

FORMULATION OF MALAYSIA-HSOPSC FOR NURSE NOTIFICATION
INTERRUPTION IN PATIENT'S SAFETY CULTURE

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DEDICATION

In dedication to my parent (Aminah Hasan & Ismail Mosnan) and my handsome angel (Adam b. Lukman Hakim)

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To the one who believing in me, through thick and thin, my mother and father, thank you for the tender love and trust and believe I can be a better person every day. To my son, Adam, this is for you.

ABSTRACT

Measurement and assessment of patient safety culture is a top priority in developed countries today. The main aim of this study is to evaluate the current condition of patient safety culture in Malaysia using a Malay version of Hospital Survey on Patient Safety Culture (M-HSOPSC) and propose a mitigation tool to improve patient safety in Malaysian hospital. For the first part, a number of 723 nurses was surveyed from a general hospital in southern region of Peninsular Malaysia. Principal component analysis and confirmatory factor analysis were used to study the psychometric properties of M-HSOPSC, while internal consistency of 13-factor (45 items) model of M-HSOPSC was examined by calculating the Cronbach α score. The principal component analysis revealed that an 11-factor model with 40 items was suitable for Malaysian sample. The internal consistency was at an acceptable level. Out of 13 factors, 9 dimensions of M-HSOPSC were identified as opportunities for improvement with staff interruption in hospital and staffing were rank lowest (29%). The level of staff interruption was chosen for further study. This was done by looking at interruption faced by nurses based on work experience. A new Nurse Interruption in Hospital (NIH) questionnaire was developed for this purpose. Finally, two design of Wearable Interruption Signage (WIS) which are armband WIS and watch WIS were developed and evaluated using human factor engineering approach (heuristic evaluation and usability testing). Findings from the heuristic evaluation and usability testing shows that the armband WIS device has a better usability attributes rating compare to watch WIS device. As a conclusion, this study provides an overall assessment of patient safety culture among nurses in Malaysia and proposed a mitigation tools to improve patient safety in Malaysian hospital.

ABSTRAK

Pengukuran dan penilaian budaya keselamatan pesakit menjadi perkara penting di negara maju masa kini. Matlamat utama kajian ini adalah untuk menilai keadaan semasa budaya keselamatan pesakit di Malaysia menggunakan *Malay version of Hospital Survey on Patient Safety Culture (M-HSOPSC)* dan mencadangkan cara meningkatkan keselamatan pesakit di hospital Malaysia. Bagi bahagian pertama, sejumlah 723 jururawat telah ditinjau dari sebuah hospital umum di wilayah selatan Semenanjung Malaysia. Analisis komponen utama dan analisis faktor pengesahan digunakan untuk mengkaji sifat psikometrik M-HSOPSC, manakala konsistensi dalaman bagi model M-HSOPSC yang mempunyai 13 faktor (45 item) diperiksa dengan mengira skor Cronbach α . Analisis komponen utama menunjukkan bahawa model M-HSOPSC 11 faktor dengan 40 item adalah sesuai untuk sampel Malaysia. Konsistensi dalaman berada pada tahap yang memuaskan. Daripada 13 faktor, 9 dimensi M-HSOPSC dikenalpasti sebagai peluang untuk penambahbaikan dengan faktor gangguan kakitangan di hospital dan kakitangan adalah yang paling rendah (29%). Tahap gangguan kakitangan telah dipilih untuk kajian lanjut. Ini dilakukan dengan menilai gangguan yang dihadapi oleh jururawat berdasarkan pengalaman kerja mereka. Soal selidik Gangguan Jururawat di Hospital (GJH) telah dibangunkan untuk tujuan ini. Akhir sekali, dua jenis papantanda gangguan mudah alih (PGM) iaitu gelang tangan PGM dan jam PGM telah dibangunkan dan dinilai menggunakan pendekatan kejuruteraan faktor manusia (penilaian heuristik dan ujian kebolegunaan). Hasil dari penilaian heuristik dan ujian kebolegunaan menunjukkan bahawa gelang tangan PGM mempunyai kebolegunaan yang lebih baik berbanding dengan jam PGM. Sebagai kesimpulan, kajian ini menyediakan penilaian keseluruhan tentang budaya keselamatan pesakit di kalangan jururawat di Malaysia dan mencadangkan alatan pengurangan gangguan untuk meningkatkan keselamatan pesakit di hospital Malaysia.

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LIST OF ABBREVIATIONS

NIH	-	Nurse Interruption in Hospital
HSOPSC	-	Hospital Survey on Patient Safety Culture
IOM	-	Institute of Medicine
AHRQ	-	Agency for Healthcare Research and Quality
NHS	-	National Health Service
RCA	-	Root Cause Analysis
HFMEA	-	Healthcare failure mode and effect analysis
CWA	-	Cognitive work analysis
HFE	-	Human factor engineering
FGDs	-	Focus group discussions
CFA	-	Confirmatory factor analysis
PCA	-	Principal component analysis
LED	-	Light emitting diode
TAT	-	Task-severity awareness tool

LIST OF SYMBOLS

V	-	Volt
mA	-	Milliampere
kB	-	Kilobyte
MHz	-	Megahertz
χ^2	-	Chi-squared

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Patient safety is an important component of health care quality. Patient safety, including the measurement of patient safety culture is a top priority in developed countries now days (Aspden et al., 2004). Research shows that safety and efficient care requires all the various elements of a health care system be well integrated and coordinated (Reid et al., 2005; Stone et al., 2007). Patient safety in the context of health care organizations was highlighted following the Institute of Medicine (IOM) report “To Error is Human: Building a Safer Health System” (Kohn et al., 2000). This report advocates for a safety culture in which adverse events can be reported without blaming individuals and that when mistakes occur, lessons can be learned. Therefore, if hospitals want to improve patient safety, it is critical to recognize more about the views of their staff in relation to safety culture in practice.

Patient safety culture, also referred to as patient safety climate, is the overall behaviour of individuals and organizations, based on a common set of beliefs and values that are aimed at reducing the chances for patient injuries (Ross, 2011). Culture may vary within organizations and among their units and by professional disciplines. Safety climate, a related construct, refers to shared perceptions of existing safety policies, procedures and practices (Dov, 2008). Organizational culture is a crucial component of patient safety in healthcare organizations (Gershon et al., 2004). The breadth of safety culture has been associate with several healthcare outcomes such as medication errors (Hofmann and Mark, 2006), nurse back injuries (Nelson et al., 2003), urinary tract infections (Saint et al., 2008), nurse working satisfaction (McCarthy et al., 2007) and patient satisfaction (Sorra et al., 2012).

According to Gershon et al. (2000), safety problems arise from safety violations and unintentional errors and mistakes (Gershon et al., 2000). Study done by Nicolini et al. (2011) show that majority of errors and adverse events arise from a complex chain of events that accumulate to the cause of errors rather than human mistake itself (Nicolini et al., 2011). Efforts to minimize these injuries have led to patient safety movement. The generally accepted definition of patient safety is the prevention and reduction of adverse outcomes or injuries stemming from the processes of health care (Kohn et al., 2000).

Organizational culture definition are varied but generally characterize as the shared values, norms and tacit assumptions of members within an organization, while other attributes include more tangible characteristics such as social practices and capacities (Schneider et al., 1998). Safety climate is described as shared perceptions regarding the practices, procedures and events as well as behaviour that receives support and rewarded which are expect in a particular organizational setting (Pronovost et al., 2003).

The characteristics of a proactive and strong safety culture are generally consists of: leadership commitment to learning from errors, documenting and improving patient safety, encouraging and practicing teamwork, identifying potential hazards, using systems for reporting and analysing adverse events and perceiving workers as key players in improving safety rather than causing errors (Piotrowski and Hinshaw, 2002). Safety culture is also characterized by systematic data collection and reporting blame-free environment (Wong et al., 2002), leadership involvement (Taylor et al., 2011) and system focus (Beckmerhagen et al., 2003).

Previous researchers had identified four factors from the literature that characterize safety culture which are: (1) recognition of the risk of error in the organization's activities, (2) blame-free environment for reporting, (3) collaboration across the organization and (4) organizational resources for safety (Reason, 2000a).

To date, many developed countries have initiated researches that look into the role of patient safety culture research in reducing medical errors and accidents. On a

global basis, several international organizations promote the establishment of patient safety culture. The World Alliance for Patient Safety, the National Patient Safety Agency in the UK, the Agency for Healthcare Research and Quality in US and the Australia Commission of Safety and Quality in Australia are among the established organisations related to patient safety culture improvement. Several studies also conducted in Asian (Chen and Li, 2010; Nie et al., 2013; Matsubara et al., 2008). Mostly emphasis on the evaluation of the psychometric properties using the Hospital Survey on Patient Safety Culture (HSOPSC) which has been translated in foreign languages such as Japan (Matsubara et al., 2008), Norway (Haugen et al., 2010), French (Perneger et al., 2013) and Scotland (Sarac et al., 2011).

1.2 Problem statement

Over the three decades, many researches have led to a general consensus on the importance of safety climate as a ‘leading indicator’ of organisational safety (Zohar, 2010) and a significant correlation of employees’ safety-related behaviour in the workplace (Christian et al., 2009). Although there are strong evidences that safety climate can be generalised across all employment groups (Cheyne et al., 1998), organizations (Mearns et al., 2001), and industries (Hahn and Murphy, 2008), there has been limited focus to generalise across national cultures. One particular concern is the extent to which safety climate instruments developed in the Western countries transferred successfully to the non-Western cultures.

Among the initiatives to advance patient safety include the growing interest of patient safety culture. As stated in the Institute of Medicine’s report ‘To err is human’ (Kohn et al., 2000), if safety culture is properly promoted, it will enhance patient safety. The Joint Commission for Accreditation of Healthcare Organizations included an annual assessment of safety culture in its 2007 patient safety goals. The assessment provides information on aspects of the organizational culture (the underlying values, beliefs and norms; the way we communicate around or work together in an organization) that underlie active failure in patient care and on latent conditions (for

instance, unworkable procedures, poor or inadequate technology, understaffing) that should be addressed by patient safety initiatives.

In Malaysia context, with regards to the rising problem of medical errors and increasing media attention and public pressure, health organizations have been actively pursuing efforts to improve quality and safety of the healthcare services. Several initiatives have been implemented to improve safety mainly through the establishment of standards and initiation of accreditation schemes. Malaysia Patient Safety Goals were introduced by Ministry of Health Malaysia in 2013. Since then a lot of initiatives has been implemented to improve patient safety across all hospitals in Malaysia. Before any new initiatives can be implemented, an assessment of the current patient safety culture in a particular hospital need to be established. According to a study done by Wagner et al. (2019), assessment of safety culture in hospital setting is recognised as a prerequisite step towards improving the overall patient safety. The result for the assessment will help top management in hospital formulate achievable and effective strategies in improving the overall patient safety.

There are several studies on safety culture assessment have been conducted in Malaysia previously. A study done by Jye et al. (2019) in Sarawak General hospital using the original English version of HSOPSC questionnaires. Apart from using HSOPSC questionnaires, another well established and validated SAQ questionnaires were used by few researchers in patient safety culture assessment in Malaysia context (Samsuri et al., 2015; Sivanandy et al., 2016; Hamid et al., 2016). Despite of the previous attempts made by the above researchers, there is a dearth of study that looks into patient safety culture (PSC) among nurses by adapting the local Malaysian context in patient safety assessment. There is also needs to localise the Western version of HSOPSC to suit Asian perspectives as there are vast culture differences in different language groups (Sung and Park, 2019).

Study conducted in the USA, identified the occurrence of adverse events during healthcare delivery which is the 8th leading cause of death in the country. Hence, any small misconducts could jeopardise patient safety as well could result in fatality (Monteiro et al., 2015). In developed countries, interruptions in healthcare are viewed

as a big concern as it can bring substantial risk on medical practices. Developing country such as Malaysia have relatively high fidelity of interruptions as compared to developed country due to lack of patient safety awareness in hospitals. Public take the safety issues for granted and regarded it as a small matter. Few cases related to interruptions led to medical errors have opened the eyes of clinical practice that interruptions should not to be weighed lightly.

Thus, the purpose of this study was to evaluate the extent to which organization culture supports patient safety in Malaysia hospitals and the extent to which safety is a strategic priority among healthcare institutions. Using human factor engineering approach to improve patient safety, the researcher has identified and classified nurse's interruptions in Malaysia hospital and developed plus evaluated a mitigation tool named Wearable No-Interruption Signage (WIS) to reduce nurse's interruptions in hospitals.

1.3 Aims and objectives

The overall aim of this study was to evaluate the current condition of patient safety culture in Malaysia hospitals and proposed a mitigation tool to improve patient safety in Malaysia's hospital. The following research objectives are outlined as follows:

1. To investigate issues surrounding patient safety culture (PSC) in Malaysia hospital and to test the suitability of Hospital Survey on Patient Safety Culture (Malay translated version: M-HSOPSC) tools as a measurement of patient safety practices.
2. To develop and test nurse's interruptions in Malaysia hospital using a Nurse Interruption in Hospital (NIH) questionnaires.
3. To develop and evaluate Wearable Interruption Signage (WIS), a mitigation tool to reduce nurse's interruptions in hospital setting using human factor engineering approaches.

1.4 Research questions

The purpose of the study was to assess and evaluate the suitability of Malay translated version of Hospital Survey on Patient Safety Culture (M-HSOPSC) for Malaysia content and proposed a mitigation tool to improve patient safety in Malaysia`s hospital using human factor engineering approaches. In order to answers those objectives, the following research questions were outlined:

- a) What are the issues concerning patient safety culture in Malaysia hospital?
- b) What are the perceptions of medical personals regarding patient safety in practices of hospital in Malaysia?
- c) What are the elements that are required to improve the overall patient safety condition of hospital in Malaysia?
- d) What are the interruptions experienced by nurses in servicing patients at hospital in Malaysia?
- e) How do the nurses experience the WIS device?

1.5 Scope of the study

The research involved in a two stage approaches of data collection. In the first part, research focused on the development of a Malay translated version of Hospital Survey on Patient Safety Culture (M-HSOPSC). The original HSOPSC which was developed by AHRQ was translated, finalised and later piloted on a small number of nurses for validity and reliability conformation of the new developed M-HSOPSC. The final version of M-HSOPSC questionnaires were later tested among nurses working in public hospital in Johor Bahru, Malaysia. Albeit, the final surveys were only conducted in hospital in Johor Bahru area, which served as a microcosm view of hospitals in Malaysia. The research participants in the survey focused only on nurses because they constantly deal with patients and have direct contacts with them. In many situations in hospital, nurses are the first healthcare staffs that a patient meet, thus it is paramount to evaluate nurse`s views about patient safety culture in their working environment.

For the second part, this research concentrated on identifying and analysing nurse's interruptions at hospital using Nurse Interruption in Hospital (NIH) questionnaires. Then a mitigation tool was developed in order to reduce nurse's interruptions in hospital setting and later evaluated using human factor engineering approaches. According to Weigl et al. (2011), interruptions can also lower job satisfactions and work performances of nurses. It is said that the healthcare givers are too tired with their work and if interruption occurs, it will increase their mental workload. Therefore, it is important to identify and mitigate nurse's interruptions in hospitals to better safe guard the overall patient`s safety.

1.6 Significance of the study

The purpose of this study was to measure the patient safety culture in Malaysia's hospitals using the M-HSOPSC questionnaires here. A comparative analysis from the survey data with the previous study was done as a benchmarking exercise. It is anticipated that findings of this study will provide better understanding about hospital safety culture and the extent to which patient safety attitudes among nurses are present in hospital in Malaysia. It is expected that findings from this research help top management of hospital to further plan an effective patient safety initiatives and mitigation plans to improve the overall patient safety culture at hospitals.

The Malay translated version Hospital Survey of Patient Safety Culture (M-HSOPSC), can also be used as a benchmarking tool in comparing patient safety cultures among others hospitals in Malaysia. Results from this comparison can aid Malaysian policy makers to identify, evaluate and design more aids and assistance to improve the overall patient cultures at the respective hospitals.

Findings from nurse's interruption highlighted several measures that can be taken into consideration by the top management of hospital in planning and designing the right mitigation tools or activities that can help to reduce nurse`s interruption in delivering effective services to patient and putting safety as the most priority. Findings

from this study contributed to further knowledge in the area of hospital interruption and overall patient safety in hospitals which are somehow lacking in the literatures.

1.7 Organizational of the thesis

This thesis consisted of six chapters and the overall thesis structure is as follows:

Chapter 1 focuses on the introduction and overview of the research. This chapter is divided into several sub-topics namely as research background, problem statement, research objectives, scope and significance of the research. In research background, theoretical bases regarding the study was briefly presented as a basis of presenting critical problem statement. The overall research objectives and questions were also presented.

Chapter 2 concentrates on the literature review that are related to the research topic. Review of the literature was segmented into understanding and measuring patient safety, current trend in patient safety culture assessment, the application of human factors methods and techniques in healthcare, study of human factor engineering related to hospital, interruption in hospital and many more.

Chapter 3 describes the research methodology that was adopted in this study. In this chapter, a detailed discussion on research design, research operational framework, sampling procedures, selection of testing, testing administration, instrument development and data analysis were presented.

Chapter 4 highlights the device development of wearable signage system (WIS). This chapter explains on the hardware and software requirement, the flowcharts of WIS on each of the phases and the process of WIS also was presented in this chapter. Heuristic evaluation and usability testing which refer to methods in human factor engineering approaches were used to evaluate the effectiveness of the mitigation tool in order to reduce nurse's interruptions.

Chapter 5 of the thesis covers two different parts. The first part shows the results obtained from flow works while the second part presents the analysis and discussion of the results of the study. The discussions and analysis were supported with the literature presented earlier in Chapter 2.

Finally, the conclusion for this study is presented in Chapter 6 together with several recommendations for the future research.

1.8 Summary

This chapter has presented the background of the study, problem statements, the importance of the study, research objectives and research questions, the scope of the study and thesis organization. The next Chapter 2 follows serve as literature review of the related study.

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