commitment; and measuring the training and information sharing are good predictors of their performance, which affect the quality of care and patient safety (Bonias *et al*., 2010). For example, one study measured the outcome of diabetic patient care (provide education, control blood pressure, weight management and foot examination) by measuring staff commitment to adhere to guidelines of caring for patients with diabetes mellitus (Elovainio *et al*., 2013). Thus, quality indicator is the best tool for monitoring the variations and measuring the quality of performance.

Nursing working index is the most validated tool to measure work environment practice and staff perception of their work environment (Van Bogaert *et al*., 2009). The PES-NWI is validated internationally (Aiken *et al*., 2012; Coetzee *et al*., 2013; Lake, 2002; Van Bogaert *et al*., 2009; Warshawsky & Havens, 2011; You *et al*., 2013). The PES-NWI includes five subscales: "nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; staffing and resource adequacy; and nurse-physician relationship" (Aiken *et al*.,

2012; Lake, 2002). The study considers staff perception as a tool for measuring the environment and the outcomes of care.

2.6.2.2 Measuring the structure, process and outcome

The Donabedian theory states that there are three dimensions to assess quality of care: structure, process and outcome (Donabedian, 1988; Hillner *et al*., 2000). Structural quality indicators are used to measure the features of care setting, for example, resources (materials, facilities and human); staff qualification; and organizational structure (Gok & Sezen, 2013; Sidorenkov *et al*., 2011). Process quality indicators reflect what is actually being done during the treatment process (Gok & Sezen, 2013; Sidorenkov *et al*., 2011). For instance, measuring hemoglobin levels for diabetic patients and the compliance of assessing their feet and eyes, are process indicators (Nyweide, Weeks & Gottlieb, 2009). Assessment chart for patients who have a high risk of falling down or pressure ulcer reflect the compliance with process guidelines, which help to measure the quality performance of healthcare (Harvey, 2004). Additionally, structure and process indicators provide good evidence of the performance of healthcare (Brand *et al*., 2011).

Outcome of quality indicators reflect the end result of treatment and interventions, for example, the actual number of patients who fall or develop bed sores as a result of hospitalization (Harvey, 2004); or changes in the patient's behavior or knowledge (Gok & Sezen, 2013). Additionally, Nyweide *et al*. (2009) studied the hospital acquired condition and readmission rate as outcome indicators of measuring quality performance. Harvey (2004) stated that if the proportion of patients assessed for fall

risk decreased, the expected number of patients who will fall down will increase. Thus, indicators should be developed to strengthen the relationship between the process and outcomes of care (Harvey, 2004). Process indicators are easier to measure than outcome indicators, because they are mostly documented in the medical records (Brand *et al*., 2011). Data collection from the patient's file needs time and resources which are costly (Brand *et al*., 2011). Moreover, the Department of Health (2000) stated that medical records provide an inaccurate picture regarding the investigated problem (Harvey, 2004). Thus, in this study, the medical records are not regarded as tools of data collection.

Table 2.4
Summary of the quality indicators used by previous studies

Author	**Type of clinical indicators used**	**Indicators**
Gok and Sezen (2013)	Structural indicators	Organizational structure Material resources Human resources
Kerr *et al*. (2012)	Process indicators	Safety lab assessment, CD4 assessment, Hepatitis screening
Kolfschoten *et al*. (2012)	Process and outcome indicators	Outcome indicators: mortality and morbidity rate Process indicators: diagnostic test, radiotherapy, time of treatment, complete colonoscopy and MRI
Brand *et al*. (2011)	Outcome indicators	Delirium, dementia, pressure ulcer, falling down, physical function
Nyweide *et al*. (2009)	Process and outcome indicators	Outcome indicators: Hospital acquired conditions and readmission Process indicators: Hemoglobin test for diabetic patients
Bhavsar *et al*. (2007)	Process and outcome indicators	Process indicators: beta blocker, angiotensin-converting enzyme inhibitor and statins Outcome indicators: length of stay, adverse events and mortality rate
Harvey (2004)	Process and outcome indicators	Outcome indicators: slip, trip, fall and physical activities, length of stay and pressure ulcer. Process audited in order to improve practices to reduce incidences

As illustrated in Table 2.4, there are many ways and little consistency in measuring and defining quality indicators (Brooten *et al*., 2004). Adherence to the treatment guidelines is not optimized, because there is an underuse of evidence-based treatment and differences of care outcomes among hospitals (Jaber & Holmes, 2007). The outcomes of care could be related to clinical case complexity rather than structure or process of patient care (Jaber & Holmes, 2007). Patient care outcomes are affected by knowledge, skills, experiences and motivation of staff to enhance providers-patients relationship and the staff's ability in implementing a standardized care process (Margaret, 2001). Process indicators are used to measure the compliance with international standards; while outcome indicators are used to measure patients' health status (Virga *et al*., 2012). A systematic literature review was conducted to identify whether quality indicators of diabetic patients' care affect the outcomes of patient care. They found both structural (e.g., material, human resources, facilities and staff qualifications) and process indicators (e.g., procedures, laboratory tests, patient's visits and physical examination) as not being good predictors of outcomes of diabetic patient care (Sidorenkov *et al*., 2011). Thus, staff perception used as a tool for measuring the outcomes of patient care, along with the Donabedian theory as an underlining theory, are used for this study. The next section discusses the instruments used for measuring the quality of care and patient safety in the study.

2.6.2.3 Measuring the quality of care and patient safety

The quality of patient care is measured by asking the nurses to grade the quality of care in the last shift and in the last year (Van Bogaert *et al*., 2009). Nurses are asked whether they will recommend the hospital to their friends and families if they need hospital care, or as a good place to work (Coetzee *et al*., 2013).

Patient safety is measured by asking the nurse to report the overall rating of patient safety and their rating of the frequency of the adverse events. The items from the AHRQ survey on patient safety are retrieved by asking the nurse the degree of agreement of the rate of overall patient safety in their respective units (Aiken *et al*., 2012; Coetzee *et al*., 2013; You *et al*., 2013). The second measure of patient safety of the study is the adverse events that include nosocomial infection, pressure ulcer, patient fall, medication errors, readmission and patient and family complaints (Laschinger & Leiter, 2006; Van Bogaert *et al*., 2014; Weingart *et al*., 2011). Individual nurses are asked their degree of agreement to the frequency of these events on a five-point scale (Van Bogaert *et al*., 2014).

This part of the review discusses the quality of performance and the outcomes of healthcare. The tools for measuring performance are highlighted. When discussing clinical performance, financial performance and cost effectiveness of quality interventions and programs should also be pointed out (Rogers, 2006). The next part focuses on the cost issues followed by the gaps in improving quality of care and patient safety and the Malaysian healthcare system and summarizes the key issues for improving quality and patient safety.

2.7 The cost issues on the quality of care and patient safety

Delivering healthcare is not merely treatment, but should also take into consideration the resources and the cost issues to ensure the continuity of care. Increasing demands, costs and overcrowding are some of the main challenges for countries in delivering comprehensive healthcare to their citizens. Lack of money and resources is negatively associated with the quality of care and patient safety (Steiger, 2007).

The "Cost of Poor Quality" concept was developed by Philip B. Crosby in 1979 (McLaughlin & Kaluzny, 2004). Hence, dissatisfied patients are likely to complain about the perceived care ten times more than a satisfied patient (Gabbott & Hogg, 1998). The cost of unresolved patients and family complaints in one hospital with 88,000 discharges per year was estimated to be USD 4 million (Øvretveit, 2000). The costs, resulting from compensations related to medico-legal complaints, are threatening the survival of hospitals. Philip B. Crosby focused on defect prevention and developed a concept of "Zero Defect"; he defined quality as "Doing it right the first time" (McLaughlin & Kaluzny, 2004).

Cost containment in healthcare has negative consequences on the quality of care and patient safety (Aiken *et al*., 2012). Cases with higher severity are associated with higher cost of care and cost utility help to enhance quality of life for patients (Graf, Wagner, Graf, Koch & Janssens, 2005). So, improving the quality of care and reducing the cost without inducing harm for hospitalized patients is very challenging. Thus, there is a need for a cost effective model for improving the quality of care and patient safety.

Improving the work environment can be considered as a low cost strategy towards optimizing the quality of care (Aiken *et al*., 2012). Non-physicians (nurses, pharmacists and physician's assistants) can work as substitutes and complement the role of a physician, which could lead to decreased workload for the physician, increased hospital capacity and also decreased cost of care (Laurant *et al*., 2009). Poor nurse-physician relationship is negatively associated with the quality of care and patient safety (Steiger, 2007). Thus, a healthy work environment is required to sustain the outcomes of care and is regarded as a predictor for improving the quality of care and patient safety.

Staff training and education can be considered as a low cost strategy towards optimizing the quality of care. Care provided by skilled nurses increases patient satisfaction and compliance with treatment, reduces length of stay, decreases readmission, positively improves patient care outcomes and lowers the cost of care (Brooten *et al*., 2004). Understaffing increases workload and is negatively associated with the quality of care and patient safety (Boyer *et al*., 2012; Ferguson *et al*., 2007). Thus, optimizing the staffing level required to sustain the outcomes of care is regarded as a predictor for improving the quality of care and patient safety.

In addition, staff having high adherence to treatment guidelines, lead to lower cost of health service delivered (Fritz *et al*., 2007). Patients receiving adherent care had lower charges and fewer visits to the hospital (Fritz *et al*., 2007). One study introduced the concept of "patient value", which in turn helped decrease the tension between cutting costs and the quality of care (Korne *et al*., 2009). This shows that patient-centeredness as a process factor can help to lower the cost of care. Improving

the process of care, given the same level of structural input (staffing and work environment) leads to improving the outcomes and lowering the cost of care (Peabody, Tozija, Muñoz, Nordyke & Luck, 2004). It can be concluded that the model of hospital nurse staffing, work environment and patient-centeredness might be cost effective in improving the quality of care and patient safety. The following section discusses the gaps in improving the quality of care and patient safety of these factors.

2.8 The gaps of improving the quality of care and patient safety

Quality of care and patient safety are the current challenges for the managers and have become a national and international priority. Boyer *et al*. (2012); Ferguson *et al*. (2007); Newhouse *et al*. (2013); Olson *et al*. (2013); Sheppard *et al*. (2008); and Zeng *et al*. (2012) argued that adverse events and poor quality of care refer to staffing as a human factor affecting the outcomes of care. Abilleira *et al*. (2009); Chehab *et al*. (2001); Dyer *et al*. (1975); Nantsupawat *et al*. (2011); Van Bogaert *et al*. (2009); and Webster *et al*. (2011) considered the work environment as a main predictor of the quality of care and patient safety. However, there are limited studies investigating both staffing and work environment as separate predictors affecting the outcomes of care. Moreover, there are limited evidences of the effect of the work environment on the outcomes compared to staffing (Aiken *et al*., 2009). This indicates the importance of investigating the impact of hospital nurse staffing and work environment on the quality of care and patient safety.

2.8.1 Staffing

Staff adequacy is essential to sustain the outcomes of care. However, patient-to-nurse ratio has a mixed effect on the outcomes of care. For instance, Brooten *et al*. (2004); Newhouse *et al*. (2013); Olson *et al*. (2013); and Zeng *et al*. (2012) found that adequate staffing positively affects the outcomes and quality of care and patient safety. Boyer *et al*. (2012); and Ferguson *et al*. (2007) found that understaffing increases workload and is negatively associated with the quality of care and patient safety. On the other hand, You *et al*. (2013) found that staff adequacy is significantly associated with the quality and job outcomes, but not associated with the patient care outcomes. Similarly, Needleman *et al*. (2002) found that patient-to-nurse ratio is inconsistently associated with the outcomes of care. These inconsistent findings in the previous studies show the importance to investigate the impact of patient-to-nurse ratio in the outcomes of care in the study.

According to Stimpfel, Rosen & McHugh (2014), little effort has been focused on improving nursing care in order to optimize the outcomes of care. There is also insufficient evidence of the nursing working hours' length on the quality of care and patient safety (Estabrooks *et al*., 2009). Shift length has a mixed effect on the quality of care and patient safety (Estabrooks *et al*., 2009; Philibert *et al*., 2013; Stone *et al*., 2006). For instance, Philibert *et al*. (2013); and Stone *et al*. (2006) found that duty hour limit by working 8-hour shift is negatively associated with the outcomes of care, decreases the continuity of care and lowers job satisfaction. On the other hand, Bhavsar *et al*. (2007) found that limited working hours by working eight hour shifts is positively associated with the outcomes of patient care and reducing burnout and

fatigue of staff. This shows the importance of investigating the effect of the working duty hours' length and work load on the quality of care and patient safety in Malaysian private hospitals.

2.8.2 Work environment

A healthy work environment is required to sustain the outcomes of care. Lake (2002) labeled five dimensions which contribute significantly to building a healthy work environment for nurses: "nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; staffing and resource adequacy; and nurse-physician relationship". However, there are mixed effects of the impact of these dimensions on the outcomes of care. For instance, Aiken *et al*. (2012); and Van Bogaert *et al*. (2014) found that these dimensions are significantly associated with the quality of care and patient safety. On the other hand, other studies have found that the nurse work environment is positively associated with the quality of care, but not associated with patient safety metrics: nosocomial infections, medication errors, patient and family satisfaction and pressure ulcer (Gardner & Thomas-Hawkins, 2007; Manojlovich *et al*., 2009; Manojlovich & DeCicco, 2007). Similarly, Warshawsky and Havens (2011), in a meta-analysis study, found that nurse work environment dimensions are inconsistently associated with the outcomes of care. These inconsistent findings show the importance to investigate the effect of hospital nurse staffing and work environment on the quality of care and patient safety. A mediating variable is required to intervene or adjust the relationship

between the independent and dependent variables to explain these inconsistencies (Sekaran & Bougie, 2010).

2.8.3 Patient-centeredness

Patient-centeredness refers to putting the patient's interests first, and sustained outcomes of care. Patient-centeredness is considered as a process factor affecting the outcomes of care, and is used to explain the effect of hospital nurse staffing and work environment on the outcomes of care. However, studies that have investigated the impact of structure-process-outcome factors are limited (Hearld *et al*., 2008). Patient-centeredness is used as a process factor because it helps maintain the efforts toward improving the outcomes of patients' care (Ballard, 2003; Mallak *et al*., 2003; Webster *et al*., 2011). Patient-centeredness helps mitigate the negative impact of work process on the outcomes of care (Chandrasekaran *et al*., 2012). For instance, patients who are involved and who participated in care decisions are more likely to prevent adverse events (Tappenden *et al*., 2013; Weingart *et al*., 2011). Studies have proposed shifting to a patient-centered approach to improve the quality and patient safety (Patel & Mitera, 2011). The power of patient-centeredness is expected to be able to explain the effect of hospital nurse staffing and work environment on the outcomes of care. Thus, the study investigates the impact of hospital nurse staffing and work environment on the quality of care and patient safety, and the mediating effect of patient-centeredness on hospital nurse staffing and work environment on the outcomes of care.

2.9 The quality of care and patient safety in Malaysia

2.9.1 The country profile

Malaysia is an upper middle income developing country (Tan *et al*., 2014), and occupies an area of 329,758 km^2, located in the Western Pacific region in Southeast Asia, between 1-7 degrees North latitude and 100-119 degrees East longitude (Merican & bin Yon, 2002). Malaysia consists of 14 states: Johor, Kedah, Perlis, Terengganu, Kelantan, Malacca, Negeri Sembilan, Pahang, Perak, Pulau Penang, Sabah, Sarawak, Selangor and the Federal Territory of Kuala Lumpur. The population is 28.96 million, with 1.3 per thousand population annual growth rate (MOH, 2011a); 36.6% of the population are youths (below 20 years), with a higher proportion of males at 51.5% than females at 48.5% (MOH, 2011a). Selangor records the highest population (5.58 million) compared to the other states in Malaysia (MOH, 2011a). Malaysia has a multiracial population, consisting of Malays 67.4%, Chinese 24.6%, Indians 7.3%, and 0.7% other ethnic groups (MOH, 2011b).

In 2008, Malaysia was the 19th largest trading nation in the world, with trade excess of USD 270 billion and per capita income of USD 6,726 (WHO, 2010). The incidence of poverty has been decreasing sharply over the last few decades. The incidence of poverty in 1990, 2000, 2004 and 2008 was 49.3%, 16.5%, 5.7% and 3.8%, respectively (MOH, 2011b). Thus, Malaysia is moving towards realizing the 10th Malaysia Plan to become a high income nation (MOH, 2011b).

2.9.2 Malaysian healthcare system

Malaysian healthcare services are provided by the public sector, private sector and non-MOH organizations (Merican & bin Yon, 2002). MOH Malaysia is responsible for the population's health (Merican & bin Yon, 2002). Table 2.5 highlights the characteristics of these sectors, according to data obtained from the official website of MOH Malaysia. The public sector is the major provider of healthcare and consists of 141 hospitals. A total of 28,949 doctors and 56,503 nurses are working in public healthcare facilities, delivering services for patients, with a capacity of 39,728 beds.

Table 2.5
The Characteristics of the Malaysian healthcare sector

Characteristics	**Public**	**Private**	**Non-MOH**	**Total**
Hospitals	141	214	8	363
Beds	39,728	14,033	3,708	57,469
Doctors	28,949	11,697	6,270	46,916
Nurses	56,503	26,653	6,011	89,167
Community nurses	23,971	267	181	24,419
Dental nurses	2,706	-	87	2,793

Source: according to the data obtained from the official website of MOH Malaysia as accessed on 31 January 2015 (http://www.moh.gov.my/english.php/pages/view/405)

The private sector is the second main provider of healthcare services (Merican & bin Yon, 2002), and consists of 214 hospitals. A total of 11,697 doctors and 26,653 nurses are working in the private healthcare facilities, and delivering services for patients, with a capacity of 14,033 beds. The private healthcare facilities include private hospitals, medical clinics, hemodialysis centers, dental clinics, hospices, maternity homes, private psychiatric hospitals, ambulatory care centers, nursing homes, psychiatric nursing homes, blood banks and community mental health centers (MOH, 2011a).

The non-MOH organizations include the care delivered by the Ministry of Education, the Ministry of Human Resources, Ministry of Defense, Ministry of Rural Development, and the Ministry of Housing and Local Government (Merican & bin Yon, 2002). The non-MOH organizations complement the role of MOH with eight hospitals, having a total capacity of 3,708 beds. A total 6,270 doctors and 6,011 nurses are employed in these healthcare facilities.

The health status in Malaysia has grown, and Malaysians today live longer lives (MOH, 2011a). The estimated life expectancy at birth, based on 2010 data, has increased to 77.0 years for females, and 71.9 years for males, as compared to records in 2002, where it was 75.3 years for females, and 70.8 years for males (refer to Figure 1.1). The MOH has carried out regular health reforms and has implemented medical tourism to attract foreign patients in efforts to become a high income nation (Merican & bin Yon, 2002). The MOH Malaysia has the mission of facilitating and supporting the population's health and providing high quality of care, characterized by patient-centeredness, equitable, efficient, affordable and environmentally adaptable care with emphasis on respect for human dignity (MOH, 2011a). According to the Prevention and Control of Infectious Disease Act (1988), it is mandatory to notify the state health office in order to take actions to control the spread of diseases (Aljunid *et al*., 2012). However, there are challenges in sustaining the quality and patient safety in Malaysia. As the population increases (MOH, 2011a), demand for healthcare increases as well (MOH, 2011b). Further, the total bed occupancy rate in the hospitals is increasing (refer to Figure 1.2). This increase in the demand for care and bed occupancy rate of hospitals creates challenges for the

MOH in realizing its mission of delivering high quality care. Thus, the key issues of improving quality of care and patient safety are highlighted in the next section.

2.9.3 Why quality of care and patient safety is important in Malaysia

Quality assurance activities have been introduced in Malaysian hospitals since 1985 in order to provide the best healthcare for the population (Reerink & Alihussein, 1990). At that time, the MOH set quality indicators to monitor the hospitals' performance, and found that nurses and doctors are not trained to participate in the quality improvement programs (Reerink & Alihussein, 1990). In the current literature, the importance of improving quality of care and patient safety in Malaysian hospitals is visible in the growing attention to reduce medical errors, waste and inefficiency in the healthcare sector (Husin, Rashid, & Othman, 2012). Further, the rapid growth in healthcare industry competition, similar to private medical centers, has led leaders to guarantee care outcomes are promptly delivered by their healthcare professionals (Husin *et al*., 2012).

Demographic changes in the population structure in Malaysia challenge the sustenance of the outcomes of care (John, Mani & Azizah, 2004). By 2050, it is expected that one out of every five Malaysians will be over 60 years old (John *et al*., 2004). The patient care outcomes of a cross-sectional study conducted in Ampang hospital, Kuala Lumpur, found that the quality of care is better among younger patients than patients older than 40 (Priscilla *et al*., 2011). However, the present study is limited to data from patients' or hospital records. Thus, medical and surgical

wards are selected from Malaysian private hospitals to control the variability of patients' demographics and clinical case complexity.

A study conducted in a teaching hospital in Kuala Lumpur revealed that poor communication is negatively associated with patient satisfaction and the quality of care among cancer patients (Ezat, Fuad, Hayati, Zafar & Kiyah, 2014). Hence, dissatisfied patients are likely to complain about the perceived care ten times more than a satisfied patient (Gabbott & Hogg, 1998). Similarly, a study conducted in a Malaysian hospital found that nurse and patient communication is important in building patient trust (Maskor & Krauss, 2013). Nurses need to smile and maintain eye contact with the patient and understand the nonverbal communication to ensure patient comfort (Maskor & Krauss, 2013). In 2011, the private medical practice control section in Malaysia recorded a total of 312 patients' and family complaints (MOH, 2011a). The cost of unresolved patients' and family complaints in one hospital with 88,000 discharges per year was estimated to be USD 4 million (Øvretveit, 2000). The most salient complaints refer to private hospitals, with 154 records (MOH, 2011a). Thus, developing strategies for improving the delivered care and reducing harm to patients in Malaysian private hospitals are becoming more of a priority. Moreover, the degree of patient-centeredness in Malaysian private hospitals needs to be investigated.

In Malaysia, there are less than 10 institutions (public and private) awarding a degree in the medical field (Khoo & Richard, 2002). Thus, medical and nursing workforce is still deficient, with a low proportion of bachelor's degree holders (Khoo & Richard, 2002). A current study in the Malaysian hospitals found that less than

10.0% of nurses are holding a bachelor's degree, and over 90.0% are holding a diploma (Coomarasamy, Wint & Sukumaran, 2015; Yaakup, Eng & Shah, 2014). Thus, the impact of nurses' education and staffing levels on the outcomes of care are questionable. Additionally, a national nursing audit conducted by the Department of Research and Quality Development under the nursing division of MOH Malaysia found that nurses working in private hospitals have lower performance than nurses working in public hospitals (refer to Table 1.1) (MOH, 2011a). Thus, this study focuses on the Malaysian private hospitals.

Studies investigating the staffing level, shift length and work environment in Malaysian hospitals are limited. The mediating effect of patient-centered care on the effect of hospital nurse staffing and work environment on the outcomes of care have never been undertaken. Thus, the staffing factors, their work environment, patient-centeredness and their impact on the performance, patient safety and the quality of care in the Malaysian private hospitals needs to be investigated.

2.10 Summary

There are three levels of quality: structural quality, process quality and outcome quality. Structural quality refers to the features of care setting, human resources, materials, facilities, staff qualifications and organizational structure. Work environment and staffing reflect the most prominent structural quality according to the current literature being reviewed. Adequate staffing is positively associated with the quality of care and patient safety. There are inconsistencies in previous studies regarding the impact of shift length and staff-patient ratio on the quality of care and

patient safety, as discussed previously. Nurses working in a favorable work environment deliver safe care with low dissatisfaction. Improving nurse work environment is considered a low cost strategy towards optimizing the quality of care. The most validated tool to measure the work environment is the Nurse Work Environment Index. The PES-NWI is internationally recognized as well. Nurse involvement is essential for providing high quality patient care. Properly documenting mutual staff-manager goals can increase staff motivation and work satisfaction towards improving patient care, which in turn, can improve performance. Communication and teamwork among providers, especially the nurse-physician relationship, help sustain the performance of patient care. Further, improving the work environment and staffing helps mitigate the negative impact of nursing shortage on the quality of care and patient safety. All these findings show the importance of investigating the impact of hospital nurse staffing and work environment on the quality of care and patient safety in Malaysia, as summarized in the theoretical framework in Figure 2.6.

Process quality reflects what is actually being done during the treatment process. Because the patient is the core of the treatment process, patient-centeredness is the most prominent predictor reflecting the quality of the care process. Scholars have used the patient-centeredness concept to place patients' interest first, which is also known as the patient-focus approach or customer-oriented behavior. In addition, patient-centeredness is not merely involvement of patient in the care process, but also delivering to the patient proper nutrition, treatment, communication and education to prevent adverse events. Shifting to patient-centered approach can help

to mitigate the negative impact of nursing shortage and decrease the negative impact of the work process on the outcomes of care. A successful patient care process depends on the providers respecting patient's culture and keeping patients and family involved in the treatment process. This shows the importance of investigating the patient-focus approach in the study, as summarized in the theoretical framework in Figure 2.6.

Quality outcome reflects the end result of interventions and treatment. Quality of care and patient safety are the most prominent outcomes of quality reviewed in the latest literature. The quality of care, according to the IOM's definition and the latest current professional knowledge, include job satisfaction, job outcome and quality of patient care. Patient safety refers to the prevention of any potential harm or adverse events for a hospitalized patient. An adverse event is the unexpected patient harm or negative effect that is related to patient hospitalization other than the illness process, also called hospital-acquired conditions. For instance, adverse events or the hospital-acquired conditions could be a hospital-acquired infection (nosocomial infection). Pressure ulcer, patient fall, medication errors, readmission and patient and family complaints are all considered adverse events. Figure 2.6 summarizes the theoretical framework of the structure, process and outcome of quality according to the underlining theory of the study. The underlying theories of the study are the social cognitive theory of Bandur (1977); and Donabedian theory (1988), as discussed in Section 2.3.2.

All of these discussions lead to developing the theoretical framework of improving quality of care and patient safety as shown in Figure 2.6. Structural quality includes

the staffing and the work environment. Process quality includes patient-centeredness. The outcome quality includes the quality of care and patient safety. The next chapter discusses the research framework and the methodology. Research hypotheses, research design, the operational definitions and the measurement of each variable involved in the study, followed by the data collection methods, sampling techniques and techniques of data analysis are discussed.

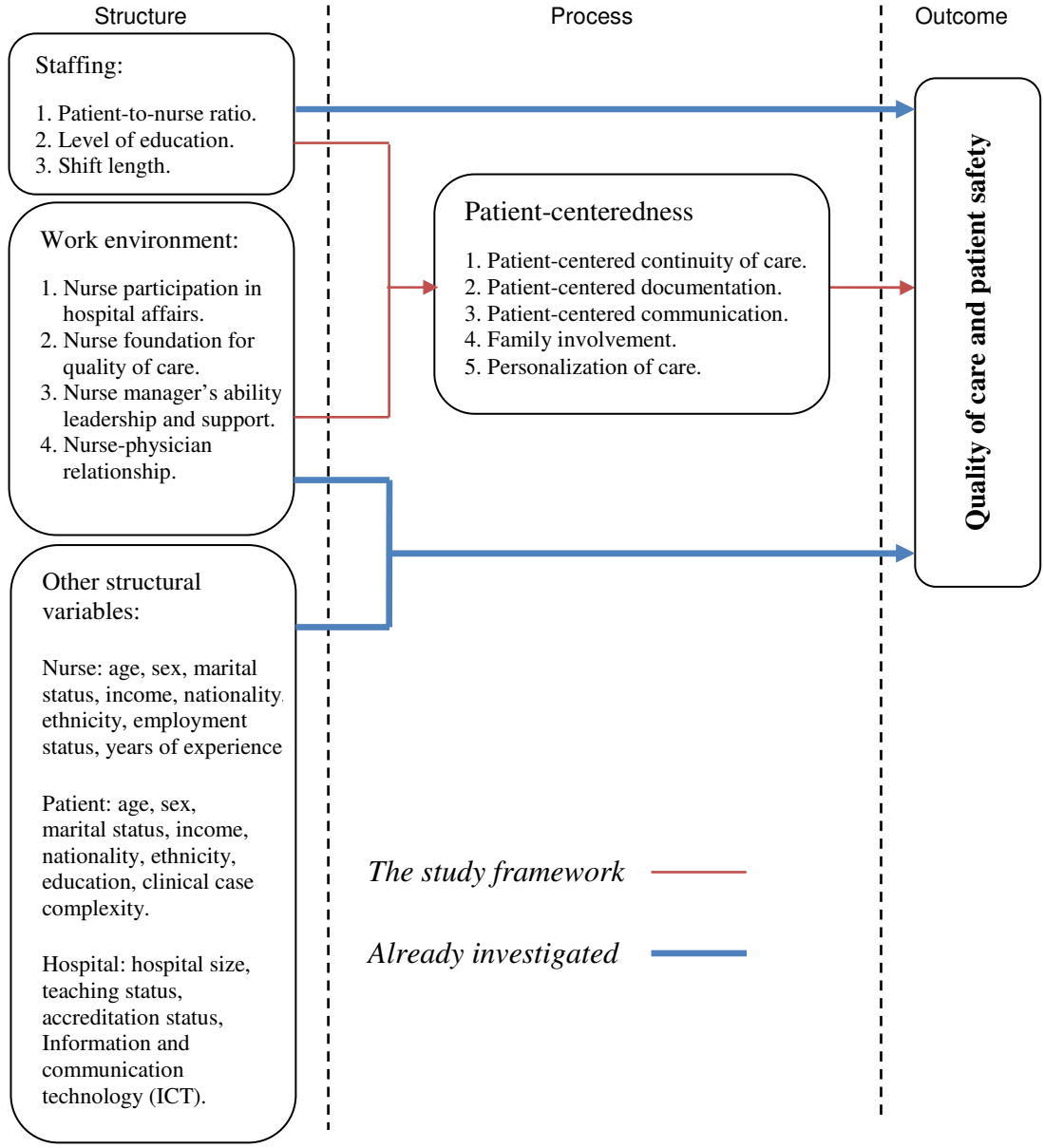

Figure 2.6
The theoretical framework

CHAPTER THREE
RESEARCH FRAMEWORK AND METHODOLOGY

3.1 Introduction

This chapter discusses the research framework and methodology. The framework is followed by data collection, sampling and techniques of data analysis, that measure the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety.

3.2 Research framework

This framework helps investigate the previously mentioned research questions on Malaysian private hospitals. In addition, the research framework, illustrated in Figure 3.1, helps in using the proper data collection and sampling method for analyzing the effect of hospital nurse staffing and work environment on the quality of care and patient safety. Whether or not patient-centeredness affects these relationships is investigated as well.

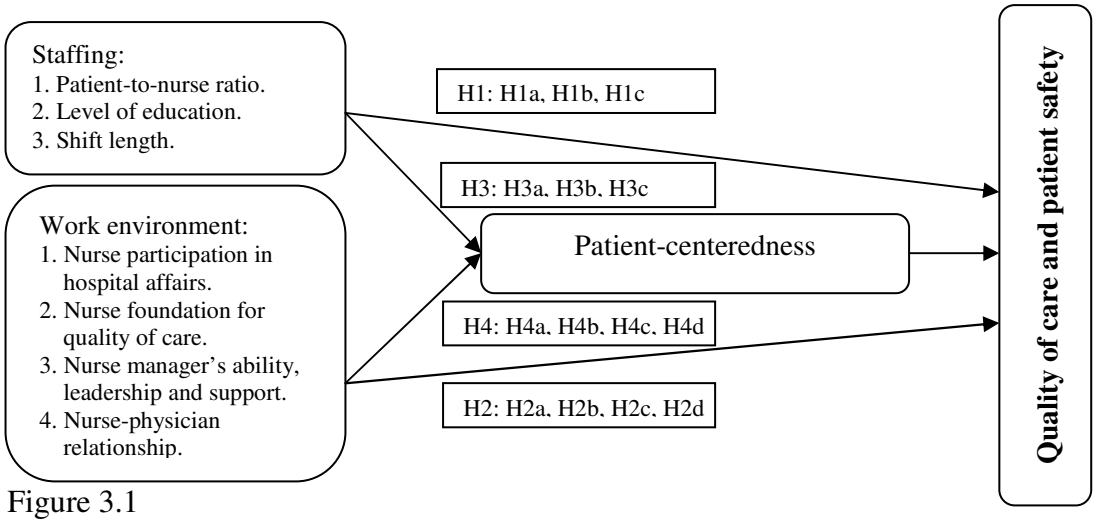

Figure 3.1
Research framework

3.3 Hypotheses

Research hypothesis is a measurable, tentative statement that reflects the expected findings of the empirical relationship of investigated variables (Sekaran & Bougie, 2010). According to the research framework, there are three dimensions affecting the quality of care and patient safety, which are measured through the study of Malaysian private hospitals, which are: nurse staffing, work environment and patient- centeredness. Staffing and work environment are the independent variables in the study. Patient-centeredness is the mediator variable. Because of the conflicting findings of the effect of these variables on the quality of care and patient safety, non-directional hypotheses are postulated (Sekaran & Bougie, 2010). The study measures the effect of patient-centeredness on the effect of hospital nurse staffing and work environment on the quality of care and patient safety.

3.3.1 Staffing

Many studies have found that understaffing leads to increased workload, which in turn, results in risks to patient safety and delivering poor quality of care (Ferguson *et al*., 2007). Controlling the patient flow to the department by adding a new nurse or physician leads to improved quality of care, decreased waiting time and length of stay (Zeng *et al*., 2012). On the other hand, the effect of overstaffing on the quality of patient care and safety is not covered by literature. Thus, adequate staffing is required to improve the quality of patient care (Newhouse *et al*., 2013). For instance, one study found that the higher patient-nurse ratio is negatively associated with the quality of care and job outcomes, but not associated with patient care outcomes (You

et al., 2013). Additionally, there are less than 10.0% nurses holding bachelor's degree and over than 90.0% holding diploma in nursing in the Malaysian hospitals (Coomarasamy *et al*., 2015; Yaakup *et al*., 2014). Nurses with higher education deliver safer and higher quality of care consistent with the current nursing practices (Aiken *et al*., 2014; Orsolini-Hain, 2011). Further, there is an inconsistent effect of staff duty hour limits on the quality of care and patient safety (Estabrooks *et al*., 2009; Philibert *et al*., 2013; Stone *et al*., 2006). Some researchers have found that duty hour limit (working 8-hour shifts) is negatively associated with the outcomes of care and decreases the continuity of care and job satisfaction (Philibert *et al*., 2013; Stone *et al*., 2006). Others researchers have found that limited working hours (eight hours) is positively associated with the quality of care and patient safety and reduces burnout and fatigue (Bhavsar *et al*., 2007). These findings lead to formulating the first set of hypotheses:

H1: Staffing has a significant effect on the quality of care and patient safety.

H1a: Patient-to-nurse ratio has a significant effect on the quality of care and patient safety.

H1b: Nurse level of education has a significant effect on the quality of care and patient safety.

H1c: Length of nurses' duty hours has a significant effect on the quality of care and patient safety.

3.3.2 Work environment

A stable work environment leads to improved quality of care and lowers harm to patients (Newhouse *et al*., 2013). Poor work environment leads to poor quality of

patient care (Nantsupawat *et al*., 2011). In addition, hospitals with high occupancy rates have higher workload and poor quality of patient care (Forster *et al*., 2000). On the other hand, Hannan *et al*. (1992) found that high occupancy hospitals improved the quality of patient care, due to improved employee skills through repetition of procedures for multiple patients. Moreover, high performance work system does not lead to improvement in the quality of patient care if the staff are not empowered (Bonias *et al*., 2010). Lake (2002) labeled five dimensions which contribute significantly to building a healthy work environment for nurses: "nurse participation in hospital affairs, nurse foundation for quality of care, nurse manager's ability and leadership support, staffing and resource adequacy and nurse-physician relationship". Staff involvement is essential for the provision of high quality of patient care (Van Bogaert *et al*., 2009). Writing mutual staff-manager goals increases staff motivation and work satisfaction towards improving patient care, which in turn improves performance (Dyer *et al*., 1975). Staff who provide the best care will experience higher career satisfaction. However, there are inconsistencies and mixed effects of the impact of these dimensions on the outcomes of care (Gardner & Thomas-Hawkins, 2007; Manojlovich *et al*., 2009; Manojlovich & DeCicco, 2007; Warshawsky & Havens, 2011). Therefore, these findings lead to formulating the second set of hypotheses for investigation at Malaysian private hospitals:

H2: Work environment has a significant effect on the quality of care and patient safety.

H2a: Nurse participation in hospital affairs has a significant effect on the quality of care and patient safety.

H2b: Nurse foundation for quality of care has a significant effect on the quality of care and patient safety.

H2c: Nurse manager's ability and leadership support has a significant effect on the quality of care and patient safety.

H2d: Nurse-physician relationship has a significant effect on the quality of care and patient safety.

3.3.3 Patient-centeredness

A patient-centered culture helps to maintain the efforts of quality improvement and patient safety (Webster *et al*., 2011). Cultural commitment helps deliver the best care practices for patients (Ballard, 2003). In addition, patients who are involved and participate in their care decisions are more likely to prevent adverse events (Tappenden *et al*., 2013; Weingart *et al*., 2011). Patient-centeredness helps to mitigate the negative impact of working process on the quality of care and patient safety (Chandrasekaran *et al*., 2012). One study found that patient-to-nurse ratio is not associated with patient satisfaction, due to nursing being task-oriented and patient and family involved in the caring process (You *et al*., 2013). Thus, the staff should shift to patient-centered culture in order to improve quality and patient safety (Patel & Mitera, 2011). Thus, patient-centeredness helps improve patient safety and quality of care, prevents adverse events (Tappenden *et al*., 2013; Weingart *et al*., 2011; Woodard *et al*., 2012) and strengthens the patient-provider relationship, which in turn lead to increased patient compliance with treatment (Da Silva *et al*., 2012; Fischman, 2010; Muntlin *et al*., 2006; Sriram *et al*., 2011). So, nurses with lower patient ratio, higher education and limited shift length might be more patient-centered and spend more time with their patients. These might help in reducing

patient harm and improving quality of care and patient safety. Therefore, this leads to formulating the third set of hypotheses:

H3: Patient-centeredness mediates the effect of staffing on the quality of care and patient safety.

H3a: Patient-centeredness mediates the effect of patient-to-nurse ratio on the quality of care and patient safety.

H3b: Patient-centeredness mediates the effect of nurse level of education on the quality of care and patient safety.

H3c: Patient-centeredness mediates the effect of the length of nurses' duty hours on the quality of care and patient safety.

Generally, the work environment is unstable and complex in hospitals; hence, its impact on Malaysian private hospitals is investigated. For instance, more complex and severe cases receive a higher quality of care (Baron *et al*., 2006; Woodard *et al*., 2012). Young *et al*. (1999) found that patients with complicated cases face a high risk of receiving poor quality of care. Thus, patient flow and hospital size affect the quality of performance of patient care. For instance, patients treated in smaller hospitals have been treated appropriately with higher adherence to guidelines than patients in larger hospitals (Abilleira *et al*., 2009). Moreover, patient satisfaction and hospital efficiency are higher among smaller hospitals (Gok & Sezen, 2013). On the other hand, it is difficult to identify the causal relationship between high hospital volume and quality of patient care. Patient and provider-related factors that affect the treatment process and the outcomes of care should be taken into account (Hillner *et al*., 2000). The work environment is the factor most associated with exhaustion and job dissatisfaction, which lead to poor patient care (Van Bogaert *et al*., 2009). When

the nurses, pharmacists and physicians substitute and complement each other's role, it can lead to increased hospital capacity, decreased workload and improved quality and patient involvement (Laurant *et al*., 2009). Therefore, nurses with good relationship with a physician are more likely to be patient-centered. Similarly, nurses guided by a skilled leader and who participate and involve themselves in the recognition program might be more patient-centered. These might help in reducing patient harm and improve quality of care and patient safety. This shows the importance of shifting to patient-centered approach, which can help to mitigate the negative impact of work environment (You *et al*., 2013). Therefore, these findings lead to formulating the fourth set of hypotheses to investigate the effect of patient-centeredness on the effect of work environment on the quality of patient care in Malaysian private hospitals.

H4: Patient-centeredness mediates the effect of work environment on the quality of care and patient safety.

H4a: Patient-centeredness mediates the effect of nurse participation in hospital affairs on the quality of care and patient safety.

H4b: Patient-centeredness mediates the effect of nurse foundation for quality of care on the quality of care and patient safety.

H4c: Patient-centeredness mediates the effect of nurse manager's ability and leadership support on the quality of care and patient safety.

H4d: Patient-centeredness mediates the effect of nurse-physician relationship on the quality of care and patient safety.

3.4 Research design

After identifying the problem, framework and research hypotheses, a research design must be developed to gather and analyze data to answer the research questions (Sekaran & Bougie, 2010). In addition, a research design includes the study purpose, setting, time horizon and unit of analysis. The study purpose could be exploratory or descriptive; the setting could be a field or experimental study; the time horizon could be cross-sectional or longitudinal; and the unit of analysis could be at the individual, group or organizational level (Sekaran & Bougie, 2010). These help to investigate the above mentioned research hypotheses on Malaysian private hospitals.

Quantitative and qualitative approaches are the two main research approaches (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). This study is quantitative in nature, because it examines the effect of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety. This study describes the characteristics of a group of employees and work environment in delivering services. Thus, the purpose of the study is to describe the relationship between the variables as stated by Sekaran and Bougie (2010).

The study setting reflects whether it is conducted naturally or artificially. According to Sekaran and Bougie (2010), a study conducted in a natural environment is a correlational study and is called a field study; whereas a study conducted in an artificial environment is a causal study or an experimental study. Due to the fact that this study attempts to investigate the effect of hospital nurse staffing, work environment and patient-centeredness on the perceived quality of care and patient

safety, the setting is a field study rather than an experimental study, as illustrated in Table 3.1.

The time horizon of a study could be cross-sectional, where the data are gathered once over days, weeks or months; or it could be longitudinal, where the data are gathered at two different points of time and are mostly used in the experimental study before and after the intervention (Sekaran & Bougie, 2010). Since this study is correlational and not experimental, it uses the cross-sectional time horizon. This is also due to the limited access to medical records which are confidential and because the data collected at one point of time is sufficient (Sekaran & Bougie, 2010). A cross-sectional questionnaire survey was developed by adapting the questionnaire from previous literature to investigate the relationship between the variables in this study.

The unit of analysis reflects the level of data collection during the next data analysis stage (Sekaran & Bougie, 2010). Quality indicators are required to measure the performance of patient care outcomes (Margaret, 2001). In addition, relationships between indicators and care outcomes at an individual level could not exist at higher levels, such as at team or hospital level, because there are many other variables affecting the organization and group levels (Sidorenkov *et al*., 2011). As this study examines the impact of hospital nurse staffing, work environment and the patient-centered approach on the quality of care and patient safety, the unit of analysis is the individual nurse. The data was collected and aggregated at the individual nurse level according to the data collected from the questionnaire. Table 3.1 summarizes the research design of the study. The next part discusses the operational definitions of all

variables included in the study for investigating the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety.

Table 3.1
Summary of the research design of the study

Research design	**Type**
Purpose of the study	Descriptive
Study setting and type of investigation	Field study
Time horizon	Cross-sectional
Unit of analysis	Individual nurse

3.5 Operational definitions

The concept 'operational definition' or 'operationalizing' is a technique of reducing the subjectivity of the variables to observable behavior or characteristics to render them measurable and tangible (Sekaran & Bougie, 2010). Operational definition involves the definitions and instrument of measuring the constructs of a study (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). In addition, it includes the scale of measuring the variables (Zikmund *et al*., 2013). Thus, the respondents, Likert scale type and the operationalization of each variable of the study, are discussed below.

3.5.1 Respondents

The respondents of the study are practical and staff nurses working in medical and surgical wards in the Malaysian private hospitals. Data was collected from nurses in the same wards to investigate the effect of patient-centeredness on hospital nurse

staffing and work environment on the quality of patient care and patient safety. Medical and surgical wards are chosen because they deliver a multidisciplinary level of care: medical cardiology, oncology, gastroenterology, nephrology, urology, orthopedics and ENT treatment (Coetzee *et al*., 2013). Further, by conducting the study among stable cases in private hospitals, the researcher can control the impact of clinical case complexity on the result. Nurses are chosen as respondents in the study as they more likely implement interpersonal interventions in order to improve the quality of care; whereas physicians mainly implement technical interventions in order to improve healthcare outcomes (Conry *et al*., 2012). As the variables in the study are more interpersonal than technical, nurses are the respondents in the current study. Staff nurses or registered nurses (RN) are those nurses who hold a bachelor's degree in nursing and have undergone a four-year education (Boumans *et al*., 2004); while practical nurses are those holding a diploma in nursing, and have two years of intermediate vocational education (Boumans *et al*., 2004).

3.5.2 Likert scale

The Likert scale, developed by Rensis Likert, is designed to identify the respondents' degree of agreement with a statement on a five-point scale (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). The options range from 'strongly agree' to 'strongly disagree' on a five-point scale (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). The study used the five-point Likert scale, because it is extremely popular and common in recent researches (Zikmund *et al*., 2013).

3.5.3 Operationalizing

In order to operationalize the variables of the study, it is important to first come up with a theory covering those variables. As mentioned before, the Donabedian theory (1988) is the underlying theory of the study (structure, process and outcome). The study investigates the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of patient care and patient safety. Thus, the Donabedian theory is used to investigate the effect of structure (hospital nurse staffing and work environment) on the process (patient-centeredness) and the effect of structure and process on the outcomes (patient safety and quality of care). The mediating effect of patient-centeredness on the effect of structure on the outcomes is also measured.

3.5.3.1 Structural quality

Structural quality reflects the care setting features, for example, resources (materials, facilities and human); staff qualification; and organizational structure (Gok & Sezen, 2013; Sidorenkov *et al*., 2011). In this study, structural quality involves two constructs: staffing (hospital nursing) and work environment. The definition of construct refers to the concept measured by multiple variables (Zikmund *et al*., 2013).

Staffing refers to the hospital nurse who delivers direct in-patient care (Aiken *et al*., 2012), classified according to their education level to practical or staff nurse (You *et al*., 2013). Staff nurses or registered nurses (RN) are those nurses who hold a bachelor's degree in nursing and have four years of education (Boumans *et al*.,

2004); while practical nurses (assistant nurses) are those who hold a diploma in nursing and have two years of intermediate vocational education (Boumans *et al*., 2004). This construct includes patient-to-nurse ratio; level of education; and shift length (working hours). The patient-to-nurse ratio was determined by asking the staff how many patients and nurses were present in their unit on the previous shift (Aiken *et al*., 2012; Coetzee *et al*., 2013; You *et al*., 2013). A lower ratio indicates a more favorable staffing (Aiken *et al*., 2012). The level of education was determined by inquiring as to whether the correspondent holds a diploma or bachelor's degree in nursing (You *et al*., 2013). In terms of their shift length, the respondents were asked about their shift times: whether it is 12 hours, 10 hours, eight hours or seven hours.

Work environment, in the context of a healthcare organization, is defined as "the organizational characteristics of a work setting that facilitate or constrain professional nursing practice" (Lake, 2002 P.178). This construct was measured using the PES-NWI, which is validated internationally (Aiken *et al*., 2012; Coetzee *et al*., 2013; Lake, 2002; Van Bogaert *et al*., 2009; Warshawsky & Havens, 2011; You *et al*., 2013). The PES-NWI includes five subscales: "nurse participation in hospital affairs, nurse foundation for quality of care, nurse manager's ability and leadership support, staffing and resource adequacy and nurse-physician relationship" (Aiken *et al*., 2012; Lake, 2002). However, the study uses only four subscales out of five, and the fourth subscale was deleted (You *et al*., 2013). The staffing and resources adequacy subscale are considered in a separate construct in this study, which is under the staffing construct (patient-to-nurse ratio). The degree of agreement of respondents to statements in the work environment subscales was

obtained using a five-point rating scale to make a fixed rate scale, which in turn helped render the data of the study comparable to the PES-NWI subscale.

3.5.3.2 Process quality

Process quality reflects what is actually being done during the treatment process (Gok & Sezen, 2013; Sidorenkov *et al*., 2011). In this study, process quality includes the patient-centered construct because patient care is the focal point of the caring process. The patient-centered concept is used by scholars to place patients' interests ahead (patient-focus approach), which is also called customer-oriented behavior (Lanjananda & Patterson, 2009). In addition, patient-centeredness is not merely the involvement of patients in the care process, but also delivery to the patient, proper nutrition, treatment, communication and education to prevent adverse events (Tappenden *et al*., 2013). Thus, patient-centered care considers a patient's needs, expectations and preferences to ensure delivering care based on these needs (Frampton & Charmel, 2009). This construct in the study includes patient-centered continuity of care; patient-centered communication and education; and patient-centered documentation and access to the documents. Further, the patient-centered construct includes the personalization of care and family involvement in patient care (Frampton *et al*., 2008). This construct was measured by adapting the questionnaire developed by Planetree and Picker Institutes. A self-assessment tool on the nurses' degree of patient-centeredness has been developed (Frampton *et al*., 2008). This self-assessment tool was first developed by the AHRQ to assess the CAHPS for hospital survey (You *et al*., 2013).

3.5.3.3 Outcome quality

The outcome quality reflects the end result of interventions and treatment (Harvey, 2004). It is the dependent variable of the study and includes two dimensions: quality of care and patient safety. The IOM defines quality of care as ‘‘the degree to which health services for the population increase the likelihood of desired health outcomes and are consistent with current professional knowledge’’ (IOM, 2000). This construct includes the quality of patient care and safety. The items for measuring this construct have been internationally validated (Aiken *et al*., 2012; Coetzee *et al*., 2013; Van Bogaert *et al*., 2009). Quality of patient care was measured by asking the nurses to grade the quality of care in the last shift and in the last year (Van Bogaert *et al*., 2009). Nurses were asked whether they will recommend the hospital to their friends and families if they need hospital care, or if it is a good place to work (Coetzee *et al*., 2013).

Patient safety refers to preventing any potential harm or adverse events for hospitalized patients (Groene *et al*., 2010). Adverse events are the unexpected patient harm or negative effects related to patient hospitalization other than the illness process (Weingart *et al*., 2011). For instance, adverse events could be a hospital-acquired infection, also termed nosocomial infection. In addition, pressure ulcer, patient fall, medication errors and re-admission are all considered as adverse events (Weingart *et al*., 2011; Welton, 2008). This construct required the nurses’ to rate overall patient safety and the frequency of the adverse events. The items from the AHRQ survey on patient safety were retrieved by asking the nurse the degree of agreement to overall patient safety rating in their respective units (Aiken *et al*., 2012;

Coetzee *et al*., 2013; You *et al*., 2013). The second measure of patient safety of the study is the adverse events that include nosocomial infection, pressure ulcer, patient fall, medication errors, re-admission, and patient and family complaints (Laschinger & Leiter, 2006; Van Bogaert *et al*., 2014; Weingart *et al*., 2011). Individual nurses were asked their degree of agreement to the frequency of these events on a five-point scale (Van Bogaert *et al*., 2014).

3.6 Measurement of variables and instrumentation

An adapted questionnaire was used in this study to measure nurses' perceptions of work environment, patient-centeredness, quality of care and patient safety. Table 3.2 summarizes the items adapted from previous studies with its source, items and scale of measurement. Demographic data regarding staffing are also included in the questionnaire. In order to measure the mediating effect of patient-centeredness between the effect of independent and dependent variables, the adapted questionnaire was used.

Table 3.2

Summary of the items and scales for measuring the variables

Variables	Items	Scale	Source
Independent variables (Structural variables)			
Staffing			
Patient-to-nurse ratio	1. How many patients under your care on the last shift?	Categorical	(Coetzee *et al*., 2013)
Level of education	2. What is your level of education - bachelor's degree (registered nurse) or diploma (practical nurse) or others (specify)?	Categorical	(Boumans *et al*., 2004)
Shift length	3. How many hours you worked in last shift?	Categorical	(Stone *et al*., 2006)
Work environment			
Nurse participation in hospital affairs	1. Staff nurses are involved in the internal governance of the hospital 2. Opportunity for staff nurses to participate in policy decisions 3. Opportunities for advancement 4. Administration that listens and responds to employees' concerns 5. A chief nursing officer who is highly visible and accessible to staff 6. Career development/clinical ladder opportunity 7. Nursing administrators consult with staff on daily problems and procedures 8. Staff nurses have the opportunity to serve on hospital and nursing committees 9. A chief nursing officer equal in power and authority to other top-level hospital executives	Five-point scale (interval scale)	(Lake, 2002; Warshawsky & Havens, 2011)
Nurse foundations for quality of care	10. Use of nursing diagnoses 11. An active quality assurance program 12. A preceptor program for newly hired nurses 13. Nursing care is based on a nursing, rather than medical model	Five-point scale (interval scale)	(Lake, 2002; Warshawsky & Havens, 2011)

Table 3.2 (Continued)

Variables	Items	Scale	Source
Nurse foundations for quality of care (continued)	14. Patient care assignments that foster continuity of care 15. A clear philosophy of nursing that pervades the patient care environment 16. Written up-to-date care plans for all patients 17. High standards of nursing care are expected by the administration 18. Active staff development or continuing education programs for nurses 19. Working with nurses who are clinically competent		
Nurse manager's ability, leadership and support of nurses	20. A nurse manager who is a good manager and leader 21. A nurse manager who backs up the nursing staff in decision-making, even if there is conflict with a physician 22. Supervisors use mistakes as learning opportunities, not criticism 23. A supervisory staff that is supportive of the nurses 24. Praise and recognition for a job well done	Five-point scale (interval scale)	(Lake, 2002; Warshawsky & Havens, 2011)
Nurse-physician relationship	25. A lot of teamwork between nurses and physicians 26. Physicians and nurses have good working relationships 27. Collaboration (joint practice) between nurses and physicians	Five-point scale (interval scale)	(Lake, 2002; Van Bogaert *et al*., 2009; Warshawsky & Havens, 2011)
Process variables **Patient-centeredness**			
Patient-centered continuity of care	1. Patient and family members are always able to participate in my rounds. 2. Patients and families are always able to participate in change of my shift report. 3. My plans of care are always written in a language that patients and families can understand. 4. My patient and their family have opportunities to meet multiple healthcare members (including the nurse and physician) at one time.	Five-point Likert scale (interval scale)	(Frampton *et al*., 2008)

Table 3.2 (Continued)

Variables	Items	Scale	Source
Patient-centered continuity of care (continued)	5. I always provide my patients clear instructions and teaching tools to help them manage their medications, medical appointments and other healthcare needs. 6. My patients and families are encouraged to participate in discharge planning from the beginning of hospitalization. 7. I follow the proper procedure to ensure that my patients understand the information provided at discharge.		
Patient-centered documentation and access to the information	8. I provide my patients and their family additional information if they request it regarding their diagnosis and treatment options. 9. I help my patients to have access to their medical record while they are in the hospital when they request so and I help them understand the information in their medical records. 10. I remind my patients that they can request to review their medical record with the support of a healthcare professional. 11. I encouraged my patients to contribute their own progress notes in their medical record. 12. I give my patients educational materials such as handouts appropriate for readers of varying literacy levels and for speakers of different native languages	Five-point Likert scale (interval scale)	(Frampton *et al*., 2008)
Patient-centered communication and education	13. I direct patients and their families to where they can obtain access to more health information. 14. Through a clear procedure, I always inform my patients and their family about unexpected outcomes. 15. I always introduce myself and explain my role to my patients and their families when he/she is assigned to	Five-point Likert scale (interval scale)	(Frampton *et al*., 2008)

Table 3.2 (Continued)

Variables	Items	Scale	Source
Patient-centered communication and education (continued)	my care. 16. I always explain clearly to my patients and their families. 17. When I assess my patient who is in pain, I always actively engage him/her in two-way communication 18. I listen to what my patient has to say before I respond. 19. I always give my patient full attention. 20. When I deal with my patient, I am always careful about the subconscious meaning in my body language 21. When I communicate with my patients, I always make use of appropriate eye contact 22. I always repeat what my patient has asked me to ensure my understanding of their question.		
Family involvement	23. I explain what I am saying slowly to give my patient enough time to process the information. 24. I always confirm with my patient whether the manner I communicate with them makes them understand effectively. 25. I make my patients aware of how to raise a concern related to patient safety and/or their care while they are hospitalized. 26. I always encourage my patients and their families to ask questions related to their health condition. 27. I always make sure that arrangements are in place to capture questions that arise when care givers are not present to answer them. 28. I follow the procedure to assist patients and families in knowing who is providing their care, and what the role is of each person on the care team.	Five-point Likert scale (interval scale)	(Frampton *et al*., 2008)

Table 3.2 (Continued)

Variables	Items	Scale	Source
Family involvement (continued)	29. I accommodate my patients' requests for when meals will be served to accommodate their personal schedule and routine. 30. I accommodate my patients' requests for when certain procedures will be performed to accommodate their personal schedule and routine. 31. Resources are available to me to help me educate my patients on different cultural beliefs/traditions related to health and healing. 32. I can use food options to meet the preferences of different ethnic groups. 33. I can provide food for my patients at all hours of the day and night during my shift and direct their families where food is available to them		
Personalization of care	34. I let the patient define who their family is. 35. Unless I am working in a behavioral/mental health area, I am flexible with visitors staying 24-hours as long as the patient directs this as their preference. 36. I give formal training/education to a patient's loved one who may be providing routine care following discharge. 37. I allow family members to remain with the patient during codes and resuscitation if they wish to. 38. I provide support to patients and families involved in an adverse event. 39. I give support to patients' informal care givers	Five-point Likert scale (interval scale)	(Frampton *et al*., 2008)
Dependent variables (outcome variables) **Quality of care**	1. Rating the quality of care in the current unit 2. Rating the quality of care in the last shift	Five-point Likert scale (interval scale)	(Van Bogaert *et al*., 2009)

Table 3.2 (Continued)

Variables	Items	Scale	Source
Quality of care (continued)	3. Rating the quality of care in the last year.		
	4. If I needed hospital care, I would come to this hospital. 5. I will recommend the hospital to my friends and family if they need hospital care. 6. I will recommend the hospital to my friends and family as a good place to work	Five-point Likert scale (interval scale)	(Coetzee *et al*., 2013)
Patient safety			
Overall patient safety	7. The overall patient safety in your unit.	Five-point Likert scale (interval scale)	(Aiken *et al*., 2012)
Adverse events			
Nosocomial infection	8. I rarely come across nosocomial infection events in my current work.	Five-point Likert scale (interval scale)	(Van Bogaert *et al*., 2014)
Pressure ulcer	9. I rarely come across pressure ulcer events in my current work.		
Patient fall	10. I rarely come across patient fall events in my current work.		
Medication errors	11. I rarely come across medication errors events in my current work.		
Readmission	12. I rarely come across re-admission events in my current work.		
Patient and family complaints	13. I rarely come across patient and family complaints events in my current work. 14. I rarely come across patient and family complaints of verbal abuse in my current work. 15. I rarely come across patient and family complaints of high cost of care in my current work. 16. In my current work, I rarely filled out and submitted an event report. 17. I rarely worry about filling out an event report. 18. I rarely worry that mistakes I make are kept in my personnel file.		

In addition to the above mentioned variables, the demographic data of the respondents and environmental characteristics were gathered. Nurses were asked about their age, sex, marital status, specialty, nationality, ethnicity, monthly income, employment status (full-time or part-time employee), and years of experience in the current hospital. The work environment characteristics, including hospital size, the teaching status (teaching or non-teaching) and the accreditation status (accredited or not accredited) were also gathered.

3.7 Data collection

The source of the data could be primary or secondary (Sekaran & Bougie, 2010). Examples of primary data are opinions of staff on a specific issue, which are gathered directly by researchers (Sekaran & Bougie, 2010). In this study, the source of data is primary data gathered through questionnaire. The questionnaire is a pre-set group of questions to which respondents write their answers (Sekaran & Bougie, 2010). Ethical approval was obtained from the original authors for instruments used to measure the study variables as shown in Appendix A. The respondents of the study are nurses working in the Malaysian private hospitals, and the estimated number is 15,935 nurses working in Malaysian private hospitals, according to the National Healthcare Establishments and Workforce Statistics (Sivasampu *et al*., 2010). Further, data in the medical and surgical wards of the Malaysian private hospitals to determine the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of patient care and patient safety were gathered. Medical and surgical wards are chosen, because they deliver multidisciplinary levels

of care: medical cardiology, oncology, gastroenterology, nephrology, urology, orthopedics and ENT treatments (Coetzee *et al*., 2013). Data was also collected from nurses employed in the medical and surgical wards to investigate the mediating effect of patient-centeredness on the variables. The required ethical approvals were obtained from hospitals that participated in the study as shown in Appendix B. Cross-sectional survey was conducted using questionnaires adapted from previous literature to investigate the relationship between the variables. In addition, a pilot study was conducted at the individual nurse level of analysis and the internal consistency (Cronbach's Alpha) was measured using Statistical Package for the Social Sciences (SPSS) Software to ensure the validity and reliability of the questionnaire prior to distributing it to the respondents.

3.8 Sampling

Sampling is the process of choosing a sufficient number of the right individuals or objects as representative of the whole population (Sekaran & Bougie, 2010). The purpose of sampling is to estimate the characteristics of the population (Zikmund *et al*., 2013), which in turn help to generalize such characteristics to a single member of the population called population element (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). This part discusses the sampling process, defines the population of study and determines the sample's frame, design and size.

The sampling process began by identifying the target population and sample frame, followed by determining sampling design and sample size, and then conducting the sampling process in the fieldwork (Sekaran & Bougie, 2010; Zikmund *et al*., 2013).

The population of a study is the group of people, objects or things that share a common set of characteristics (Zikmund *et al*., 2013) that the researcher is interested in investigating (Sekaran & Bougie, 2010). In this study, the population is the nurses working in Malaysian private hospitals. According to the official website of MOH Malaysia, the total number of nurses working in private and public sectors in Malaysia is 89,167 (http://www.moh.gov.my/english.php/pages/view/405), as accessed on 31st January 2015. The total number of nurses working in private healthcare facilities is 26,653, which delivers services for 14,033 total beds, whereas 56,503 nurses are working in public healthcare facilities, delivering services for 39,728 beds. The private healthcare facilities include private hospitals, medical clinics, hemodialysis centers, dental clinics, hospices, maternity homes, private psychiatric hospitals, ambulatory care centers, nursing homes, psychiatric nursing homes, blood banks, and community mental health centers (MOH, 2011a). This study focuses on the quality of care and patient safety in private hospitals. The total population of the study is 15,935 nurses working in Malaysian private hospitals, according to the National Healthcare Establishment and Workforce Statistics (Sivasampu *et al*., 2010).

The sampling frame is a list of elements from which the sample is drawn (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). The sampling frame of the study is the nurses working in medical and surgical wards who deliver direct in-patient care in Malaysian private hospitals. The medical and surgical wards are considered in the study because a sample's frame should represent all elements of the population (Sekaran & Bougie, 2010). Moreover, medical and surgical wards deliver a

multidisciplinary level of care: medical cardiology, oncology, gastroenterology, nephrology, urology, orthopedics, and ENT treatments (Coetzee *et al*., 2013). A study in Malaysian hospitals found that nurses in the critical care wards perform better than the general wards (Yaakup *et al*., 2014). So, the medical and surgical wards are the sample frame in the study.

Sampling design could be a probability or nonprobability sampling (Sekaran & Bougie, 2010). Probability sampling is a sampling technique by which the element of the population is well known (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). Nonprobability sampling of the member of the population is not known, and the technique is based on the researcher's judgment (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). The study uses the probability sampling technique, because the element is drawn randomly with equal probability (Zikmund *et al*., 2013). Further, probability sampling helps select a representative sample of the population, which in turn facilitates the generalizability of findings (Sekaran & Bougie, 2010). There are two types of probability sampling design: simple random sampling or complex probability sampling (Sekaran & Bougie, 2010). The study uses the complex random sampling because it is more efficient and more information could be obtained from the sample size (Sekaran & Bougie, 2010). In addition, private hospitals are stratified according to the hospital size using stratified random sampling. In addition, stratified random sampling offers more homogeneity within the stratum and higher heterogeneity among the group of strata, which is considered as a "mirror image of the population" (Sekaran & Bougie, 2010). Hospitals are stratified according to hospital size because previous studies have found that the size of hospitals

empirically affects the outcomes of care and patient safety (Abilleira *et al*., 2009; Gok & Sezen, 2013). According to the current nursing literature, researchers have used the number of beds to categorize the hospital size to small, medium and large-sized hospitals (less than 100, 100-199, 200 and over, respectively) (Gok & Sezen, 2013; Lee & Yang, 2009). According to the hospitals registered in the Association of Private Hospitals of Malaysia, the average number of beds is 107; so, this classification suits Malaysian private hospitals. Thus, after stratifying the hospitals to the three levels: small size (less than 100 beds); medium size (100-199 beds); and large size (over than 200 beds), the hospitals were chosen randomly using simple random sampling of each stratum. This ensured that each hospital had an equal chance of being selected (Sekaran & Bougie, 2010).

Sample size is important to evaluate the research project to ensure the representativeness of the sample to generalize the findings of the study (Sekaran & Bougie, 2010). A higher sample size leads to reduced sampling error (Zikmund *et al*., 2013), but adding extra samples can lower the utility of the previous sample, which is part of the law of dimensioning marginal returns in economics (Zikmund *et al*., 2013). For instance, the relationship between the sample size and the total population is exemplified by increasing population size that is followed by the sample size increase in dimensioning rate (Krejcie & Morgan, 1970). Krejcie and Morgan's (1970) Table was used to identify the sample size, which was constructed using the National Education Association sample size formula (Krejcie & Morgan, 1970). This formula is the best to use in case the total population is known:

$S = X^2 NP (1- P) \div d^2 (N -1) + X^2P (1- P)$.

S: The required sample size.
X^2: The table value of chi-square for 1 degree of freedom at the desired confidence level 3.841.
N: The population size (15,935 nurses).
P: The population proportion (assumed to be 0.50 since this would provide the maximum sample).
d: The degree of accuracy expressed as a proportion 0.05.

Confidence interval refers to the number or the interval within which the population mean lies, and commonly, researchers use 95% confidence interval (Zikmund *et al*., 2013). Thus, the confidence interval is 95%. According to this formula, the sample size of the study is 375 nurses.

3.9 Data collection procedures

The source of the data in the study is the primary data gathered through a questionnaire, collected from nurses working in Malaysian private hospitals across all working shifts in the medical and surgical wards. In this study, the primary data technique for data collection is chosen because for secondary data, hospital records and patient files are highly confidential. Thus, a personally administered questionnaire was used in the present study because it is less expensive and the data could be collected within a short period of time as opposed to interviewing (Sekaran & Bougie, 2010). English and Bahasa Malaysia were used throughout the study for the questionnaire and the adapted questionnaire items were translated into Bahasa Malaysia (by a bilingual expert in both languages) in order to ensure the respondents are able to understand the questionnaire items. The validity of the questionnaire

items was conducted in staffing, work environment, patient-centeredness and the quality of care variables.

3.9.1 Back-to-back translation

Back-to-back translation is required to make sure that the questionnaire is free of mistakes, wrong words or changed meaning. The questionnaire was translated to the local language and translated back by an expert to guarantee the conceptual and vocabulary equivalence of the questionnaire items (Sekaran, 2003). Poorly worded items will not merely lead to difficulty of responding (answering), but to further problems during the analysis or producing spurious positive or negative results, thus threatening the research's reliability (Oppenheim, 2001). Similarly, Malhotra and Birks (2007) stated that a poorly worded questionnaire leads to item non-response, which in turn increases the complexity of data analysis. This shows that translating the study questionnaire by expert native speakers is important by using back translation in order to ensure no changes in the meaning of the items.

A teacher who teaches in Sekolah Kebangsaan Batu 4 (Jalan Jeniang 08300, Gurun, Kedah) translated the questionnaire from English to Bahasa Malaysia. The translated questionnaire was double-checked by another local expert to make sure that the meaning of the items remains the same before it was translated into English. Translation from Bahasa Malaysia to English was by another teacher who teaches in a secondary school in Changlun (Sekolah Menengah Kebangsaan Changlun) and it was ensured that he did not have access to the original English questionnaire. The final draft of the translated English version was compared with the original draft to

make sure that there were no mistakes and the questionnaire is conceptually and vocabulary-equivalent. The translated questionnaire should be tested by a pilot study to test the pattern of response to detect any cultural biases and the reliability of questionnaire items in measuring the corresponding variables (Malhotra & Birks, 2007). Appendices C and D are the English and Bahasa Malaysia versions of the questionnaire, respectively.

3.9.2 Pilot study

A pilot study is a scaled research that collects data from respondents similar to those participating in the actual study for it to be used in the full research (Malhotra & Birks, 2007; Zikmund *et al*., 2013). A pilot study is important to prevent uninterpretable results or unquantifiable responses, which will save time and money (Oppenheim, 2001). Further, a pilot study helps conceptualize or re-conceptualize the study aims, and prepare an effective questionnaire for field work and data analysis (Oppenheim, 2001). In addition, the questionnaire should not be used in the survey without pilot testing, in order to check the reliability, content, wording, difficulty and instructions (Malhotra & Birks, 2007). One of the main issues in reliability test is checking the internal consistency of the scale in order to make the scale's items match (Pallant, 2011), and capable of measuring similar variables (Sekaran & Bougie, 2010). The most popular indicator used for internal consistency is Cronbach's alpha coefficient (Pallant, 2011; Sekaran & Bougie, 2010). According to Malhotra and Birks (2007), a 0.60 Cronbach's alpha coefficient indicates

satisfactory internal consistency of the scale. The acceptable level of Cronbach's alpha coefficient is 0.70 (Pallant, 2011; Sekaran & Bougie, 2010).

The main purpose of a pilot study is to test the internal consistency using SPSS version 21 in order to check the instrument's adequacy and soundness of the questionnaire by measuring Cronbach's alpha coefficient. A total 45 questionnaires were distributed among nurses working in medical and surgical wards over all working shifts, and 30 questionnaires were returned (10 respondents from each shift). According to Hertzog (2008), 30 respondents are sufficient for a pilot study for measuring instrument adequacy.

Table 3.3 shows the Cronbach's alpha coefficient of each variable's dimensions of the study. The Cronbach's alpha coefficient of most of the study variables exceed 0.70, as shown in Table 3.3; so, no remedial actions are required. One subscale of work environment construct had poor Cronbach's alpha coefficient of 0.54 (collegial nurse-physician relations). According to Pallant (2011), the Cronbach's alpha coefficient is very sensitive, and scales fewer than ten items usually have lower Cronbach's alpha value of up to 0.50; in this case, it is most appropriate to check the inter-items correlation values. The optimal range of inter-items correlation value, according to Briggs and Cheek (1986), is 0.20-0.40. The inter-items correlation of this scale is within the optimal range and the mean item correlation is 0.30; so, no remedial actions were required. Hence, the instrument used in the study is adequate and reliable to measure the variables.

Table 3.3
Reliability analysis of pilot study

Variable	Number of items	Cronbach's alpha
Work environment construct		
1. Nurse participation in hospital affairs	9	0.88
2. Nurse foundation for quality of care	10	0.87
3. Nurse manager's ability, leadership and support	5	0.79
4. Collegial nurse-physician relations	3	0.54
Patient-centeredness		
1. Patient-centered continuity of care	7	0.76
2. Patient-centered documentation	7	0.78
3. Patient-centered communication	14	0.90
4. Personalization of care	5	0.79
5. Family involvement	6	0.71
Quality of care	6	0.75
Patient safety	12	0.84

3.10 Data analysis methods

Once the data collection is completed, data analysis is required to transform the raw data into information (Zikmund *et al*., 2013). The unit of analysis of the study is at the individual nurse level, because the study investigates the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety. Data analyses includes data editing and coding, descriptive analysis, test of multivariate assumptions, exploratory factor analysis, multiple regression analysis and Hayes PROCESS macro-regression analysis. The SPSS software is the most popular one used by business researchers (Zikmund *et al*., 2013), which is why the SPSS software version 21.0 was used for data analysis in this study.

3.10.1 Data editing and coding

Editing and coding of the data are the first steps in the data analysis process (Zikmund *et al*., 2013). However, before beginning data analysis, data editing and coding are required to ensure that the data collected are complete, accurate and adequate for further analysis (Sekaran & Bougie, 2010). Editing is the process of adjusting the missing, inconsistent or omitted data to prepare it for analysis (Zikmund *et al*., 2013). In this study, the missing data was imputed. Imputing the missing data refers to statistically guessing the missing items based on the available response (Zikmund *et al*., 2013). The response of the overall job satisfaction or the overall patient safety was not imputed and the response was left blank if the respondents failed to complete it, because the response is very important and could not be guessed by the researcher. Data coding is a process of assigning a number to the participants' response and the previously edited data for them to be transferred to a computer (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). The work environment variable in the study was coded, with higher scores indicating better work environment, validated by previous literature (Van Bogaert *et al*., 2009). Similarly, other variables in the study were coded to indicate the highest quality of care and patient safety. Dummy coding is a numeric zero or one coding (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). The present variables, which had two option answers (Sex, marital status, employment status, shift type, shift length, education status and patient-to-nurse ratio), were coded with zero or one dummy coding.

3.10.2 Descriptive analysis

Descriptive analysis is a basic data analysis and primary transforming of the data in a way that describes certain characteristics of the entire population, such as minimum, maximum, central tendency and dispersion (Sekaran & Bougie, 2010; Zikmund *et al*., 2013). The study used the mean for continuous data; and the percentage for discrete data. The descriptive statistics were used to get a feel for the data and for data screening in order to answer research question number one. Getting a feel for the data is required to check the variances in the responses (Sekaran & Bougie, 2010). Data screening in the study includes the response rate, response bias, missing values and outliers. The response rate was calculated by dividing the total number of completed questionnaires returned by the respondents by the number of eligible respondents, who participated in the survey (Zikmund *et al*., 2013). Response bias occurs when intentionally or unintentionally, the respondents misrepresent the truth (Zikmund *et al*., 2013). The t-test and ANOVA were used to check the response bias in this study. For instance, ANOVA analysis was used to differentiate the response between the three ethnic groups of the nurses (Malaysian, Chinese and Indians). The t-test was used to differentiate the response between the two groups (Zikmund *et al*., 2013), which is used with variables having two option answers to ensure that the respondents are from the same population. Outliers refer to the values beyond the normal range of the data (Zikmund *et al*., 2013). Response rate, response bias, missing data and outliers were statistically investigated to ensure complete and accurate data for the next stage of data analysis.

3.10.3 Multivariate assumptions

Multivariate assumptions (normality, linearity, homoscedasticity and multicollinearity) in the study were verified. The normality test reflects the fact that the sample is sufficient and normally distributed, which means that the sample represents the population of the study (Sekaran & Bougie, 2010). Linearity refers to the straight line relationship between the independent and dependent variables (Zikmund *et al*., 2013). Homoscedasticity should also be checked, because if there are no variations between the respondents, it is difficult to explain the relationship between the variables (Sekaran & Bougie, 2010), and the study will have a heteroscedasticity problem. The multicollinearity problem refers to the close correlation between two independent variables (Sekaran & Bougie, 2010). The multicollinearity test renders regression analysis impossible (Sekaran & Bougie, 2010). The rule of thumb is if the variance inflation factor (VIF) is more than five, then the variables have a multicollinearity problem (Zikmund *et al*., 2013).

3.10.4 Factor analysis

After ensuring the normality and linearity of data and the fact that the data is free of heteroscedasticity or multicollinearity problems, factor analysis is required to reduce the number of factors measuring the variables. Factor loading was checked to know how strongly the measured variable is correlated to the factor (Zikmund *et al*., 2013). This prompted the researcher to check the validity and reliability of the items measuring the variables. The reliability coefficient was measured using Cronbach's alpha, indicating how strongly the items are correlated to each other, or its internal

consistency reliability (Sekaran & Bougie, 2010). Exploratory factor analysis was used to reduce the data prior to the multivariate analysis (Groene *et al*., 2010) for multiple regression.

3.10.5 Multiple regression analysis

Multiple regression analysis is a multivariate statistical method used to analyze multiple sets of variables simultaneously (Zikmund *et al*., 2013). In this study, multiple regression analysis was used to answer research questions two and three, because both the independent and dependent variables are in interval scales (Baker & Schutz, 1972). Thus, multilevel models measuring how hospital nurse staffing (shift length, patient-to-nurse ratio and level of education); work environment; and the degree of patient-centeredness affect the quality of care and patient safety were run. The study used SPSS for multiple regression analyses instead of using the structural equation modeling (SEM) because of the following reasons:

First, the rule of thumb for using SEM is the sample size and the model complexity (Hayes, 2013; Kline, 2011). SEM is more suitable for more complicated models. This study's model is less complicated. Moreover, the sample size must be 10 times the model parameters for using SEM (Kline, 2011). SEM can be used with small sample sizes up to 200 respondents (Kline, 2011). However, a large sample size to measure the model parameters of the study was collected as discussed in Section 4.2.1.

Secondly, the purpose of the study is to separately investigate the impact of hospital nurse staffing and work environment on the quality of care and patient safety. This was to reach the cut-off point on who to blame, system or staff, in order to improve quality of care and patient safety. However, SEM is widely used to explore the impact of predictors on the dependent variable simultaneously (Hayes, 2011). So, SEM is not used for analysis in this study.

Thirdly, the staffing construct in the study includes three dimensions: the shift length, nurse level of education and patient-to-nurse ratio. These dimensions are categorical variables and coded as dummy variables. According to West and Aiken (1996), regression analysis of the nominal data simultaneously with the continuous data (work environment) in the same SEM function lead to losing the predictive power of the work environment construct. Thus, SPSS is used as a result of these considerations for multiple regression analysis rather than SEM, to test the study hypotheses, and to answer the second and the third research questions of the study.

3.10.6 Hayes PROCESS macro-regression analysis

Hayes PROCESS macro-regression analysis was used in the study to investigate the mediating effect of patient-centeredness between the effect of hospital nurse staffing and work environment on the outcomes of care (quality of care and patient safety), and was used to answer the research questions four and five. Hayes SPSS PROCESS macro-regression analysis is used because it is superior and more powerful than the Sobel's test or Baron and Kenny's causal steps approach (Hayes & Preacher, 2014; Hayes, 2013; Zhao, Lynch Jr., & Chen, 2010). Further explanations of the

superiority of Hayes PROCESS macro-regression analysis are provided in Section 4.9.5. Figure 3.2 summarizes the technique of data analysis process used in the study.

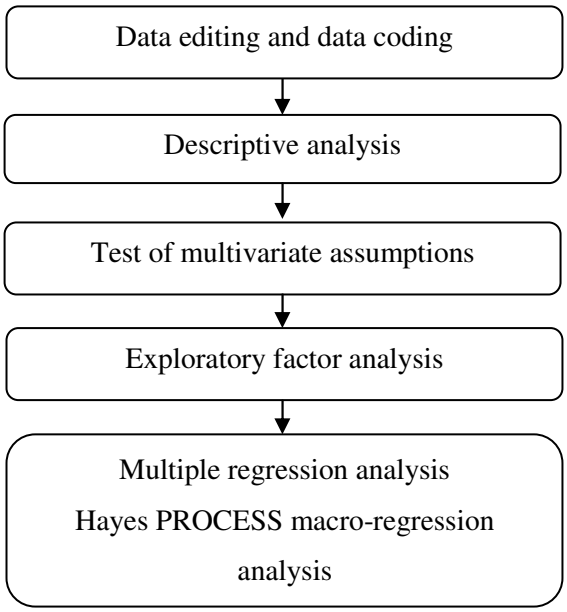

Figure 3.2
The process of data analysis

3.11 Summary

This chapter discusses the research framework and hypotheses that aim to answer the research questions. Data collection, sampling and techniques of data analysis to measure the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of patient care and patient safety in Malaysia are discussed as well as measuring the effect of patient-centeredness between these variables. In the next chapter, the result of data analysis is discussed and the research hypotheses are empirically tested to realize the research objectives.

CHAPTER FOUR
DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter reports data analysis, findings, data analysis methods, data collection, response rate, respondents' profile and non-response bias in this study. This is followed by testing multivariate assumptions and the validity and reliability of constructs. Descriptive statistics and regression analyses results are reported in order to answer the research questions.

4.2 Data collection and preparation

This section discusses the actual sampling process during data collection and highlights the response rate in order to ensure the representativeness of the sample. Data entry, coding and cleaning were performed in order to make sure that the data is of high quality.

4.2.1 Sampling procedure

The target population of the study is nurses working in Malaysian private hospitals in the medical and surgical wards. However, some private hospitals mix both medical and surgical wards under the name 'general' or 'multidisciplinary' ward. According to the current nursing literature, the hospital size is classified into small size hospitals of less than 100 beds; medium size hospitals with 100-199 beds; and large size hospitals with over 200 beds (Gok & Sezen, 2013; Lee & Yang, 2009).

Ten hospitals of each stratum were chosen randomly using simple random sampling in order to ensure that each hospital had an equal chance of being chosen from the 14 states in Malaysia. The criterion for inclusion of hospitals in the study is hospitals registered with the Association of Private Hospitals of Malaysia. However, Perlis and Terengganu have no private hospitals registered with the Association of Private Hospitals. Hospitals were stratified based on their respective sizes (number of beds) in the remaining 12 states (Johor, Kedah, Kelantan, Malacca, Negeri Sembilan, Pahang, Perak, Pulau Penang, Sabah, Sarawak, Selangor and Federal Territory of Kuala Lumpur), and 10 hospitals were chosen from each stratum using simple random sampling. Table 4.1 illustrates the randomly chosen hospitals from 123 hospitals, which met the criteria of inclusion accessed from the Association of Private Hospitals of Malaysia website on 1/3/2014 (http://www.hospitals-malaysia.org/portal/index.asp?menuid=3).

Table 4.1
Hospitals chosen by simple random sampling according to the state and hospital size

State	**Number of hospitals chosen**	**Small size**	**Medium size**	**Large size**
Johor	1	-	1	-
Kedah	3	1	2	-
Melaka	1	-	-	1
Negeri Sembilan	1	1	-	-
Pahang	1	1	-	-
Perak	3	2	-	1
Pulau Pinang	5	1	1	3
Sarawak	1	-	1	-
Selangor	7	3	2	2
Kuala Lumpur	7	1	3	3
Total	30	10	10	10

An official letter to the hospital directors was sent via email in order to obtain their approval to collect data from nurses working in the medical and surgical wards. The total numbers of hospitals that responded and agreed to participate in the survey were six hospitals, or 20.0% within the first two weeks. In the next two weeks, the researcher followed up with the secretary of the hospital director of the non-responding hospitals. The nursing directors were also contacted in order to increase the number of participating hospitals in a one-month period. Twelve hospitals, or 40.0%, was the final total number of hospitals that agreed to participate in the survey, as shown in Table 4.2.

Table 4.2
Hospitals that agreed to participate in the survey according to state

State	**Number of hospitals**
Kedah	3
Pulau Pinang	3
Selangor	2
Kuala Lumpur	4
Total	12

Those 12 hospitals that were willing to participate in the study were categorized as:

1. Two small size hospitals out of 10 (20.0%).
2. Three medium size hospitals out of 10 (30.0%).
3. Seven large size hospitals out of 10 (70.0%).

Thus, larger private hospitals in Malaysia were more willing to participate in the healthcare quality survey compared to their smaller counterparts.

After the researcher received the emails or written ethical approval from the hospitals to conduct the study, the researcher distributed the questionnaire to the

respondents (nurses working in the medical and surgical wards). Hospital procedures do not allow the distribution of questionnaires by an external party (the researcher); so, the nursing directors or their assistants were asked to distribute the questionnaire and collect it back. For this purpose, clear methodological instructions regarding the survey were given as follows:

1. Data to be collected from nurses working in the medical and surgical wards only.
2. Invite all licensed nurses (registered under the MOH Malaysia) working in the medical and surgical wards to voluntarily participate in the survey.
3. Invite nurses working in all duty shifts (morning, afternoon and evening) to participate voluntarily in the study.
4. A one-week period was given to the nurses to return the questionnaires and submit it. Nurses submitting after a week were regarded as late, and kept separate from the total collected questionnaires, in order to check whether it can be included or not. This would depend on the result of non-response bias test, as discussed later.

4.2.2 Response rate

A total of 1,055 registered nurses working in the medical and surgical wards in the 12 participating hospitals were invited to participate in the survey. A total 807 questionnaires were returned. However, 155 respondents were excluded from the study, because they did not meet the inclusion criterion (nurses not working in the medical and surgical wards), and others had fixed responses to all questionnaire items, or missed one full construct and left it blank. Thus, the remaining usable

respondents were 652 for data analysis, representing a 61.8% response rate. Table 4.3 shows the detailed responses of nurses who participated in the study.

Table 4.3
Response rate, early response and late response of the participating nurses

Hospital No:	**State**	**Forms distributed**	**Early response**	**Late response**	**Total response**	**Percent (%)**
H1	Kedah	45	30	0	30	66.6
H2	Kuala Lumpur	50	30	5	35	70.0
H3	Selangor	90	55	0	55	61.1
H4	Kuala Lumpur	130	55	15	70	53.8
H5	Selangor	90	28	12	40	44.4
H6	Kuala Lumpur	125	50	0	50	40.0
H7	Pulau Pinang	125	96	0	96	76.8
H8	Pulau Pinang	150	120	0	120	80.0
H9	Kedah	50	30	0	30	70.0
H10	Kedah	50	29	10	39	78.0
H11	Pulau Pinang	100	23	24	47	47.0
H12	Kuala Lumpur	50	32	8	40	80.0
Total		1,055	578	74	652	61.8

Nurses were given a week to return the questionnaire to their direct manager, and the ones returned on time were regarded as early responses. A total of 578 nurses submitted the questionnaire within the first week (54.8%). A total of 74 respondents submitted in the week after (7.0%), and they were considered late responses. This indicates that a week was enough time for nurses to complete the questionnaire and return it. Thus, the response bias test was conducted to ensure non-response bias of the late respondents.

4.2.3 Data coding and entry

A code book is required (Ho, 2006) to assign the variables a name, code and level of measurement of each variable in the SPSS program (Pallant, 2011). The code book

was prepared; the questionnaire items labeled, defined and given the appropriate code. Work environment items were called WE1-WE27; patient-centered items, PC1-PC39; quality of care items, QC1-QC6; and patient safety items, PS1-PS12. Questionnaire items in the study were given codes 1-5: one for 'strongly disagree' to five for 'strongly agree'; the higher score reflects better work environment, higher patient-centeredness, greater quality of care and patient safety. So, there were no reversed coded items in the study as all questionnaire items were positively worded. The study questionnaire measured data at the interval level, and was given a default scale in the SPSS (Pallant, 2011). Categorical data was given a nominal measurement scale and the ordinal measurement scale given for data included rankings or ordered values (Pallant, 2011), such as the level of education and shift type. According to Pallant (2011), the missing response to the questionnaire items were given the code 99 to ensure the total number of missing items in the data cleaning stage.

4.2.4 Data cleaning

Before beginning data analysis, the data had to be cleaned to ensure its quality (Pallant, 2011). Data cleaning includes checking for errors, missing values and outliers.

4.2.4.1 Checking for errors

Checking for errors includes identifying and finding the error and correcting it to the data file to prevent its effect on the findings of data analysis (Pallant, 2011). Errors in the categorical data were checked using descriptive statistics and frequencies; then

the maximum and minimum values were inspected and the out-of-range values corrected. Similarly, continuous questionnaire items were checked using descriptive statistics and a few errors were detected and corrected by checking the original respondents' booklet.

4.2.4.2 Missing values

It is very common in medical studies to find missing data from the refusal to answer patients' confidential questions (Buuren, 2012). Missing data also results from respondents refusing to answer personal questions (age, sex, marital status, income and others), or they lack the knowledge regarding a particular area (Longford, 2005; Meyers, Gamst & Guarino, 2006). Missing data could be problematic, which decreases the sample size or affects the validity of the data (Hair, Tatham, Anderson & Black, 2010). The seriousness of missing data depends on the amount and the pattern of missing data (Tabachnick & Fidell, 2013). Figures 4.1 and 4.2 show the pattern and the amount of missing data, respectively.

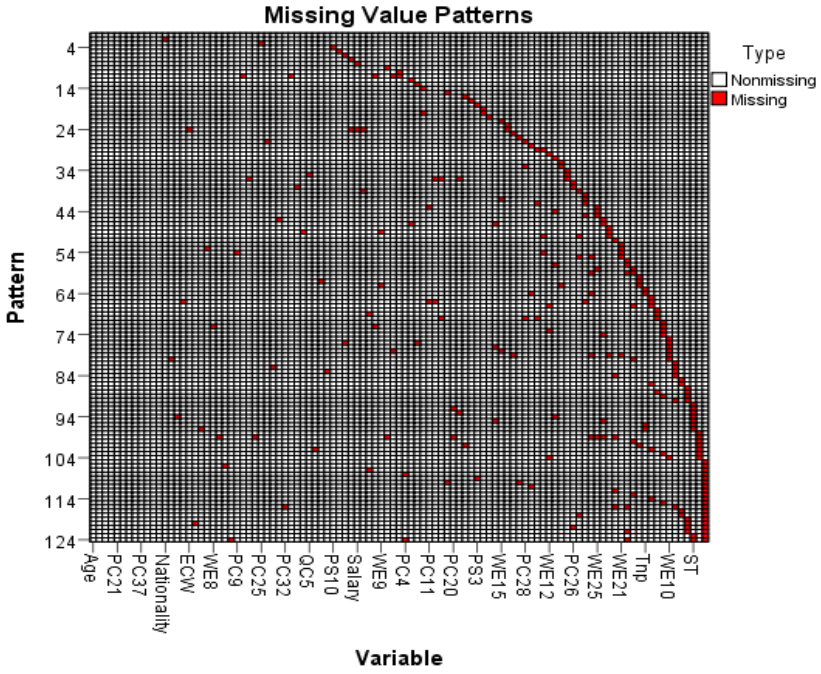

Figure 4.1
The pattern of missing value

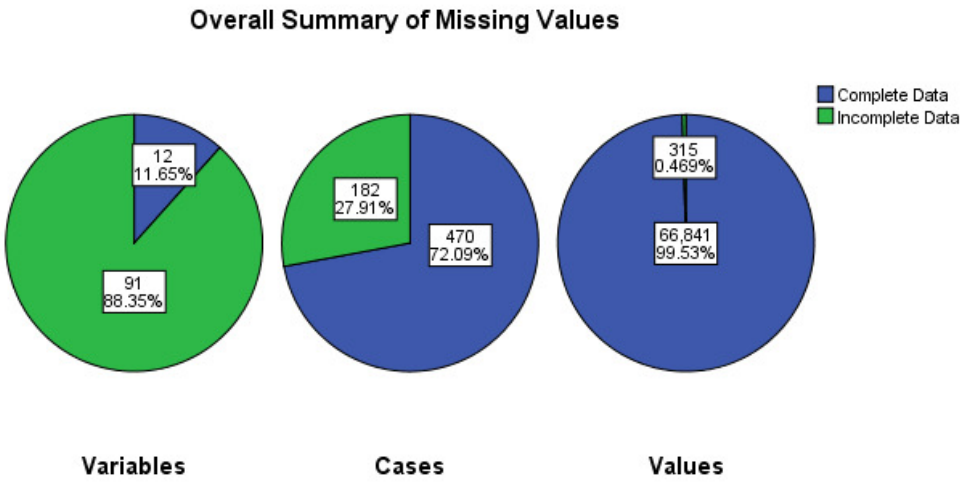

Figure 4.2
The amount of missing and complete data

As shown in Figure 4.1, the missing data in the study are not patterned or scattered randomly. Scattered missing data is indicative of a less than serious problem that does not affect the generalizability of the results (Tabachnick & Fidell, 2013).

Figure 4.2 includes three pie charts representing the missing values in the study. The variables pie chart shows that 88.3% of the variables in the study contain at least one missing value, while the cases pie chart shows that 27.9% of respondents have at least one missing value. The results show that the missing data are randomly scattered. The values pie chart shows that 0.5% is the total number of missing values, while 99.5% is the complete data in the study. In a large study, data sets that contain missing data of less than 5.0% indicate that missing values are not serious, and any procedure of handling missing data is considered validated and gives the same result (Tabachnick & Fidell, 2013). This low proportion of missing values indicate that the sampling design in the study is perfectly selected and a good representation of the population (Longford, 2005). Estimating missing values could be imputed through several methods: replacing by the mean, using prior knowledge of the researcher multiple imputation, or expectation of maximization methods (Tabachnick & Fidell, 2013). The prior knowledge and the mean substitution methods were used in the study. The prior knowledge method is used if the researcher has worked in the area for a while (Tabachnick & Fidell, 2013). The teaching status, the accreditation status and the number of hospital beds are facts, but a few of the nurses are unaware of this. The missing values were replaced according to the data obtained from each hospital's nursing director and based on the Association of Private Hospitals of Malaysia. They were asked whether their

respective hospitals award degrees in the medical field, or have international accreditation recognition, and the total number of beds that are in the hospital. Mean substitution was used to handle the rest of the missing values, because it is the best estimation of the missing value (Meyers *et al*., 2006); and it is a common tool being used (Coakes, 2005; Davey & Savla, 2010; Hair *et al*., 2010; Tabachnick & Fidell, 2013). According to Hair *et al*. (2006), it is advisable to use mean substitution method with a relatively low proportion of missing data. So, the mean substitution is very convenient with a few missing data, because it can produce a complete set of data (Enders, 2010), since the statistical power of a complete set of data is better than incomplete data (Davey & Savla, 2010). Thus, missing values were imputed by using the mean substitution method, in order to maintain a complete set of data.

4.2.4.3 Outliers detection

Outlier is a respondent or observation that is extremely different from others on one or more characteristics (Hair *et al*., 2010). Outliers could be problematic, not representative of the population (Hair *et al*., 2010) and distort data analysis (Tabachnick & Fidell, 2013). So, prior to main regression analysis, outliers need to be eliminated (Tabachnick & Fidell, 2013). There are two main reasons for outliers: errors in data entry; or the subject is not from the same population (Stevens, 2009). Errors in data entry were already checked during the first stage of data cleaning. The most common tool that provides an overall diagnosis of outliers is the Mahalanobis D^2 measure (Hair *et al*., 2010). A subject is considered as an outlier if the Mahalanobis D^2 result exceeds the Chi-square critical value (Pallant, 2011). At the

0.001 significance level and 84 degrees of freedom (number of variables in the model), the chi-square critical value of the study is 129.80. The Mahalanobis D^2 measures the distance between each subject and the mean of the multivariate group, and the respondents reaching this critical value were deleted (Meyers *et al*., 2006). So, the results of the data analysis reflect the population of nurses working in medical and surgical wards, and not influenced by the extreme subjects that are not representative of the population (Stevens, 2009). Thus, 69 (10.6%) respondents were among the 652 deleted from the study; thus, 583 (89.4%) respondents were considered for further data analysis.

4.3 Non-response bias

The problem of non-response is expected to mislead the findings of the studies. When the non-response ratio is high, then it is expected that differences between the respondents and non-respondents will be present (Stevens, 2009). People who are not willing to respond or pushed to respond to the questionnaire survey are expected to have differences from the normal respondents. Furthermore, they could provide a response that might be interesting for further study. In this study, the total number of respondents is 652 (61.8%), with 74 late responses (respondents giving back the questionnaire after the two weeks given to respond). As discussed in the previous section, 69 outlier cases were omitted from the study; with seven of them being late respondents (case number: 62, 523, 388, 64, 530, 385 and 524). So, 67 late respondents were compared with the early respondents using independent sample t-test to compare a mean of continuous variables between these two groups (Pallant,

2011). Table 4.4 shows the results of independent sample t-test with numbers rounded up to two-fraction digits.

Table 4.4
Independent sample t-test

Dimension	**Early response (n=516) mean**	**Late response (n=67) mean**	**Levene's test sig**	**P-value**
Work environment	3.56	3.54	0.95	0.74
Patient-centeredness	3.64	3.66	0.68	0.64
Quality of care	3.73	3.81	0.47	0.26
Patient safety	3.48	3.50	0.11	0.83

Independent sample t-test conducted on the total number of early respondents was 516, while late respondents was 67. Levene's test was used to test the equality of the variances between the early and late respondents (Pallant, 2011). As shown in Table 4.4, the significant value of Levene's test exceeds 0.05; so the variances equality assumption is not violated and thus, equal variances are assumed between these two groups (Pallant, 2011). Moreover, the p-value exceeds 0.05; so there is no significant difference in the mean of the perceived work environment, degree of patient-centeredness, perceived quality of care and patient safety between the early and late respondents in the study. Thus, the late respondents were included in the next stage of the data analysis together with early respondents. Moreover, there was no response bias between the early respondents and late respondents and the samples

being taken from the same population, could be generalized. Figure 4.3 shows the 583 clean and usable respondents that were used for further data analysis.

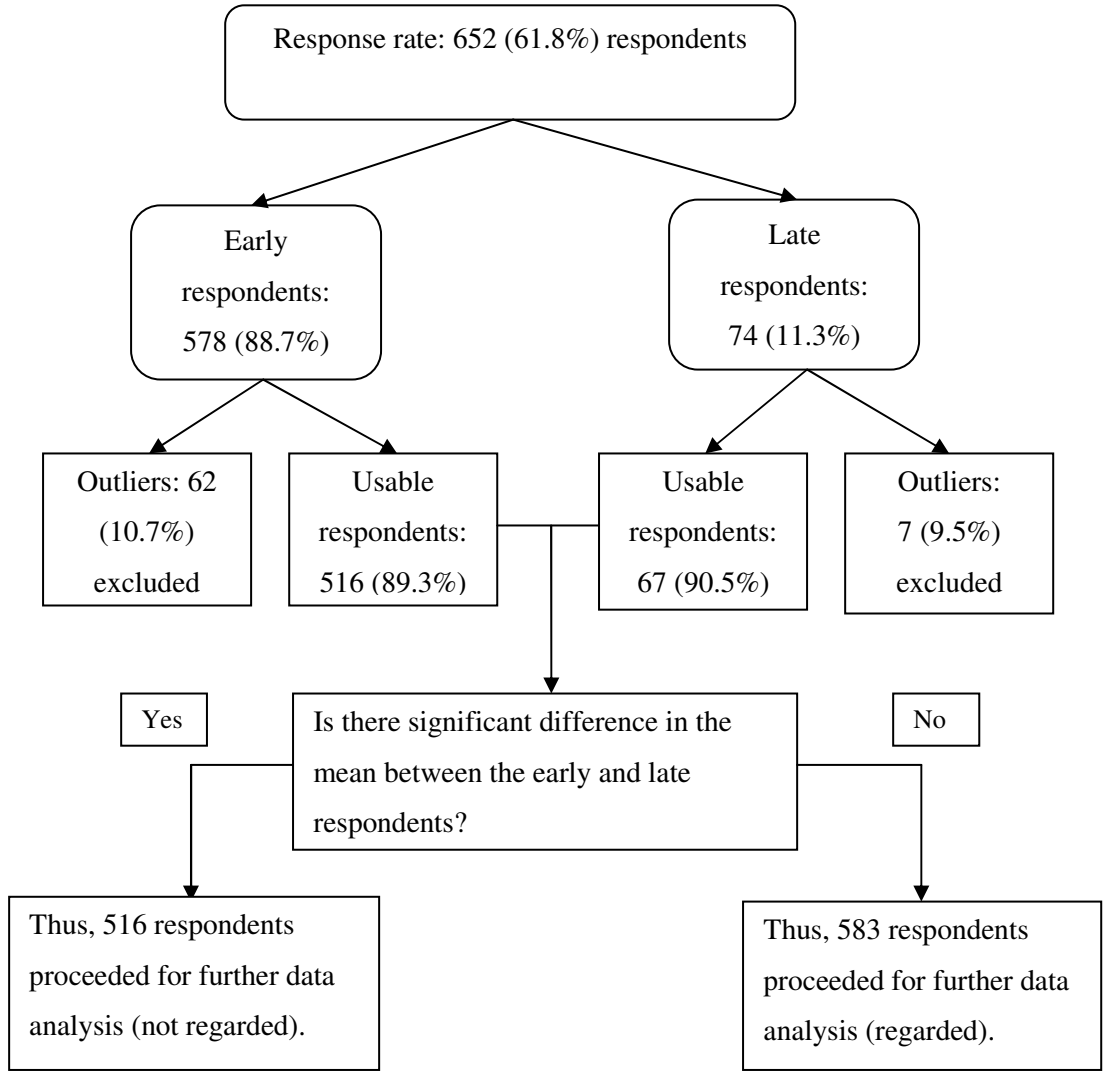

Figure 4.3
Total respondents used for further data analysis

4.4 Respondents' profile

After the data was cleaned, the sample's characteristics were highlighted. The sample characteristics are divided in two parts: participants' demographic data; and the ward and hospital that the participants are working in. Table 4.5 shows the

participants' nationality, age, gender, marital status, race, education level, job title, employment status, years of experience and their monthly salary.

Table 4.5
Participants' demographic data

Demographic characteristics	**Categories**	**Frequencies**	**Percentage (%)**
Nationality	Malaysian	577	99.0
	Non-Malaysian	6	1.0
Age	Less than 25 years	196	33.6
	25-30 years	255	43.7
	31-35 years	71	12.2
	Over 35 years	61	10.5
Gender	Male	14	2.4
	Female	569	97.6
Marital status	Married	264	45.3
	Single	306	52.5
	Others	13	2.2
Race	Malay	350	60.0
	Chinese	126	21.6
	Indian	83	14.2
	Others	24	4.1
Education level	Bachelor's degree	60	10.3
	Diploma	493	84.6
	Others	30	5.1
Job title	Staff nurse	527	90.4
	Assistant nurse	36	6.2
	Others	20	3.4
Employment status	Full-time	572	98.1
	Part-time	11	1.9
Years of experience	0-5 years	384	65.9
	6-10 years	108	18.5
	11-15 years	41	7.0
	Over 15 years	50	8.6

Table 4.5 (Continued)

Demographical characteristics	Categories	Frequencies	Percentage (%)
Monthly salary	Less than RM	8	1.4
	1,000	285	48.9
	RM 1,000-2,000	229	39.3
	RM 2,001-3,000	42	7.2
	RM 3,001-4,000	19	3.3
	Over RM 4,000		
Experience in the current ward	Less than 1 year	126	21.6
	1-5 years	329	56.4
	6-10 years	88	15.1
	11-15 years	26	4.5
	Over 15 years	14	2.4
Experience in nursing	Less than 1 year	82	14.1
	1-5 years	314	53.9
	6-10 years	98	16.8
	11-15 years	42	7.2
	Over 15 years	47	8.1

The demographic characteristics, as shown in Table 4.5, indicate that 99.0% of nurses who participated in the study are Malaysian; and 97.6% are female. The Malay nurses have the highest proportion of participation in the study at 60.0%; while 21.6% are Chinese; 14.2% are Indian; and 2.2% others (including Thais and Filipinos nurses). Most of the nurses are between 25-30 years of age (43.7%). Most of the respondents have a diploma (84.6%); while 10.3% have a bachelor's degree in nursing; and 5.1% others (including nurses with an associate degree in nursing). In terms of job title, the majority of nurses are staff nurse (90.4%); while only 6.2% are assistant nurses; and 3.4% others (such as community nurses, in-charge nurse), but all of them deliver direct in-patient care. The employment statuses of nurses participating in the study are 98.1% full-time, while 1.9% are part-time nurses. It was found that 48.9% of nurses earn between RM 1,000 and RM 2,000; and 39.3%

between RM 2,001 and RM 3,000; 10.5% over than RM 3,001; and 1.4% less than RM 1,000. Further, 60.9% of the respondents have less than five years working experience; 18.5% have 6-10 years; 7.0% have 11-15 years, and 8.6% have over 15 years of experience. In terms of years of experience, 21.6% have less than one-year experience in the current ward; 2.4% have worked for more than 15 years in the same ward; while 8.1% of the participants have worked for over 15 years.

Table 4.6 illustrates the ward and hospital characteristics of the participants of the study. The majority of nurses are working in large size hospitals (72.2%); while 16.5% are working in medium size hospitals; and 11.3% in small size hospitals. About 60.9% of nurses who participated in the study are working in teaching hospitals (hospitals awarding medical degrees); while 39.1% are working in non-teaching hospitals; 72.0% are working in non-accredited hospitals; and 28.0% in accredited hospitals. The total working hours of the nurses are mostly 7-hour shifts (47.7%); while 17.5% are working 8-hour shifts; 16.8% are working 10-hour shifts; 16.0% are working 12-hour shifts; and 2.1% others (including nurses working more than one-shift or "double shift"). The most prominent shift type is the morning shift (38.1%); while 15.1% are working in the afternoon shift; 19.9% are working in the evening shift; and 26.9% others (including those nurses working 12-hour "day and night shift" or "double shift").

Table 4.6
Participants' ward and hospital characteristics

Characteristics	Categories	Frequencies	Percentage (%)
Hospital beds	Less than 100	66	11.3
	100-199	96	16.5
	Over than 200	421	72.2
Teaching status	Teaching	355	60.9
	Non-teaching	228	39.1
Accreditation status	Accredited	163	28.0
	Non-accredited	420	72.0
Total working hours	7 hours	278	47.7
	8 hours	102	17.5
	10 hours	98	16.8
	12 hours	93	16.0
	Others	12	2.1
Shift type	Morning shift (A)	222	38.1
	Afternoon shift (B)	88	15.1
	Evening shift (C)	116	19.9
	Others	157	26.9
Patient-to-nurse ratio	Less than 5	45	7.7
	5-10	182	31.2
	11-15	140	24.0
	Over 15	216	37.0
Working ward	Medical	136	23.3
	Surgical	152	26.1
	General	43	7.4
	Multidisciplinary	186	31.9
	Others	66	11.3

The patient-to-nurse ratio shows that 37.0% of nurses working in Malaysian private hospitals have more than 15 patients under their care; whereas 24.0% have 11-15 patients; 31.2% have 5-10 patients; and 7.7% have less than five patients under their care in the last shift they were working. Further, 23.3% of nurses who participated in the study are working in the medical ward; 26.1% in the surgical ward; 7.4% in the general ward; 31.9% in the multidisciplinary ward; and 11.3% others (endoscopy,

oncology, cardiology and cardiothoracic wards where nurses provide direct in-patient care).

4.5 Test of multivariate assumptions

The final stage of preparing the data for multivariate analysis is statistically testing the multivariate assumptions, which include normality, linearity, multicollinearity and homoscedasticity (Hair *et al*., 2010). These assumptions were handled carefully in the study. Researchers argue that violation of one multivariate assumption could lead to bias or serious distortion of data analysis (Hair *et al*., 2010; Meyers *et al*., 2006; Pedhazur & Schmelkin, 1991).

4.5.1 Normality

Normality refers to the data distribution for an individual variable and its correspondence to a normal distribution curve (Hair *et al*., 2010). The continuous variable should be normally distributed in a bell-shaped curve (Meyers *et al*., 2006). The normality can be tested using graphical or statistical approaches (Coakes, 2005; Meyers *et al*., 2006; Stevens, 2009; Tabachnick & Fidell, 2013). Kurtosis and skewness are the most common statistical approaches used to describe the shape of a normal distribution and in most cases, achieving the univariate normality is sufficient to diagnose the normality (Hair *et al*., 2010). Kurtosis refers to the flatness and peakedness of the distribution; while skewness is used to describe the balance of the variable distribution to check whether it is skewed to the right or left (Hair *et al*., 2010). Table 4.7 shows the kurtosis and skewness of the study variables.

Table 4.7
Kurtosis and skewness results of study variables

Variable	Kurtosis	Skewness
Work environment	-0.10	0.84
Patient-centeredness	-0.22	1.94
Quality of care	-0.35	1.58
Patient safety	-0.10	0.58

Kurtosis and skewness are the most powerful statistical techniques for detecting normality; multivariate analysis functions fairly well when the kurtosis is within ±7, and skewness within ±2 (Stevens, 2009). The kurtosis value in this study, as shown in Table 4.7, ranges between -0.35 and -0.10; while the skewness value falls between 0.84 and 1.94; hence, normality was assumed.

The graphical approach for testing normality is the normal probability plot of the standardized regression residual. If the points are reasonably straight, this indicates no violation of the normality assumption (Pallant, 2011). As shown in Figures 4.4 and 4.5, the points lying from the top right to the bottom left are reasonably straight; thus, normality was assumed.

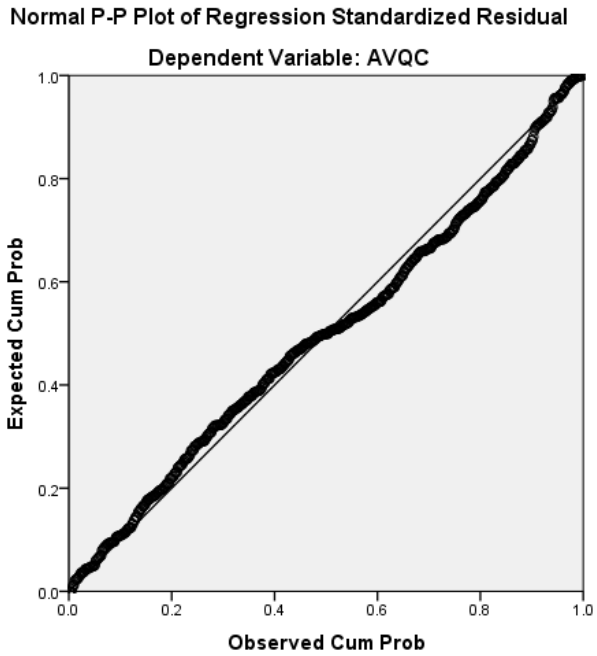

Figure 4.4
Normal probability plot of quality of care

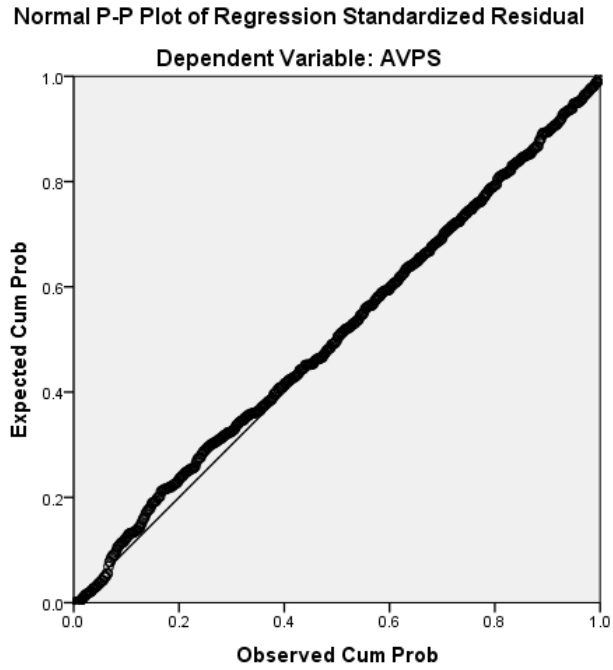

Figure 4.5
Normal probability plot of patient safety

4.5.2 Linearity

Linearity is an assumption of all multivariate analyses that should be obtained for the correlational measures, which include factor analysis, multiple regression, logistic regression and SEM (Hair *et al*., 2010). In case the variables are related in non-linear condition, then the correlation coefficient underestimates the strength of the relationship between variables (Pallant, 2011). The most common way of identifying non-linear pattern is by inspecting the scatterplots of standardized residuals of the variables (Hair *et al*., 2010). According to Hair *et al*. (2010), a simple regression analysis is conducted to obtain the residual value that identifies any non-linear portion not explained by the relationship, as done later in the model testing of this study. The scatterplots of the study, as shown in Figures 4.6 and 4.7, indicate that the scores are distributed in a rectangular shape with most of the points concentrated in the center. According to Pallant (2011), this indicates that the linearity is assumed.

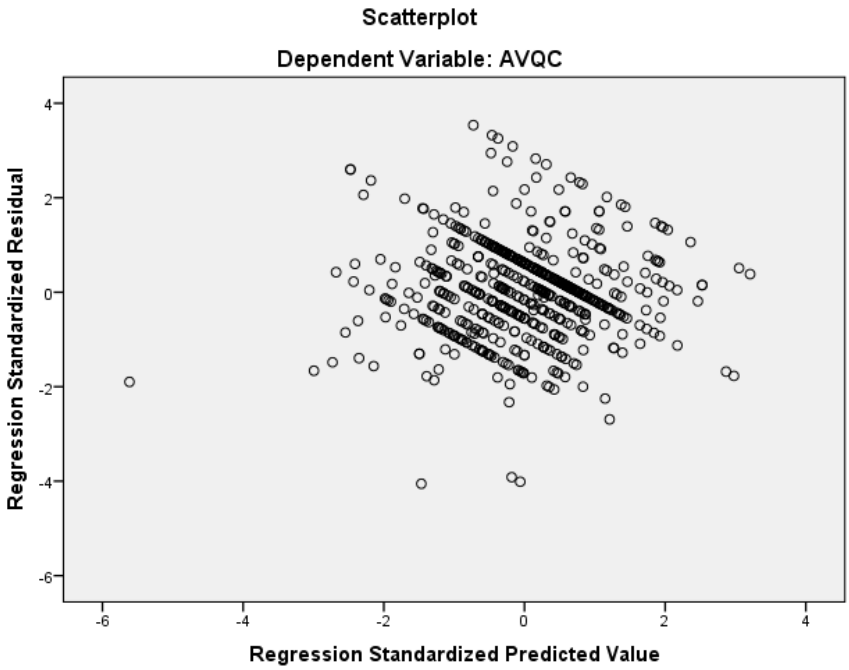

Figure 4.6
Scatterplots of standardized residuals of quality of care

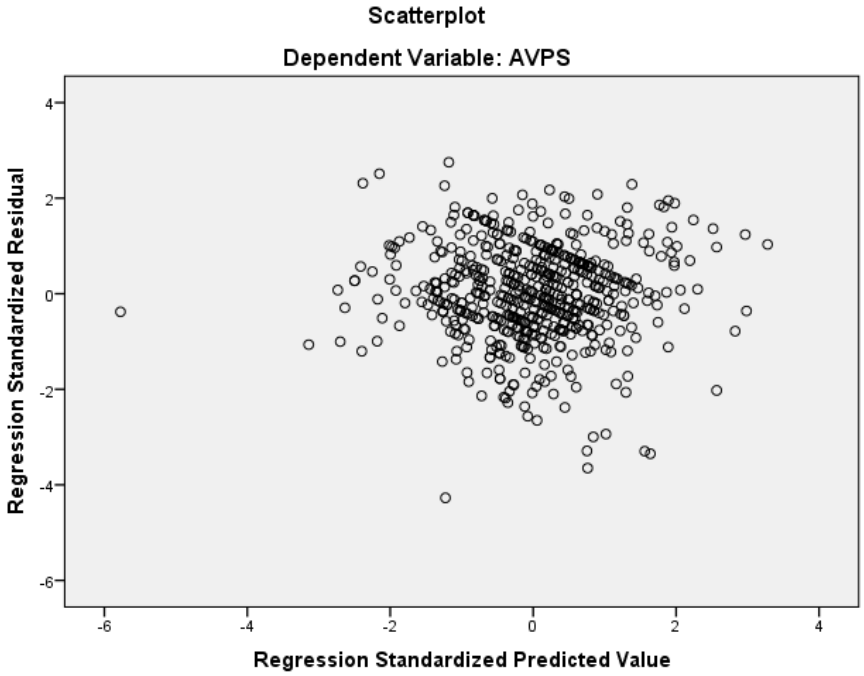

Figure 4.7
Scatterplots of standardized residuals of patient safety

4.5.3 Multicollinearity

Multicollinearity is a problem in a model containing two or more variables that measure the same thing (Tabachnick & Fidell, 2013). The variables with higher than 0.9 correlation are considered as multicollinearity variables (Tabachnick & Fidell, 2013). The correlation coefficient between the variables should preferably be above 0.30, and it is also preferable that it does not include two variables with a correlation above 0.70 in the same model (Pallant, 2011). Thus, as shown in Table 4.8, all variables are retained in the present model because they are free of multicollinearity.

Table 4.8
Correlations between study variables

Variables	**WE**	**PC**	**QC**	**PS**
Work environment (WE)	1.00	0.57	0.58	0.49
Patient-centeredness (PC)	0.57	1.00	0.51	0.48
Quality of care (QC)	0.58	0.51	1.00	0.61
Patient safety (PS)	0.49	0.48	0.61	1.00

Besides the correlation coefficient, the tolerance and VIF values are used to diagnose the multicollinearity assumption (Pallant, 2011). The tolerance value indicates how much the variable is not explained by other variables; a value smaller than 0.10 indicates potential multicollinearity (Pallant, 2011). The VIF indicates the inverse of tolerance value (one divided by the tolerance), and if this value exceeds 10, it indicates that the multicollinearity of this value is not assumed (Pallant, 2011). Table 4.9 shows the tolerance and VIF values in the study; there are no tolerance values

lesser than 0.10; and no VIF value greater than 10; therefore, the multicollinearity assumption is not violated.

Table 4.9
Tolerance and VIF values of study variables

Variables	Tolerance	VIF
Work environment	0.67	1.48
Patient-centeredness	0.67	1.48

4.5.4 Homoscedasticity

Homoscedasticity is assumed when the variability of the continuous variables has roughly the same value, known as homogeneity of variance (Ho, 2006; Pallant, 2011; Tabachnick & Fidell, 2013). Homogeneity of variance means that groups are coming from the same population with equal variances (Coakes, 2005). When normality is assumed, this means that the relationship between the variables is homoscedastic; and when it is not assumed, then the variables are heteroscedastic (Tabachnick & Fidell, 2013). While heteroscedasticity weakens the results of data analysis, however, it does not invalidate it (Tabachnick & Fidell, 2013). Graphically, the scatterplots used to diagnose the variability of the variables (Ho, 2006), are shown in Figures 4.6 and 4.7; the scores are concentrated in the center with no patterned relationship of the residuals. This means that the variables of the study are free from heteroscedasticity. Thus, the study data passed the multivariate assumptions, and the researcher was ready to proceed for further data analysis.

4.6 Construct validity

Validity and reliability are required to ensure the soundness of the study's measures. Validity refers to the extent to which the measures represent the study concepts; whereas reliability refers to the consistency of measures (Hair *et al*., 2010). Construct validity is established by conducting a factor analysis (Tabachnick & Fidell, 2013). Factor analysis is a data reduction procedure by using the smallest number of components or dimensions that measure the constructs of a study (Pallant, 2011). Factor analysis extracts the items that are mostly correlated with each other that help in naming or renaming the dimensions according to the items presented under each dimension (Tabachnick & Fidell, 2013). Exploratory factor analysis is the useful technique of data reduction to estimate the number of components of each construct without prior constraints (Hair *et al*., 2010). According to Tabachnick and Fidell (2013), an adequate sample size is required to conduct factor analysis and at least 300 cases are required. In this study, the total usable respondents is 583, considered as adequate cases for factor analysis. Three constructs were tested for validity and for reliability (work environment; patient-centeredness; and quality of care and patient safety constructs), as discussed in Section 4.7.

4.6.1 Factor analysis of nursing work environment

The work environment construct contains 27 items. This construct was measured using the PES-NWI, which is internationally recognized (Aiken *et al*., 2012; Coetzee *et al*., 2013; Lake, 2002; Van Bogaert *et al*., 2009; Warshawsky & Havens, 2011; You *et al*., 2013). This construct was adapted to the Malaysian context from the

organizational level to the individual nurse level of analysis. Exploratory factor analysis was conducted to identify the number of items and dimensions under the work environment construct. Two outputs were generated from the SPSS for factor analysis: the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) tests (Pallant, 2011). The Bartlett's test should be significant (less than 0.05); whereas the KMO should be higher than 0.60 for a sampling adequacy and suitability for factor analysis (Pallant, 2011; Tabachnick & Fidell, 2013). Table 4.10 presents the loading factor of items included for further data analysis and the Bartlett's and KMO values. The loading factors of items less than 0.50 were omitted from the analysis for greater interpretation of variances that share at least 25.0% of the variability of the construct (Hair *et al*., 2010; Stevens, 2009). This does not mean that the omitted items are not important, but they had little incremental predictive power, and their effect was already represented by other included items under its corresponding dimension (Hair *et al*., 2010).

Table 4.10
Factor analysis of the work environment construct

	1	2	3	4
WE19	0.81			
WE17	0.80			
WE5	0.74			
WE24	0.71			
WE4	0.54			
WE11	0.54			
WE22		0.77		
WE25		0.75		
WE27		0.69		
WE26		0.62		
WE21		0.60		
WE7			0.82	
WE2			0.81	
WE6			0.69	
WE12				0.80
WE1				0.76
WE20				0.61
Variances explained				58.2%
KMO				0.88
Bartlett's (Sig)				0.000

The suitability of factor analysis for the work environment construct was assessed using Bartlett's and KMO values (Pallant, 2011; Tabachnick & Fidell, 2013). The KMO value is 0.88, which is more than the recommended value of 0.60 (Pallant, 2011; Tabachnick & Fidell, 2013). Bartlett's test showed a statistical significance that supports the suitability of this construct for factor analysis. Table 4.10 shows these values and the factor loading of the retained items under each dimension. Items with loading factor of less than 0.50 were omitted from further analysis, which are WE3, WE8, WE9, WE10, WE13, WE14, WE15, WE16, WE18, and WE23. According to Kaiser (1960), dimensions with eigenvalues of more than one are retained (Stevens, 2009). The output of exploratory factor analysis as shown in

Appendix E reveals the existence of four dimensions (component factors), with eigenvalues more than one explaining variances of 33.8%, 10.5%, 7.7% and 6.2%, respectively. Moreover, all of these dimensions and items included in the study are consistent with the original scale. These four dimensions explain 58.2% of the variances. The first dimension refers to nurse participation in hospital affairs, and the loading factor of this dimension ranged from 0.54-0.81. The second dimension refers to nurse foundation for quality of care, and the loading factor of this dimension ranged from 0.60-0.74. The third dimension refers to nurse manager's ability, leadership and support of nursing, and the loading factor of this dimension ranged from 0.69-0.82. The fourth dimension refers to collegial nurse-physician relationship, and the loading factor of this dimension ranged from 0.61-0.80. Appendix E shows the full output of SPSS for exploratory factor analysis of the work environment construct.

4.6.2 Factor analysis of patient-centeredness

Patient-centeredness construct contains 39 items adopted from Planetree and Picker institutes. Exploratory factor analysis was conducted to identify the number of dimensions under this construct in a Malaysian context. The scree plot test helps to identify the total number of dimensions of the construct. Scree plot is a reliable approach to estimate the number of dimensions of the scale in a large sample size, and when the dimension includes items with high factor loadings (Tabachnick & Fidell, 2013). However, the blind use of scree plot criteria could lead to the removal of variables with small variances, which might be practically significant (Stevens,

2009). Thus, according to Kaiser (1960), dimensions with eigenvalues of more than one were retained in the study (Stevens, 2009). The output of exploratory factor analysis, as shown in Appendix E, reveals the existence of five dimensions with eigenvalues of more than one, explaining variances of 34.0%, 12.9%, 6.1%, 5.4% and 4.6%, respectively. These five dimensions explain a total 63.1% of the variances and were retained for further analysis in the study. The loading factor of each item, as illustrated in Table 4.11, reveals a high factor loading under each dimension.

Table 4.11
Factor analysis of patient-centered construct

	1	**2**	**3**	**4**	**5**
PC15	0.83				
PC16	0.82				
PC17	0.77				
PC18	0.75				
PC19	0.72				
PC20	0.68				
PC33		0.87			
PC32		0.83			
PC29		0.71			
PC30		0.57			
PC34		0.54			
PC31		0.54			
PC24			0.85		
PC23			0.84		
PC22			0.80		
PC25			0.78		
PC39				0.80	
PC38				0.75	
PC37				0.69	
PC1					0.81
PC2					0.79
PC3					0.57
Variances explained					63.1%
KMO					0.91
Bartlett's (Sig)					0.000

The suitability of this construct for factor analysis was assessed using Bartlett's and KMO values (Pallant, 2011; Tabachnick & Fidell, 2013). The KMO value is 0.91, which is more than the recommended value of 0.60 (Pallant, 2011; Tabachnick & Fidell, 2013). Bartlett's test shows a statistical significance that supports the suitability of this construct for factor analysis. Table 4.11 shows these values and the factor loading of the retained items under each dimension. Items with loading factors of less than 0.50 were omitted from further analysis: PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC21, PC26, PC27, PC28, PC35, and PC36. The loading factors of items less than 0.50 were omitted from the analysis for greater interpretation of variances that share at least 25.0% of the variability of the construct (Hair *et al*., 2010; Stevens, 2009). This does not mean that the omitted items are not important, but they had little incremental predictive power, and their effects are already represented by other items included under its corresponding dimension (Hair *et al*., 2010). These five dimensions produced from the factor analysis showed that the four dimensions are exactly as proposed, as adapted from the Planetree and Picker institutes. However, the patient-centered documentation was not validated in the Malaysian private hospitals (items between PC8-PC14). This result is consistent with some nursing directors' comments: "The procedures and policies do not allow patients and families to access the medical records". The patient-centered communication dimension was split into two dimensions: the first group of items; PC15-PC20, refers to the communication process, while the second group, PC22-PC25, refers to the effectiveness of the communication process (feedback), revealing the patient's level of awareness and education. So, the net result of factor analysis is five dimensions, as shown in Table 4.11. The first dimension refers to patient-

centered communication and the factor loading for this dimension ranged between 0.68-0.83. The second dimension refers to personalization of care, and the factor loading ranged between 0.54-0.87. The third dimension refers to patient-centered education (effective communication and feedback), and the factor loading ranged between 0.78-0.85. The fourth dimension refers to family involvement and the factor loading ranged between 0.69-0.80. The fifth dimension refers to continuity of care, and the factor loading ranged between 0.57-0.81. Appendix E shows the full output of SPSS for exploratory factor analysis of the patient-centered construct.

4.6.3 Factor analysis of quality of care and patient safety

Quality of care and patient safety construct includes 18 items adopted from Aiken *et al*. (2012); Coetzee *et al*. (2013); and Van Bogaert *et al*. (2009, 2013) Exploratory factor analysis was conducted to identify the number of items and dimensions under this construct in the Malaysian context. The output of exploratory factor analysis, as shown in the Appendix E, reveals the existence of two dimensions with eigenvalues of more than one, explaining variances of 49.1% and 12.7%, respectively. The loading factor of each item, as illustrated in Table 4.12, reveals a high factor loading under each dimension (ranging between 0.56-0.83 for the first dimension; and 0.68-0.91 for the second dimension). These two dimensions explain a total 61.8% of the variances. The full SPSS output of exploratory factor analysis for quality of care and patient safety construct is shown in Appendix E.

The suitability of factor analysis for the quality of care and patient safety construct were assessed using Bartlett's and KMO values (Pallant, 2011; Tabachnick & Fidell, 2013). The KMO value is 0.88, which exceeds the recommended value of 0.60 (Pallant, 2011; Tabachnick & Fidell, 2013). Bartlett's test shows a statistical significance that supports the suitability of this construct for factor analysis. Table 4.12 shows these values and the factor loading of the retained items under each dimension. Items with factor loadings of less than 0.50 were omitted from further analysis: PS1, PS9, PS10, PS11, PS12,and QC3. The first dimension was classified as quality of care; while the second was classified as patient safety, as proposed and classified by previous authors.

Table 4.12
Factor analysis of quality of care and patient safety construct

	1	**2**
PS3	0.83	
PS5	0.83	
PS4	0.80	
PS6	0.78	
PS2	0.70	
PS7	0.66	
PS8	0.56	
QC5		0.91
QC4		0.86
QC6		0.85
QC2		0.69
QC1		0.68
Variances explained		61.8%
KMO		0.88
Bartlett's (Sig)		0.000

4.7 Construct reliability

Construct reliability refers to the consistency of the measures (Hair *et al*., 2010) and its capability in measuring the same construct (Sekaran & Bougie, 2010). The most popular indicator used for internal consistency is Cronbach's alpha coefficient (Pallant, 2011; Sekaran & Bougie, 2010). According to Malhotra and Birks (2007), a value of 0.60 for Cronbach's alpha coefficient indicates a satisfactory internal consistency of the scale. Table 4.13 shows the internal consistency of the study's constructs and dimensions. The study's constructs have a good internal consistency with a Cronbach's alpha coefficient for work environment construct of 0.87; patient-centeredness of 0.89; and quality of care and patient safety of 0.90. The dimensions of these constructs are adequately consistent in measuring its construct, as shown in Table 4.13. Appendix F shows the full SPSS output of reliability analysis of the study variables.

Table 4.13
Reliability coefficient of constructs and its dimensions

Construct	**No. of Items**	**Cronbach's Alpha**
Work environment construct	17	0.87
1. Manager's ability, leadership and support	3	0.79
2. Nurse participation	6	0.82
3. Nurse foundation for quality	5	0.73
4. Nurse-physician relationship	3	0.67
Patient-centered construct	22	0.89
1. PC continuity of care	3	0.64
2. PC communication	6	0.88
3. PC education	4	0.86
4. PC personalization	6	0.82
5. PC family involvement	3	0.63
Quality of care and patient safety construct	12	0.90
1. Quality of care	5	0.87
2. Patient safety	7	0.87

4.8 Descriptive analysis

The main purposes of descriptive statistics are to describe the characteristics of categorical and continuous data (Pallant, 2011), and find a reliable difference(s) to estimate the population values (Tabachnick & Fidell, 2013). Moreover, the purpose of descriptive statistics in the study, as mentioned in Section 3.10.2, is to answer research question one. The characteristics of nurses who participated in the study are the frequencies and percentage of the nationality, age, gender, race and educational level; and their years of working experience, all of which were discussed in Section 4.4, in the respondent profiles' section. The categorical data of the nurses' wards and hospital characteristics were discussed as well. So, this section discusses the descriptive statistics for continuous data of the study variables.

First, this section describes the mean, standard deviation and the range of the perceived work environment, perceived quality of care and patient safety and the degree of patient-centeredness of nurses participating in the study, as shown in Table 4.14. The mean of the perceived work environment is 3.59; where the highest score of mean refers to a better work environment. It is shown that the mean of its dimensions ranges between 3.32 for the nurse participation in hospital affairs dimension and 3.78 for the nurse foundation for the quality of care dimension. Similarly, the patient-centeredness construct mean is 3.65, which indicates the degree of patient-centeredness of nurses participating in the study is high. The patient-centered education mean is 3.90, which is the highest score, followed by the patient-centered communication mean of 3.86; while the patient-centered continuity of care is the lowest at 3.36. The dependent variables of the study are the quality of

care and patient safety. The perceived quality of care mean is 3.73 and it is higher than the perceived patient safety dimension of 3.58.

Table 4.14
Descriptive statistics of the study's continuous variables

Constructs and dimensions	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Work environment construct	1.47	4.76	3.57	0.42
1. Nurse manger's ability, leadership and support	1.33	5.00	3.68	0.63
2. Nurse participation in hospital affairs	1.50	4.83	3.32	0.56
3. Nurse foundation for quality of care	1.20	5.00	3.78	0.48
4. Nurse-physician relationship	1.00	5.00	3.64	0.55
Patient-centered construct	1.59	4.82	3.65	0.39
1. PC communication	2.17	5.00	3.86	0.47
2. PC personalization of care	1.50	5.00	3.49	0.56
3. PC education	1.25	5.00	3.90	0.49
4. PC family involvement	1.00	5.00	3.50	0.59
5. PC continuity of care	1.00	5.00	3.36	0.64
Quality of care and patient safety construct	1.17	5.00	3.64	0.51
1. Quality of care	1.00	5.00	3.73	0.56
2. Patient safety	1.00	5.00	3.58	0.58

Secondly, descriptive statistics aim to answer the first research question of the study (What are the most common adverse events in Malaysian private hospitals). Descriptive statistics for the validated and reliable items of the patient safety dimension were explored in order to identify the most common adverse events among nurses working in medical and surgical wards, as shown in Table 4.15. The higher mean score indicates uncommon adverse events and superior safety metrics. As shown in Table 4.15, nosocomial infection is the least common adverse event in

Malaysian private hospitals; with a mean of 3.72; while patient and family complaints is the most common adverse event in Malaysian private hospitals, with a mean of 3.45. This output is consistent with the Malaysian MOH Annual Report 2011, that patient and family complaints are sharply increasing, as discussed in Section 1.2.4 and Figure 1.3. Thus, the importance of investigating the predictors that lead to jeopardizing the quality of care and patient safety are proposed. Hence, regression analysis is required to investigate the effect of these predictors on the outcomes of care.

Table 4.15
Descriptive statistics of adverse events in Malaysian private hospitals

The adverse events items	**Mean**	**Standard deviation**
I rarely come across nosocomial infection events in my current work	3.72	0.76
I rarely come across pressure ulcer events in my current work.	3.62	0.77
I rarely come across patient fall events in my current work.	3.65	0.78
I rarely come across medication errors events in my current work.	3.62	0.71
I rarely come across re-admission events in my current work.	3.54	0.73
I rarely come across patient and family complaints events in my current work.	3.45	0.80
I rarely come across patient and family complaints of verbal abuse in my current work.	3.52	0.86

4.9 Regression analysis and hypothesis testing

Regression analysis is the process of predicting the dependent variable from one independent (simple regression analysis) or several independent variables (multiple regression analysis) in order to answer the study questions and test the hypotheses (Field, 2009). After the multiple regression assumptions (normality, linearity, multicollinearity and homoscedasticity) and the descriptive statistics, correlation and factor analyses were performed, with the study data being prepared for regression analysis and hypothesis testing. Testing of hypothesis is performed to answer the research questions and identify the impact of hospital nurse staffing and work environment on the quality of care and patient safety; and to identify the mediating effect of patient-centeredness between these relationships. The results of factor analysis reveal that the dependent variable in the study has two dimensions: the quality of care and patient safety. Thus, the research framework proposed in Section 3.2 (Figure 3.1) is divided into two models: Figure 3.1 (a) and Figure 3.1 (b) - the model for predicting the quality of care and the model for predicting patient safety, respectively, as shown in Figure 4.8. So, the proposed hypotheses in the study, as discussed previously in Section 3.3, become eight hypotheses (double); and the hypotheses were restated to differentiate the one that was hypothesized for predicting the quality of care rather than patient safety, as shown in Table 4.16. The hypotheses, as shown in Figure 4.8, are consistent with the proposed hypotheses, the flow of the regression analysis of the present chapter, the discussions in the concluding chapter.

Figure 3.1 (a) *Quality of care model after factor analysis (model 1)*

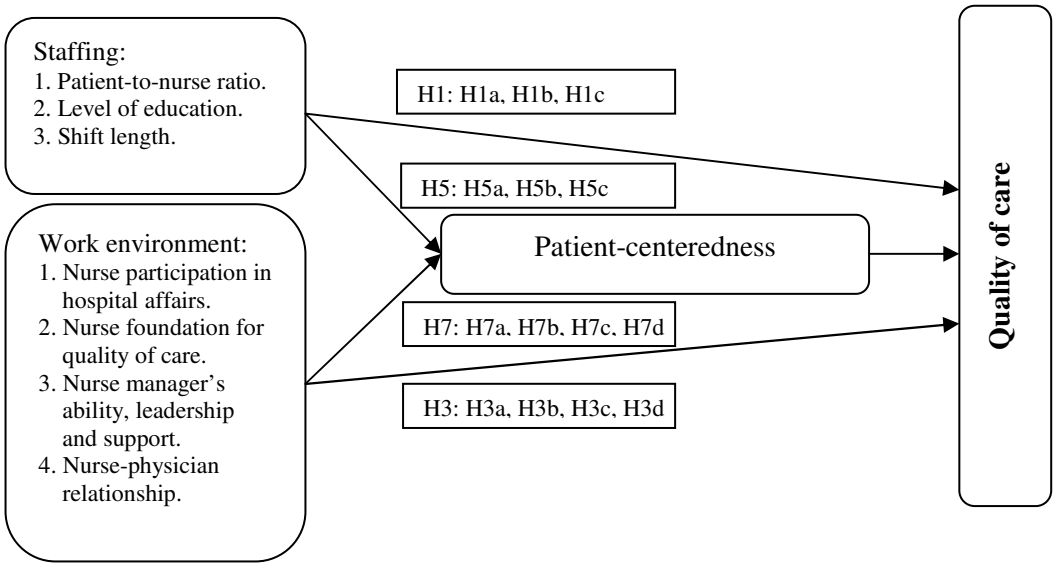

Figure 3.1 (b) *Patient safety model after factor analysis (model 2)*

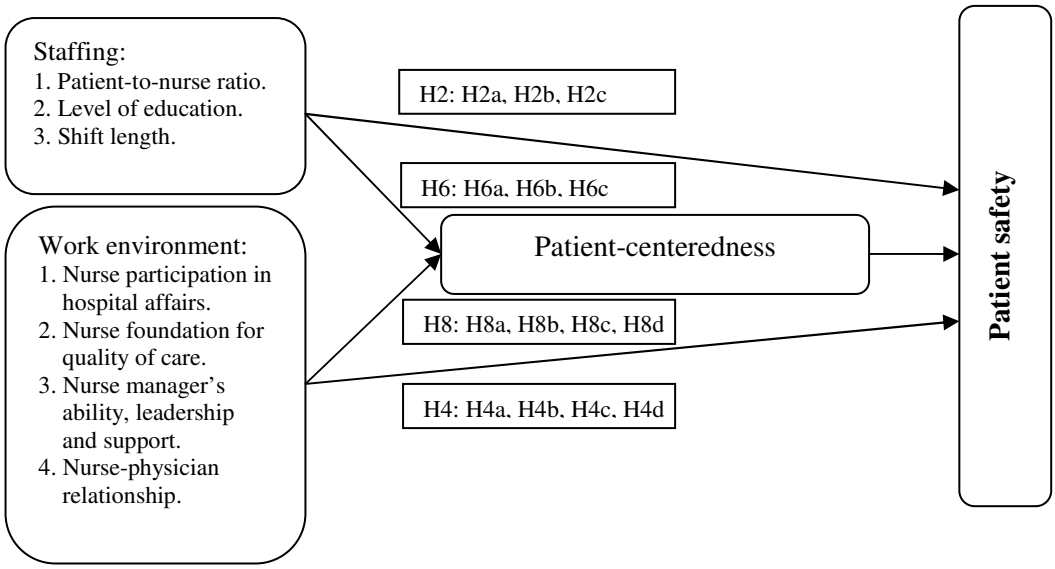

Figure 4.8
Quality of care and patient safety models after factor analysis

Table 4.16
Restatement of the study hypotheses

Hypothesis No	Hypothesis statement
Hypothesis 1	Staffing has a significant effect on the quality of care.
H1a	Patient-to-nurse ratio has a significant effect on the quality of care.
H1b	Nurse level of education has a significant effect on the quality of care.
H1c	Length of nurses' duty hours has a significant effect on the quality of care.
Hypothesis 2	Staffing has a significant effect on patient safety.
H2a	Patient-to-nurse ratio has a significant effect on patient safety.
H2b	Nurse level of education has a significant effect on patient safety.
H2c	Length of nurses' duty hours has a significant effect on patient safety.
Hypothesis 3	Work environment has a significant effect on the quality of care.
H3a	Nurse participation in hospital affairs has a significant effect on the quality of care.
H3b	Nurse foundation for quality of care has a significant effect on the quality of care.
H3c	Nurse manager's ability and leadership support has a significant effect on the quality of care.
H3d	Nurse-physician relationship has a significant effect on the quality of care.
Hypothesis 4	Work environment has a significant effect on patient safety.
H4a	Nurse participation in hospital affairs has a significant effect on patient safety.
H4b	Nurse foundation for quality of care has a significant effect on patient safety.
H4c	Nurse manager's ability and leadership support has a significant effect on patient safety.
H4d	Nurse-physician relationship has a significant effect on patient safety.
Hypothesis 5	Patient-centeredness mediates the effect of staffing on the quality of care.
H5a	Patient-centeredness mediates the effect of patient-to-nurse ratio on the quality of care.
H5b	Patient-centeredness mediates the effect of nurse level of education on the quality of care.
H5c	Patient-centeredness mediates the effect of length of nurses' duty hours on the quality of care.
Hypothesis 6	Patient-centeredness mediates the effect of staffing on patient safety.
H6a	Patient-centeredness mediates the effect of patient-to-nurse ratio on patient safety.
H6b	Patient-centeredness mediates the effect of nurse level of education on patient safety.
H6c	Patient-centeredness mediates the effect of length of nurses' duty hours on patient safety.

Table 4.16 (Continued)

Hypothesis No	Hypothesis statement
Hypothesis 7	Patient-centeredness mediates the effect of work environment on the quality of care.
H7a	Patient-centeredness mediates the effect of nurse participation in hospital affairs on the quality of care.
H7b	Patient-centeredness mediates the effect of nurse foundation for quality of care on the quality of care.
H7c	Patient-centeredness mediates the effect of nurse manager's ability and leadership support on the quality of care.
H7d	Patient-centeredness mediates the effect of nurse-physician relationship on the quality of care.
Hypothesis 8	Patient-centeredness mediates the effect of work environment on patient safety.
H8a	Patient-centeredness mediates the effect of nurse participation in hospital affairs on patient safety.
H8b	Patient-centeredness mediates the effect of nurse foundation for quality of care on patient safety.
H8c	Patient-centeredness mediates the effect of nurse manager's ability and leadership support on patient safety.
H8d	Patient-centeredness mediates the effect of nurse-physician relationship on patient safety.

Hypothesis is a statement of a population's characteristics that is tested by the null hypothesis H_0 at a predefined level of significant P value (Verma, 2013). The null hypothesis means that there are no differences between the population's parameters and the sample (Verma, 2013). The significance level of the study is 0.05, with a confidence interval of 95%. When the null hypothesis is rejected ($P < 0.05$), then the alternative hypothesis H_1 (study hypothesis) will be supported, meaning that there is a significant association between the independent and dependent variables (Hayes, 2013; Verma, 2013). However, there are four alternative decisions about accepting or rejecting the null hypothesis, through which the researcher expected to be exposed to two correct decisions and to two types of errors (Hair *et al*., 2010; Verma, 2013):

1. Reject H_0 when it is false, and this is correct decision.

2. Fail to reject H_0 when it is true, and this is correct decision.

3. Reject H_0 when it is true, and this is called type I error.

4. Fail to reject H_0 when it is false, and this is called type II error.

Before proceeding to regression analysis and hypothesis testing, it was prudent to highlight the simple and multiple regression equations that define the symbols used in interpreting the findings of the study. The simple linear regression equation, as shown below, links one independent variable (X) with a dependent variable (Y) to identify their respective association (Hayes, 2013), where b_0 is the regression intercept (constant); b_1 is the regression coefficient; and e is the error term of the estimation of the relationship, known as the residual (Hayes, 2013).

$$Y = b_0 + b_1X + e \qquad (1)$$

Ordinary least squares (OLS) regression in SPSS is best used to estimate the values b_0,, b_1, and the residual values (Hayes, 2013). The sign of the regression coefficient indicates the direction of the relationship of the independent variable on the dependent variable (Hayes, 2013). The coefficient of determination (R^2) and the standardized coefficient (β) are outputs of the regression analysis, with the R^2 value indicating the proportion of variances in the dependent variable, which is explained by independent variables; while β indicates the expected differences in the dependent

variable by one standard deviation (SD) change in an independent variable (Hayes, 2013).

Multiple regression is a statistical analysis technique that analyzes and predicts the relationship between a single continuous dependent variable with a set of independent variables (Cohen, Cohen, West, & Aiken, 2003; Hayes, 2013; Ho, 2006; Pallant, 2011; Tabachnick & Fidell, 2013; Verma, 2013), which allows the researcher to investigate the relationship between the variables simultaneously (Hayes, 2013). Similarly, the multiple regression equation for k number of independent variables is extended from the simple regression equation in the following manner (Hayes, 2013):

$$Y = b_0 + b_1X_1 + b_2X_2 + \ldots + b_kX_k + e \qquad (2)$$

In regression analysis, the predictor could be continuous or dichotomous (categorical), and equations (1) and (2) are used without modification when the predictor is dichotomous (Hayes, 2013). The study variables are work environment, patient-centeredness, quality of care and patient safety, all of which are continuous. The staffing construct in the study is categorical data, and contains three dimensions. Dummy coding was used to conduct regression analysis to compare the differences between these groups in the categorical variable. However, the differences between groups of dummy coded variables (0, 1) were deferred by one unit rather than by one standard deviation; thus, the unstandardized coefficient (B) is reported for interpreting the findings rather than the standardized coefficient (β) for the categorical variables (Hayes, 2013).

4.9.1 Regression analysis of the effect of staffing on the quality of care

The staffing construct includes three multicategorical dimensions: patient-to-nurse ratio; nurse level of education; and the length of nurses' duty hours. Categorical dimension with j categories requires j – 1 dummy variables to capture all the information for each category (Cohen *et al*., 2003; Hardy, 1993; West, Aiken, & Krull, 1996). According to Hardy (1993), the reference group should be carefully chosen as a useful comparison group. This group should be the group expected to score highest or lowest in relation to the dependent variable (Cohen *et al*., 2003; Hardy, 1993; West *et al*., 1996). The reference group should be well defined in order to clearly interpret the regression results, and should not be "others" category (Cohen *et al*., 2003; Hardy, 1993; West *et al*., 1996). So, according to these criteria, the reference group of each dimension was chosen. For instance, nurses with diploma were expected to score lower on the perceived quality of care than higher educated nurses (bachelor's degree); so it was chosen as a comparison group for the nurse level of education dimension. Similarly, nurses working for seven hours are expected to score higher perceived quality of care than nurses working longer shifts, and the issues of predicting factors led to poor quality of care or patient safety (patient and family complaints), so 7-hour shift was chosen as a comparison group. Further, for similar reasons, nurses delivering care for less than five patients were chosen as a comparison group for the patient-to-nurse ratio dimension. Thus, each dummy variable captured information to explain its impact on the quality of care. Figure 4.9 as shown below, highlights the dummy variables and the reference groups under each dimension of the staffing construct.

Dummy coding of patient-to-nurse ratio

Category	Dummy 5-10 patients	Dummy 11-15 patients	Dummy over 15 patients
Less than 5 patients (R)	0	0	0
5-10 patients	1	0	0
11-15 patients	0	1	0
Over 15 patients	0	0	1

Dummy coding of nurse level of education

Category	Dummy bachelor's	Dummy other education
Diploma (R)	0	0
Bachelor's	1	0
Others	0	1

Dummy coding of length of nurses' duty hours

Category	Dummy 8 hour shift	Dummy 10 hour shift	Dummy 12 hour shift	Dummy other shift
7-hour shift (R)	0	0	0	0
8-hour shift	1	0	0	0
10-hour shift	0	1	0	0
12-hour shift	0	0	1	0
Others	0	0	0	1

R: Reference group

Figure 4.9
Dummy coding of the staffing construct

The regression analysis of staffing construct explored three sub-models of multiple regression analysis. Hypotheses H1a, H1b, H1c were tested to predict the impact of patient-to-nurse ratio; nurse level of education; and length of nurses' duty hours on the quality of care, respectively. All these dimensions were explored simultaneously to identify the predictive power of the staffing construct on the perceived quality of care among nurses working in medical and surgical wards in Malaysian private hospitals.

4.9.1.1 Patient-to-nurse ratio and quality of care

The patient-to-nurse ratio dimension included three dummy variables. Table 4.17 provides the results of multiple regression analysis of its impact on quality of care in order to test the hypotheses:

H1a: *Patient-to-nurse ratio has a significant effect on the quality of care.*

$H1a_0$: *Patient-to-nurse ratio has no significant effect on the quality of care.*

Table 4.17
Multiple regression analysis results of patient-to-nurse ratio on the quality of care

Variables	**Unstandardized Coefficients B**	**Std. Error**	**Standardized Coefficients β**	**t**	**Sig.**
(Constant)	3.90	0.08		46.46	0.00
5-10 patients	-0.12	0.09	-0.10	-1.27	0.20
11-15 patients	-0.21*	0.10	-0.16	-2.13	0.03
Over 15 patients	-0.22*	0.09	-0.19	-2.38	0.02
R^2	0.01				
F value	2.61				
Significance of F value	0.05				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.17 show that F = 2.61 and P value = 0.05, indicating that the study has failed to reject the null hypothesis $H1a_0$. So, the effect of patient-to-nurse ratio on the quality of care is not significant. The R^2 indicates that the patient-to-nurse ratio variable predicts 0.01 of variances in the quality of care, and is not significant at a level of $p<0.05$. However, the unstandardized coefficient of the three dummy variables indicates that increasing patient-to-nurse ratio is negatively associated with the quality of care; by increasing the number of patients assigned under each nurse, this negative impact increases by 0.12, -0.21 and -0.22, respectively. Further, nurses delivering care for 11-15 patients variable (B=-0.21, t=-2.13, p=0.03) has a significant negative impact on the quality of care at $p<0.05$ significance level compared to those caring for less than five patients. Similarly, nurses delivering care for over 15 patients variable (B=-0.22, t=-2.38, p=0.02) has a significant negative impact on the quality of care at $p<0.05$ significance level compared to those caring for less than five patients.

4.9.1.2 Nurse level of education and quality of care

Nurse level of education dimension includes two dummy variables. Table 4.18 provides the results of multiple regression analysis of the impact on the quality of care in order to test the hypotheses:

H1b: *Nurse level of education has a significant effect on the quality of care.*

$H1b_0$: *Nurse level of education has no significant effect on the quality of care.*

Table 4.18
Multiple regression analysis results of nurse level of education on the quality of care

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	3.74	0.03		146.60	0.00
Bachelor's degree	-0.07	0.08	-0.04	-0.86	0.39
Other education	0.12	0.11	0.05	1.11	0.27
R^2	0.004				
F value	1.07				
Significance of F value	0.34				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.18 show that F = 1.07 and P value = 0.34, indicating that the study has failed to reject the null hypothesis $H1b_0$. So, the effect of the nurse level of education on the quality of care is not significant. The R^2 value indicates that the nurse level of education variable predicts only 0.004 of variances in the quality of care and is not significant at a level of p<0.05. Moreover, nurses with bachelor's degree variable (B=-0.07, t=-0.86, p=0.39) does not significantly affect the quality of care at p<0.05 significance level compared to those having diplomas.

4.9.1.3 Length of nurses' duty hours and quality of care

Length of nurses' duty hours dimension includes four dummy variables. Table 4.19 provides the results of multiple regression analysis of its impact on the quality of care in order to test the hypotheses:

H1c: *Length of nurses' duty hours has a significant effect on the quality of care.*

$H1c_0$: *Length of nurses' duty hours has no significant effect on the quality of care.*

Table 4.19
Multiple regression analysis results of length of nurses' duty hours on the quality of care

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	3.74	0.03		110.38	0.00
8-hour shift	0.07	0.07	0.05	1.04	0.30
10-hour shift	-0.11	0.07	-0.07	-1.64	0.10
12-hour shift	-0.01	0.07	-0.01	-0.16	0.88
Other shift	0.03	0.17	0.01	0.15	0.88
R^2	0.01				
F value	1.27				
Significance of F value	0.28				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.19 show that F = 1.27 and P value = 0.28, indicating that the study has failed to reject the null hypothesis $H1c_0$. So, the effect of length of nurses' duty hours on the quality of care is not significant. R^2 indicates that the length of nurses' duty hours variable predicts 0.01 of variances in the quality of care and is not significant at a level of p<0.05. However, the unstandardized coefficient of the dummy variables indicates that nurses working 10-hour (B=-0.11, t=-1.64, p=0.10) and 12-hour shifts (B=-0.01, t=-0.16, p=0.88) are negatively associated with the quality of care compared to nurses working 7-hour shifts. However, these negative associations are not significant at p<0.05 significance level for predicting the quality of care of nurses working in the medical and surgical wards in Malaysian private hospitals.

4.9.1.4 Staffing and quality of care

The staffing construct regression analysis measured the impact of patient-to-nurse ratio; nurse level of education; and length of nurses' duty hours dimensions

(previously measured models) simultaneously on the perceived quality of care among nurses working in medical and surgical wards in Malaysian private hospitals. Table 4.20 provides the results of multiple regression analysis of these dummy variables in order to test the first hypotheses:

H1: *Staffing has a significant effect on the quality of care.*

$H1_0$: *Staffing has no significant effect on the quality of care.*

Table 4.20
Multiple regression analysis results of staffing on the quality of care

Variables	**Unstandardized Coefficients B**	**Std. Error**	**Standardized Coefficients β**	**t**	**Sig.**
(Constant)	3.90	0.09		45.56	0.00
5-10 patients	-0.12	0.09	-0.10	-1.24	0.22
11-15 patients	-0.20*	0.10	-0.15	-2.01	0.04
Over 15 patients	-0.22*	0.09	-0.19	-2.34	0.02
Bachelor's degree	-0.07	0.08	-0.04	-0.86	0.39
Other education	0.11	0.11	0.05	1.07	0.29
8-hour shift	0.07	0.07	0.04	0.99	0.32
10-hour shift	-0.09	0.07	-0.06	-1.34	0.18
12-hour shift	0.03	0.07	0.02	0.46	0.64
Other shift	0.07	0.17	0.02	0.44	0.66
R^2	0.02				
F value	1.60				
Significance of F value	0.11				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.20 show that F = 1.60 and P value = 0.11, indicating that the study has failed to reject the null hypothesis $H1_0$. So, the effect of staffing on the quality of care is not significant among nurses working in medical and surgical wards in Malaysian private hospitals. The R^2 value

indicates that the staffing construct predicts 0.02 of variances in the quality of care and is not significant at the $p<0.05$ level. However, the unstandardized coefficient reveals that nurses delivering care for 11-15 patients (B=-0.20, t=-2.01, p=0.04); and nurses delivering care for over 15 patients (B=-0.22, t=-2.34, p=0.02) have significant negative impact on the quality of care at $p<0.05$ significance level compared to those caring for less than five patients. However, according to the p-value of 0.11, it can be concluded that H1 is not supported.

4.9.2 Regression analysis of the effect of staffing on patient safety

The regression analysis of the staffing construct to predict patient safety explored three sub-models of multiple regression analysis. The hypotheses H2a, H2b, H2c were tested to predict the impact of patient-to-nurse ratio; nurse level of education; and length of nurses' duty hours on patient safety, respectively. All these dimensions were explored simultaneously to identify the predictive power of the staffing construct on patient safety among nurses working in the medical and surgical wards in Malaysian private hospitals.

4.9.2.1 Patient-to-nurse ratio and patient safety

Table 4.21 provides the results of multiple regression analysis of the impact of patient-to-nurse ratio on patient safety in order to test the hypotheses:

H2a: *Patient-to-nurse ratio has a significant effect on patient safety.*

$H2a_0$: *Patient-to-nurse ratio has no significant effect on patient safety.*

Table 4.21
Multiple regression analysis results of patient-to-nurse ratio on patient safety

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	3.80	0.09		43.46	0.00
5-10 patients	-0.18	0.10	-0.14	-1.81	0.07
11-15 patients	-0.25*	0.10	-0.18	-2.44	0.02
Over 15 patients	-0.26**	0.10	-0.21	-2.66	0.01
R^2	0.01				
F value	2.73*				
Significance of F value	0.04				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of the regression analysis in Table 4.21 show that F = 2.73 and P value = 0.04, indicating that the study rejects the null hypothesis $H1a_0$. So, the effect of patient-to-nurse ratio on patient safety is significant. The R^2 indicates that patient-to-nurse ratio variable predicts 0.01 of variances in patient safety, and is significant at the p<0.05 level. Moreover, the unstandardized coefficient of the three dummy variables indicates that increasing patient-to-nurse ratio is negatively associated with patient safety, and by increasing the number of patients assigned under each nurse, this negative impact increases by -0.18, -0.25, and -0.26, respectively. Further, nurses delivering care for 11-15 patients (B=-0.25, t=-2.44, p=0.02) has a significant negative impact on patient safety at p<0.05 significance level, compared to those caring for less than five patients. Similarly, nurses delivering care for over 15 patients (B=-0.26, t=-2.66, p=0.01) has a significant negative impact on patient safety at p<0.01 significance level compared to those caring for less than five patients among nurses working in medical and surgical wards in Malaysian private hospitals. Thus, hypothesis H2a is supported.

4.9.2.2 Nurse level of education and patient safety

Table 4.22 shows the results of multiple regression analysis of the nurse level of education on patient safety in order to test the hypotheses:

H2b: *Nurse level of education has a significant effect on patient safety.*

$H2b_0$: *Nurse level of education has no significant effect on patient safety.*

Table 4.22
Multiple regression analysis results of nurse level of education on patient safety

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	3.59	0.03		135.42	0.00
Bachelor's degree	-0.05	0.08	-0.03	-0.62	0.53
Other education	-0.03	0.11	-0.01	-0.26	0.80
R^2	0.001				
F value	0.22				
Significance of F value	0.81				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.22 show that F = 0.22 and P value = 0.81, indicating that the study has failed to reject the null hypothesis $H2b_0$. So, the effect of nurse level of education on patient safety is not significant. The value of R^2 indicates that nurse level of education variable predicts only 0.001 of variances in patient safety, and is not significant at level p<0.05. Moreover, nurses with bachelor's degree (B=-0.05, t=-0.62, p=0.53) is not significant in affecting patient safety at p<0.05 significance level compared to those having diplomas. Thus, hypothesis H2b is not supported.

4.9.2.3 Length of nurses' duty hours and patient safety

Table 4.23 shows the results of multiple regression analysis of length of nurses' duty hours on patient safety in order to test the hypotheses:

H2c: *Length of nurses' duty hours has a significant effect on patient safety.*

$H2c_0$: *Length of nurses' duty hours has no significant effect on patient safety.*

Table 4.23
Multiple regression analysis results of length of nurses' duty hours on patient safety

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	3.64	0.04		103.43	0.00
8-hour shift	-0.03	0.07	-0.02	-0.40	0.69
10-hour shift	-0.17*	0.07	-0.11	-2.40	0.02
12-hour shift	-0.11	0.07	-0.07	-1.56	0.12
Other shift	-0.15	0.17	-0.04	-0.84	0.40
R^2	0.01				
F value	1.81				
Significance of F value	0.13				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.23 show that F = 1.81 and P value = 0.13, indicating that the study has failed to reject the null hypothesis $H2c_0$. So, the effect of length of nurses' duty hours on patient safety is not significant. The R^2 value indicates that length of nurses' duty hours variable predicts 0.01 of variances in patient safety, and is not significant at the p<0.05 level. However, the unstandardized coefficient of the four dummy variables indicates that increasing the length of nurses' duty hours leads to decreased patient safety compared to nurses working 7-hour shifts. Further, nurses working 10-hour shifts (B=-0.17, t=-2.40, p=0.02) has a significant negative impact on patient safety compared to nurses

working 7-hour shifts at a $p<0.05$ significance level. Further discussion of these findings among nurses working 10-hour shifts in the medical and surgical wards in Malaysian private hospitals is in Chapter Five. Thus, hypothesis H2c is not supported.

4.9.2.4 Staffing and patient safety

The staffing construct regression analysis measured the impact of patient-to-nurse ratio; nurse level of education; and length of nurses' duty hours dimensions (previously measured models) simultaneously on the perceived patient safety among nurses working in medical and surgical wards in Malaysian private hospitals. Table 4.24 shows the results of multiple regression analysis of these dummy variables in order to test the second hypotheses:

H2: *Staffing has a significant effect on patient safety.*

$H2_0$: *Staffing has no significant effect on patient safety.*

Table 4.24
Multiple regression analysis results of staffing on patient safety

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	3.82	0.09		42.89	0.00
5-10 patients	-0.16	0.10	-0.13	-1.61	0.11
11-15 patients	-0.21*	0.10	-0.15	-2.07	0.04
Over 15 patients	-0.22*	0.10	-0.18	-2.27	0.02
Bachelor's degree	-0.05	0.08	-0.03	-0.60	0.55
Other education	-0.03	0.11	-0.01	-0.28	0.78
8-hour shift	-0.02	0.07	-0.01	-0.28	0.78
10-hour shift	-0.15*	0.07	-0.09	-2.11	0.04
12-hour shift	-0.08	0.07	-0.05	-1.05	0.30
Other shift	-0.11	0.17	-0.03	-0.63	0.53
R^2	0.02				
F value	1.50				
Significance of F value	0.14				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.24 show that F = 1.50 and P value = 0.14, indicating that the study has failed to reject the null hypothesis $H2_0$. So, the effect of staffing on patient safety is not significant among nurses working in medical and surgical wards in Malaysian private hospitals. The value of R^2 indicates that the staffing construct predicts 0.02 of variances in patient safety, and is not significant at a level of p<0.05. However, the unstandardized coefficient reveals that nurses delivering care for 11-15 patients (B=-0.21, t=-2.07, p=0.04); and nurses delivering care for over 15 patients (B=-0.22, t=-2.27, p=0.02) have significant negative impact on patient safety, at a p<0.05 significance level compared to those assigned to less than five patients. Further, nurses working 10-hour shifts (B=-0.15, t=-2.11, p=0.04) has a significant negative impact on patient safety at a p<0.05

significance level compared to those working 7-hour shifts. Therefore, according to the p-value 0.11, H2 is not supported.

4.9.3 Regression analysis of the effect of work environment on the quality of care

The regression analysis of the work environment construct explored the multiple regressions of the four dimensions of the work environment: nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; and nurse-physician relationship in order to test the hypotheses H3a, H3b, H3c and H3d, respectively. This regression model explored all these dimensions simultaneously to identify the predictive power of work environment construct on the perceived quality of care among nurses working in the medical and surgical wards in Malaysian private hospitals in order to test hypothesis H3. Table 4.25 provides the results of multiple regression analysis of these dimensions in order to test the third set of hypotheses:

H3: *Work environment has a significant effect on the quality of care.*

H3a: *Nurse participation in hospital affairs has a significant effect on the quality of care.*

H3b: *Nurse foundation for quality of care has a significant effect on the quality of care.*

H3c: *Nurse manager's ability and leadership support has a significant effect on the quality of care.*

H3d: *Nurse-physician relationship has a significant effect on the quality of care.*

Table 4.25
Multiple regression analysis results of work environment on the quality of care

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	0.98	0.17		5.76	0.00
Nurse participation in hospital affairs	0.30	0.04	0.30***	6.89	0.00
Nurse foundation for quality of care	0.23	0.05	0.20***	4.81	0.00
Nurse manager's ability, leadership and support	0.07	0.04	0.08	1.89	0.06
Nurse-physician relationship	0.18	0.04	0.18***	4.27	0.00
R^2	0.34				
F value	72.22***				
Significance of F value	0.00				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.25 show that F =72.22 and P value =0.00, indicating that the study rejects the null hypothesis $H3_0$. So, the effect of the work environment on the quality of care is significant among nurses working in medical and surgical wards in Malaysian private hospitals. The value of R^2 indicates that the work environment construct predicts 0.34 of variances in the quality of care and is significant at the p<0.001 level. Further, the standardized coefficient reveals that nurse participation in hospital affairs (β=0.30, t=6.89, p=0.00); nurse foundation for quality of care (β=0.20, t=4.81, p=0.00); and nurse-physician relationship (β=0.18, t=4.27, p=0.00) have significant positive impact on the quality of care at p<0.001 significance level. Thus, hypotheses H3a, H3b and H3d are supported, respectively, whereas nurse manager's ability and leadership support (β=0.08, t=1.89, p=0.06) has no significant impact on the quality of care at

$p<0.05$ significance level. Thus, hypothesis H3c is not supported. However, according to the p-value of 0.00, H3 is supported at $p<0.001$ significance level.

4.9.4 Regression analysis of the effect of work environment on patient safety

The regression analysis of the work environment construct on patient safety explored the multiple regression of the four dimensions of work environment: nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; and nurse-physician relationship in order to test the hypotheses H4a, H4b, H4c, and H4d, respectively. This regression model explored all these dimensions simultaneously to identify the predictive power of work environment construct on the perceived patient safety among nurses working in medical and surgical wards in Malaysian private hospitals in order to test the hypothesis H4. Table 4.26 provides the results of multiple regression analysis of these dimensions in order to test the fourth hypothesis:

H4: *Work environment has a significant effect on patient safety.*

H4a: *Nurse participation in hospital affairs has a significant effect on patient safety.*

H4b: *Nurse foundation for quality of care has a significant effect on patient safety.*

H4c: *Nurse manager's ability and leadership support has a significant effect on patient safety.*

H4d: *Nurse-physician relationship has a significant effect on patient safety.*

Table 4.26
Multiple regression analysis results of work environment on patient safety

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.
(Constant)	1.59	0.20		8.10	0.00
Nurse participation in hospital affairs	0.29	0.05	0.28***	5.73	0.00
Nurse foundation for quality of care	0.07	0.06	0.06	1.31	0.19
Nurse manager's ability, leadership and support	0.01	0.04	0.01	0.31	0.76
Nurse-physician relationship	0.20	0.05	0.19***	4.21	0.00
R^2	0.20				
F value	35.23***				
Significance of F value	0.00				

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05.

The summarized results of regression analysis in Table 4.26 show that F =35.23 and P value =0.00, indicating that the study rejects the null hypothesis $H4_0$. So, the effect of work environment on patient safety is significant among nurses working in medical and surgical wards in Malaysian private hospitals. The value of R^2 indicates that the work environment construct predicts 0.20 of variances in patient safety, and is significant at p<0.001 level. The standardized coefficient reveals that nurse participation in hospital affairs (β=0.28, t=5.73, p=0.00); and nurse-physician relationship (β=0.19, t=4.21, p=0.00) have a significant positive impact on patient safety at p<0.001 significance level. Thus, hypotheses H4a and H4d are supported, respectively, whereas, nurse foundation for quality of care (β=0.06, t=1.31, p=0.19); and nurse manager's ability and leadership support (β=0.01, t=0.31, p=0.76) have no significant impact on patient safety at p<0.05 significance level., Thus hypotheses H4b and H4c are not supported. However, according to the p-value 0.00, H4 is supported at a p<0.001 significance level.

4.9.5 Regression analysis of the mediating effect of patient-centeredness on the effect of staffing on the quality of care

Before testing the mediating effect of patient-centeredness, a simple mediation model and requirement for testing mediation are discussed in the context of current literature. Mediation is the process where variables intervene in the relationship between other variables (Preacher & Hayes, 2008). So, the mediation analysis answers the question of how and why an independent variable affects the dependent variable through an intervening variable (Baron & Kenny, 1986; Preacher & Hayes, 2008). Figure 4.10 shows the simple mediation paths according to Preacher and Hayes (2008).

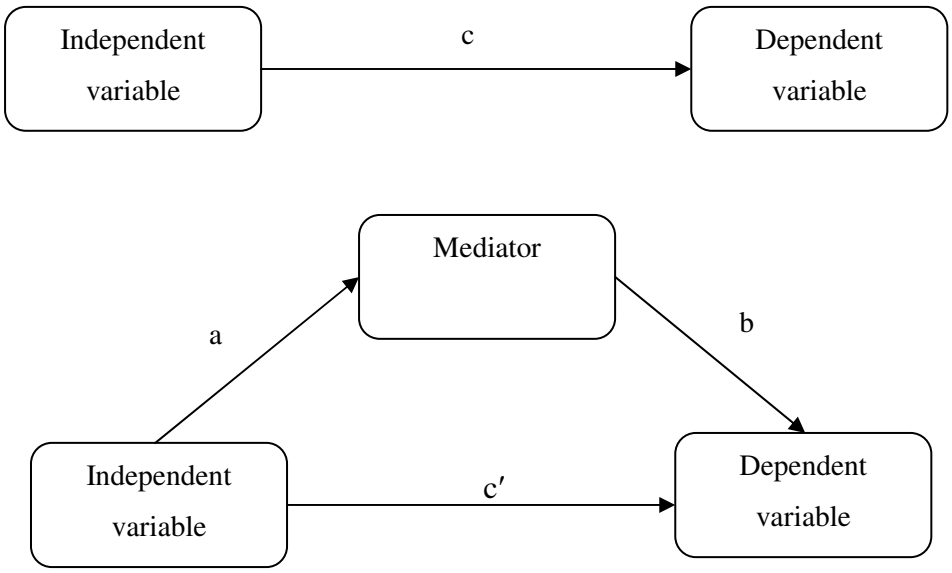

Figure 4.10
Simple mediation model as obtained from Preacher and Hayes, 2008

According to Baron and Kenny (1986), the intervening variable is a mediator if the total effect of independent variable significantly accounts for variability in the dependent variable (path c), and the independent variable significantly accounts for variability in the mediator (path a), the mediator significantly accounts for variability in the dependent variable (path b), and when controlling paths a and b, the direct effect of independent on dependent variable decreases substantially, or becomes insignificant when the mediator is entered simultaneously (path c′). However, Preacher and Hayes (2008) stated that the total effect in the first criterion (path c) is not necessarily significant for mediation. The mediation strength should be measured by the size of indirect effect paths a x b, and not by the lack of the direct effect path c′ (Zhao *et al*., 2010). Thus, the requirement to establish mediation is the significant indirect effect a x b, as shown in Figure 4.11 (Zhao *et al*., 2010). The indirect effect indicates that one unit change on the independent variable is estimated to differ by ab units on the dependent variable as a result of the effect of the independent variable on the mediator, which in turn, affects the dependent variable (Hayes, 2013). However, if the direct effect is significant on the signs of a, b and c′, then the paths are required to specify the type of mediator. If the a, b and c′ paths have similar signs, then the mediator is complementary, but if it is not, then it is a competitive mediator (Zhao *et al*., 2010). Figure 4.11 shows the decision tree of the mediation type.

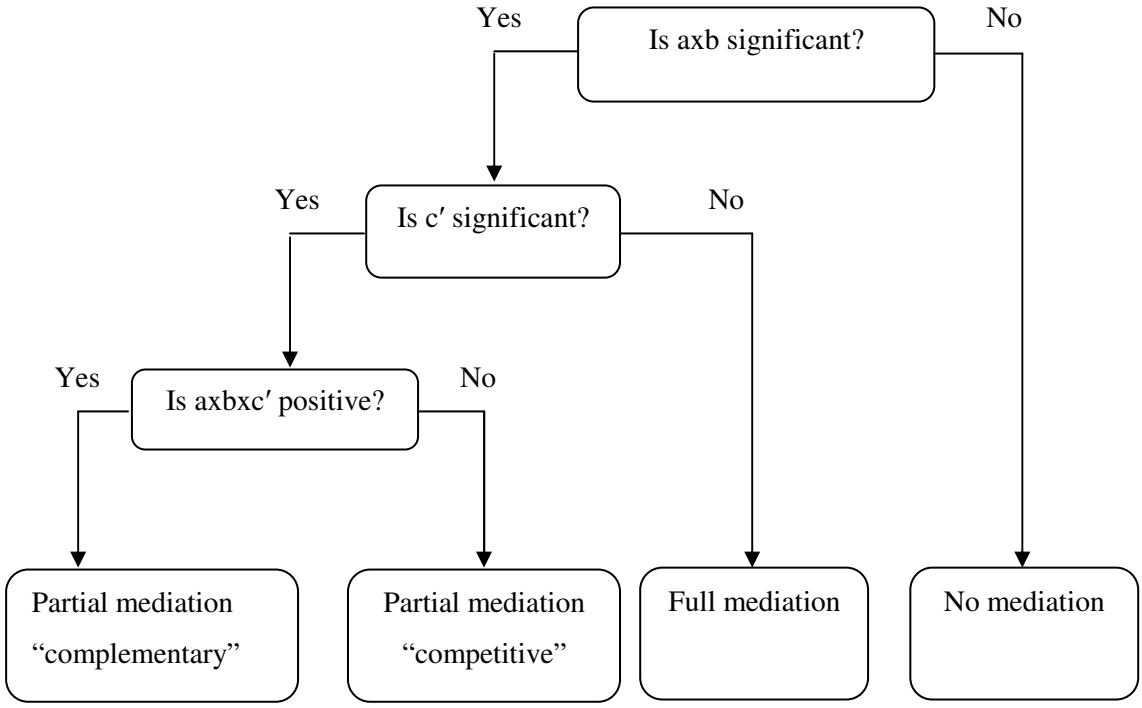

Figure 4.11
Decision tree of the mediation type according to Zhao et al. (2010)

The methods used in the study to investigate the mediating effect of patient-centeredness is the SPSS Hayes PROCESS macro-regression analysis, because it is superior and more powerful than the Sobel's test or Baron and Kenny's causal steps approach (Hayes & Preacher, 2014; Hayes, 2013; Zhao *et al*., 2010). Sobel's test has low statistical power, because the product of indirect effect is not normally distributed (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), while Baron and Kenny's approach does not provide the standard error or the size of the indirect effect of the independent on the dependent variables (MacKinnon *et al*., 2002). However, SPSS Hayes PROCESS macro-regression analysis overcomes the weaknesses of these approaches by generating thousands of empirical sampling (Bootstrapping) to test the indirect effect of mediation a x b (Hayes & Preacher, 2014; Hayes, 2013; Zhao *et al*., 2010). A total of 5,000 Bootstraps sample with 95%

confidence interval (CI) was used to estimate the mediating effect of patient-centeredness in the study (Hayes & Preacher, 2014; Hayes, 2013; Zhao *et al*., 2010). SPSS Hayes PROCESS macro-regression analysis provides the confidence interval of the indirect effect a x b, and if the interval does not straddle zero, then the indirect effect a x b is significant, and the mediation is established (Hayes & Preacher, 2014; Hayes, 2013; Zhao *et al*., 2010). In addition, the direct effect c′ reports whether or not the mediator is fully or partially mediated. The coefficient of path a, path b and path c′ are reported to identify the exact type of partial mediation, as shown in Figure 4.11. Moreover, in multidimensional constructs, the evidence of at least one indirect effect is different from zero (confidence interval does not straddle zero), supporting the conclusion that the proposed mediator significantly mediates the effect of the independent variables on the dependent variables (Hayes & Preacher, 2014).

The staffing construct is multicategorical and contains nine dummy variables. According to Hayes and Preacher (2014), when the independent variable is multicategorical, then the simple mediation equations (3) and (4) below cannot be used, because there are more than one a and c′ paths, representing the independent variables affecting the mediator and the dependent variable.

$$M = b_0 + aX + e_M \quad (3)$$

$$Y = b_0 + c'X + bM + e_y \quad (4)$$

Researchers often resort to discarding data or aggregate groups for producing ordinal data and then applying the equations (3) and (4) (Hayes & Preacher, 2014). However, this is neither ideal nor required (Hayes & Preacher, 2014). Hayes and

Preacher (2014) adopted the concept of relative indirect effect and the relative direct effect, and by using Hayes PROCESS macro-regression analysis, the dummy coded variable can be compared with the reference group as parameterized with the following two equations:

$$M = b_0 + a_1D_1 + a_2D_2 + \ldots\ldots\ldots + a_{k-1}D_{k-1} + e_M \quad (5)$$

$$M = b_0 + c'_1D_1 + c'_2D_2 + \ldots\ldots\ldots + c'_{k-1}D_{k-1} + bM + e_y \quad (6)$$

The a_1 is the coefficient quantifying the differences between the first dummy group and the reference group on the mediator; c'_1 is a coefficient quantifying between the dummy variable one and the reference group on the dependent variable holding the mediator constant; and the b is a coefficient quantifying the effect of the mediator and the dependent variable (Hayes & Preacher, 2014).

The regression analysis of the mediating effect of patient-centeredness on the effect of staffing on the quality of care explored three sub-models of Hayes PROCESS macro-regression analysis. These sub-models tested the hypotheses H5a, H5b, H5c to predict the mediating effect of patient-centeredness between patient-to-nurse ratio; nurse level of education; and length of nurses' duty hours on the quality of care, respectively. All these dimensions were explored simultaneously to identify the predictive intervening power of patient-centeredness between the staffing construct on the quality of care among nurses working in the medical and surgical wards in Malaysian private hospitals.

4.9.5.1 The mediating effect of patient-centeredness on the effect of patient-to-nurse ratio on the quality of care

Table 4.27 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between patient-to-nurse ratios on the quality of care in order to test the hypothesis:

H5a: *Patient-centeredness mediates the effect of patient-to-nurse ratio on the quality of care.*

$H5a_0$: *Patient-centeredness does not mediate the effect of patient-to-nurse ratio on the quality of care.*

Table 4.27
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of patient-to-nurse ratio on the quality of care

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	3.80		1.11		
5-10 patients	-0.10	0.74***	-0.05	-0.17,0.01	Not mediated
11-15 patients	-0.18**	0.74***	-0.07	-0.23,-0.05	Fully mediated
Over 15 patients	-0.19**	0.74***	-0.08	-0.23,-0.06	Fully mediated
R^2	0.02		0.27		
F value	4.20**		52.73***		
Significance of F value	0.01		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the relative indirect effect of both nurses delivering care for 11-15 patients (95% CI = -0.23 to -0.05); and more than 15 patients (95% CI = -0.23 to -0.06) do not straddle zero (compared to those caring for less than five patients),

indicating that patient-centeredness fully mediates the effect of these dummy variables on the quality of care. This supports the claim that patient-to-nurse ratio indirectly affects the quality of care through patient-centeredness. Thus, it can be concluded that hypothesis H5a is supported.

4.9.5.2 The mediating effect of patient-centeredness on the effect of nurse level of education on the quality of care

Table 4.28 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between the nurse level of education on the quality of care in order to test the hypothesis:

H5b: *Patient-centeredness mediates the effect of nurse level of education on the quality of care.*

$H5b_0$: *Patient-centeredness does not mediate the effect of nurse level of education on the quality of care.*

Table 4.28
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of nurse level of education on the quality of care

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	3.65		1.02		
Bachelor's degree	-0.01	0.74***	-0.06	-0.07,0.07	Not mediated
Other education	0.10	0.74***	0.04	-0.04,0.19	Not mediated
R^2	0.00		0.26		
F value	1.00		70.34***		
Significance of F value	0.37		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the relative indirect effect of both nurses with bachelor's degree (95% CI = -0.07 to 0.07); and nurses with other education (95% CI = -0.04 to 0.19) straddle zero (compared to those have diplomas), indicating that patient-centeredness does not mediate the effect of these dummy variables on the quality of care. This does not support the hypothesis that nurse level of education indirectly affects the quality of care through patient-centeredness. Thus, hypothesis H5b is not supported.

4.9.5.3 The mediating effect of patient-centeredness on the effect of length of nurses' duty hours on the quality of care

Table 4.29 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between length of nurses' duty hours on the quality of care in order to test the hypothesis:

H5c: *Patient-centeredness mediates the effect of length of nurses' duty hours on the quality of care.*

$H5c_0$: *Patient-centeredness does not mediate the effect of length of nurses' duty hours on the quality of care.*

Table 4.29
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of length of nurses' duty hours on the quality of care

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	3.70		0.96		
8-hour shift	0.02	0.75***	0.06	-0.06,0.08	Not mediated
10-hour shift	-0.13**	0.75***	-0.01	-0.17,-0.03	Fully mediated
12-hour shift	-0.15**	0.75***	0.10	-0.18,-0.05	Fully mediated
Other shift	-0.05	0.75***	0.06	-0.20,0.16	Not mediated
R^2	0.03		0.27		
F value	4.31**		42.90***		
Significance of F value	0.00		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of relative indirect effect of both nurses working 10-hour shifts (95% CI = -0.17 to -0.03); and nurses working 12-hour shifts (95% CI = -0.18 to -0.05) do not straddle zero (compared to those working 7-hour shifts), indicating that patient-centeredness fully mediates the effect of these dummy variables on the quality of care. This supports the hypothesis that length of nurses' duty hours indirectly affects the quality of care through patient-centeredness. Thus, hypothesis H5c is supported.

4.9.5.4 The mediating effect of patient-centeredness on the effect of the staffing construct on the quality of care

Table 4.30 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between the staffing construct on the quality of care in order to test the fifth hypothesis:

H5: *Patient-centeredness mediates the effect of staffing on the quality of care.*

$H5_0$: *Patient-centeredness does not mediate the effect of staffing on the quality of care.*

Table 4.30
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of staffing on the quality of care

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	3.80		1.08		
5-10 patients	-0.08	0.74***	-0.05	-0.16,0.03	Not mediated
11-15 patients	-0.15*	0.74***	-0.09	-0.21,-0.02	Fully mediated
Over 15 patients	-0.15*	0.74***	-0.11	-0.21,-0.03	Fully mediated
bachelor's degree	-0.00	0.74***	-0.07	-0.07,0.07	Not mediated
Other education	0.09	0.74***	0.04	-0.05,0.18	Not mediated
8-hour shift	0.01	0.74***	0.06	-0.06,0.09	Not mediated
10-hour shift	-0.11*	0.74***	-0.01	-0.15,-0.02	Fully mediated
12-hour shift	-0.12*	0.74***	0.12*	-0.16,-0.02	Competitive
Other shift	-0.01	0.74***	0.08	-0.17,0.18	Not mediated
R^2	0.04		0.28		
F value	2.97**		21.74***		
Significance of F value	0.00		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the relative indirect effect of both nurses delivering care for 11-15 patients (95% CI = -0.21 to -0.02); and more than 15 patients (95% CI = -0.21 to -0.03) do not straddle zero (compared to those caring for less than five patients), indicating that patient-centeredness fully mediates the effect of these dummy variables on the quality of care. Further, both nurses working 10-hour shifts (95% CI = -0.15 to -0.02); and nurses working 12-hour shifts (95% CI = -0.16 to -0.02) do not straddle zero (compared to those working 7-hour shifts), indicating that patient-centeredness mediates the effect of these dummy variables on the quality of care. This supports the hypothesis that staffing indirectly affects the quality of care through patient- centeredness. Thus, hypothesis H5 is supported.

4.9.6 Regression analysis of the mediating effect of patient-centeredness on the effect of staffing on patient safety

The regression analysis of the mediating effect of patient-centeredness on the effect of staffing on patient safety explored three sub-models of Hayes PROCESS macro-regression analysis. These sub-models tested the hypotheses H6a, H6b and H6c to predict the mediating effect of patient-centeredness between patient-to-nurse ratio; nurse level of education; and length of nurses' duty hours on patient safety, respectively. All these dimensions were explored simultaneously to identify the predictive intervening power of patient-centeredness between the staffing construct on patient safety among nurses working in the medical and surgical wards in Malaysian private hospitals.

4.9.6.1 The mediating effect of patient-centeredness on the effect of patient-to-nurse ratio on patient safety

Table 4.31 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between patient-to-nurse ratio on patient safety in order to test the hypotheses:

H6a: *Patient-centeredness mediates the effect of patient-to-nurse ratio on patient safety.*

$H6a_0$: *Patient-centeredness does not mediate the effect of patient-to-nurse ratio on patient safety.*

Table 4.31
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of patient-to-nurse ratio on patient safety

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	3.80		1.45		
5-10 patients	-0.10	0.62***	-0.12	-0.14,0.01	Not mediated
11-15 patients	-0.18**	0.62***	-0.13	-0.19,-0.04	Fully mediated
Over 15 patients	-0.19**	0.62***	-0.14	-0.19,-0.05	Fully mediated
R^2	0.02		0.18		
F value	4.20**		31.56***		
Significance of F value	0.01		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the relative indirect effect of both nurses delivering care for 11-15 patients (95% CI = -0.19 to -0.04); and more than 15 patients (95% CI = -0.19 to -0.05) do not straddle zero (compared to those caring for less than five patients), indicating that patient-centeredness fully mediates the effect of these dummy

variables on patient safety. This supports the hypothesis that patient-to-nurse ratio indirectly affects patient safety through patient-centeredness. Thus, hypothesis H6a is supported.

4.9.6.2 The mediating effect of patient-centeredness on the effect of nurse level of education on patient safety

Table 4.32 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between nurse level of education on patient safety in order to test the hypotheses:

H6b: *Patient-centeredness mediates the effect of nurse level of education on patient safety.*

$H6b_0$: *Patient-centeredness does not mediate the effect of nurse level of education on patient safety.*

Table 4.32
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of nurse level of education on patient safety

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	3.65		1.02		
Bachelor's degree	-0.01	0.63***	-0.05	-0.06,0.06	Not mediated
Other education	0.10	0.63***	-0.09	-0.04,0.17	Not mediated
R^2	0.00		0.18		
F value	1.00		41.56***		
Significance of F value	0.37		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the relative indirect effect of both nurses with bachelor's degree (95% CI = -0.06 to 0.06); and nurses with other education (95% CI = -0.04 to 0.17) straddle zero (compared to those having diplomas), indicating that patient-centeredness does not mediate the effect of these dummy variables and patient safety. This does not support the hypothesis that nurse level of education indirectly affects patient safety through patient-centeredness. Thus, hypothesis H6b is not supported.

4.9.6.3 The mediating effect of patient-centeredness on the effect of length of nurses' duty hours on patient safety

Table 4.33 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between the length of nurses' duty hours on patient safety in order to test the hypotheses:

H6c: *Patient-centeredness mediates the effect of length of nurses' duty hours on patient safety.*

$H6c_0$: *Patient-centeredness does not mediate the effect of length of nurses' duty hours on patient safety.*

Table 4.33
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of length of nurses' duty hours on patient safety

Variables	a	b	c′	a x b (LCI,UCI)	Decision
(Constant)	3.70		1.34		
8-hour shift	0.02	0.62***	-0.04	-0.05,0.07	Not mediated
10-hour shift	-0.13**	0.62***	-0.09	-0.14,-0.02	Fully mediated
12-hour shift	-0.15**	0.62***	-0.02	-0.15,-0.04	Fully mediated
Other shift	-0.05	0.62***	-0.12	-0.17,0.12	Not mediated
R^2	0.03		0.18		
F value	4.31**		25.12***		
Significance of F value	0.00		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the relative indirect effect of both nurses working 10-hour shifts (95% CI = -0.14 to -0.02); and nurses working 12-hour shifts (95% CI = -0.15 to -0.04) do not straddle zero (compared to those working 7-hour shifts), indicating that patient-centeredness fully mediates the effect of these dummy variables on patient safety. This supports the hypothesis that length of nurses' duty hours indirectly affects patient safety through patient-centeredness. Thus, hypothesis H6c is supported.

4.9.6.4 The mediating effect of patient-centeredness on the effect of the staffing construct on patient safety

Table 4.34 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between the staffing construct on patient safety in order to test the sixth hypotheses:

H6: *Patient-centeredness mediates the effect of staffing on patient safety.*

$H6_0$: *Patient-centeredness does not mediate the effect of staffing on patient safety.*

Table 4.34
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of staffing on patient safety

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	3.80		1.47		
5-10 patients	-0.08	0.62***	-0.11	-0.14,0.02	Not mediated
11-15 patients	-0.15*	0.62***	-0.12	-0.17,-0.02	Fully mediated
Over 15 patients	-0.15*	0.62***	-0.13	-0.17,-0.03	Fully mediated
Bachelor's degree	-0.00	0.62***	-0.05	-0.06,0.06	Not mediated
Other education	0.09	0.62***	-0.09	-0.04,0.15	Not mediated
8-hour shift	0.01	0.62***	-0.03	-0.05,0.07	Not mediated
10-hour shift	-0.11*	0.62***	-0.08	-0.13,-0.01	Fully mediated
12-hour shift	-0.12*	0.62***	-0.00	-0.13,-0.02	Fully mediated
Other shift	-0.01	0.62***	-0.10	-0.14,0.14	Not mediated
R^2	0.04		0.18		
F value	2.97**		12.86***		
Significance of F value	0.00		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the relative indirect effect of both nurses delivering care for 11-15 patients (95% CI = -0.17 to -0.02); and more than 15 patients (95% CI = -0.17 to -0.03) do not straddle zero (compared to those caring for less than five patients), indicating that patient-centeredness fully mediates the effect of these dummy variables on patient safety. Further, both nurses working 10-hour shifts (95% CI = -0.13 to -0.01); and nurses working 12-hour shifts (95% CI = -0.13 to -0.02) do not

straddle zero (compared to those working 7-hour shifts), indicating that patient-centeredness mediates the effect of these dummy variables on patient safety. This supports the hypothesis that staffing indirectly affects patient safety through patient-centeredness. Thus, hypothesis H6 is supported.

4.9.7 Regression analysis of the mediating effect of patient-centeredness on the effect of work environment on the quality of care

The regression analysis of the mediating effect of patient-centeredness on the effect of work environment on the quality of care explored the four dimensions of the work environment: nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; and nurse-physician relationship in order to test hypotheses H7a, H7b, H7c and H7d, respectively. This regression model explored all these dimensions simultaneously to identify the predictive intervening power of patient-centeredness between the effect of work environment construct on the perceived quality of care among nurses working in medical and surgical wards in Malaysian private hospitals in order to test the seventh hypothesis. Table 4.35 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between the work environment construct on the quality of care in order to test the hypotheses:

H7: *Patient-centeredness mediates the effect of work environment on the quality of care.*

H7a: *Patient-centeredness mediates the effect of nurse participation in hospital affairs on the quality of care.*

H7b: *Patient-centeredness mediates the effect of nurse foundation for quality of care on the quality of care.*

H7c: *Patient-centeredness mediates the effect of nurse manager's ability and leadership support on the quality of care.*

H7d: *Patient-centeredness mediates the effect of nurse-physician relationship on the quality of care.*

Table 4.35
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of work environment on the quality of care

Variables	**a**	**b**	**c′**	**a x b (LCI, UCI)**	**Decision**
(Constant)	1.71		0.25		
Nurse participation in hospital affairs	0.08*	0.42***	0.27***	0.01,0.06	Complementary
Nurse foundation for quality of care	0.27***	0.42***	0.11*	0.07,0.17	Complementary
Nurse manager's ability, leadership and support	0.05	0.42***	0.05	-0.00,0.05	Not mediated
Nurse-physician relationship	0.14***	0.42***	0.12**	0.03,0.10	Complementary
R^2	0.32		0.40		
F value	67.65***		77.28***		
Significance of F value	0.00		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveals that the confidence interval of the indirect effect of nurse participation in hospital affairs (95% CI = 0.01 to 0.06); nurse foundation for quality of care (95% CI = 0.07 to 0.17); and nurse-physician relationship (95% CI = 0.03 to 0.10) do not straddle zero, indicating that patient-centeredness mediates the effect these variables on the quality of care. This supports hypotheses H7a, H7b and H7d, respectively. However, the direct effect c′ paths are significant, which means that there are other mediators recommended for future research between these variables and the quality of care (Zhao *et al*., 2010). Further, according to the decision tree discussed in Figure 4.11, the signs of a x c x b are positive, indicating that the mediator is complementary mediator rather than suppressive (competitive). The confidence interval of the indirect effect of nurse manager's ability and leadership support (95% CI = -0.00 to 0.05) straddles zero; thus, H7c is not supported. However, there is at least one indirect effect that is different from zero (Hayes & Preacher, 2014); this supports the hypothesis that patient-centeredness mediates the effect of work environment on the quality of care. Thus, hypothesis H7 is supported. Thus, work environment indirectly affects the quality of care through patient-centeredness.

4.9.8 Regression analysis of the mediating effect of patient-centeredness on the effect of work environment on patient safety

The regression analysis of the mediating effect of patient-centeredness on the effect of work environment on patient safety explored the four dimensions of the work environment: nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; and nurse-physician

relationship in order to test hypotheses H8a, H8b, H8c and H8d, respectively. This regression model explored all these dimensions simultaneously to identify the predictive intervening power of patient-centeredness between the effect of work environment construct on perceived patient safety among nurses working in medical and surgical wards in Malaysian private hospitals in order to test the eighth hypothesis. Table 4.36 provides the results of Hayes PROCESS macro-regression analysis of the mediating effect of patient-centeredness between the work environment construct on patient safety in order to test the hypotheses:

H8: *Patient-centeredness mediates the effect of work environment on patient safety.*

H8a: *Patient-centeredness mediates the effect of nurse participation in hospital affairs on patient safety.*

H8b: *Patient-centeredness mediates the effect of nurse foundation for quality of care on patient safety.*

H8c: *Patient-centeredness mediates the effect of nurse manager's ability and leadership support on patient safety.*

H8d: *Patient-centeredness mediates the effect of nurse-physician relationship on patient safety.*

Table 4.36
Hayes PROCESS macro-regression analysis results of the mediating effect of patient-centeredness on the effect of work environment on patient safety

Variables	**a**	**b**	**c′**	**a x b (LCI,UCI)**	**Decision**
(Constant)	1.71		0.85		
Nurse participation in hospital affairs	0.08*	0.43***	0.25***	0.01,0.06	Complementary
Nurse foundation for quality of care	0.27***	0.43***	-0.04	0.07,0.17	Fully mediated
Nurse manager's ability, leadership and support	0.05	0.43***	-0.01	-0.00,0.05	Not mediated
Nurse-physician relationship	0.14***	0.43***	0.14**	0.03,0.09	Complementary
R^2	0.32		0.25		
F value	67.65***		38.75***		
Significance of F value	0.00		0.00		

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval.

The results of Hayes PROCESS macro-regression analysis reveal that the confidence interval of the indirect effect of nurse participation in hospital affairs (95% CI = 0.01 to 0.06); nurse foundation for quality of care (95% CI = 0.07 to 0.17); and nurse-physician relationship (95% CI = 0.03 to 0.09) do not straddle zero, indicating that patient-centeredness mediates the effect of these variables on patient safety. This supports hypotheses H8a, H8b and H8d, respectively. However, the direct effect c′ paths of nurse participation in hospital affairs; and nurse-physician relationship are significant, which means that there are further mediators recommended for future research between these variables and patient safety (Zhao *et al*., 2010). Further, according to the decision tree discussed in Figure 4.11, the sign of a x c x b is positive, indicating that the mediator is a complementary mediator rather than a suppressive (competitive) one. The confidence interval of the indirect effect of nurse

manager's ability and leadership support (95% CI = -0.00 to 0.05) straddles zero; thus, H8c is not supported. However, because there is at least one indirect effect that is different from zero (Hayes & Preacher, 2014), this supports the hypothesis that patient-centeredness mediates the effect of work environment on patient safety. Thus, hypothesis H7 is supported. Thus, the work environment indirectly affects patient safety through patient-centeredness.

4.10 Summary

This chapter discusses data collection, preparation and cleaning, followed by the non-response bias test, respondents' profile, multivariate assumptions tests and regression analyses. The independent sample t-test reveals no variances between the early and late respondents in the study. The multivariate assumptions tests reveal that the data are normal, linear and free of multicollinearity or heteroscedasticity problems. The factor analysis for constructs validity and Cronbach's alpha for constructs reliability were performed, and reveal that the instruments used in the study are valid and reliable. Descriptive statistics were performed in order to answer the first research question of the study; it can be concluded that the patient and family complaints event is the most prominent adverse event in the medical and surgical wards in Malaysian private hospitals.

Multiple regression analyses by SPSS 21 and Hayes PROCESS macro-regression analyses were used to test the study hypotheses. Multiple regression analyses were performed to test the first four hypotheses of the study, revealing that staffing has no significant effect on the quality of care and patient safety (H1 and H2). However, the

result of unstandardized beta coefficient reveals that there are negative associations between staffing dimensions on the quality of care and patient safety, but these associations are not significant. These findings indicate that there is at least one intervening variable with positive sign leading to this result (further discussion in the next chapter). Moreover, the multiple regression analysis of the impact of work environment on the quality of care and patient safety reveals a significant positive effect (H3 and H4 are supported). The mediation analysis was performed using Hayes PROCESS macro-regression analysis, because it is superior and more powerful than Sobel's test or Baron and Kenny's approach. Patient-centeredness mediates the effect of both staffing and work environment on the quality of care and patient safety (H5, H6, H7 and H8 are supported). Table 4.37 summarizes the results of hypotheses testing of the study.

The next chapter discusses and draws conclusions and recommendations from the output of data analysis. Theoretical and practical contributions are also discussed, followed by the limitations and the suggestions for future research.

Table 4.37
The results of hypotheses testing

Hypothesis No	Hypothesis statement	Result
Hypothesis 1	Staffing has a significant effect on the quality of care.	Not supported
H1a	Patient-to-nurse ratio has a significant effect on the quality of care.	Not supported
H1b	Nurse level of education has a significant effect on the quality of care.	Not supported
H1c	Length of nurses' duty hours has a significant effect on the quality of care.	Not supported
Hypothesis 2	Staffing has a significant effect on patient safety.	Not supported
H2a	Patient-to-nurse ratio has a significant effect on patient safety.	Supported
H2b	Nurse level of education has a significant effect on patient safety.	Not supported
H2c	Length of nurses' duty hours has a significant effect on patient safety.	Not supported
Hypothesis 3	Work environment has a significant effect on the quality of care.	Supported
H3a	Nurse participation in hospital affairs has a significant effect on the quality of care.	Supported
H3b	Nurse foundation for quality of care has a significant effect on the quality of care.	Supported
H3c	Nurse manager's ability and leadership support has a significant effect on the quality of care.	Not supported
H3d	Nurse-physician relationship has a significant effect on the quality of care.	Supported
Hypothesis 4	Work environment has a significant effect on patient safety.	Supported
H4a	Nurse participation in hospital affairs has a significant effect on patient safety.	Supported
H4b	Nurse foundation for quality of care has a significant effect on patient safety.	Not supported
H4c	Nurse manager's ability and leadership support has a significant effect on patient safety.	Not supported
H4d	Nurse-physician relationship has a significant effect on patient safety.	Supported
Hypothesis 5	Patient-centeredness mediates the effect of staffing on the quality of care.	Supported
H5a	Patient-centeredness mediates the effect of patient-to-nurse ratio on the quality of care.	Supported
H5b	Patient-centeredness mediates the effect of nurse level of education on the quality of care.	Not supported
H5c	Patient-centeredness mediates the effect of length of nurses' duty hours on the quality of care.	Supported

Table 4.37 (Continued)

Hypothesis No	Hypothesis statement	Result
Hypothesis 6	Patient-centeredness mediates the effect of staffing on patient safety.	Supported
H6a	Patient-centeredness mediates the effect of patient-to-nurse ratio on patient safety.	Supported
H6b	Patient-centeredness mediates the effect of nurse level of education on patient safety.	Not supported
H6c	Patient-centeredness mediates the effect of length of nurses' duty hours on patient safety.	Supported
Hypothesis 7	Patient-centeredness mediates the effect of work environment on the quality of care.	Supported
H7a	Patient-centeredness mediates the effect of nurse participation in hospital affairs on the quality of care.	Supported
H7b	Patient-centeredness mediates the effect of nurse foundation for quality of care on the quality of care.	Supported
H7c	Patient-centeredness mediates the effect of nurse manager's ability and leadership support on the quality of care.	Not supported
H7d	Patient-centeredness mediates the effect of nurse-physician relationship on the quality of care.	Supported
Hypothesis 8	Patient-centeredness mediates the effect of work environment on patient safety.	Supported
H8a	Patient-centeredness mediates the effect of nurse participation in hospital affairs on patient safety.	Supported
H8b	Patient-centeredness mediates the effect of nurse foundation for quality of care on patient safety.	Supported
H8c	Patient-centeredness mediates the effect of nurse manager's ability and leadership support on patient safety.	Not supported
H8d	Patient-centeredness mediates the effect of nurse-physician relationship on patient safety.	Supported

CHAPTER FIVE
DISCUSSIONS AND CONCLUSIONS

5.1 Introduction

This chapter recapitulates the previous four chapters, where the key points of the study are summarized. The study findings, according to the output of data analysis are highlighted. Theoretical and practical contributions are discussed, followed by the limitations and the recommendations for future research.

5.2 Recapitulation of the study

The main purpose of the study is to investigate the impact of hospital nurse staffing and work environment on the quality of care and patient safety, and explore the mediating effect of patient-centeredness on these relationships among nurses working in medical and surgical wards in Malaysian private hospitals.

The study background shows that the Malaysian government is focused on transforming healthcare, improving quality and sustaining the population's quality of life to achieve Vision 2020 and to become a "high income nation" (MOH, 2011b, 2012). The MOH has set four strategies to achieve this thrust, and is promoting the theme "1 Care for 1 Malaysia" in order to establish a universal coverage of healthcare for the population to become a high income nation (MOH, 2011b, 2012). Despite all these efforts, a lack of resources, increase in demand for and cost of care, lack of individual empowerment and lack of supportive environment, threaten the performance of the Malaysian health system (MOH, 2011b). Further, patients treated

in private hospitals are more prone to filing medico-legal complaints and be attended to by incompetent nurses. Thus, the quality of care and patient safety in Malaysian private hospitals is questionable.

The literature review shows that healthcare quality is a challenge and priority for the healthcare managers to deliver efficient, timely, effective, patient-centered and safe healthcare (IOM, 2003). There is no single intervention to prevent the adverse events and the optimization of the outcomes of care (Greene *et al*., 2009). Thus, a multidimensional model is required to improve the quality of care and patient safety. Many studies have argued that the adverse events are related to staffing as a human factor; while other studies have considered the work environment as the main predictor of the quality of care and patient safety (refer to page 18). Only a few studies have investigated both staffing and environmental factors as separate predictors affecting quality of care and patient safety. Moreover, there are limited evidences of the effect of the work environment on the outcomes compared to staffing (Aiken *et al*., 2009). There is insufficient evidence regarding the influence of the length of nurses' duty hours on the quality of care and patient safety (Estabrooks *et al*., 2009). Limited efforts have been focused on improving nursing care in order to optimize the outcomes (quality of care and patient safety), including several nursing factors, such as nursing work environment, shift length and staffing (Stimpfel *et al*., 2014). This shows that it is theoretically relevant to investigate the impact of hospital nurse staffing and work environment on the quality of care and patient safety. Additionally, there are inconsistencies in the findings in the literature on the effect of staffing on the outcomes (Estabrooks *et al*., 2009; Philibert *et al*.,

2013; Stone *et al*., 2006). Thus, an intervening variable is required to explain the relationship between the independent and dependent variables (Sekaran & Bougie, 2010). Patient-centeredness is used as an intervening variable to mediate the effect of hospital staffing and work environment on the quality of care and patient safety, based on the following considerations:

1. The patient is the core of the caring process.
2. Patient-centeredness culture helps to maintain the efforts toward improving the outcomes of patient care (Ballard, 2003; Mallak *et al*., 2003; Webster *et al*., 2011).
3. Patient-centeredness helps to mitigate the negative impact of working process on the outcomes of care (Chandrasekaran *et al*., 2012)
4. Patients who are involved and participated in their care decisions are more likely to prevent adverse events (Tappenden *et al*., 2013; Weingart *et al*., 2011).
5. Studies have proposed shifting to patient-centered approach in order to improve quality and patient safety (Patel & Mitera, 2011).

The underlying theories of the study are the social cognitive theory of Bandura (1977); and Donabedian theory (1988). The social cognitive theory covers the independent variables of the study: personal quality was matched with the nursing staff perception, while the environmental characteristics were matched with the nursing work environment variable. Although the study used the social cognitive theory, it is limited only to the structural factors and does not cover the process factors affecting the outcomes. The Donabedian theory (1988) focuses on the

workflow in the context of structure, process and outcome (Stone *et al*., 2006), and covers the study variables. The structural factors are the hospital nurse staffing and work environment; the process factor is the patient-centeredness; and the outcome factors are the quality of care and patient safety variables. The adverse events are related to defects in the structure or process, which in turn threaten the quality of care and patient safety (Forster *et al*., 2000). Thus, the study investigates the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety in Malaysian private hospitals. The study finds that process factors intervene in the relationship between structural factors and outcomes (supporting the Donabedian theory). However, it is also found that the process factor could interact negatively or positively with the structural variables on the outcomes. Further, by using Hayes PROCESS macro-regression analysis to identify the intervening predictive power of the process factor on these relationships, it is found that patient-centeredness suppresses the negative impact of staffing and complements the positive impact of work environment on the outcome of care.

Methodologically, data collected at one point of time was sufficient; thus, a cross-sectional survey was conducted at the individual nurse level of analysis in the medical and surgical wards in Malaysian private hospitals. The required approvals for instruments used to measure the study variables were obtained from the original authors as shown in Appendix A (Lake (2002) for measuring the work environment; and Planetree and Picker Institutes for measuring patient-centeredness). Ethical approvals required were obtained from hospitals that participated in the study as shown in Appendix B. Further, stratified simple random sampling was used.

Participating hospitals did not allow the researcher to personally administer the questionnaire for data collection. Thus, clear instructions were given to the nurse manager or educator to ensure that they are methodologically-oriented in the context of the study's survey.

Data preparation and cleaning, non-response bias test, respondents' profile, multivariate assumptions tests, descriptive statistics and regression analyses were performed. The independent sample t-test revealed no variances between the early and late respondents in the study. The multivariate assumptions tests revealed that the data were normal, linear and free of multicollinearity or heteroscedasticity problems. Further, factor analysis for construct validity and Cronbach's alpha for construct reliability were performed, and revealed that the instrument used in the study is valid and reliable. Multiple regression analysis by SPSS 21 and Hayes PROCESS macro-regression analyses were used to test the hypotheses. Multiple regression analyses reveal that staffing does not significantly affect the quality of care and patient safety; while work environment significantly affects the quality of care and patient safety. Hayes PROCESS macro-regression analyses reveal that patient-centeredness mediates the effect of both staffing and work environment on the quality of care and patient safety. The following sections discuss the study findings, contributions, limitations and suggestions for future research.

5.3 Discussions of the study findings

The flow of the discussions of the study findings are according to the study objectives for answering the research questions. This section discusses the most common adverse event in the medical and surgical wards in the Malaysian private hospitals, followed by the findings on the impact of hospital nurse staffing and work environment on the quality of care and patient safety. It also discusses the mediating effect of patient-centeredness on the effect of hospital nurse staffing and work environment on the quality of care and patient safety. Further, the proposed model for improving the quality of care and patient safety is highlighted.

5.3.1 The most common adverse event in Malaysian private hospitals

Descriptive statistics were conducted to identify the most common adverse event in the medical and surgical wards in Malaysian private hospitals in order to achieve the first research objective of the study. The validated and reliable items of the patient safety dimension were explored in order to identify the most common adverse events among nurses working in medical and surgical wards, as reported in Table 4.15 in Chapter Four. The higher mean score indicates uncommon adverse events and better safety metrics. According to the current nursing literature, the common events in the medical and surgical wards are: nosocomial infection, patient falls, medication error and patient and family complaints (Laschinger & Leiter, 2006; Van Bogaert *et al*., 2014). However, as reported in Table 4.15, the event of patient and family complaints is the most common adverse event in Malaysian private hospitals, with a mean of 3.45. This output is consistent with the Malaysian MOH Annual Report in

2011 indicating that patient and family complaints is sharply increasing, as discussed in Section 1.2.4 and Figure 1.3. Thus, the importance of investigating the predictors that lead to jeopardizing the quality of care and patient safety is proposed in the study. Further discussion of these results to improve the quality of care and patient safety is highlighted in the next section.

5.3.2 The effect of staffing on the quality of care and patient safety

The staffing construct in the study refers to the characteristics of hospital nurses who deliver direct in-patient care (Aiken *et al*., 2012) in the medical and surgical wards in Malaysian private hospitals. This construct includes three multicategorical dimensions: patient-to-nurse ratio; nurse level of education; and length of nurses' duty hours. The reference group of these dimensions is the nurse caring for less than five patients; nurses with a diploma; and nurses working 7-hour shifts, respectively, as reported in Figure 4.9. Regression analyses as reported in Sections 4.9.1 and 4.9.2, were conducted to identify the effect of staffing on the quality of care and patient safety in order to achieve the second research objective of the study. Table 5.1 summarizes the effect of the staffing construct and its dimensions on the quality of care and patient safety among nurses working in the medical and surgical wards in Malaysian private hospitals. The results of the regression analyses, as shown in Table 5.1, reveal that the staffing construct does not significantly affect the quality of care and patient safety. Thus, detailed discussions with the current evidenced-based practices and literature are highlighted for each dimension.

Table 5.1
Summary of the multiple regression analyses results of the effect of staffing on the quality of care and patient safety

Variables	Quality of care (B)	Patient safety (B)
Patient-to-nurse ratio		
(Constant)	3.90	3.80
5-10 patients	-0.12	-0.18
11-15 patients	-0.21*	-0.25*
Over 15 patients	-0.22*	-0.26**
R^2	0.01	0.01
F value	2.61	2.73*
Significance of F value	0.05	0.04
Nurse level of education		
(Constant)	3.74	3.59
Bachelor's degree	-0.07	-0.05
Other education	0.12	-0.03
R^2	0.004	0.001
F value	1.07	0.22
Significance of F value	0.34	0.81
Length of nurses' duty hours		
(Constant)	3.74	3.64
8-hour shift	0.07	-0.03
10-hour shift	-0.11	-0.17*
12-hour shift	-0.01	-0.11
Other shift	0.03	-0.15
R^2	0.01	0.01
F value	1.27	1.81
Significance of F value	0.28	0.13
Staffing construct		
R^2	0.02	0.02
F value	1.60	1.50
Significance of F value	0.11	0.14

Significance level: ***: $p<0.001$; **: $p<0.01$; *: $p<0.05$. B: is the unstandardized beta coefficient.

Regression analyses results of the effect of patient-to-nurse ratio, as shown in Table 5.1, indicate an insignificant impact on the quality of care and a significant negative impact on patient safety at $p<0.05$ significance level. These findings are inconsistent with previous studies (Aiken *et al*., 2012; Boyer *et al*., 2012; Brooten *et al*., 2004; Coetzee *et al*., 2013). Boyer *et al*. (2012) found that the mismatch between patient flow and staffing level leads to increased workload, which in turn lowers the outcomes of care. In addition, according to Aiken *et al*. (2012), low patient-to-nurse ratio enhances the quality of care, patient safety and patient satisfaction. Thus, adequate staffing is required to improve the quality of patient care (Aiken, Clarke & Sloane, 2002; Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002; Newhouse *et al*., 2013). However, a study conducted in China found that a high patient-to-nurse ratio is negatively associated with the quality of care and job outcomes, but not associated with patient care outcomes (You *et al*., 2013). Further, other studies have found an inconsistent relationship between patient-to-nurse ratio and the outcomes of care (Needleman *et al*., 2002). These inconsistent findings support the study finding, showing the importance of investigating an intervening variable with an opposite sign, suppressing the effect of patient-to-nurse ratio on the quality of care in the medical and surgical wards in Malaysian private hospitals, as discussed in Section 5.3.4.

A study conducted in 12 European countries and in the US found that a high patient-to-nurse ratio is indicative of an unfavorable staffing affecting the outcomes (Aiken *et al*., 2012). This finding is consistent with the present study. The unstandardized beta coefficient reported in Table 5.1 reveals that increasing patient-to-nurse ratio is

negatively associated with the quality of care; by increasing the number of patients assigned under each nurse, this negative impact increases by -0.12, -0.21 and -0.22, respectively. Similarly, it is negatively associated with patient safety; by increasing the number of patients assigned under each nurse, this negative impact increases by -0.18, -0.25 and -0.26, respectively. Further, nurses delivering care for 11-15 patients; and nurses delivering care for more than 15 patients, have significant negative impacts on both the quality of care and patient safety at $p<0.05$ significance level, compared to those caring for less than five patients. Thus, more than 10 patients assigned under an individual nurse tends to threaten the quality of care and patient safety in the medical and surgical wards in Malaysian private hospitals.

Regression analysis results of the effect of nurse level of education, as shown in Table 5.1, indicates an insignificant impact on both the quality of care and patient safety at $p<0.05$ significance level. However, these findings are inconsistent with previous studies. Many studies have found that nurses with higher levels of education are significantly associated with delivering high quality of care and patient safety (Aiken *et al*., 2003; Cramer *et al*., 2011; Estabrooks *et al*., 2005; Tourangeau *et al*., 2007, 2006). For instance, Tourangeau *et al*. (2007) found that increasing the proportion of nurses with bachelor's degree by 10.0% significantly led to decreased mortality by almost nine cases from a 1,000 discharged patients (Tourangeau *et al*., 2007). Further, training and learning by providing skills for healthcare professionals is the key to optimizing the quality and patient safety (Scott *et al*., 2008; Siriwardena, 2006; Valero *et al*., 2009). Thus, leaders should prepare educated nurses in order to optimize the outcomes of care. All new staff should take part in a

general orientation program and training that outline the policies and procedures and their respective role and responsibilities in order to improve the quality of patient care (Scott *et al*., 2008). Malaysian private hospitals should use their resources to provide structured nursing orientation and training programs for newly appointed staff to reduce the various levels of education for nurses which affect the quality of care and patient safety. This is supported by a comparative study between the Malaysian and the Australian healthcare systems, where there are compulsory training programs for staff prior to entry into general practice and a continuous professional development program, which is important for sustaining the outcomes of care (Khoo & Richard, 2002). However, education and training alone are ineffective in changing practice (Kaplan & Ballard, 2012). Thus, multi-level interventions are required, in addition to education and training in order to sustain the outcomes of care.

Regression analysis results of the effect of length of nurses' duty hours, as shown in Table 5.1, indicates an insignificant impact on both the quality of care and patient safety at $p<0.05$ significance level. These findings are consistent with previous studies. Some scholars have found a significant effect of length of nurses' duty hours on the outcomes, while others have found it to be insignificantly associated with the outcomes of care (refer to Table 2.2). However, the unstandardized coefficient of the nurses working 10-hour shifts (B=-0.11); and working 12-hour shifts (B=-0.01) negatively affects the quality of care compared to nurses working 7-hour shifts. This negative impact is not significant at $p<0.05$ significance level of predicting the quality of care. On the other hand, nurses working 10-hour shifts (B=-

0.17) has a significant negative impact on patient safety compared to nurses working 7-hour shifts at $p<0.05$ significance level of nurses working in the medical and surgical wards in Malaysian private hospitals. These findings are also consistent with previous studies. Scholars have found that staff duty hour limits has a mixed effect on patient safety and the quality of outcome (Estabrooks *et al*., 2009; Philibert *et al*., 2013; Stone *et al*., 2006). Some have found that working 8-hour shift is negatively associated with the outcomes of care (Stone *et al*., 2006). Stone *et al*. (2006) found that nurses working for 12-hour shifts have higher job satisfaction and are less fatigued than those working for 8-hour shifts, while others found that working 8-hour shifts is positively associated with outcomes of care and reducing burnout and fatigue (Bhavsar *et al*., 2007). For instance, working 8-hour shifts reduces burnout and fatigue and enhances staff's mood and sleeping hours, which in turn lead to improved performance (Philibert *et al*., 2013). In addition, Bhavsar *et al*. (2007) found that duty hours limit improves the process quality, but does not significantly affect the clinical outcome of quality. This result shows that the length of nurses' duty hours indirectly affects the outcomes through the process factor, and there is at least one intervening factor with a positive sign that makes the relationship insignificant and inconsistent among previous studies in a different context. Section 5.3.4 discusses how patient-centeredness affects the relationships between the length of nurses' duty hours and the quality of care and patient safety.

The regression analysis summary of the effect of staffing on the outcomes, as shown in Table 5.1, indicate that staffing does not significantly affect the quality of care ($F=1.60$, $P=0.11$); and patient safety ($F=1.50$, $P=0.14$). There is at least one

intervening variable with a positive sign to mitigate the negative impact of staffing on the outcomes, as discussed in Section 5.3.4. The R^2 value indicates that staffing variable predicts 0.02 of variances in the quality of care and patient safety. These findings show the importance of shifting from blaming individuals to blaming the system in order to optimize the outcomes of care provided by nurses working in the medical and surgical wards in Malaysian private hospitals.

5.3.3 The effect of work environment on the quality of care and patient safety

Work environment construct in the study refers to the nurses' work setting that facilitates or constrains professional practices (Lake, 2002, p:178) in the medical and surgical wards in Malaysian private hospitals. This construct includes four dimensions: nurse participation in hospital affairs; nurse foundation for quality of care; nurse manager's ability and leadership support; and nurse-physician relationship. Regression analysis results reported in Sections 4.9.3 and 4.9.4, were conducted to identify the effect of work environment on the quality of care and patient safety in order to achieve the third research objective of the study. Table 5.2 summarizes the effect of work environment construct and its dimensions on the quality of care and patient safety among nurses working in the medical and surgical wards in Malaysian private hospitals. The results of regression analyses, as shown in Table 5.2, reveal that the work environment construct significantly affects the quality of care and patient safety. Nurses working in a better work environment have a higher perceived quality of care and patient safety. These findings are consistent with previous studies, where poor work environment was found to lead to poor care

outcomes (Nantsupawat *et al*., 2011). Hence, detailed discussion with the current evidenced-based practices and literature is highlighted for each dimension.

Table 5.2
Summary of the multiple regression analyses results of the effect of work environment on the quality of care and patient safety

Variables	**Quality of care (β)**	**Patient safety (β)**
(Constant)	0.98	1.59
Nurse participation in hospital affairs	0.30***	0.28***
Nurse foundation for quality of care	0.20***	0.06
Nurse manager's ability, leadership and support	0.08	0.01
Nurse-physician relationship	0.18***	0.19***
R^2	0.34	0.20
F value	72.22***	35.23***
Significance of F value	0.00	0.00

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. β: is the standardized beta coefficient.

Regression analyses results of the effect of nurse participation in hospital affairs, as shown in Table 5.2, indicates a significant impact on both the quality of care and patient safety at p<0.001 significance level. These findings are consistent with previous studies. Staff involvement and participation are essential for the provision of high quality of patient care and patient safety (Van Bogaert *et al*., 2009). Managers who involve their staff with writing mutual staff-manager goals increase motivation and work satisfaction towards improving patient care, which in turn, improves performance (Dyer *et al*., 1975). Further, the standardized beta coefficient reveals that one standard deviation increase in nurse participation in hospital affairs significantly increases the perceived quality of care and patient safety by 0.30 and

0.28, respectively. These findings show that highly participative and involved nurses in hospital affairs have a higher perceived quality of care and patient safety in Malaysian private hospitals.

Regression analysis results of the effect of nurse foundation for quality of care, as shown in Table 5.2, indicate a significant impact on the quality of care; and insignificant impact on patient safety at $p<0.001$ and $p<0.05$ significance levels, respectively. These findings are inconsistent with previous studies (Aiken *et al*., 2009; Van Bogaert *et al*., 2014). Nurses engaged in quality improvement programs, upgrading equipment and continuous training, can lead to improvement in the care outcomes (Clapham *et al*., 2004). Thus, all staff should be engaged in collaborative quality improvement, safety plans, practical interventions and general orientation programs and training to outline the policies and procedures and their role and responsibilities, in order to improve the quality of patient care (Scott *et al*., 2008). Moreover, training programs for staff lead to improved quality of care and patient safety (Valero *et al*., 2009). However, other studies have found that the work environment is positively associated with the quality of care, but is not associated with patient safety metrics: nosocomial infections, medication errors, patient and family satisfaction and pressure ulcer (Gardner & Thomas-Hawkins, 2007; Manojlovich *et al*., 2009; Manojlovich & DeCicco, 2007). Further, the standardized beta coefficient reveals that one standard deviation increase in the nurse foundation of the quality of care significantly increases the perceived quality of care by 0.20; and insignificantly increases the perceived patient safety by 0.06. These findings show that nurses engaged in quality improvement programs in their hospitals have

significantly improve the quality of care, but they are not significantly affecting patient safety in the medical and surgical wards in Malaysian private hospitals. These inconsistent findings show that there is at least one intervening process factor affecting the relationship between nurse foundation for the quality of care and the outcomes of care, as discussed in Section 5.3.5.

Regression analysis results of the effect of nurse manager's ability and leadership support, as shown in Table 5.2, indicates an insignificant impact on the quality of care and patient safety at $p<0.05$ significance level. These findings are inconsistent with previous studies (Aiken *et al*., 2009; Van Bogaert *et al*., 2014). Leadership is required to direct the efforts and empower employees in order to improve the quality of care and patient safety (LeBrasseur *et al*., 2002; Nwabueze, 2011; Xirasagar *et al*., 2005). Trained and skilled leaders are required in order to enhance teamwork and patient-centeredness and improve the quality of care and patient safety (Ferguson *et al*., 2007). However, a meta-analysis study has found that the work environment subscales inconsistency is associated with the outcomes of care (Warshawsky & Havens, 2011). Further, the standardized beta coefficient reveals that one standard deviation increase in a nurse manager's ability and leadership support does not significantly increase the perceived quality of care and patient safety by 0.08 and 0.01, respectively. These inconsistent findings show that there is at least one intervening process factor affecting the relationship between nurse manager's ability and leadership support on the outcomes of care, as discussed in Section 5.3.5.

Regression analysis results of the effect of nurse-physician relationship, as shown in Table 5.2, indicate a significant impact on both the quality of care and patient safety at $p<0.001$ significance level. These findings are consistent with previous studies. The nurse-physician relationship is required in order to sustain the quality of care and patient safety (Steiger, 2007). Nurses can substitute and complement the physician's role, which can lead to decreased workload and improved outcomes of care (Laurant *et al*., 2009). Moreover, communication effectiveness and teamwork lead to improving patient safety and the quality of care (Kaplan & Ballard, 2012). For instance, studies have found that a multidisciplinary team improves the quality of care for patients with mental disorder (Franx *et al*., 2008), reduces the incidence of hospital-acquired conditions and promotes safety metrics (Scott *et al*., 2008). Thus, periodical multidisciplinary meetings between professionals are recommended in order to improve the outcomes of care (Scott *et al*, 2008). Further, the standardized beta coefficient reveals that one standard deviation increase in nurse-physician relationship significantly increases the perceived quality of care and patient safety by 0.18 and 0.19, respectively. These findings show that nurses with better nurse-physician relationship have a higher perception of the quality of care and patient safety, and are more likely to prevent adverse events than nurses having poor relationship with physicians in the medical and surgical wards in Malaysian private hospitals.

The regression analysis summary of the effect of work environment on the outcomes, as shown in Table 5.2, indicate that the work environment significantly affects the quality of care ($F=72.22$, $P=0.00$) and patient safety ($F=35.23$, $P=0.00$) at

$p<0.001$ significance level. The value of R^2 indicates that the work environment variable predicts 0.34 and 0.20 of variances in the quality of care and patient safety, respectively. These findings support the argument of the importance of shifting from blaming individual staff to blaming the system in order to optimize the outcomes of care provided by nurses working in the medical and surgical wards in Malaysian private hospitals. These findings are consistent with previous studies. Nurses working in a better work environment have a higher perceived quality of care and patient safety (Aiken *et al*., 2009; Newhouse *et al*., 2013). Nurses with high participation, involvement and engagement in hospital quality programs, and who are on good terms with the physicians positively affect the quality of care and patient safety in the medical and surgical wards.

5.3.4 The mediating effect of patient-centeredness on the effect of staffing on the quality of care and patient safety

Patient-centeredness in the study refers to putting the patients' interest first (Lanjananda & Patterson, 2009) by delivering proper nutrition, treatment, communication and education to prevent adverse events. In order to achieve the fourth research objective of the study, regression analyses were conducted using Hayes PROCESS macro-regression analysis to identify the mediating effect of patient-centeredness on the effect of staffing on the quality of care and patient safety, as reported in Sections 4.9.5 and 4.9.6, respectively. Table 5.3 summarizes the mediating effect of patient-centeredness on the effect of the staffing construct and its dimensions on the quality of care and patient safety among nurses working in the

medical and surgical wards in Malaysian private hospitals. The results of Hayes PROCESS macro-regression analyses, as shown in Table 5.3, reveal that patient-centeredness significantly mediates the effect of the staffing construct on the quality of care and patient safety. Thus, a detailed discussion of the mechanism of this mediating effect and its contribution to the current evidenced-based practices and literature is highlighted for each staffing dimension.

Table 5.3
Summary of the Hayes PROCESS macro-regression analyses results of the mediating effect of patient-centeredness on the effect of staffing on the quality of care and patient safety

Variables	Quality of care (LCI,UCI)	Patient safety (LCI,UCI)
Patient-to-nurse ratio (Constant)		
5-10 patients	-0.17,0.01 (N)	-0.14,0.01 (N)
11-15 patients	-0.23,-0.05 (F)	-0.19,-0.04 (F)
Over 15 patients	-0.23,-0.06 (F)	-0.19,-0.05(F)
$R^{2(a)}$	0.02	0.02
F value	4.20**	4.20**
Significance of F value	0.01	0.01
Nurse level of education (Constant)		
Bachelor's degree	-0.07,0.07 (N)	-0.06,0.06 (N)
Other education	-0.04,0.19 (N)	-0.04,0.17 (N)
$R^{2(a)}$	0.00	0.00
F value	1.00	1.00
Significance of F value	0.37	0.37
Length of nurses' duty hours (Constant)		
8-hour shift	-0.06,0.08 (N)	-0.05,0.07 (N)
10-hour shift	-0.17,-0.03 (F)	-0.14,-0.02 (F)
12-hour shift	-0.18,-0.05 (F)	-0.15,-0.04 (F)
Other shift	-0.20,0.16 (N)	-0.17,0.12 (N)
$R^{2(a)}$	0.03	0.03
F value	4.31**	4.31**
Significance of F value	0.00	0.00
Staffing construct		
$R^{2(a)}$	0.04	0.04
F value	2.97**	2.97**
Significance of F value	0.00	0.00
Beta coefficient of Path b	0.74***	0.62***

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval. $R^{2(a)}$: R-squire of the path a. (F): Full mediation. (C): Complementary mediated. (S): Suppressor and competitively mediated. (N): Not mediated.

Hayes PROCESS macro-regression analyses results of the mediating effect of patient-centeredness between the effect of patient-to-nurse ratio on the quality of care and patient safety, as shown in Table 5.3, indicates that patient-centeredness significantly mediates this relationships. These findings are supported by previous studies (Brooten *et al*., 2004; Forster *et al*., 2000; You *et al*., 2013). Nurses with high workloads cannot spend time with their patients or their families when performing procedures, which in turn could lead to poor quality of care and patient safety (Forster *et al*., 2000). Similarly, others have found that adequate nurses and low patient-to-nurse ratio in the department increase the time they spend with patients, which in turn affects the outcomes of care (Brooten *et al*., 2004). On the other hand, regression analyses results of the effect of patient-to-nurse ratio on the quality of care and patient safety, as reported in Table 5.1 (Section 5.3.2), indicate an insignificant negative impact on the quality of care; and a significant negative impact on patient safety, at $p<0.05$ significance level. So, there is an inconsistent relationship between patient-to-nurse ratio and the outcomes of care (Needleman *et al*., 2002); an intervening variable is required to explain the mechanism of these relationships. The results of Hayes PROCESS macro-regression analyses reported in Table 5.3 reveal that patient-centeredness fully mediates the effect of nurses delivering care for 11-15 patients on both the quality of care (95% CI = -0.23 to -0.05); and patient safety (95% CI = -0.19 to -0.04). Patient-centeredness fully mediates the effect of nurses delivering care for more than 15 patients on both the quality of care (95% CI = -0.23 to -0.06) and patient safety (95% CI = -0.19 to -0.05). So, the patient-to-nurse ratio indirectly affects the quality of care and patient safety through patient-centeredness. Thus, patient-centeredness helps mitigate the

negative impact of nursing shortage on the quality of care and patient safety (You *et al*., 2013) in the medical and surgical wards in Malaysian private hospitals. The result shows that nurses working in the medical and surgical wards in Malaysian private hospitals have a high degree of patient-centeredness that suppresses the negative impact of nurse shortage on the outcomes of care. However, a nurse who has high workloads provides poor care outcomes (Nantsupawat *et al*., 2011). So, managerial corrective actions are required to maintain adequate staffing or sustain the culture of patient-centeredness in order to deliver safe and high quality of patient care.

Hayes PROCESS macro-regression analyses results of the mediating effect of patient-centeredness between the effect of nurse level of education on the quality of care and patient safety, as shown in Table 5.3, indicate that patient-centeredness is not mediated by these relationships. Further, regression analyses of the effect of nurse level of education on the quality of care and patient safety, as reported in Table 5.1 (Section 5.3.2), indicates an insignificant impact on the quality of care and patient safety at $p<0.05$ significance level. The results of Hayes PROCESS macro-regression analyses reveal that patient-centeredness does not mediate the effect of nurses with bachelor's education on both the quality of care (95% CI = -0.07 to 0.07); and patient safety (95% CI = -0.06 to 0.06). These findings are inconsistent with the previous studies. Nurses with higher education and are task-oriented could be more patient-centered, which can help to improve the quality of care and patient safety (You *et al*., 2013). Similarly, (Ferguson *et al*., 2007) found that highly educated and involved healthcare providers are more patient-centered in order to

improve the quality of care and patient safety. However, the respondents' profiles discussed in Section 4.4 and reported in Table 4.6 reveal that 355 (60.9%) of the respondents participating in the study are working in teaching hospitals. In teaching hospitals, all new staff should take part in a general orientation and training program that outlines the policies and procedures and their respective roles and responsibilities in order to improve the quality of patient care (Scott *et al*., 2008). Thus, there is no significant difference in the level of competencies of nurses working in the medical and surgical wards in Malaysian private hospitals, because they have structured training programs which make the various levels of education to insignificantly affect the degree of patient- centeredness, quality of care and patient safety. This point of view is supported by studies involving Malaysian hospitals (Chiu, 2006; Ludin *et al*., 2014). A study conducted in four Malaysian public hospitals supports this point of view as well (Ludin *et al*., 2014). Teaching hospitals are committed to teaching and training their staff (Ludin *et al*., 2014). In Malaysia, there is a four-week post registration training program conducted on a joint-venture between an Australian university and Malaysian private hospitals (Chiu, 2005). The post-registration training program for nurses in Malaysia is to help upgrade the diploma nurses (Chiu, 2006). The training program increases their self-confidence, knowledge, critical thinking abilities and their interpersonal skills (Chiu, 2006). It can be concluded that better education and training for medical and surgical wards staff nurses are required to satisfy clients' expectations, sustain the outcomes of care and improve the quality of care and patient safety.

Hayes PROCESS macro-regression analyses results of the mediating effect of patient-centeredness between the effect of length of nurses' duty hours on the quality of care and patient safety, as shown in Table 5.3, indicates that patient-centeredness significantly mediates these relationships. Additionally, the results of Hayes PROCESS macro-regression analyses reveal that patient-centeredness fully mediates the effect of nurses working 10-hour shifts on both the quality of care (95% CI = -0.17 to -0.03); and patient safety (95% CI = -0.14 to -0.02). Similarly, patient-centeredness fully mediates the effect of nurses working 12-hour shifts on both the quality of care (95% CI = -0.18 to -0.05); and patient safety (95% CI = -0.15 to -0.04). However, regression analyses of the effect of length of nurses' duty hours on the quality of care and patient safety, as reported in Table 5.1 (Section 5.3.2), indicate an insignificant impact on the quality of care and patient safety at $p<0.05$ significance level. These findings are supported by previous studies, and contribute to the Donabedian theory. Bhavsar *et al*. (2007) found that duty hour limit improves the process quality, but does not significantly affect the clinical outcomes quality. This result shows that length of nurses' duty hours indirectly affects the outcomes through a process factor, and patient-centeredness as an intervening factor with a positive sign, which make the effect insignificant; it also explains the inconsistency of previous studies, as discussed in Section 5.3.2. For instance, nurses working longer shifts have higher burnout and fatigue (Bhavsar *et al*., 2007; Philibert *et al*., 2013), resulting in patients receiving improper education or participation in their care, which in turn threatens the quality of care and patient safety (Tappenden *et al*., 2013; Weingart *et al*., 2011). Thus, nurses working longer hours in the medical and

surgical wards in Malaysian private hospitals have lower degree of patient-centeredness, which in turn negatively affects the quality of care and patient safety.

The summary of Hayes PROCESS macro-regression analyses results indicate that patient-centeredness mediates the effect of staffing on both the quality of care and patient safety. On the other hand, discussions in Section 5.3.2 reveal that the staffing construct does not significantly affect the quality of care and patient safety. However, the function of patient-centeredness in the study is to suppress the negative impact of staffing on the outcomes of care. Thus, it can be concluded that nurses in the medical and surgical wards in Malaysian private hospitals deliver transformed care with high patient-centeredness, which in turn mitigates the negative impact of nursing shortage and nurse shift length on the quality of care and patient safety. According to the Donabedian theory, the staffing construct (structural factor) indirectly affects the outcomes of care through patient-centeredness (process factor). The R^2 value of path a indicate that staffing explains 0.04 of the variances in the nurses' level of patient-centeredness, which in turn negatively affects the quality of care and patient safety at $p<0.01$ level of significance. However, the beta coefficient of path b indicates that one unit of improvement in patient-centeredness significantly improves the quality of care and patient safety by 0.74 and 0.62, respectively, at $p<0.001$ level of significance, which in turn suppresses the negative impact of staffing on the outcomes of care. So, staffing indirectly affects the outcome of care through patient-centeredness. Thus, adequate and trained staff with limited duty hours (not longer than 8-hour shift) are required for improving the quality of care and patient safety. Nurses with lower patient ratio and with working hours of less

than eight hours spent more time with their patients, which in turn affects the outcomes of care. Similarly, a study conducted in Malaysian hospitals found that nurse and patient communication is important in building patient trust (Maskor & Krauss, 2013). Nurses need to smile and maintain eye contact with the patient and understand non-verbal communication to ensure the patients' comfort (Maskor & Krauss, 2013). Thus, general orientation and training programs for the newly appointed nurses are required in order to sustain the degree of patient-centeredness to prevent the negative impact of nurse shortage and length of nurses' duty hour on the outcomes of care.

5.3.5 The mediating effect of patient-centeredness on the effect of work environment on the quality of care and patient safety

In order to achieve the fifth research objective of the study, regression analyses were conducted using Hayes PROCESS macro-regression analysis to identify the mediating effect of patient-centeredness on the effect of work environment on the quality of care and patient safety, as reported in Sections 4.9.7 and 4.9.8, respectively. Table 5.4 summarizes the Hayes PROCESS macro-regression analyses results of the mediating effect of patient-centeredness on the effect of work environment construct and its dimensions on the quality of care and patient safety among nurses working in the medical and surgical wards in Malaysian private hospitals. The results of Hayes PROCESS macro-regression analyses, as shown in Table 5.4, reveal that patient-centeredness significantly mediates the effect of the work environment construct on the quality of care and patient safety. Thus, detailed discussion of the mechanism of this mediating effect and the contribution to the

current evidenced-based practices and literature are highlighted for each work environment dimension.

Table 5.4
Summary of the Hayes PROCESS macro-regression analyses results of the mediating effect of patient-centeredness on the effect of work environment on the quality of care and patient safety

Variables	**Quality of care (LCI,UCI)**	**Patient safety (LCI,UCI)**
(Constant)		
Nurse participation in hospital affairs	0.01,0.06 (C)	0.01,0.06 (C)
Nurse foundation for quality of care	0.07,0.17 (C)	0.07,0.17 (F)
Nurse manager's ability, leadership and support	0.00,0.05 (N)	0.00,0.05 (N)
Nurse-physician relationship	0.03,0.10 (C)	0.03,0.09 (C)
$R^{2(a)}$	0.32	0.32
F value	67.65***	67.65***
Significance of F value	0.00	0.00
Beta coefficient of Path b	0.42***	0.43***

Significance level: ***: p<0.001; **: p<0.01; *: p<0.05. LCI, UCI: Lower and upper confidence interval. $R^{2(a)}$: R-squire of the path a. (F): Full mediation. (C): Complementary mediated. (S): Suppressor and competitively mediated. (N): Not mediated.

Hayes PROCESS macro-regression analyses results, as shown in Table 5.4, indicate that patient-centeredness significantly mediates the effect of nurse participation in hospital affairs on the quality of care (95% CI = 0.01 to 0.06); and patient safety (95% CI = 0.01 to 0.06). Regression analyses of the effect of nurse participation in hospital affairs on the quality of care and patient safety, as reported in Table 5.2 (Section 5.3.3), indicate a significant positive impact on both the quality of care and patient safety at p<0.001 significance level. These findings support the Donabedian theory, where nurses with one unit more of participation in hospital affairs have a higher degree of patient-centeredness by 0.08, which in turn improves both the

quality of care and patient safety by 0.42 and 0.43, respectively, as reported in Tables 4.35 and 4.36. Previous studies have supported these findings; for instance, nurses with high participation and involvement have high practice and clinical outcomes (American Association of Critical-Care Nurses, 2005; Hendrich *et al*., 2012; Van Bogaert *et al*., 2009). Nurses with high involvement have higher satisfaction of delivering patient care (Dyer *et al*., 1975). According to the American Association of Critical-Care Nurses (2005) report, ensuring effective staff participation and patient and family education are required to sustain a healthy work environment in order to improve the quality of care and patient safety. Similarly, in the Malaysian healthcare industry, employee involvement and participation are important factors for optimizing the quality of care (Habidin, Shazali, & Ali, 2014). In addition, it is important to encourage nurses to address patients' concerns and questions in order to prevent adverse events and improve the outcomes of care (Weingart *et al*., 2011). So, nurses with more participation and involvement in hospital governance or policy decisions have a higher degree of patient-centeredness, which in turn leads to delivering higher quality of care with lower adverse events and patient and family complaints. Thus, decision-makers should sustain a healthy work environment by enhancing nurse participation in hospital affairs in order to increase the degree of patient-centeredness, which in turn improves the outcomes of care in the medical and surgical wards in Malaysian private hospitals.

Hayes PROCESS macro-regression analyses results, as shown in Table 5.4, indicate that patient-centeredness significantly mediates the effect of nurse foundation for the quality of care on both the quality of care (95% CI = 0.07 to 0.17); and patient safety

(95% CI = 0.07 to 0.17); whereas regression analyses results of the effect of nurse foundation for the quality of care and patient safety, as reported in Table 5.2 (Section 5.3.3), indicate a significant positive impact on the quality of care and insignificant impact on patient safety, at $p<0.001$ and $p<0.05$ significance level, respectively. Similarly, previous studies have found that the nurse work environment subscales are inconsistently associated with the outcomes of care, and an intervening variable is required to interpret the mechanism of these relationships (Gardner & Thomas-Hawkins, 2007; Manojlovich *et al*., 2009; Manojlovich & DeCicco, 2007). According to the AHRQ, nurses are required to be engaged in quality improvement programs, and continuous education and training is required in order to improve the quality of care and patient safety (Hughes, 2008). For instance, nurses involved in reducing medication error programs, longer time for medication preparation and spending more time for patients' orientation (Hughes, 2008), which in turn improve the outcomes of care. Similarly, an interventional study in 15 wards in Malaysian hospitals found that nursing education and training are effective tools in improving the safety climate (Keat & Sooaid, 2013). So, nurses with one unit of increase in the engagement in quality improvement and training programs have higher degrees of patient-centeredness by 0.27, which in turn improves the quality of care and patient safety by 0.42 and 0.43, respectively, as reported in Tables 4.35 and 4.36. These findings are consistent with the Donabedian theory, where nurse foundation for quality of care as a structural factor, affects the outcomes of care through nurse level of patient-centeredness as a process factor in the medical and surgical wards in Malaysian private hospitals.

Hayes PROCESS macro-regression analyses results, as shown in Table 5.4, indicate that patient-centeredness does not mediate the effect of nurse manager's ability, leadership and support on both the quality of care (95% CI = 0.00 to 0.05); and patient safety (95% CI = 0.00 to 0.05), whereas, regression analyses results of the effect of nurse manager's ability, leadership and support on the quality of care and patient safety, as reported in Table 5.2 (Section 5.3.3), indicate an insignificant impact on both the quality of care and patient safety at $p<0.05$ significance level. These findings do not support the Donabedian theory, where nurse manager's ability, leadership and support is not significantly affected by the degree of patient-centeredness, and do not significantly improve the outcomes of care. However, trained and skilled leaders are required in order to improve the quality of care and patient safety (LeBrasseur *et al*., 2002; Nwabueze, 2011; Xirasagar *et al*., 2005); and enhance teamwork and patient-centeredness (Ferguson *et al*., 2007). According to the AHRQ, skilled leaders, effective decision-making and collaboration are all required to sustain a healthy work environment. On the other hand, nurse work environment subscales are inconsistently associated with the outcomes of care (Warshawsky & Havens, 2011). However, there are two justifications for these findings. The first justification is that there is at least one intervening variable with a negative sign suppressing the positive impact of nurse manager's ability, leadership and support on the outcomes of care. This study's intervening variable (patient-centeredness) has a positive sign, complementing the effect of nurse work environment dimensions on the outcomes of care. The second justification is that Malaysians are respectful towards figures of authority, making the variances between able and skilled leaders not very much different from the non-able and non-

skilled leaders in a Malaysian context. Culture is a factor for maintaining efforts of quality improvement and patient safety (Webster *et al*., 2011). Moreover, cultural commitment is required in order to deliver best practice care for patients (Ballard, 2003). This is supported by a study conducted in non-MOH hospitals in Malaysia; it was found that employer encouragement and support are not associated with the outcomes of care (Veerasamy, Sambasivan, & Kumar, 2013). Similarly, a comparative correlational survey in teaching hospitals in England and Malaysia found that Malaysian nurses are more committed to their managers (Ahmad & Oranye, 2010). However, safety organizational culture requires transformational and evidence-based leaders having the ability to develop teamwork and learning and involving healthcare providers to be more patient-centered in order to improve the quality of care and patient safety (Ferguson *et al*., 2007). Thus, further study is required to explore the intervening factor with negative sign suppressing the positive impact of nurse manager's ability, leadership and support on the outcomes; or the impact of the cultural factor as a positive intervening variable complementing the impact of nurse manager's ability, leadership and support on the outcomes of care in the medical and surgical wards in Malaysian private hospitals.

Hayes PROCESS macro-regression analyses results, as shown in Table 5.4, indicate that patient-centeredness significantly mediates the effect of nurse-physician relationship on the quality of care (95% CI = 0.03 to 0.10); and patient safety (95% CI = 0.03 to 0.09). Regression analyses results of the effect of nurse-physician relationship on the quality of care and patient safety, as reported in Table 5.2 (Section 5.3.3), indicate a significant positive impact on both the quality of care and

patient safety at $p<0.001$ significance level. These findings support the Donabedian theory, where nurses with one unit more in the nurse-physician relationship have a higher degree of patient-centeredness by 0.14, which in turn improves both the quality of care and patient safety by 0.42 and 0.43, respectively, as reported in Tables 4.35 and 4.36. Previous studies support these findings. For instance, an interdisciplinary team with high nurse-physician relationship is required to sustain the outcomes of care (Van Bogaert *et al*., 2013). Nurses and physicians substitute and complement each other's role, which leads to decreased workloads (Laurant *et al*., 2009). Thus, nurses in good terms with the physicians have more time to spend with the patients, which in turn improves both the quality of care and patient safety. So, an effective communication among the multidisciplinary teams and periodical meeting of professionals are recommended for sustaining the outcomes of care in the medical and surgical wards in Malaysian private hospitals.

The summary of Hayes PROCESS macro-regression analyses results indicate that patient-centeredness mediates the effect of work environment on both the quality of care and patient safety. The discussions in Section 5.3.3 reveal that the work environment construct significantly affects the quality of care and patient safety. The function of patient-centeredness in the study is to complement the impact of work environment on the outcomes of care. Thus, the explanation is that medical and surgical wards in Malaysian private hospitals are delivering transformed care with high patient-centeredness, which in turn, improves the positive impact of the nurses' favorable work environment on the quality of care and patient safety. So, according to the Donabedian theory, nurses' work environment construct (structural factor)

directly and indirectly affects the outcomes of care and is mediated through patient-centeredness (process factors). The R^2 value of path a indicates that work environment explains 0.32 of the variances in the nurse level of patient-centeredness, which is in turn, positively affects the quality of care and patient safety at $p<0.001$ level of significance. However, the beta coefficient of path b indicates that one unit improvement in patient-centeredness significantly improves the quality of care and patient safety by 0.42 and 0.43, respectively, at $p<0.001$ level of significance, which in turn, complements the positive impact of work environment on the outcomes of care.

5.3.6 The proposed model for improving the quality of care and patient safety

This section discusses the proposed model for improving the quality of care and patient safety in Malaysian private hospitals in order to achieve the sixth objective of the study. The implications and future challenges of this model are highlighted. According to the Donabedian theory, improving the quality of care and patient safety refers to the outcome quality, which reflects the end result of the caring process and structure (Harvey, 2004). However, according to the study results, it can be concluded that quality of care is the sum of structural and process factors and outcome quality; it is not merely the end result of the caring process or the outcomes of care. Figure 5.1 proposes a model of improving quality of care and patient safety in Malaysian private hospitals.

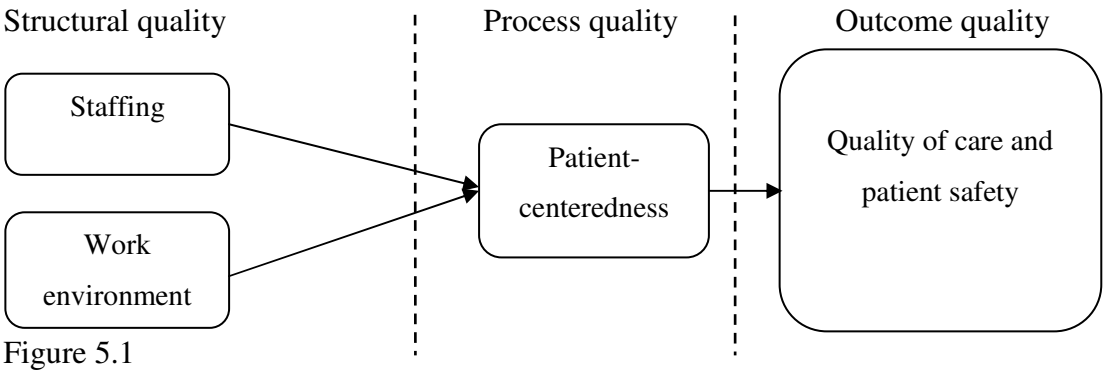

Figure 5.1
The proposed model for improving quality of care and patient safety

This model is based on the input of data collected from nurses working in the medical and surgical wards in Malaysian private hospitals. The structural quality, as shown in Figure 5.1, includes the hospital nurse staffing and work environment, while the process quality includes patient-centeredness. Any defect in the structure or process will endanger the quality of care and patient safety (Forster *et al*., 2000). Thus, the empirical evidence of the study predicts the outcome quality, which includes the quality of care and patient safety.

The regression analyses results reported in Section 5.3.2 reveal that the staffing construct insignificantly affects the quality of care and patient safety. However, the Hayes PROCESS macro-regression analyses presented in Section 5.3.4, indicates that patient-centeredness mediates the effect of staffing on both the quality of care and patient safety. Thus, the negative impact of nursing shortage and nurse shift length indirectly affect the quality of care and patient safety through patient-centeredness. The function of patient-centeredness is to suppress the negative impact of staffing on the outcomes of care. However, level of education of nurses working in the medical and surgical wards in Malaysian private hospitals insignificantly

affects the outcomes of care. A total of 355 (60.9%) nurses participating in the study are from teaching hospitals. Teaching hospitals have structured training programs for their new staff, rendering the level of education insignificant. These findings indicate that Malaysian private hospitals deliver managed care with high patient-centeredness, which in turn mitigates the negative impact of nursing shortage and nurse shift length, on the quality of care and patient safety. Thus, adequate staffing is required and highly trained staff with less shift length should be maintained to improve the quality of care and patient safety. The R^2 value of paths a and c indicates that staffing significantly explains 0.04 of the variances in the degree of patient-centeredness of nurses, and insignificantly explains 0.02 of variances in the outcomes of care at $p<0.01$ and $p<0.05$ levels of significance, respectively. Thus, nurse managers and decision-makers should shift from blaming individuals to blaming the system in order to improve the outcomes of care.

The regression analyses results reported in Section 5.3.3 reveal that nurse's work environment construct significantly affects the quality of care and patient safety. Hayes PROCESS macro-regression analyses presented in Section 5.3.5, indicate that patient-centeredness mediates the effect of the work environment on both the quality of care and patient safety. In addition, the function of patient-centeredness is to complement the positive impact of the nurse's work environment on the outcomes of care. The R^2 value indicates that the work environment variable predicts 0.34 and 0.20 of variances in the quality of care and patient safety, respectively, at $p<0.001$ level of significance; while the R^2 value of path a indicates that the work environment explains 0.32 of the variances in the degree of patient-centeredness, at

$p<0.001$ level of significance. These findings show that nurses working in the medical and surgical wards in Malaysian private hospitals have a healthy work environment with high patient-centeredness, significantly improving the outcomes of care. The impact of the nurse manager's ability and leadership support on both the quality of care and patient safety is insignificant. The cultural commitment towards respecting authority figures causes the variances between able and skilled leaders to be insignificant.

5.4 Contributions of the study

The study investigates the impact of hospital nurse staffing, work environment and the mediating effect of patient-centeredness on the quality of care and patient safety among nurses working in medical and surgical wards in Malaysian private hospitals. Its contributions towards academics and practitioners for improving the outcomes of healthcare quality and safety are discussed below.

5.4.1 Theoretical contribution

The study is among the few investigating the impact of staffing and environmental factors as separate predictors affecting the quality of care and patient safety. The study expands the body of knowledge by applying the social cognitive theory of Bandura (1977) to understand the predictors affecting the quality of care and patient safety. The study found that nurse staffing does not determine the characteristics of the work environment. Thus, the study contributes to the social cognitive theory. It is found that this theory is limited to the structural factors and ignores the process

factors affecting the outcomes of care. Thus, the study also used the Donabedian theory (1988) and expands the body of knowledge by focusing on structure, process and outcome dimensions that predict the comprehensive model discussed in Section 5.3.6. The study adds to nursing and management literature as follows:

First, the study contributes to the current literature by focusing on work environment in addition to staffing in order to improve the quality of care and patient safety. Many studies have argued that poor quality of care and adverse events are related to staffing as human factor affecting the outcomes of care. However, other studies have considered the work environment as a main predictor of quality of care and patient safety (refer page 18). The work environment predictor is significantly explained by 0.32 and 0.20 of variances in the quality of care and patient safety, respectively. However, staffing insignificantly explains 0.02 of variances in the quality of care and patient safety. Thus, future research should shift focus on work environment rather than staffing in order to sustain the outcomes of care.

Secondly, the study contributes to management literature and the Donabedian theory through the output of the data analyses. Staffing insignificantly affects the outcomes of care. On the other hand, the work environment significantly affects the outcomes of care. However, both staffing and work environment indirectly affect the outcomes of care through patient-centeredness. So, a good structure leads to better process, which in turn increases the likelihood of good outcomes (Donabedian, 1988). For instance, the study results reveal that nurses with higher participation and involvement in the hospital's affairs and participation in quality improvement programs and nurses with strong relations with the physician significantly affect both

the process and the outcomes of care. These findings support the flow of the Donabedian theory. For instance, nurses working in a favorable work environment are highly patient-centered and have a higher perceived quality of care and patient safety. However, in assessing the quality of care and patient safety, the Donabedian theory is limited to the structure-process-outcome pathway (Donabedian, 1988). For instance, the study results reveal that nurse level of education insignificantly affects both the degree of patient-centeredness and the outcomes of care. So, the study provides better understanding of the fact that nurse education level does not necessarily affect the process or the outcomes of care, because there is at least one other variable that induces variances between diploma nurses and bachelor's degree nurses. For example, training and engagement in the general orientation program make these relationships insignificant. Thus, the study contributes to the Donabedian theory, and finds that structural factor does not necessarily affect the process or the outcomes of care.

Another contribution to the Donabedian theory is the output of the data analyses reveal that the negative impact of staffing does not affect the outcomes of care because there is at least one intervening variable with a positive sign that mitigates this relationship. Moreover, there is inconsistency in the previous studies of the impact of patient-to-nurse ratio on the outcomes of care. The study explains this inconsistency and finds that the process factor could interact negatively or positively with the structural variable on the outcomes. The study finds that patient-centeredness suppresses the negative impact of nursing shortage on the outcomes of care in the medical and surgical wards in Malaysian private hospitals. However,

patient-centeredness positively affects the impact of work environment on the quality of care and patient safety. Patient-centeredness complements the effect of work environment on the quality of care and patient safety. Thus, it can be concluded that the function of patient-centeredness suppresses the negative impact of staffing and complements the positive impact of work environment on the outcomes of care.

Thirdly, the study contributes empirical evidence on the effect of shift length on the quality of care and patient safety. Many studies have found that there is an inconsistent effect of the impact of the length of nurses' duty hours on the outcomes of care (refer to Table 2.2). Similarly, the study finds that nurses working longer shift have insignificant negative impacts on the quality of care and patient safety. However, the study finds that patient-centeredness suppresses the negative impact of the shift length on the outcomes of care in the medical and surgical wards in Malaysian private hospitals. Thus, the intervening process variable with a positive sign, such as patient-centeredness, explains the inconsistent findings of the previous studies.

Fourthly, the study contributes empirical evidence that nurses with favorable work environment have a higher degree of patient-centeredness, which in turn improves the quality of care and patient safety. It is found that nurses led by a skilled leader insignificantly affect the degree of patient-centeredness and the outcomes of care as well. These findings do not support the Donabedian theory. However, trained and skilled leaders are required in order to improve the quality of care and patient safety. Thus, further study is required to investigate the intervening variable with a negative sign suppressing the positive impact of nurse manager's ability, leadership and

support on the outcomes of care in the medical and surgical wards in Malaysian private hospitals. The cultural factor with a positive sign is expected to complement the positive impact of these relationships.

Finally, the study provides better understanding of the Magnetism requirement in the literature by strengthening the components of the Magnet Recognition Model. The components of the magnet model include transformational leadership, structural empowerment, exemplary professionals, new knowledge and innovation and empirical outcomes. Further practical implication of the magnet model is discussed in the next section.

In summary, the academic implications of the study results have expanded the body of knowledge through empirical evidences of the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety. The study results also support the social cognitive and Donabedian theories. In terms of the social cognitive theory, it is limited to the structural factors affecting the outcomes of care; and as for the Donabedian theory, the process factor may suppress or complement the effect of structural factor on the outcomes of care. Thus, this has provided further understanding of the workability of the social cognitive and Donabedian theories. The study provides further support for the leaders, senior managers, decision-makers and policymakers to sustain the outcomes of care as discussed in the next section.

5.4.2 Practical contribution

The findings of the study help managers, decision-makers, policymakers and risk managers to improve the quality of care and prevent adverse events on hospitalized patients in the medical and surgical wards in Malaysian private hospitals. This could be achieved by helping the Malaysian managers to be structured and process- and outcome-oriented to understand the importance of hospital nurse staffing, work environment and patient-centeredness towards improving the quality of care and patient safety. These practical contributions are summarized as the following:

First, the study helps the policymakers and risk managers adjust the staffing patterns for improving patient safety and the quality of patient care. For instance, nurses who work 10-hour shifts can endanger patient safety in the medical and surgical wards in Malaysian private hospitals. Nurses who are delivering care for 11-15 patients or more are negatively affecting the quality of care and patient safety. Thus, corrective actions should be taken by the policymakers and the risk managers to minimize mistakes from nurses working longer hours or having a higher patient ratio in order to optimize the outcomes of care. This will help to set a limit for shift length and patient ratio for nurses working in the medical and surgical wards in Malaysian private hospitals.

Secondly, the findings of the study can help the human resource managers in Malaysian private hospitals to hire and retain trained nurses in order to improve quality of care and patient safety. There is no significant difference in the nurse level of education working in the medical and surgical wards in Malaysian private hospitals, because a total of 355 (60.9%) nurses participating in the study are

working in teaching hospitals, which have structured training programs for their staff. This might render the effect of various nursing education levels to be the same between the groups of nurses. Thus, training and continuous education are required to maintain the delivery of the best care outcomes with minimal variances. Resources should be provided for training, education and curriculum development.

Thirdly, the study finds that staffing predicts only 0.02 of the variances on quality of care and patient safety. On the other hand, work environment significantly predicts 0.32 and 0.20 of variances in the quality of care and patient safety, respectively. These findings can help the managers in Malaysian private hospitals sustain a healthy work environment as a first priority (rather than blaming nurses) in order to improve the quality of care and patient safety. This will help nursing educators focus on systems rather than nurses in order to improve the quality of care and patient safety. It will help policymakers establish guidelines for maintaining the nurses' involvement in hospital affairs, engage them in quality improvement programs and strengthen their relationship with the physicians in order to improve quality of care and prevent the occurrence of adverse events on the hospitalized patients.

Fourthly, the findings of the mediating effect of patient-centeredness on the effect of hospital nurse staffing and work environment on the outcomes of care can help the nursing manager and the nurse educator in the healthcare settings. Patient-centeredness can mitigate the negative impact of nursing shortage and shift length on the outcomes of care. Moreover, it can strengthen the positive impact of work environment on the outcomes of care. These will help the managers maintain a degree of patient-centeredness and focus on patient needs and wants in order to

suppress the negative impact of nurse shortage or shift length on the outcomes of care. Further, these will help to complement the positive impact of a healthy work environment on the outcomes of care. Thus, Malaysian managers in private hospitals should keep delivering care with high patient-centeredness, which in turn can mitigate the negative impact of staffing and complement the impact of a healthy work environment on the outcomes of care.

Finally, cost containment in healthcare has negative consequences on the quality of care and patient safety (Aiken *et al*., 2012). Improving the quality of care and reducing the cost without inducing harm for hospitalized patients is very challenging. Thus, there is a universal need for a cost effective model for improving the quality of care and patient safety. Hayes PROCESS macro-regression analyses results of the impact of staffing on the outcomes of care indicate that one unit change in patient-centeredness leads to improving the quality of care and patient safety by 0.74 and 0.62, respectively (as shown in Tables 4.30 and 4.34). Additionally, Hayes PROCESS macro-regression analyses results of the impact of work environment on the outcomes of care indicate that one unit change in patient-centeredness leads to improving the quality of care and patient safety by 0.42 and 0.43, respectively (as shown in Tables 4.35 and 4.36). These findings are supported by previous studies. Improving the nurses' work environment can be considered as a low cost strategy towards optimizing the quality of care (Aiken *et al*., 2012). In addition, staff having high adherence to the treatment guidelines can lead to lower cost of health service delivery (Fritz *et al*., 2007). Patients receiving adherent care have lower charges and fewer visits to the hospital (Fritz *et al*., 2007). Care provided by skilled nurses

increases patient satisfaction and compliance with treatment, reduces length of stay, decreases re-admission, positively improves patient care outcomes and lowers the cost of care (Brooten *et al*., 2004). One study introduced the concept of "patient value", which in turn helps decrease the tension between cutting costs and the quality of care (Korne *et al*., 2009). It can be concluded that the model of hospital nurse staffing, work environment and patient-centeredness is cost effective and can improve the quality of care and patient safety.

Additionally, the findings of the study reinforce the component of the magnetism program (survey conducted by the ANCC), which can in turn help managers maintain a healthy work environment, by attracting and retaining nurses for delivering excellent care in order to improve the quality of care and patient safety. Thus, a healthy work environment is required to minimize turnover and burnout, which can sustain the outcomes of care. Thus, resources required for managers to build a healthy work environment must be provided. The component of magnet recognition should be included in the curriculum in the medical schools to help the new generations participate in building a healthy work environment as an agent of change.

In summary, hospital managers, leaders, decision-makers, risk managers and policymakers can use the findings to provide sufficient budget for general orientation and continuous education programs. Nurse managers who create healthy work environment, maintain an adequate staffing and set a limited shift length, can optimize the quality of care and patient safety. So, senior hospital managers can use the study results for policy decisions, setting guidelines for nurse-physician

relationship and involving nurses in the unit decisions. These can encourage nurses to participate and to share their concerns which in turn can help to improve the outcomes of care for both nurses and patients.

5.5 Limitations of the study

The study has several limitations in investigating the effect of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety in Malaysian private hospitals. The limitations are mainly in the methodology, access to data and patient confidentiality and are summarized as follows:

First, there were methodological limitations in data collection. The study was limited to collecting data at one point of time by conducting a cross-sectional survey using a questionnaire adopted from previous studies. However, the data collected was sufficient to accomplish the study objectives. The study is limited to collecting data from nurses working in medical and surgical wards who deliver direct in-patient care in Malaysian private hospitals. The subject of the study is the patients' and family complaints that raise the concern of quality of care and patient safety. Nurses are chosen as respondents in the study because the nurses are more likely to implement interpersonal interventions in order to improve the quality of care and patient safety, whereas physicians mainly implement technical interventions in order to improve healthcare outcomes (Conry *et al*., 2012). Medical and surgical wards are chosen in order to control patient-related factors, and because these wards deliver multidisciplinary levels of care: medical cardiology, oncology, gastroenterology, nephrology, urology, orthopedics and ENT treatment (Coetzee *et al*., 2013). The

study can generalize the findings of the care outcomes of nurses working in the medical and surgical wards in Malaysian private hospitals.

Secondly, the confidentiality issue points to limited access to the patients. Data collection was limited to using hospital records or patients' files, because patient or hospital data are confidential. Similarly, a study conducted in six economies in the Asia Pacific region was also limited by access due to privacy protection (Aljunid *et al*., 2012). Thus, the staffing level and perceived work environment, patient-centeredness and outcomes data were collected through the questionnaire. Additionally, the study was limited to conducting a self-administered data collection procedure, because hospitals did not allow the researcher access to nurses working in the medical and surgical wards. Thus, clear methodological instructions for the nurse managers and their assistants were given to ensure that the data is collected without bias, as discussed in Section 4.2.1.

Thirdly, shortage of resources constrained data collection from nurses working in medical and surgical wards in the Malaysian private hospitals. Thus, the data was collected from nurses working in the medical and surgical wards in the 12 hospitals that were willing to participate in the study.

In summary, the limitations of the study are mainly on the methodology, access to data, patient confidentiality and resources. The sample is nurses working in the medical and surgical wards, and 652 nurses responded from 12 hospitals. Further research should invite more hospitals, units and professionals from different regions as discussed in the next section.

5.6 Recommendations for future research

The findings, discussions and limitations of the study have resulted in several suggestions for future research. The recommended future research is discussed as follows:

First, the study is cross-sectional in nature, and this cannot confirm the causality between the variables. Thus, further longitudinal, observational and experimental researches are required to perform the causality analysis between the study variables. Establishing the causality is required in an experimental study by changing the staffing level, length of duty hours and the work environment and observing the hospital outcomes over time to check whether these variables predict the outcomes of care.

Secondly, the study finds that patient-centeredness is complementary to the effect of work environment on the outcomes of care. However, the direct effect c′ paths are significant, which means that there are further mediators between the impact of the work environment on the quality of care and patient safety (Zhao *et al*., 2010). Thus, there is at least one other process factor mediating this relationship that is recommended for future research. Nurses working 10-hour shifts have a significant negative impact on patient safety. The study finds that patient-centeredness suppresses this negative impact. However, further study is required to explore other factors that make nurses working 10-hour shifts have poor perceived patient safety, while nurses working 12-hour shifts are regarded as better.

Thirdly, the study finds that there are no significant differences in the level of education of nurses working in the medical and surgical wards in Malaysian private hospitals. A total 355 (60.9%) nurses are working in teaching hospitals, which have structured training programs for their staff. Thus, further study is required to investigate the impact of hospital teaching status on the outcomes of care.

Fourthly, the study finds no significant impact of the nurse manager's ability and leadership support on both the quality of care and patient safety. However, trained and skilled leaders are required to sustain the outcomes of care. Thus, further study is required to explore the intervening factor with negative signs which suppresses the positive impact of nurse manager's ability, leadership and support. Cultural issues and commitment towards respecting an authority figure made the variances between skilled leaders be similar to the unskilled leaders. Therefore, future studies are required to explore the impact of the cultural factors on the outcomes of care in the medical and surgical wards in Malaysian private hospitals.

Finally, the costs resulting from compensations related to medico-legal complaints, are threatening the survival of Malaysian private hospitals. This study is cross-sectional in nature. Thus, further experimental studies are required to confirm the cost effectiveness of the proposed model for improving the quality of care and patient safety.

In summary, longitudinal studies, cost effectiveness of the proposed model and exploration of further mediators are recommended for future research. The study is limited to collecting data from nurses working in the medical and surgical wards.

Thus, the study should be replicated in other wards. Also, further research from different wards with more variations in the staff adequacy, shift length, work environment and clinical case complexity is required for better understanding the predictors affecting the outcomes of care. Replicating the study in the other contexts should include larger groups of hospitals, units and professionals from different countries and regions. Moreover, future studies can be replicated in different settings, for instance, exploring the proposed model will be challenging in the mental healthcare settings (patient-related variables must be controlled). The workability of the proposed model could be investigated in the other industries. For instance, it can be replicated in schools by investigating the effect of student-centeredness as a process factor on the teaching outcomes.

5.7 Closing remarks

This study is motivated by the need to explore the impact of hospital nurse staffing, work environment and patient-centeredness on the quality of care and patient safety, as many evidences have emerged, showing the need for further understanding of these relationships. To some extent, the study has managed to give insights into a number of key issues and factors that play major roles in patient care and safety. The proposed model could help to understand the complexities of interactions between these factors. The results of this research will be used by the academics and key policymakers to strengthen healthcare systems and patient-centered care everywhere. Policy makers may benefit by channeling more resources for general orientation and continuous education. Maintaining optimal patient-to-nurse ratio and limiting duty

hours length can facilitate the transition to a highly trained nursing workforce and generally move towards patient-centered hospitals. Moreover, maintaining a healthy work environment is essential in order to attract and retain skilled staff for delivering the best care. These will help to fulfill the targets of reducing patient hazards and improving quality of care.

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