PREVALENCE AND FACTOR ASSOCIATING MEDICATION ERROR AMONG REGISTERED NURSES AT PUBLIC HOSPITAL IPOH

EZAWATY BINTI MAT JOHOR

OPEN UNIVERSITY MALAYSIA
2020

PREVALENCE AND FACTOR ASSOCIATING MEDICATION ERROR AMONG REGISTERED NURSES AT PUBLIC HOSPITAL IPOH

EZAWATY BINTI MAT JOHOR

A Research Project submitted in partial fulfilment of the requirements for the degree of Bachelor of Nursing Science with Honours

Cluster of Applied Sciences
Open University Malaysia

2020

DECLARATION

Name: Ezawaty binti Mat Johor

Matric Number: 770501087564001

I hereby declare that this Research Project is the result of my own work, except for quotations and summaries which have been duly acknowledged.

Signature: Date: 29.09.2020

(Ezawaty bt. Mat Johor)

AKNOWLEDGMENTS

I would like to take this opportunity to thank my supervisor Pn. Aroma, for her firm and unwavering belief in me to complete this dissertation. Thanks for her knowledge, expert guidance, generous support and patience in drawing me into the realm of qualitative research and making me feel at home. She is an inspiration and a role model for the nurse educator that I hope to become.

I also wish to thank my family, my loving husband Faizal Sutiara, my adorable and charming children, who supported me during the most challenging journey of my life. Never giving up on me and having patience with me when I was busy on the computer and not paying enough attention to them.

Additionally, I extend gratitude to my friends, Ms. Adha, Md. Seetha and staff nurse Nasir for their excellent comments and suggestions. Finally, I would like to thank all the nurses who participated in this study. I am forever indebted to them for their generosity in sharing their experiences. It was a privilege to have known them first as research participants and then as nurse colleagues.

PREVALENCE AND FACTOR ASSOCIATING MEDICATION ERROR AMONG REGISTERED NURSES AT PUBLIC HOSPITAL IPOH

EZAWATY BINTI MAT JOHOR

SEPTEMBER 2019

ABSTRACT

Medication administration is an important task performed daily by nurses and is one of the key aspects of safe patient care. Research indicates that when medication errors occur the concern is usually for the patients involved in the incident. However, making a medication administration error has a lasting effect on the nurse as well as the patient (Schelbred & Nord, 2007; Treiber & Jones, 2010). The objective of the study is to evaluate the prevalence and factor associate medication error among registered nurse at public hospital Ipoh. Method of the study is quantitative study in carry out the research from the questionnaires. This study has conducted two types of statistics namely descriptive and inferential. Data collected from N = 80 respondents from two clinical areas; medical and surgical ward. The data collected through this questionnaire was analysed with the help of statistical program for social science (SPSS) version 24.0. The data were statistically treated using mean, standard deviation and one-way ANOVA test. Based on the key findings of the study, it found out the element related to 'preparing and administering' (mean=4.88) was the highest prevalence compared to other elements. This study also found that management factor (mean = 3.55; SD = 4.914) was the main factor contributing to the incident of medication error at the study location followed by environmental factor (mean = 3.53; SD = 4.231) and human characteristic factor with mean score = 3.51 (SD = 4.237). While one-way ANOVA test showed that the difference in marital status of the respondents was significant with the causative factor of medication error with the value is (p=0.027). In conclusion, this review paper summarizes the preventive measures of medication errors made by nurses. As it is obvious, there is a plenty of factors that need to be applied in the hospital to succeed low medication error rate. To improve nurses' knowledge of how individual factors, contribute to errors and help them develop effective strategies to prevent errors occurring, it is important that institutions reward and encourage leaders who demonstrate characteristics of mindfulness on all levels.

Keywords: Prevalence, Factor, Influence, Medication error, Registered Nurses,

PREVALEN DAN FAKTOR BERKAITAN *MEDICATION ERROR* DALAM KALANGAN JURURAWAT BERDAFTAR DI HOSPITAL KERAJAAN DI IPOH

EZAWATY BINTI MAT JOHOR

SEPTEMBER 2019

ABSTRAK

Pemberian ubat adalah tugas penting jururawat yang perlu dilakukan setiap hari dan ia merupakan salah satu aspek penting dalam penjagaan serta keselamatan pesakit. Kajian menunjukkan apabila berlakunya *medication error*, ia akan memburukkan keadaan pesakit. Hal ini di katakan demikian kerana kesalahan ini akan memberikan kesan buruk yang berpanjangan bukan sahaja kepada pesakit tetapi juga kepada jururawat (Schelbred & Nord, 2007; Treiber & Jones, 2010). Objektif kajian ini adalah untuk menilai kelaziman dan faktor berkaitan *medication error* di kalangan jururawat berdaftar di hospital kerajaan di Ipoh. seramai N = 80 responden dari wad medikal dan surgikal yang mengambil bahagian dalam kajian ini. Data yang dikumpulkan akan dianalisis dengan menggunakan SSPS versi 24.0. Secara statistik, data menggunakan min, *standard deviation* dan *one-way ANOVA test.* Berdasarkan keputusan kajian, *preparing and administering* merupakan elemen prevalensi yang tertinggi iaitu skor min=4.88 berbanding dengan elemen yang lain. Kajian ini juga mendapati faktor pengurusan (min = 3.55; SD = 4.914) merupakan faktor utama juga yang menyumbang kepada *medication error* diikuti oleh faktor persekitaran (min = 3.53; SD = 4.231) dan faktor *human characteristic* dengan min skor = 3.51 (SD = 4.237). Manakala ujian ANOVA pula menunjukkan terdapat perbezaan dalam status perkahwinan responden dengan nilai P nya adalah (p=0.027). Kesimpulannya, researcher akan membuat kajian supaya lankah-langkah pencegahan dapat diambil untuk mengurangkan berlakunya *medication error* di kalangan jururawat bedaftar. Jelaslah bahawa terdapat banyak factor yang perlu diperbaiki untuk mengurangkan *medication error.* Oleh itu, untuk meningkatkan pengetahuan jururawat, sesebuah instituisi itu perlu mengatur strategi yang berkesan kepada pemimpin atau ketua jururawat untuk mencegah berlakunya *medication error*.

Kata kunci: Kelaziman, Faktor, Pengaruh, *Medication error*, Jururawat berdaftar

TABLE OF CONTENT

LIST OF TABLE

LIST OF THE FIGURE

LIST OF ABBREVIATION

MAE	Medication administration error
NCCMERP	National Coordinating Council for Medication Error Reporting and Prevention
MERP	Medication Error Reporting and Prevention
US	United States
ME	Medication error
AHRQ	Agency for Healthcare Research and Quality
WI	work interruption
ISMP	Institute of Safe Medication Practices
IDC	independent double checking
RN	Registered nurse
IOM	Institute of Medicine
VA	Veterans affairs
WHO	World Health Organization
ADE	Adverse drug events
HRPB	Hospital Raja Permaisuri Bainun
NCSBN	National Council State Board of Nursing
OUM	Open University Malaysia
SPSS	Statistical software for social science
STEPPS	Strategies & Tools to Enhance Performance & Patient Safety
MAR	Medication administration record

CHAPTER 1

INTRODUCTION

1.1 Introduction

One of the key roles when providing safe quality care to patients is safe medication administration. In carrying out this vital role, nurses are expected to understand that safe medication administration is an individual responsibility and that the accountability eventually rests with the person who administer the medication. Nurse are generally concerned of committing medication errors, which may be viewed first in relation to patient welfare as in violating the ethical aspect of non-maleficence and second as a potential threat to self in terms of blame, loss of position and more (Treiber & Jones, 2010).

In this chapter, the researcher will describe the background of the study, followed by the problem statement related to medication error. Exploratory research in these areas will be invaluable in creating a foundation for program change ultimately leading to improvements in safe medication management. Next, the significance of this study will be further explained in this chapter. In addition, the objectives of this study including the general and specific objectives, and, the research questions of this study will be described by the researcher in this chapter. Finally, the operational definition of the important terms will be elaborated.

1.2 Background of Study

Nowadays, medical errors are one of the most important issues in the field of public health in which patients' safety is threatened (Mohajan, 2018). According to Motycka et al. (2018), it is an important indicator of health care quality. Medication administration error (MAE) are often used as indicators of patient safety in hospitals because of their common incident and potential injury to patients. Study results have indicated approximately one third of adverse drug occurrences are associated with medication errors that are viewed as preventable (Nanji & Bates, 2016). Study of Abousallah (2018) 10% to 18% of all reported hospital injuries have been attributed to medication errors. Jember et al. (2018) stated that medication errors are caused by many health care professionals, such as physicians, pharmacists; however, nurses are usually placed on the frontline when medication errors occur.

Fundamental challenges in applying research evidence to reducing medication errors have been the variety of definitions of "medication error" used in studies (Oshikoya et al., 2013) or the lack of a reported definition (Keers et al, 2013). Keers et al. (2013) stated they considered any actions that differed from physician's orders, manufacturers' instructions, or organizational medication management policies as a medication error and others used specific criteria, such as omission, unauthorized drug, wrong time, etc., with detailed definitions (Acheampong, 2015). Fortunately, increasing numbers of investigators are following the advice of the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) and using the organization's definition in their research (Durham et al., 2016). MERP (2014) and Polnariey (2016) definition is also used by the Food and Drug Administration when identifying medication errors.

According to United States (US) National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) (2010) defined the medication error (ME) as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use. "Medication error may occur at any nodes of the medication system, according to Mansur (2016). In addition to working from a clear definition of medication error, it is also important to understand the various causes of errors, including errors of both commission and omission.

Moreover, according to Westbrook & Braver (2015) reported that errors rates measured by reporting systems are often much lower than found using observation or chart audit, yet many organizations are relying on reporting systems for data on incidence and cause of errors. Some researches stated a persistent problem in some parts of the world is the lack of, underdeveloped or underutilized error reporting system (Cebeci et al., 2015; Mostafaei et al., 2014). Even when a reporting system is in place several studies discussed that some health professional doesn't realize they have made an error (Baker et al., 2002) and others fail to report errors because of the effort required, lack of knowledge about the reporting system, fear of retribution from administration, loss of peer respect, or even loss of their job (Haw, Stubbs, & Dickens, 2014; Hajibabaee et al., 2014; Oshikoya et al., 2013). Without accurate data, it is unlikely that effective changes can be made to improve patient safety.

According to Salami (2018) stated that medications are part of the patient treatment plan and management to ensure patient safety. Any medications could cause harm if given in the wrong concentration, at the wrong frequency, or via the wrong route (Hsaio et al., 2010). Thus, the Institute of Safe Medication Practices (ISMP) has implemented many strategies in medication safety to prevent error, one of its independent double checking (IDC). Whereby, two nurses have to do the same checking hoping to find the error before administering high-alert medication. If high-alert medications are given in error, they could cause harm more frequently, therefore increasing patient suffering and maximizing the cost of care (Salami, 2018). However, human is fallible even human trying to do their best to avoid mistake and always to do their best to ensure patient safety. Literally, no one have intention to do medication error.

In performing this vital role, nurses are expected to understand that safe medication administration is an individual responsibility and that the accountability ultimately rests with the person who administers the medication. Before improvements can be implemented in pre-license nursing education or orientation programs, it is important to understand what is taking place in these programs related to safe medication management, and the perceptions new nurses have developed about medication error and their cause. The specifics of accurate medication administration are well embedded in the nursing profession and explicitly understood by practicing nurses.

1.3 Problem Statement

Nurses are central to providing safe and quality care to patients and patient safety has been a matter of concern for a considerable length of time. Perceptions regarding how to build a safe environment for these patients in healthcare facilities vary among healthcare workers. Evidence suggests that different viewpoints exist amongst leaders and staff nurse in relation to culture of safety in organizations (Vogelsmeier, Scott-Cawiezell, & Miller, 2010). According to Farley et al., (2005) due to the high incidence in medical errors, the Agency for Healthcare Research and Quality (AHRQ) was designated to forge a patient safety research and development initiative to assist health care personnel to reduce the incidence of errors and improve patient outcomes.

Medication administration is a high-risk, high-frequency nursing task in everyday practice (Sulosaari et al., 2015). It involves the processes of prescription, transcription, dispensing, preparation and administration of medication (Oshikoya et al., 2013). Medication error caused at least one death every day and injure approximately 1.3 billion people annually in the United States (FDA). In the clinical setting, nurses are the health care personnel who administer the medications the most to the patient compare other healthcare professional. Thus, have primary responsibility for administration of medication to make sure five rights are implemented correctly even after medication administration such as observation of the patient for effectiveness or adverse reaction. Patient who received the medication either can help or hurt them. No doubt, many studies have been carrying out related to medication safety in delivering quality care to the patient. However, the error still happening in medication administration.

In Malaysia, the medications errors are reported to the National Medication Error Reporting System. This database consisted all medication errors report from private and government settings in the country. Moreover, the medication safety center will solicit and encourage reporting of medication errors and will maintain strict confidentiality with regards to the identity of patients and the healthcare providers involved. According to a retrospective study done by Samsiah et al. (2016), from 2009 to 2012, most of the errors are prescribing error (76.1%) and pharmacist detected most of the errors (92.1%). Most of the errors (98.1%) are not harmful to the patients. This signifies that the medication errors reported by the private sectors and non-pharmacists are low, which require further investigation.

Another study done by Chua et al. (2009), in a Malaysian Hospital, drug administration errors were the second most frequent type of medication errors, after prescribing errors but the latter were often intercepted hence, administration errors were more probably to reach the patients. A total of 1118 opportunities for errors were observed and 127 administrations had errors. This gave an error rate of 11.4 %. Incorrect time errors were the most common type of drug administration errors. Shehata et al. (2016) has found that prescribing errors were the most common type of MEs (54%), followed by monitoring (25%) and administration errors (16%); only 13% of reported errors lead to patient harm. Therefore, causes of MEs were mostly lack of knowledge, environmental factors, lack of drug information sources, and incomplete prescribing.

According to a systematic review done in 2013, dispensing and documentation errors were inadequately evaluated. Error rates varied from 7.1 % to 90.5 % for

prescribing and from 9.4 % to 80 % for administration. The most common types of prescribing errors reported were incorrect dose (with an incidence rate from 0.15 % to 34.8 % of prescriptions), wrong frequency and wrong strength (Alsulami et al., 2013). In a study done by Van Doormaal et al. (2009), the study included 592 hospital admissions with 7286 medication orders (MOs), of which 60% contained at least one prescribing or transcribing error. Therefore, a review of medication errors in Iran has shown that individual factor, with "inadequate knowledge of medication" were the most reported source of MEs. Fear and reporting process were two most important reporting barriers. The sense of being reprimanded and ignoring to report respectively were their most frequent factors of reporting barriers. (Mansouri et al., 2014).

A study conducted in the United Kingdom identified ten latent failures that underpin medication errors. The failures identified were based on the analysis of the interviews of 12 nurses and 8 managers and were; ward climate, local working environment, workload, human resources, team communication, routine procedure, bed management, written policies and procedure, supervision and leadership and training. The researchers reported that among the ten failure, ward climate was rated the most prevalent theme. According to the researchers, the finding of this study may be significant in assisting researchers and organizational leaders to develop patient safety measures, which may lead to proactive management of errors and incident reporting system in hospitals (Lawton, Carruthers, Gardner, Wright & McEachan, 2012).

Other than that, a study conducted in Canada documented characteristics of work interruption (WI) encountered during medication administration. The findings of this study indicated that there were 6.3 WI per hour encountered by nurses during

medication administration. The study concluded that is significant risk of WIs to nurses during medication administration. Additionay, the researchers recognized that there is no surveillance system in place that may protect these nurses against WIs (Biron, Loiselle, & Lavoie-Tremblay, 2009). It is evident that the occurrence and impact of medication errors are not just limited to the USA but are recognized as a critical issue globally.

However, In Malaysia, several studies have been conducted in inpatient settings (Ong & Subasyini, 2013) as well as in outpatient pharmacy. The rates of medication error (ME) reported from these studies varied between 11.7 to 97.7%. To our knowledge there has been no study teaching hospital in Malaysia providing an insight into the occurrence of ME in Medical and Surgical ward setting. Since ME can occur at various stages of a medication use process, in this study we chose to explore errors associated with drug administration. Therefore, the objectives of this study were to determine the prevalence and factor associate the medication errors among nurses in the medical and surgical ward of one a government hospital in Perak.

Therefore, the researcher would like to conduct a study to emphasize its importance in terms of incidence and prevalence, significance to nursing education and practice related to patient outcomes. This study aims to ultimately build upon the existing research on medication errors and inform the body of knowledge related to this area of nursing science, to improve nursing practice, enhance nursing education and influence policy.

1.4 Objective of The Study

1.4.1 General Objective:

To evaluate the prevalence and factor associating medication error among registered nurses at public hospital Ipoh.

1.4.2 Specific Objective

Based on the objectives above, following are some specific objectives for the study:

1.4.2.1 To determine the prevalence of medication error among registered nurses at public hospital Ipoh.

1.4.2.2 To identify the most factor influence of medication error among registered nurses at public hospital Ipoh.

1.4.2.3 To see the different between demographic data and factor influence medication error among registered nurse at public hospital Ipoh.

1.5 Research Question

1.5.2 What is the most factor influence of medication error among registered nurses at public hospital Ipoh?

1.5.3 What is the prevalence of medication error among registered nurses at public hospital Ipoh?

1.5.4 Is there any different between demographic data and factor influence medication error among registered nurse at public hospital Ipoh?

1.6 Significant of The Study

1.6.1 Significant to the nurse

Registered Nurse (RN) are primary care to sustain patient safety and one of the worldwide concern and this is including medication error, whereby, the most frequent cause in morbidity and mortality prevention in the hospital (Adam and Koch as cited from Parry, 2014). Drug administration is a routine but important part of nursing practice, which requires special skills, technique and knowledge in order to attend to patients. When a medication error occurs, nurses' performance is undermined more than that of any other health care professional e.g. physician. Therefore, it is often the nurses who are held responsible (Mrayyan, 2012). This may be because nurses often carry out medication orders and with this corners greater responsibility, as they are in charge of both the medications and the patients' safety (Joolaee et al., 2011). Practical advice, which can be followed by nurses independently expands the opportunities to improve care (Whitaker, 2006); hence, emphasizing the need for nurses to play a more active role in the prevention of medication errors (Alsulami, Conroy & Choonara, 2013).

Moreover, obtaining medication histories from patients has been the responsibility of the professional nurse in many health care settings. An ideal situation would occur if patients and their families provided a complete and accurate history to the nurse. Therefore, for medication safety, it is necessary that providers engage in meaningful communication about the safe and effective use of medications at multiple points in the medication-use process (IOM, 2007). In addition, Barnsteiner & Disch (2012) recommended effective strategies of using protocols, implementing medication reconciliation, and having nurse take the lead role in designing and implementing systems to record medications and changes in them so that a systematic record is available to all providers.

1.6.2 Significant to the management and practice

Nurse and medication management have been studied extensively because this is a key health system/patient interface. Some nurse-related issues have already been identified as impacting errors, including level of experience (Fasolino & Synder, 2012), knowledge of pharmacology (Pazokian, Tafreshi & Rassouli, 2014), and use of safe practices (Sahay, Hutchinson & East, 2015). A number of studies have examined nurse perceptions of the causes of medication errors using a questionnaire with results often reflecting a need for a more supportive environment, decreased workload, and improved packaging of medications, and technology that is more user-friendly (Mrayyan & Al-Atiyyat, 2011). In contrast, Fasolino and Synder (2012) found, based on data from questionnaires and error reporting system, that while greater experience by the nurse lead to decreased errors, the workplace environment was not strongly associated with medication error rates.

Although system change can be an important factor in improving patient safety related to medication management in our health system, the human factor in the process will not be removed anytime in the foreseeable future. One way to ensure that nurses are not having a negative impact on patient safety related to medication management is to validate that they are being prepared adequately for their role. Unfortunately, one of the biggest gaps in the literature relates to how nurses are prepare to manage medications safely. System factors include the safety culture of an organization, management and leadership, workplace communication and workplace policies and procedures. Examples include addressing the educational needs of staff (including agency nurses) and having accessible, succinct, step-by-step guidelines and protocol for the operation of equipment. Personal factors include the cognitive ability and skill,

situational awareness, decision-making ability and personal resources (including response to stress and fatigue) of individual practitioners (WHO, 2000).

1.7 Operational Definition

1.7.1 Prevalence

Prevalence is a frequently used epidemiological measure of how commonly a disease or condition occurs in a population. Prevalence measures how much of some disease or condition there is in a population at a particular point in time. The prevalence is calculated by dividing the number of persons with the disease or condition at a particular time point by the number of individuals examined (Kumurya & Auta, 2017). Therefore, prevalence in this study is referring to the factor associate medication error among nurses. It will be measured by knowledge on medication error question. Research substantiates that prevalence of medication errors among registered nurse has implications on patient safety outcomes. However, in this study researcher want to develop a system where nurses work in an amicable, fear free environment, establish a system of reporting not to blame but to efficiently document errors by removing obstacles that hinder reporting to enable reduction in medication errors

1.7.2 Factor

A factor is an element that influences something, occurrences that are significant or pivotal, in either a desirable or an undesirable way. In this research, researcher refers to the factors in a medication error such as the lack of competent and skilled staffs, heavy overtime work, long work days, a crowded ward, necessity of intensive cares, and etc., and some of the knowledge-based causes include, inadequate pharmaceutical

knowledge and experience, no awareness about patients' and drug mathematical calculations (Hashemi, Nasrabadi & Asghari, 2012).

1.7.3 Medication error

The United States National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as: "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use". (MERP, 2010). Due to this, assessing the magnitude and associated factors of medication administration error has a significant contribution for improving the quality of patient care. The aim of this study was to assess the magnitude and associated factors of medication administration errors among nurses at the hospitals. So that, to all the new graduate registered nurse have demonstrated a minimal level of competence as a generalist nurse.

Therefore, one of the primary assumptions of this study is that the performance of the nurse related to medication management on error reduction. Past studies have proven that there are various factors that contribute to the incident of medication error including system, equipment, organization, human, education and etc. This study takes into account three main factors including human characteristic factor, environmental factor and management factor. In addition, researcher provides nine elements to study the prevalence related to medication error including behavioural/attitude of the staff,

carrying out doctor's order, transcribing, endorsing, preparing and administering, documenting, monitoring, educating/health teachings and evaluating.

1.7.4 Registered Nurse

In Malaysia, registered nurse refers to a nurse who has registered with the Malaysia Nursing Board (MNB). Registered nurse is well positioned to monitor and affect how the healthcare system functions across many aspects of patient care and patient safety. Therefore, in this study registered nurses' is an individual to perform nursing duties and decision-making processes regarding error reporting to medication error to prevent and improve an incident in the future. Therefore, registered nurse at medical and surgical ward will be participant for this research.

1.7.5 Hospital

Hospital can be define as an institution that is built, staffed, and equipped for the diagnosis of disease; for the treatment, both medical and surgical, of the sick and the injured; and for their housing during this process. The modern hospital also often serves as a center for investigation and for teaching. So, researcher will use public hospital Ipoh as a location for this research.

1.8 Summary

Medication errors are an ongoing, serious problem in Malaysian, as well as systems throughout the world. As identified by the NCC MERP, there are many causes and factors that contribute to the occurrence of a medication error. Some of these courses will not be overcome until administrative changes are made within organizations and cultural changes occur within the healthcare system. Because "nurses are crucial in preventing medication errors" as well as other adverse events (Institute of

Medicine, 2011, p. 3), the lack of literature related to best practices or effective strategies for registered nurse education and workplace orientation related to medication administration safety, to improve nursing practice, enhance nursing education and influence nursing policy.

The chapter explained the background of the research that had been carried out by the researcher. Followed by the problem statement, had described the several problems which had enhanced the researcher to carry out this study. Research objectives have been stated in order to ensure the researcher in the right track during completing this study; the researcher will be successfully meeting the research objective. Also the researcher had explained the operational definition of the several terms that related in this study in order to develop the further understanding about this study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This section concentrates on the conceptual framework, search strategies, article selected and literature review. In conceptual framework researcher will explain the independent and dependent variables. The chapter will be continuing with previous work which has been produced by researchers comprising academic experts, relevant researches and journals. In this chapter, the researcher will explain the literature that assists to conduct this research. The literature review will be explained and describe in chronological order to gain better understanding about the study topic. The subheading of this chapter are search strategies, article selection and literature review of the previous study were related to the study topic.

2.2 Study theoretical framework

The focus of the study is to investigate prevalence and factor associate to medication errors among nurses. According to Sulosaari (2012) explained nurses are the professionals closest to patients, and are the final link in the medication administration chain. Therefore, as the product of nurses' shared values and beliefs, medication safety can be taught, developed and internalised in student nursing programmes (Butterworth et al., 2011) to transform safety culture (Reid and Catchpole, 2011; Vaismoradi et al., 2011). Yet, even with all of the dedicated resources to this important topic, patients are still risk for becoming victims of medical error. It is impossible to fully identify how many medical errors occur due to inconsistent reporting of errors related to voluntary error reporting systems (Wu, 2011).

There is an abundance of literature in regards to patient safety. Errors occur in the health care environment. A report issued by the Institute of Medicine [IOM]: *Crossing the Quality Chasm* documented the need for a change to the delivery of healthcare. Safety was identified as a top priority. More (2017) defined safety as, "patients should be safe from injury caused by the care system. Reducing risk and ensuring safety require greater attention to systems that help prevent and mitigate errors". The report initiated a national health care reform committed to patient safety. Moreover, other review of literature uncovered a plethora of research related to the implementation of a Just Culture in the health care setting. Errors occur in the health care environment. Taking the cue from high-risk industries, health care leaders are seeking to transform hospitals into high reliability organizations in which minimal errors occur (Currie, Desjardins, Levine, Stone, Schnall, Li, & Bakken, 2009. p. 675). Literature addresses the implementation of Just Culture with the focus to identify system and process failures to improve patient safety and ultimately improve patient outcomes (Miranda & Olexa, 2013).

A review of literature revealed that medication error is defined in multiple ways. Ala'a, Aljasser, & Sasidhar (2016) defined medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm. While, Alshahrani, et al. (2019) told that Medication error is a global issue where 5% of the MEs are deadly and almost 50% are preventable. Therefore, United States National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as: *"any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care*

professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use". (MERP, 2010). It is one of the major issues in today's health care and prevention is linked to accurate reporting of errors stated by Jember et al. (2018). Voluntary reporting is indispensable to appreciate the extent and impact of MEs (Buttigieg, Azzopardi, & Cassar, 2019).

Patient safety at the systems level refers to the commitment of the system in safeguarding risks. In order for safety to be a priority, the institution must have policies and procedures, adequate staffing ratios, and support from all disciplines involved in aspects of patient care. Safety is the responsibility of all disciplines involved in providing safe patient care. The Department of Veterans Affairs (VA) operates the largest integrated healthcare system in the United States (Hatva, 2014, p. 45). Due to the enormity of the system, healthcare technology management is a priority. The VA's concern is how to effectively ensure patient safety and safe use of medical devices system wide reducing and preventing harm through fostering a culture of patient safety. One activity the VA has proactively implemented is a boot camp on patient safety.

In addition, patient safety in nursing and other health disciplines should also be considered essential from a global perspective. Research supports a global proposal for integrating quality and safety sciences into both nursing education and practice (Sherwood, 2011; Kagan and Barnoy, 2013). The World Health Organization [WHO] published the *Patient Safety Curriculum Guide* with eleven safety themes to guide

health education curricula (Safety and World Health Organization [WHO], 2011). The guide was initially established in 2009 specific to medical school curriculums. Currently, the WHO has expanded the patient safety guidelines for integration into various health-care academic institutions including dentistry, midwifery, nursing and pharmacy. The intended outcome is to provide a framework and resource materials for effective teaching and assessment of patient safety (Tingle, 2011).

Nelms and Treiber (2011) conducted a study to reduce medication administration errors using Watson's caring theory. The purpose of the study was to institute a nursing unit intervention to decrease medication administration errors. These authors consulted Watson and received strategies to decrease distractions and increase concentration during medication administration. Three of Watson's ten caritas processes were consistent with medication administration: (a) practice loving-kindness and calmness within the context of a caring consciousness, (b) being authentically present, and (c) developing and sustaining a helping trusting, authentic caring relationship. Watson recommended that nurses centre themselves before beginning medication administration and before each patient contact. Watson gave the nurses examples of centring, slow, deep breathing, or concentrating on ones' breathing.

Another method of centring included the process of hand washing. During the hand washing process, the nurse should clear her mind of the previous patient and concentrate on the next patient activity with authentic presence. Watson states that centring promotes nursing practice conducted with equanimity. Another strategy recommended by Watson involved the nurses wearing a brightly coloured sash when administering medications. The sash represented an area of protection around the nurse

to prevent distractions. The last caritas strategy related to ongoing use of policies and procedures related to medication administration. Verifying medication orders, concentration, checking the rights of medication administration, verifying allergies, identifying the patient, and correctly administering medications confirm the helping, trusting care of patients and family members.

2.3 Literature review

2.3.1 Medication Error

According to National Coordinating Council for Medication Error Reporting and Prevention (NCCMERPP), amedication error is “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use. "Medication errors have always been a rising trend in hospital settings. Although safe medication strategies have received a commodious harbour from healthcare researchers, medication error remained to climb to its third leading cause of death in United States (Farag et. al, 2017).

The risk of error in medication administration is of a primary concern in healthcare worldwide in promoting patient safety during nursing care delivery. Although studies suggest that high occurrence of errors were during the ordering, transcribing and administration stage, nurses are imposed to be the most vulnerable channel to medication errors. Additionally, in an inpatient setting, the use of technology

adjoining medication delivery system that is implemented in the authors' organisation during the recent years has had not proven the efficacy in preventing medication errors. Human errors still occur regardless computerized system in medication administration and decision support software for improving medication safety. (Muroi et al., 2017).

Based on Keers (2013) study's, by collecting the systematic multinational review of the prevalence and nature of medication administration error, three most common medication administration error reported are the wrong time, omission, and wrong dosage. An adverse drug reaction may occur when medication administration error. An adverse drug reaction defined as "an undesirable response associated with the use of a drug that either compromise therapeutic efficacy, enhances toxicity, or both. (Joint Commission). Meanwhile, adverse drug events (ADE) defined as "injuries that result from medication use, although the causality of this relationship may not be proven." By definition, all ADEs are associated with patient harm, but not all ADEs are caused by an error. (NCCMERP). The impact of medication error to the patient is potential to cause clinical deterioration and increase monitoring and intervention (Quelennec, 2013). Besides that, the cost of hospitalisation increase due to prolong stay (Samp, et al., 2013), increase patient mortality and post discharge disability. (Classen, et al., 1997).

2.3.2 Incident / prevalence of medication error

According to the central region of Saudi Arabia from study setting hospital based on the report (N= 3683 in 2016; N=2251 in 2015) total reported medication errors, this represents a 38.8% increase in reporting from 2015 to 2016. Meanwhile, the incidence of harm from medication error is 0.27%, which is 0.66%, 60% reduction from

2015, but 50% of harm incidents in 2016 were reportedabout high alert medications. In a review of medication error incidents reported to the National Reporting and Learning Systems (NRLS) over six years between 2005 to 2010 there were 525,186 incidents reported. Furthermore, 86,821 (16%) of medication incidents reported actual patient harm, 822 (0.9%) resulted in death or severe harm. (NHS England, 2014).

2.3.3 Factor contribution to medication error

There are many factors can lead to the medication error. WHO divided into few major categories that affect in a medication error, which is related tohealth care professionals, patients, work environment, medicines, tasks and computerised information systems. Based on the survey ofthe author's hospital in 2016, the top stages of medication error associated with prescribing/ordering 1726 cases and administering fall at second place with 534 cases. Lack of knowledge has been shown the most significant factor contributing to medication errors (Winsterstein, 2004) and lack of knowledge about high-alertmedication was one of the primary causes of medication errors. (Benner et al., 2002). Based on the previous study in term of health care professional, a rising workload was associated with an increase in a medication error (Al-Kandari & Thomas, 2008; Valentin et al., 2009; Schubert et al., 2009). According to Parry et al. (2014), based on the narrative review, medication error divide into three domain environment, person and behaviour that related to each other. To link with factor associated with medication error divide into three domains as per Bandura Theory; environment, RN characteristic and behaviour.

2.3.4 Medication error related to environment factor

The environment is referring to the clinical setting and clinical activity which include staffing, workload, interruption and distraction, organisation, teamwork, communication and safety measure (Parry et al., 2015). A leading cause of medication error is interruption and distraction in the administration of medication (Jennings et al., 2011). The nature of the environment is unenviable and unpredictable. For example, the nurse can get disturbed by the other colleague during medication administration by having a conversion.

Therefore, the interruption also can come from the patient or visitor itself, for example, the patient call for help from the nurse who in the middle of administering the medication. Various study of the rise in workload was reports associated with medication administration error. (Mckeon et al., 2006; Al-kandari & Thomas, 2008; Valentin et al., 2013). Work setting can include leadership and communication. (Parry et al., 2014). The various study was done the relationship between leadership and medication error and it interesting lower that with leadership can reduce medication error due to trustiness and support from the manager (Paquet et al., 2013).

In addition, nurse-physician communication in work environment increase, medication administration error decrease. (Manoj lovich & De Cicco, 2007). For example, a story from the study by Stefanacci and Riddle, 2016. The patient just started subcutaneous Enoxaparin every 12 hours and Warfarin 3mg daily, and the patient has to continue Enoxaparin until the INR between 2–3 times. After four days, the patient needs to check INR, and the result is 2.2. Since it in the weekend, the nurse informed to the covering physician via phone. The physician whodoes not meet the patient and did not

get good information and some staff prone to ramble. Unfortunately, the physician verbalise to continue with the same dose and to repeat INR in one week. Two days later, find out the patient is unresponsive and found to have an intracranial haemorrhage. There is no discussion that the patient just started the Warfarin and did not inform about the Enoxaparin.

2.3.5 Medication error related to Registered Nurse (RN) characteristic factor

RN characteristic measures the experience and expertise of the nurses. The experience of nurses refers to the quality of working life. According to Fasolino & Snyder (2012), the interesting found that with the increase of the age of the nurse, reduce the medication error. Thus, the experience nurses are more knowledgeable compared to the newly graduated nurse (Unver et al., 2012). Shortage of nursing staff and fatigue resulting from high workload human factors associated with medication errors. (Ehsani, 2013). And also supported by Valentin (2009), that fatigue influence to medication administration error. However, in term of working hours, there is no relationship in medication administration error.

2.3.6 Medication error related to behaviour factor

The way nurses behaving in medication administration that can lead to medication error can be intentionally or unintentionally due to the violation. Generally speaking, the violation is breaking the rules, policies and procedure (Alper et al., 2012). According to Alper et al. (2012), medication administration violation among nurses highest during emergency situation compare routine task. Another finding, by having adequate training and resourcing able to fight error and procedural violations. (McKeon et. al., 2006) this is can be related to lack of knowledge on of the common system

failures contributing to unsafe practice. (Meurier, 2000, as cited from McKeon et. al., 2006).

2.3.7 Independent double checking

Independent Double Checks of high-alert medications is a strategy that has been widely promoted in healthcare to detect potentially harmful medication error before reaching the patient (Baldwin et. al., 2014). Independent double checks are procedure where two qualified nurses checked the medication independently correspondently. The term independent double check is not specified by name but described as practitioner checking the work of another independently hoping for similar outcome or errors being identified before medication administration (Hewitt et. al, 2016). It has been used as a risk-reduction strategy. However, the strategy has been doubtful to be ineffective in preventing errors that it has been observed to be redundant in minimising medication errors (Schwappach et. al, 2016). A widespread study had shown recommendations and tools on independent double checks. However, there is still ambiguity in the processes and detail standardised guidelines on the double-checking procedures.

2.4 Conceptual Framework

The conceptual framework for this study is based on the cause-effect relationship of the two types of variables in the study: independent and dependent. The independent variables were the participant's socio-demographic data such as age, gender, ethnic group, marital status, level of education, year of service (staff nurse), completion of the course on Medication Error, perceived of sufficient knowledge on medication error and practice serving correct medication in healthcare setting. These independent variables are the cause or reason for the outcomes being examined and

referred as presumed effect. Independent variables are stable variables and will not be affected by other variables when it is being measured. As such, it refers to the condition of an experiment that is systematically manipulated by researcher. The dependent variables are the variable that depends on other factors that are measured. These variables are expected to change as a result of the independent variables as mentioned in the earlier paragraph. It is identified as the presumed effect. The dependent variables were the knowledge, attitude, practice and barrier (nurse and health system) of the participants on Medication Error.

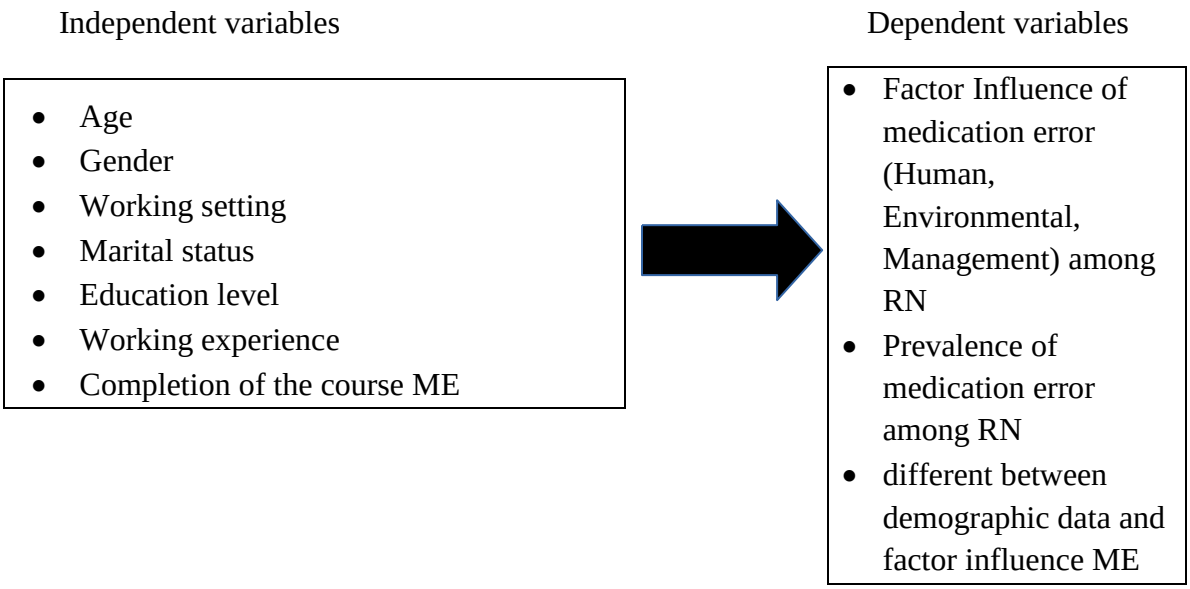

Figure 1: Conceptual framework

The diagram (Figure 1) illustrated the independent variables which are the nurse's socio-demographic data and the dependent variables (factor influence of medication error, prevalence of medication error and different between demographic data and factor influence medication error) are expected to change as a result of the independent variables.

2.5 Theory Framework

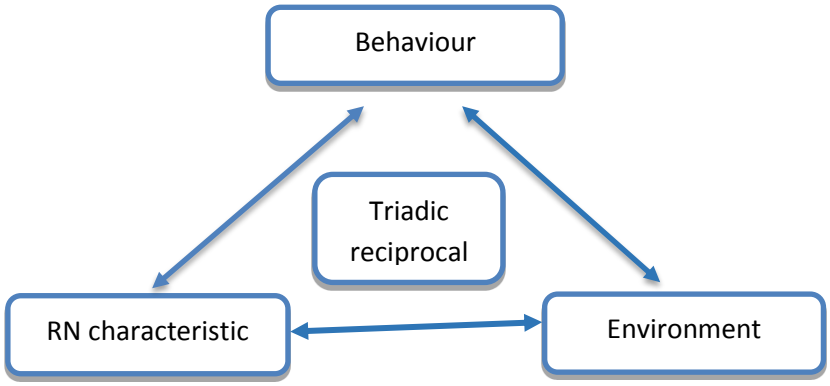

Figure 2: Factor Influence Medication Error based on Bandura Theory

Bandura (1989) Theory acknowledged the reciprocal interaction between three domains, environment, person and behaviour through their cognitive process. According to Bandura, people learn through observing other's behaviour, attitudes and outcome of those behaviours. So based on Bandura's Theory, to understand Registered Nurse (RN) behaviours that give characteristic affected from the environment, these creates triadic reciprocal as shown in figure 2. Adapted from Parry's study, 2015.

2.6 Summary

Medication errors are an ongoing, serious problem throughout the world. As identified by the NCC MERP, there are many causes and factors that contribute to the incident of a medication error. Moreover, the causes will not be overcome until administrative changes are made within organizations and cultural changes occur within the healthcare system. Because "nurses are crucial in preventing medication errors" as well as other adverse events (Institute of Medicine, 2011), the lack of literature related to best practices or effective strategies for registered nurse. Therefore, literature review performed for this study provided valuable and extensive evidence of researches

conducted on various aspects of factors that contribute to medication errors, as well as interventions to reduce such as factor influence of medication error and prevalence of medication error among registered nurse at public hospital Ipoh.

Other studies explored multifactorial effects and helped to define risk management behaviours (Pospescu et al., 2013; Buchini & Quattrin, 2012). Articles of literature review helped to identify personal and organizational factors of medication errors, individual and systems issues contributing to medication errors, preventive measures guided by patterns of medication errors and contribution of work interruption on medication errors (Agyemeng & While, 2010; Keikkas et al, 2011). Further exploration in this area required to understand and better equip the nurses to provide a comfortable workplace environment for nurses and a safer healthcare system for patients.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, the researcher will describe in depth the methodology of this study. Firstly, the researcher will explain the study design that will be employed during conducting this study. Next, the study setting, study population, sample, sample size and sample calculation will be briefly discussed in this chapter. Besides that, the instrument that had been chosen will be used in order to collect the data for this study will be explained in depth by the researcher in a section of this chapter. Then, the procedure of data collection and statistical analysis that will be used to analyses the data of this study will be stated and explained by the researcher in this chapter. The procedure of the pilot study will be explained in this chapter in order to determine the reliability and validity of the instruments.

3.2 Research design

This study is using a quantitative survey method by using cross sectional. The study specifically depicts the profile of the respondents as to age, sex, highest educational attainment and work setting. It determined the level of prevalence and factor associate medication error among registered nurse along the standards of care on medication management. It also determined the extent of influence of the following factors: personal,

professional, managerial, and work-related factors in the prevalence of medication errors. In addition, the research questions were straight forward and it will be analysed statistically through numerical data. The questionnaire was choosing in allowing the researcher to provide information in short amount of time and able to examine the current practices based on questionnaires.

3.3 Study Setting

Hospital Raja Permaisuri Bainun (HRPB) has earned an excellent reputation which is reflected in a large number of referral patients seeking care in this hospital. It has continued expanding while providing services for a rapidly growing patient population in many disciplines. The study will be conducted at the Hospital Raja Permaisuri Bainun, Ipoh (HRPB), which is a primary hospital located Perak state, known as third largest hospital in Malaysia. In this study researcher will focus on general medical and surgical wards such as surgical – 1B, 2A, 2B, 5B, and medical - 6A, 6B, 7A, 7B in the hospital setting.

3.4 Study Population

The population of this study involved all the registered staff nurses that working in the medical and surgical ward at the Hospital Raja Permaisuri Bainun, Ipoh (HRPB). Researcher choose medical and surgical nurse involved in this study because medication error is the most common type of errors that may compromise patient safety and are the most predictable cause of adverse events. This will help to improve patient's health by understanding on their health progress, achieve organization vision as patient centre care and sustain Malaysia as a leading health care in the world.

3.5 Sampling method

A non-probability which is the random sampling design will be employed in order to recruit the participants in this study. This technique is commonly used to select samples when each subject in the population has the same opportunity to be selected as the respondent of the study (Chua Yan Piaw, 2011). The convenience sample will be used as a sampling from the population targeting medical and surgical rgistered nurse. This method is considered as the easiest, cheapest ad least time consuming.

3.5.1 Sample size calculation

In this study, the researcher had decided to use Cochran (1977) sample size calculation in order to determine the recommended sample size of this study. From the previous study sample size was 100, based on that calculation done. It was counted according to formula as:

$S=Z^{2*}p*(1-p)/M^2$.

S= Sample size for infinite population

Z= Z score (95% confidence interval=1.96)

P= population proportion (assumed to be 50%=0.5)

The sample size was calculated based on the following: -

$S= (Z\text{-score})^2*p*(1-p)/ (\text{margin of error})^2$

$S= (1.96)^2*0.5*(1-0.5)/ (0.05)^2$

S=3.8416*0.25/0.0025

S=384.16

Then, use the following formula for Adjusted Sample Size adjusted Sample size according to previous study= **(S)/1 + [(s-1)**/population. As: -

S=(S) / 1+ [S-10 / population]

S=384.16 / 1+ [(384.16-1) / 100]

S=384.16/ 4.8316

S=79.51

S=80

However, in order to anticipate with the problem of non-response and missing values, it is wise to have an attrition rate of 10% to 20% of the calculated sample size required. Therefore, the researcher added 10% of the calculated sample size, which is additional of 13. Therefore, 80 of the questionnaire will be distributed to the registered nurses working in the medical and surgical setting at the HRPB in order to generate the more valid result that reflect the target population.

3.6 Study Instrument

In this study, the researcher will carry out the questionnaire as it is a convenient method for data collection and data analysis to answer the research questions in this research (Chua Yan Piaw, 2011). As in initial stage of planning, this research used quantitative study mode method. A quantitative approach will be used because deductive reasoning and flexible for researcher to collect numerical data to analysis using statistical procedures. The quantitative tools are adopted in previous research and it divided into four components in this research. The questionnaires adapted in English. The questionnaires adapted from Benner et al. (2002) research the utilized the

Taxonomy for Error Reporting: Root Cause Analysis and Analysis of Practice responsibility. The TERCAP is an initiative of National Council State Board of Nursing (NCSBN) to identify patterns of error, risk factors and system issues that contribute to practice breakdown. This type of analysis will facilitate the development of interventions to minimize the risk factors that may endanger patient safety.

Part A; first is a socio-demographic characteristic of registered nurses. It will be data which included age, gender, working setting, marital status, education level and working experience. The questions provided are optional and respondents only need to tick (√) in the box provided which is most appropriate to the respondents themselves. The purpose of the demographic data collected is to know the percentage distribution and mean scores and will be used to identify their prevalence and factor associate medication error involved in this study.

Part B have 3 section of questions. Question 1 is about the most factor influence of medication error among registered nurse at public hospital Ipoh. The total of question is 15 which it is divide into account three main factors including human characteristic factor, environmental factor and management factor to determine the factor that is most likely to affect the occurrence of medication errors at the study site. The respondents will rate their answer following 4-point Likert Scale (1, strongly disagree; 2, disagree; 3, neutral, agree; 4, and 5; strongly agree). Question 2 is related to the prevalence of medication error among registered nurse at public hospital Ipoh. The question divided to 9 elements and the total of question is 28. The respondents will rate their answer following 4-point Likert Scale (1, strongly disagree; 2, disagree; 3, neutral; 4, agree and 5, strongly agree). The third questions are about the different between demographic data

and factor influence medication error among registered nurse at public hospital Ipoh. Out of that, the respondents will rate their answer following 4-point Likert Scale (4, always; 3, sometimes; 2, occasionally and 1, never).

Therefore, the research questions in this study were straightforward and it will be analysed statistically through numerical data. The questionnaire researcher adapts from Professor Di Muzio from Philippines and Dr. Ramadan M. Elkalmi. I have an emailed them to get permission to use theirs tool. The research title he done before is about 'Factor Affecting Medication Error Among Staff Nurse'. In addition, the purpose of respondent to answer the questionnaires is an effort to gain greater understanding of what they have been done differently in their workplace to more effectively help them to safely manage medications. The time will be given to the respondents to answer the question is 15 minutes.

3.7 Validity and reliability

3.7.1 Validity

The validity of the questionnaire referring to the degree to which the instrument measures what it is intended to measure. Basically, the questionnaire should adequately measure all aspects of the issues being studied (Bolarinwa, 2015). In this study, the researcher had chosen to use the content validity. The questionnaire of this study checked by the two panels of experts to check the content validity, which is the supervisor and healthcare provider, such as Head nurse that directly involved in the management of the registered staff nurses that working in the medical and surgical ward HRPB. Any grammatical or sentence error will be identified. Other than that, the items

in each section of the questionnaire will be examined either it is appropriate for this study or not.

3.7.2 Reliability

Taherdoost (2016) explained reliability of the questionnaire is the ability to produce the same data when it is re-administered under the same condition but difficult to obtain a replication of data when dealing with people. Reliability is referred to accuracy measurement and focuses mainly on stability and consistency (Polit & Beck, 2010). Reliability can be referring to the consistency of the research study. Therefore, the researcher will conduct a pilot study for tested the reliability of the questionnaire. It is to ensure the participants able to understand the items in the questionnaire. If the Cronbach's alpha more than α=0.7, so the tool reliable for this study and no changes to the tool and vice versa.

3.8 Data Collection

Data collection for this study will be conducted between the month of the June till July 2020 as soon after obtains approval from university senate and CRC team. The sets of questions consisting of the most factor influences of medication error, the prevalence of medication error and different between demographic data and factor influence medication error among registered nurse. The questionnaires designed to have one languages, English language only. The process of administrating the questionnaire will be done consequently in two weeks on Monday to Friday. Research aim will be explained to the nurses and Head Nurse to obtain consent.

The respondents given the explanatory statement information related to the purpose of the study. Consent obtained from the respondents before distributing the questionnaire. Time allocated to the participant to answer the questionnaire around 30 minutes and then the questionnaire will be collected back for further analysis. Respondents will be informed at any time they are allowed to withdraw from this study. All information gathered from the respondents will keep confidential.

A set of questionnaires, cover letter and pencil with eraser were sealed in envelope and distributed to participant. Participants received verbal and written information about the study including participation is voluntary; privacy and confidentiality will be strictly assured and protected. The self-report questionnaire was anonymous and to be completed once by each participant. After completing the questionnaire, participants returned and placed in a box at specific place which has been allowed by the unit sister in-charge. In order to ensure the confidentiality of the data, the envelope was placed in paper shredder cutter machine to destroy private and confidential documents as the researcher will not able to link the nurses with the information provided. The entire participant will be given the opportunity to ask if they have any doubt.

3.9 Statistical Analysis

The collected data will be represented in the form of the table. Statistics is a tool used to describe and understand the relationship between variables in studies where there are two types of statistics: descriptive statistics and inference statistics (Chua Yan Piaw, 2011). Meanwhile, data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and

evaluate data. According to Resnik (2018) stated that various analytic procedures "provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data".

In this study, the researcher will analyze these two types of statistics, descriptive statistics to describe the variables of this study in terms of frequency, percentage and mean. While inference statistics, researchers will use the Pearson coefficient hypothesis test to specify the relationship between the variables to be studied and to draw conclusions about the characteristics of the population involved based on the sample characteristics in this study. In order to obtain the results, the data were analyzed using statistical software for social science (SPSS) version 24.0. Then, the results of the analysis will be presented in the form of tables to facilitate data read and analyzed quickly and accurately by the reader.

3.10 Pilot Study

The number of participants for the pilot study is 20% of the number of participants in the real study. Those participants in the pilot study cannot be approached and recruit as the participant in the real study (Hayes, Donnellan & Stokes, 2013). Therefore, in this study, the researcher recruited 20% of registered staff nurses who working in the ward 5A and 8B in HRPB. The purpose of this study is to test the validity and reliability of the questionnaire form before it is used for future research. The results of this study will determine the validity of the questionnaire that will be used in the actual study based on the alpha value obtained. The study result was 20.

3.11 Ethical consideration

The study will follow ethical principles of the World Medical Association of the Helsinki (2018) which includes the participant's right to dignity, right to self-determination, the right to privacy and to protect the identity of the participants. The participants were informed prior to the interviews about their ethical rights, confidentiality and their possibilities to refrain from the study. These ethical principles are to justify studies and protect the participants (Polit & Beck, 2017). An ethical approval will be request to Open University Malaysia (OUM) ethical department. The nurses will be asking and approve to participate in the study before distribute questionnaire. The nurses' privacy will be obtained by not mentioning any personal details, locations or dates. Is it important for a study to have an ethical point of view throughout the entire process, from the selection of the aim of the study, the choice of method and result of the presentation. To ensure that the study follows the ethical guidelines discussions with the supervisor was made throughout the process (Polit & Beck, 2017).

3.12 Summary

The topic "Prevalence and factor associate medication error among registered nurses" is chosen in order to reduce medication errors and adverse events that cause poor patient outcomes. Nursing is regarded as a noble profession and it is really challenging to meet the expectations of the organization and society. Appropriate interventions should be carried out to enhance the quality and maintain the image of nurses.

CHAPTER 4

DATA ANALYSIS AND INTEPRETATION

4.1 Introduction

Incidents reported to occur in the clinical area have become an indicator to measure the quality of healthcare care to clients and patients. So, a study was conducted to review the prevalence and factors that cause the occurrence of incident medication error in the hospital setting. So this chapter four will present the results of the analysis obtained.

4.2 Data Analysis

This study has conducted two types of statistics namely descriptive and inferential. Data collected from N = 80 respondents from two clinical areas; medical and surgical ward to answer the study questions that have been set. The data collected through this questionnaire was analysed with the help of statistical program for social science (SPSS) version 24.0.

4.2.1 Descriptive Data

Part A: Demographic Data

This study involved a total of N = 80 respondents that is n = 11 (13.8%) are male and female n = 69 (86.3%) who work in a public hospital in Ipoh, Perak. Analysis shows that the majority are aged between 25 - 30 years (n = 39; 48.8%), n = 30 (37.5%)

are aged between 31 - 35 years, n = 6 (7.5%) are those aged 36 - 40 years and minorities are aged> 40 years (n = 5; 6.3%). Most respondents were married n = 60 (75%), single n = 19 (23.8%) and divorced (n = 1; 1.3%). Respondents in this study have a Diploma in education (n = 75; 93.8%) and the rest, n = 5 (6.3%) have a Bachelor. The study analysis also found that the study respondents had less than 5 years working experience in nursing (n = 33; 41.3%), 6 to 10 years experienced (n = 31; 38.8%), 11 to 15 years experienced (n = 10; 12.5%) and working experience over 16 years was n = 6 (7.5%) as showed in Table 4.1 below.

Table 4. 1: Distribution of Respondent's Demographic data

Respondent's background	**Score**	
AGE (N=80)	**N**	**%**
25 – 30 years	39	48.8
31 – 35 years	30	37.5
36 -40 years	6	7.5
> 40 years	5	6.3
EDUCATION LEVEL	**N**	**%**
Diploma	75	93.8
Bachelor	5	6.3
Master	0	0
PhD	0	0
MARITAL STATUS	**N**	**%**
Single	19	23.8
Married	60	75
Divorced	1	1.3
Widowed	0	0
GENDER	**N**	**%**
Male	11	13.8
Female	69	86.3
WORK SETTING	**N**	**%**
Medical	41	51.2
Surgical	39	48.8
WORKING EXPERIENCE	**N**	**%**
5 years and less	33	41.3
6 to 10 years	31	38.8
11 to 15 years	10	12.5
16 years and above	6	7.5

PART B: FACTORS INFLUENCE MEDICATION ERROR

Research question 1.5.1:

What is the most factor influence of medication error among registered nurses at public hospital Ipoh?

Table 4.2: Mean and standard deviation score of factor influence of medication error among registered nurses

No	Factors influence medication error (N=80)	Mean	SD
Human characteristic factor		**17.53**	**4.914**
1.	Overworked and fatigued health care professional	3.35	1.069
2.	Nurse failed to checked the patient's name band with the medication administration record	3.45	0.981
3.	Nurse is confusion between two drugs with similar name	3.45	1.030
4.	Inadequate drugs knowledge and experience	3.58	1.145
5.	Inadequate knowledge of the patient	3.18	1.178
Environmental factor		**17.65**	4.231
1	Poor lighting	3.48	1.079
2	Inappropriate room temperature	3.35	1.069
3	Interruption/distraction affecting serving medication	3.58	0.925
4	A high number of patients	3.53	0.968
5	Inadequate space for medication preparation	3.73	1.067
Management factor		**17.73**	4.237
1	Nurse shortage	3.81	1.092
2	Workload and time pressure	3.64	1.046
3	Lack of standardized protocols and procedures	3.35	1.069
4	A high number of patients	3.48	0.981
5	Lack of supplies or equipment for tab/injection and drop-rate calculation	3.45	1.030

Past studies have proven that there are various factors that contribute to the incident of medication error including system, equipment, organization, human, education and etc. Therefore, this study takes into account three main factors including human characteristic factor, environmental factor and management factor to determine the factor that is most likely to affect the occurrence of medication errors at the study site. The results of the analysis found that the three factors studied are contributors to

the occurrence of medication error with the overall mean human characteristic was 17.53, environmental factor was 17.65 and management factor was 17.73.

Analysis related to human characteristic factor showed that most respondents stated that they had inadequate drugs knowledge and experience (mean=3.58; SD=1.145), they failed to check the patient's name band with the medication administration record (mean=3.45; SD=0.981) and they got confusion between two drugs with similar name (mean=3.45; SD=1.030). As for environmental related factors, it was found that most respondents stated that the occurrence of medication error is due to inadequate space for medication preparation (mean=3.73; SD=1.067), interruption/distraction affecting serving medication (mean=3.58; SD=0.925). Respondents also stated that a high number of patients were also contributors to the incident of medication error in their place with a mean=3.53 (SD=0.968). While the management factor, most of the respondents agreed that the medication incident was also due to the shortage of nurse with a relatively high mean of 3.81 (SD=1.092) and was due to workload and time pressure in their workplace (mean=3.64; SD=1.046) as well as due to the high number of patients (mean=3.48; SD=0.981) and also because of the lacked of supplies or equipment for tab/injection and drop-rate calculation (mean=3.45; SD=1.030).

Table 4.2.1: Factor mostly contributing to incident of medication error

Factors/aspect	N	M	SD	LEVEL
Human characteristic	80	3.51	4.914	Moderate influence
Environmental	80	3.53	4.231	Highly influence
Management	80	3.55	4.237	Highly influence

Table 4.2.1 above showed the mean score distribution of the factors influencing the occurrence of medication error. Overall human characteristics, environmental factors and management factors are contributors to the occurrence of medication errors. However, analysis was found that management factor was the factor that most influences incident of medication error because the mean management factor was higher (mean=3.5; SD=4.237) which was at highly influence level compared to environmental factor (mean=3.53; SD=4.231) and human characteristic factor (mean=3.51; SD=4.914) which was at moderate influence level.

Part C: Prevalence of Medication Error

Research question 1.5.2:

What is the prevalence of medication error among registered nurses at public hospital Ipoh?

Table 4.3: Score mean and standard deviation on prevalence of medication error among registered nurses

NO	Elements related to prevalence of medication error (N=80)	M	SD
1	**Behavioural/attitude of the staff**	**4.76**	
a	Positive Attitude	1.69	0.908
b	Uncertain Attitude toward Medication Error Reporting	2.27	1.219
c	Reporting of others' Errors	2.39	1.258
2	**Carrying out doctor's order**	**3.64**	
a	Interprets and administer drug/medications accurately per doctor's order	1.40	0.851
b	Carefully verifies physician's written prescriptions that are not clear.	1.66	0.871
c	Checks relevant laboratory results, finds out if patient has any drug allergic and take a complete drug history	1.75	0.907
3	**Transcribing**	**3.52**	
a	Transmit doctor's order accurately and completely in the MAR chart, cardex, and endorsement sheet	1.50	0.886
b	Update new medications order in MAR charts, kardex, and endorsement sheet	1.54	0.899
c	Write/prepare medication charts correctly, general instruction and include special instructions e.g. as taking medicine with food or water	1.45	0.884
4	**Endorsing**	**3.72**	
a	Endorse documented adverse effects related to medication administration	1.57	0.915
b	Endorse any missed dose of patient's medication and intervention given	1.63	0.817
c	Identify high alert medications and endorse special precautions required with these drug	1.55	0.840
5	**Preparing and administering**	**4.88**	
a	Verifies MAR charts against doctor's order	1.50	0.955
b	Adhere infection control practice in handling medications	1.51	0.842

c	Use appropriate medication syringe, needles, dropper, cape base on the amount, consistency, and route of drug	1.56	0.824
d	Administer according to the 10 rights	1.24	0.680
6	**Documenting**	**2.93**	
a	Document each drug administered in patient's chart according to agency policy	1.23	0.656
b	Document and report results, side effects and adverse effects of medications	1.38	0.832
c	Writing incident report once a medication error occur in the unit	1.95	1.466
7	**Monitoring**	**1.97**	
a	Observe and assess for side effects, adverse reactions and effectiveness of administered drug and initiate appropriate nursing intervention	1.31	0.722
b	Monitors the patient for potential drug-to-drug or drug-to-food interactions	1.31	0.704
8	**Educating/Health Teachings**	**4.53**	
a	Establish rapport with patients	1.34	0.728
b	Teach patient about the drug he/she is receiving	1.35	0.781
c	Provide special interactions to patient and discuss interventions to avoid its occurrence	1.38	0.786
d	Disclose medication error to the patient and discuss interventions to avoids its occurrence	1.83	1.178
9	**Evaluating**	**3.23**	
a	Evaluate/assess patient's reactions to medication	1.41	0.774
b	Evaluates patients understanding regarding the medication regimen	1.35	0.695
c	Dose proficient technical ability in the use, care, maintenance and evaluation of medication-related devices/equipment	1.41	0.774

This study provides nine (9) elements to study the prevalence related to medication error including behavioural/attitude of the staff, carrying out doctor's order, transcribing, endorsing, preparing and administering, documenting, monitoring, educating/health teachings and evaluating. This prevalence was measured based on score 4 for if it 'Always' happened, score 3 for 'Sometimes', score 2 given for 'Occasionally' and score 1 for 'Never'. Overall, the results of the analysis found that the element related to 'preparing and administering' (mean=4.88) was the highest prevalence compared to other elements and followed by the element related to 'behavioural/attitude of the staff' (mean=4.76) and 'educating/health teachings' with (mean=4.53). While the moderate prevalence was 'endorsing' (mean=3.72), 'carrying out doctor's order' (mean=3.64), 'transcribing' (mean=3.52) and 'evaluating' (mean=3.23). However, the lowest prevalence was element 'monitoring' (mean=1.97) and 'documenting' with mean score=2.93.

4.2.2 Data Inferential

Research question 1.5.3:

Is there any different between demographic data and factor influence medication error among registered nurses at public hospital Ipoh?

Table 4.4: The different demographic data and factor influence medication error

Aspect	Group	Sum of square	Mean square	Df	F	*P*
Age	Between group	1444.794	481.598	3	1.184	0.322
	Within group	30508.700	406.783	75		
Marital status	Between group	2909.306	1454.653	2	3.806	0.027
	Within group	29044.187	382.160	76		
Qualification	Between group	125.199	125.199	1	0.303	0.584
	Within group	31828.295	413.354	77		

The results of one-way ANOVA in Table 4.4 above have shown that there was no significant difference in mean score in terms of age that is the value of F (1.184), p=0.322 between respondents. While the marital status aspect has shown that there was a significant difference in mean score at the value of F (3.806), P=0.027 based on the categories of singles, married and divorced. However, the results for the qualification level aspect found that the mean score was not significant with the value of F (0.303), P=0.584. In conclusion, the analysis proved that the differences in the marital aspect of the respondent status have significant with the causative factor incident of medication error.

Table 4.5: The different between gender and factor influence medication error

Group	N	MD	df	t	F	p
Male	11	-8.85829	77	-1.354	1.868	0.180
Female	69		20.78			

The t-test analysis in the table 4.5 above showed that the mean difference was -8.86 and the value of t is 1.1.354 which indicates that there is no significant difference where the value of p = 0.180. This indicates that the gender differences of the respondents are not significant with the factors that cause medication error.

Table 4.6: The different between clinical area and factor influence medication error

Group	N	MD	df	t	F	p
Medical ward	41	14.4	77	3.363	9.009	0.004
Surgical ward	39		0.001			

The t-test analysis in Table in 4.6 above showed that the mean difference between clinical area was 14.4 and the value of t is 3.363 which showed that there was a significant difference where the value of p = 0.004. This showed that the differences of clinical area where the respondents attached has significant with the causative factors of medication error.

4.3 Summary

This study is to see at the prevalence and causative factors of incident of medication error in a public hospital in Perak. This study has involved a total of N = 80 respondents from two clinical areas; medical and surgical ward. The results of the

analysis found that the element related to 'preparing and administering' (mean=4.88) was the highest prevalence compared to other elements and followed by the element related to 'behavioural/attitude of the staff' (mean=4.76) and 'educating/health teachings' with (mean=4.53). This study also found that management factor (mean = 3.55; SD = 4.914) was the main factor contributing to the incident of medication error at the study location followed by environmental factor (mean = 3.53; SD = 4.231) and human characteristic factor with mean score = 3.51 (SD = 4.237).

This study is also to see the difference between the demographics of the data of the study sample respondents with the contributing factors to the incident of medication error. Analysis using one-way ANOVA test found that age difference (p=0.322) and qualification level (p=0.584) owned by respondents did not showed positive significance with factors influencing medication error and t-test also showed gender difference also did not have significant with contributing factors medication error (p=0.180). While one-way ANOVA test showed that the difference in marital status of the respondents was significant with the causative factor of medication error with the value is (p=0.027). Similarly, the results of t-test analysis have found that the difference in clinical area of the respondents of this study was significant with factors causative to the incident of medication error (p=0.004).

CHAPTER 5

CONCLUSION AND DISCUSSION

5.1 Introduction

The main purpose of this study is to determine the prevalence and factor associating medication error among registered nurse at public hospital in Perak. In addition, this study also aims to see the different between demography factor and prevalence of medication error among registered nurse at public hospital. So this chapter 5 will discuss the results of the study findings, discussion and implications of the study as well as suggestion and conclusion based on the acquisition of data analysis for this study.

5.2 Study Summary

Researcher study was based on the research question: What is the most factor influence of medication error among registered nurses, the prevalence and different between demographic data and factor influence medication error. Therefore, the data collected were presented in the form of percentage scores and mean scores. The researcher analyzed the data to described relationship between variable by using two types of statistics: descriptive and inference statistics. While to see the difference between demographics of the data of the study sample is by using one-way ANOVA. This study is to see at the prevalence and causative factors of incident of medication error in a public hospital in Perak. The total of the respondents involved in this study

were N = 80 from two clinical areas; medical and surgical ward. Most of the respondent age between 25 – 30 years (n = 39; 48.8%) and minorities are those aged > 40 years (n = 5; 6.3%). The results of one-way ANOVA have shown that there was no significant difference in mean score in terms of age that is the value of F (1.184) p=0.322 between respondents.

Moreover, majority of the respondent were married n = 60 (75%) n = 30 (37.5%) are aged between 31 - 35 years, n = 6 (7.5%) are those aged 36 - 40 years and minorities are those aged > 40 years (n = 5; 6.3%). Base on the results of one-way ANOVA, marital status has shown that there was a significant difference in mean score at the value of F (3.806), P=0.027 based on the categories of singles, married and divorced. The analysis result proved that the differences in the marital aspect of the respondent status have significant with the causative factor incident of medication error.

The highest percentage in education obtained by the participant is Diploma (93.8%) and the rest, (6.3%) have a bachelor. However, the results for the qualification level aspect found that the mean score was not significant with the value of F (0.303), P=0.584. The study analysis also found that the study respondents had less than 5 years working experience in nursing (n = 33; 41.3%). Contrast to Fasolino and Snyder's (2012) stated the average years of experience for 460 nursing personnel in medical-surgical study units ranged from 3.77 to 12.11. However, no data available to compare with Fasolino and Snyder's result the respondent working experience that influences medication error. Suggesting further study need to be done. Additionally, the experienced nurses are more knowledgeable compared to the newly graduated nurse (Unver et al. 2012). Thus, another suggestion for future study.

Therefore, the results of the analysis found that mean and standard deviation score of factor influence of medication error among registered nurses related to 'preparing and administering' (mean=4.88) was the highest prevalence compared to other elements and followed by the element related to 'behavioural/attitude of the staff' (mean=4.76) and 'educating/health teachings' with (mean=4.53). This study also found that management factor (mean = 3.55; SD = 4.914) was the main factor contributing to the incident of medication error at the study location followed by environmental factor (mean = 3.53; SD = 4.231) and human characteristic factor with mean score = 3.51 (SD = 4.237).

5.3 Discussion and Implication

5.3.1 Discussion

5.3.1.1 Human characteristic factor

System and personal factors, respectively, relate to institutional and individual practitioner characteristics that contribute to the relative risk of medication errors. System factors influence of ME such as the human characteristic, environmental and management factor which workplace policies and procedures. Examples include addressing the educational needs of staff (including agency nurses) and having accessible, neat, step-by-step guidelines and protocols for the operation of equipment. Personal factors include the cognitive ability and skill, situational awareness, decision-making ability and personal resources (including responses to stress and fatigue) of individual practitioners.

However, the result of this study demonstrated a positive result (mean=3.45; SD=0.981). Staffing and workload policies, and in some states even laws, can have a notable impact on nurse fatigue, but just as it is the responsibility of the individual nurse to follow safe

professional practices and check a patient's name band before administering a medication, it is also the nurse's duty to identify when their schedule or workload is putting them in an unsafe practice situation.

In four previous studies using the modified Gladstone scale occurred in Jordan or Turkey (Mrayyan, 2012; Mrayyan & Al-Atiyyat, 2011; Mrayyan et al., 2007; Unver et al., 2012). Both being distracted and being tired and exhausted were in the top four causes of medication errors identified by nurses in the British and US studies. Also identified as a cause in three of the four studies were failure to check the patient's name band and physician writing being hard to read or illegible. One study reported distractions and two studies identified being tired or exhausted as the third or fourth most frequent cause of medication error. The differences may be related to the preparation of the nurses or the differences in the operations of the health care systems.

Inexperienced nurses are particularly vulnerable to errors associated with miscommunication, because of low levels of anticipation or awareness of the potential for error. They are therefore less likely than their experienced colleagues to seek clarification either through verbal communication with colleagues or from written information (Kazaoka et al., 2007; Savvato and Efstratios, 2014). Experience promotes anticipation and early detection of errors (Seki and Yamazaki, 2006). Therefore,

ensuring an adequate skill mix on shifts may help prevent medication errors (Tang et al., 2007).

Communicating with and educating patients about their medications during the administration process can result in individuals being better informed about and more involved with their medicines, thereby improving the quality and safety of medication administration (Popescu et al., 2011). This may be particularly the case in community settings, such as in a patient's home, where the most common reason for medication errors relates to administration. Therefore, helping patients to understand and manage medication administration safely can contribute to reducing errors.

5.3.1.2 Environmental factor

As for environmental related factors, it was found that most respondents stated that the occurrence of medication error is due to inadequate space for medication preparation (mean=3.73; SD=1.067). According to the results of the current study by Shahrokhi et al. **(**2013) stated poor lighting was the most important environmental factor contributing to medication errors from the nurses' point of view. It was consistent with the results. However, in the study by Bizhani, et al. (2013) also state that poor lighting was reported as the least important factor of medication errors. Perhaps the reason for this inconsistency was the difference in the quality and type of lighting and the structure of the medication room in the studied units. Moreover, Thompson et al. (2012) describe a suitable light has no shadows or glare, which can be useful to minimize medication errors. One of the standards of medication administration by nurses is that drug name and its label should be checked and read three times (Taylor et al., 2016).

Based on the results of the current study (mean=3.58; SD=0.925), interruption/ distraction one of the factor influence affecting serving medication error. According to Mahmood et al. (2011) stated the high noise level was another environmental factor contributing to medication errors from nurses' point of view. The probability of interruption and distraction increases in a crowded and noisy environment (Cleary-Holdforth & Leufer, 2013) which affects the concentration during drug preparation (Dumo, A.M.B., 2012). Perhaps the nurse being tired and exhausted, and when the nurse failed to check the patient's name band against the medication administration record (MAR). All of these reasons for errors are well supported in the literature (Abdar et al., 2014, Popescu, Currey & Botti, 2011, Sitterding et al., 2011) and indicate issues with individuals as well as policies. Policies to limit distractions and interruptions while RNs are administering medications have been shown to reduce medication errors, but they are only effective if supported by the organization.

Lack of adequate space to prepare medication was the least important environmental factor of medication errors in the current study. It was consistent with the findings of Mahmood et al. (2011). In addition, inadequate space or allocating of common space to prepare medications causes the employees to interact with each other, and thus distract them while they are preparing and giving drugs to the patients. Therefore, the room temperature also was reported as another important environmental factor according to the nurses' point of view. Inappropriate thermal conditions in the environment can lead to stress in nurses and in turn increase medication errors, which can affect their performance.

5.3.1.3 Management factor

Experiences of being overwhelmed and coping is a feeling of getting buried under a burden that is experienced by an individual completely when he or she is mentally overcome or overpowered by uncontrollable forces that are generated by situations or circumstances that pose a threat. According to Stevenson (2010) describe coping on the other hand is a protective mechanism which enables individuals to deal effectively with difficult situations with some degree of success.

Nurses are continuously challenged in the practice arena due to the complex nature of the workplace environment in the current healthcare system. These challenges are related to work overload, multitasking and emergencies which constantly overpower nurses as they try to cope with situations and care for patients. Nurses are expected to perform multiple roles and responsibilities each as important as the next with less resources on a daily basis. Consequently, nurses cope by multitasking to meet the many healthcare needs of patients in the best possible way.

While the management factor, most of the respondents agreed that the medication incident was also due to the shortage of nurse with a relatively high mean of 3.81 (SD=1.092). The literature review revealed a variety of factors contributing to the overwhelming nature of the workplace and the coping mechanisms used by nurses to give safe quality care to patients. Inadequate nursing staffing results in nurse working multiple shifts; under-staffed; over-worked; and suffering the consequences of job-related stress. As a result, patients' needs are not met.

According to O'Shea, who a classic literature review (1999), identified ten important factors that still contribute to medication errors of which high nurse-patient ratio and workload were factors responsible for nurses feeling overwhelmed, leading to error occurrences. Grave concerns surround the future of the nursing profession as it influences the performance of nurses and may result to higher incident of medication error. The Lawton et al. (2012) study also identified latent failures such as a lack of planning for human resources and team management to be among those that contributed to medication error incidents.

The current study illuminated nurses' experiences of scenarios and situations highlighting the complexity of the workplace. These experiences were exceptionally stressful and overwhelming as nurses cared for patients while simultaneously trying to cope with difficult situations. Nurses expressed feelings of frustration and inadequacy when they were unable to complete other tasks in addition to performing the vital role of safe and timely medication administration. This implies that staff nurses are at risk of committing medication errors since they do not have enough time to follow the ten rights when administering medications at the same time they don't have enough time to go back to their patients in order for them evaluate the effectiveness of the medications or to perceive earlier any signs and symptoms of adverse effects. Some nurses described overwhelming situations which led to an error like making a wrong drug choice, that they felt could have been avoided. Others described feelings of constantly being rushed and overpowered while caring for patients. The presence of these feelings and concerns supported the work of Treiber & Jones, 2010, Agyemang & While, 2010 and Buchini & Quattrin, 2011.

The findings of this study will be helpful for policy makers to refine the applied strategies

which used to improve nurses' participation in the medication error reporting process, leading to increased patient safety inside healthcare facilities. Moreover, a training and educational program regarding patient safety and near-miss reporting should be provided for the nurses to highlight the importance of near-miss reporting and to maintain safe medication administration without harming the patients. For the future, a thorough study which includes other health care practitioners such as doctors, nurses, and pharmacists could be done; this would divulge perspectives in diverse stages.

5.3.2 Implication

Medication errors are significant issue affecting patient safety and costs in hospitals often posing dangerous consequences for patients. It is important to understand that an analysis of factors leading medication errors can help healthcare professionals and managers identify why medication errors occur and provide insight into how to make improvement to prevent or reduce them. Professional nurses in many hospital systems are responsible for obtaining admission medication lists. This has serious implications for nursing practice.

This study identified a process for improved factor and prevalence of medication error among registered nurse to reduce medication error and improve patient care. The intervention was easy to administer and was completed in an hour. This research suggests that interventions can be developed and implemented to decrease medications transcription error. Nurses spend more time with patients than any other discipline, they have the ability to provide the structure for disciplines to work together. It is evident

that when multiple disciplines work together to provide care that patient outcomes are improved.

Other suggestions having implications for nursing practice include facilitating seamless computer systems for all health systems to capture all medications currently used by patients, for both inpatient and outpatient care, where all disciplines have access and ability to update and input important medication and health information. Until that occurs, nurses' have the increased responsibility to obtain an accurate medication list. This research demonstrates that with a diligent approach to the way nurses obtain medication lists, improvement in outcomes by reducing medication errors may be delivered. Utilizing a cognitive behavioural approach demonstrated that behaviours and thoughts can be changed to produce a complete and accurate admission medication history.

Implications related to the workplace environment were portrayed when nurses identified that the increase in the work volume was mostly related to understaffing of the units resulting in a constant and overwhelming struggle for nurses while trying to balance multiple RN responsibilities of patient care along with safe and timely administration of medications. Nurses also expressed concerns about the unsafe conditions of patient care prevalent in workplaces which were dangerous not just for patients but also could be grounds for nurses to ultimately lose their RN license or face termination. Provision for adequate staffing by nurse leaders on units routinely, based on the acuity and diversity of the patient population and their healthcare needs to be a priority to enable nurses to work as a team and be able to support each other as needed while rendering safe and quality care to all patients.

Several implications for education were apparent as participants reported being nervous and unsure of themselves and said that gaining knowledge in the classroom and skills lab is vastly different from independently working with real patients. Most nurses said that they were apprehensive not just because they were new to practice but also because they experienced a general atmosphere of feeling abandoned at times which generated fearfulness for the wellbeing of patients. Nurses shared experiences where as new nurses they strongly felt that support and understanding from peers would have greatly helped to build their confidence and may have prevented error incidents from happening.

One participant suggested that nurse educators should teach about the practice challenges that new nursing graduates may face initially in practice. Often the calculation of medications is the primary aspect of teaching medication administration when the complexity of the healthcare setting and the likelihood of interruptions, distractions and overwhelming number of tasks may also be of great impact to the process of safe medication administration.

5.4 Suggestion

As we know the hospital is a chaotic workplace. Holistic management approach aimed at the individual, the team, the task, the workplace, and the institution as a whole to work on the barrier. The results Very important to have a clinical environment that less distraction/interruption that can come from many sources such as colleagues, patients and physical environment during the performance of medication administration process in ensure a smooth process. In term of technology, human need technology such

as computer software in administering medication to improve performance, a human cannot run away from error due to many errors originate from the natural process of cognitive and behavioural adaptations which develop the correct behavioural skills.

Therefore, the organization should look forward to improving and applied technology in the organization. Furthermore, the adjustment of the workload in the unit should be parallel in meeting the demand of the patient in the unit according to the patient acuity to decrease turnover staff resulting to nursing shortage. In term of behaviour, analyze the situation that needs remediation due to violation and error and also to recheck the workflow in administrating medication. The national programs such as Team STEPPS (Strategies & Tools to Enhance Performance & Patient Safety) by Pham, Aswani, Rosen, HeeWon, Huddle, Weeks & Pronovost (2012) may help and prevent influence of medication error among registered nurse. This may assist RNs' to formulate ways for seamless transition of new nurses into practice.

5.5 Conclusion

This study identified the prevalence and causative factors of incident of medication error in a public hospital. Given the relationship identified in this study between working conditions and the incidence of medication errors, nursing and hospital managements must undertake measures to facilitate the decrease in error rates by detecting and better understanding such conditions. However, by developing an efficient error reporting system and precise documentation of error and removing reporting obstacles to the greatest extent possible, one should expect a decrease in medication error rates. Because a significant statistical relationship was identified between nurses' medication errors and their working conditions, it is recommended that

managers should identify the adverse situations in which many in nurses' work, provide safe conditions in the workplace and promote a climate for patients' safety.

Therefore, the factor mostly influences incident of medication error was the 'management' factor. Findings from this study illuminate the unique viewpoint of registered nurses' experiences with errors and have the potential to influence how the prevention of, notification about and resolution of errors are dealt with in the clinical setting. Further research is needed to answer multiple questions that will contribute to nursing knowledge about error reporting activities and the means to continue to improve error reporting rates. While nurses play a key role in reducing medication errors, they will only have limited impact if the organization does not develop a culture of safety that includes elements such as leadership, teamwork, evidence-based practices, communication, learning, justice, and patient-centred care (Sammer et al., 2010).

In addition, this poses a vital question which calls for the organizational and nursing leaders to investigate beyond the surface to identify the concrete causes of medication errors that exist within individual organizational setups and develop unique ways to resolve these issues. This study identifies important issues that are relevant to influence of medication errors and recommends ways to reduce medication error incidents through the description of prevalence and factor associating medication error among registered nurse for a safer patient care environment. To improve nurses' knowledge of how individual factors, contribute to errors and help them develop effective strategies to prevent errors occurring, it is important that institutions reward and encourage leaders who demonstrate characteristics of mindfulness on all levels.

REFERENCES

Ala'a, Z. M., Aljasser, I. A., & Sasidhar, B. (2016). Barriers to reporting medication administration errors among nurses in an accredited hospital in Saudi Arabia. *Journal of Economics, Management and Trade*, 1-13.

Abousallah, A. (2018). *The Impact of Application of International Safety Goals on Patient Safety Culture: A Field Study In Private Hospitals That Working in the City Of Amman* (Doctoral dissertation, Middle East University).

Abdar et al. (2014). Registered nurses' perception of medication errors: A cross sectional study in Southeast of Iran. *International Journal of Nursing Education*, *6*(1), 19-23.

Acheampong, F. (2015). *Evaluating the role of the Ghanaian pharmacist in medication safety strategies in hospitals* (Doctoral dissertation).

Agyemang, R. E. O., & While, A. (2010). Medication errors: types, causes and impact on nursing practice. *British Journal of Nursing*, *19*(6), 380-385.

Al-Kandari, F., & Thomas, D. (2008). Adverse nurse outcomes: correlation to nurses' workload, staffing, and shift rotation in Kuwaiti hospitals. *Applied nursing research*, *21*(3), 139-146.

Alper, S. J., Holden, R. J., Scanlon, M. C., Patel, N., Kaushal, R., Skibinski, K., ... & Karsh, B. T. (2012). Self-reported violations during medication administration in two paediatric hospitals. *BMJ Qual Saf*, *21*(5), 408-415.

Alshahrani, S. M., Alakhali, K. M., & Al-Worafi, Y. M. (2019). Medication errors in a health care facility in southern Saudi Arabia. *Tropical Journal of Pharmaceutical Research*, *18*(5), 1119-1122.

Alsulami, Z., Conroy, S., & Choonara, I. (2013). Medication errors in the Middle East countries: a systematic review of the literature. *European journal of clinical pharmacology*, *69*(4), 995-1008.

Baldwin, K., & Walsh, V. (2014). Independent double-checks for high-alert medications: essential practice. *Nursing2019*, *44*(4), 65-67.

Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist*, *44*(9), 1175.

Barker, K. N., Flynn, E. A., Pepper, G. A., Bates, D. W., & Mikeal, R. L. (2002). Medication errors observed in 36 health care facilities. *Archives of internal medicine*, *162*(16), 1897-1903.

Barnsteiner, J., & Disch, J. (2012). A just culture for nurses and nursing students. *Nursing Clinics*, *47*(3), 407-416.

Benner, P., Sheets, V., Uris, P., Malloch, K., Schwed, K., & Jamison, D. (2002).

Individual, practice, and system causes of errors in nursing: a taxonomy. *JONA: The Journal of Nursing Administration*, *32*(10), 509-523.

Berdot, S., Gillaizeau, F., Caruba, T., Prognon, P., Durieux, P., & Sabatier, B. (2013). Drug administration errors in hospital inpatients: a systematic review. *PloS one*, *8*(6).

Biron, A. D., Loiselle, C. G., & Lavoie-Tremblay, M. (2009). Work interruptions and their contribution to medication administration errors: an evidence review. *Worldviews on Evidence-Based Nursing*, *6*(2), 70-86.

Bizhani, M., Kouhpayeh, S. A., Abadi, R., & Tavacool, Z. (2013). Effective factors on the Incidence of medication errors from the nursing staff perspective in various department of Fasa Hospital. *Journal of Fasa University of Medical Sciences*, *3*(1), 88-93.

Bolarinwa, O. A. (2015). Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Nigerian Postgraduate Medical Journal*, *22*(4), 195.

Buchini, S., & Quattrin, R. (2012). Avoidable interruptions during drug administration in an intensive rehabilitation ward: improvement project. *Journal of nursing management*, *20*(3), 326-334.

Butterworth, T., Jones, K., & Jordan, S. (2011). Building capacity and capability in patient safety, innovation and service improvement: an English case study. *Journal of Research in Nursing*, *16*(3), 243-251.

Buttigieg, S. C., Azzopardi, E. A., & Cassar, V. (2019). The Mediating Role of Burnout in the Relationship between Perceived Patient-safe, Friendly Working Environment and Perceived Unsafe Performance in an Obstetric Unit. *Structural Approaches to Address Issues in Patient Safety (Advances in Health Care Management*, *18*, 99-118.

Cebeci, F., Karazeybek, E., Sucu, G., & Kahveci, R. (2015). Nursing students' medication errors and their opinions on the reasons of errors: A cross-sectional survey. *J Pak Med Assoc*, *65*(5), 457-62.

Chua, S. S., Tea, M. H., & Rahman, M. H. A. (2009). An observational study of drug administration errors in a Malaysian hospital (study of drug administration errors). *Journal of clinical pharmacy and therapeutics*, *34*(2), 215-223.

Chua, Y. P. (2011). *Kaedah dan statistik penyelidikan: kaedah penyelidikan*. Mcgraw-Hill Education.

Classen, D. C., Pestotnik, S. L., Evans, R. S., Lloyd, J. F., & Burke, J. P. (1997). Adverse drug events in hospitalized patients: excess length of stay, extra costs, and attributable mortality. *Jama*, *277*(4), 301-306.

Cleary-Holdforth, J., & Leufer, T. (2013). The strategic role of education in the prevention of medication errors in nursing: Part 2. *Nurse Education in Practice*, *13*(3), 217-220.

Cochran, W.G. (1977) Sampling Techniques. 3rd Edition, John Wiley & Sons, New York.

Currie, L. M., Desjardins, K. S., Levine, E. S., Stone, P. W., Schnall, R., Li, J., & Bakken, S. (2009). Web-based hazard and near-miss reporting as part of a patient safety curriculum. *Journal of Nursing Education*, *48*(12), 669-677.

Durham, M. L., Suhayda, R., Normand, P., Jankiewicz, A., & Fogg, L. (2016). Reducing medication administration errors in acute and critical care: multifaceted pilot program targeting RN awareness and behaviors. *JONA: The Journal of Nursing Administration*, *46*(2), 75-81.

Dumo, A. M. B. (2012). Factors affecting medication errors among staff nurses: basis in the formulation of medication information guide. *IAMURE International Journal of Health Education*, *1*(1), 88-149.

Ehsani, S. R., Cheraghi, M. A., Nejati, A., Salari, A., Esmaeilpoor, A. H., & Nejad, E. M. (2013). Medication errors of nurses in the emergency department. *Journal of medical ethics and history of medicine*, *6*.

Farag, A., Eweda, S., & Elsayed, N. (2017). High Alert Medications. *Alexandria Scientific Nursing Journal*, *19*(2), 1-24.

Farley, D. O., Morton, S. C., Damberg, C. L., Fremont, A., Berry, S. H., Greenberg, M. D., ... & Pollock, N. K. (2005). Assessment of the National Patient Safety Initiative: Context and Baseline Evaluation Report I.

Fasolino, T., & Snyder, R. (2012). Linking nurse characteristics, team member effectiveness, practice environment, and medication error incidence. *Journal of nursing care quality*, *27*(2), E9-E16.

Hajibabaee, F., Joolaee, S., Peyravi, H., Alijany-Renany, H., Bahrani, N., & Haghani, H. (2014). Medication error reporting in Tehran: a survey. *Journal of nursing management*, *22*(3), 304-310.

Hashemi, F., Nasrabadi, A. N., & Asghari, F. (2012). Factors associated with reporting nursing errors in Iran: a qualitative study. *BMC nursing*, *11*(1), 20.

Hatva, E. (2014). A systems approach to patient safety at the VA. *Biomedical instrumentation & technology*, *48*(1), 45-49.

Hayes, S., Donnellan, C., & Stokes, E. (2013). Associations between executive function and physical function poststroke: a pilot study. *Physiotherapy*, *99*(2), 165-171.

Haw, C., Stubbs, J., & Dickens, G. L. (2014). Barriers to the reporting of medication administration errors and near misses: an interview study of nurses at a psychiatric hospital. *Journal of Psychiatric and Mental Health Nursing*, *21*(9), 797-805.

Hewitt, T., Chreim, S., & Forster, A. (2016). Double checking: a second look. *Journal of evaluation in clinical practice*, *22*(2), 267-274.

Hsaio, G. Y., Chen, I. J., Yu, S., Wei, I. L., Fang, Y. Y., & Tang, F. I. (2010). Nurses' knowledge of high-alert medications: instrument development and validation. *Journal of advanced nursing*, *66*(1), 177-190.

Institute of Medicine (US). Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing. (2011). *The future of nursing: Leading change, advancing health*. Washington, DC: National Academies Press.

Jember, A., Hailu, M., Messele, A., Demeke, T., & Hassen, M. (2018). Proportion of medication error reporting and associated factors among nurses: a cross sectional study. *BMC nursing*, *17*(1), 9.

Joolaee, S., Hajibabaee, F., Peyrovi, H., Haghani, H., & Bahrani, N. (2011). The relationship between incidence and report of medication errors and working conditions. *International nursing review*, *58*(1), 37-44.

Kagan, I., & Barnoy, S. (2013). Organizational safety culture and medical error reporting by Israeli nurses. *Journal of Nursing Scholarship*, *45*(3), 273-280.

Keers, R. N., Williams, S. D., Cooke, J., & Ashcroft, D. M. (2013). Causes of Medication administration errors in hospitals: a systematic review of quantitative and qualitative evidence. *Drug safety*, *36*(11), 1045-1067.

Kumurya, A. S., & Auta, S. A. (2017). The Difference between Incidence and Prevalence in Public Health and Epidemiology. *Prevalence*, *519*(6139), 0-085.

Lambton, J., & Mahlmeister, L. (2010). Conducting root cause analysis with nursing students: best practice in nursing education. *Journal of Nursing Education*, *49*(8), 444-448.

Lawton, R., Carruthers, S., Gardner, P., Wright, J., & McEachan, R. R. (2012). Identifying the latent failures underpinning medication administration errors: An exploratory study. *Health services research*, *47*(4), 1437-1459.

Mahmood, A., Chaudhury, H., & Valente, M. (2011). Nurses' perceptions of how physical environment affects medication errors in acute care settings. *Applied Nursing Research*, *24*(4), 229-237.

Manojlovich, M., & DeCicco, B. (2007). Healthy work environments, nurse-physician communication, and patients' outcomes. *American Journal of Critical Care*, *16*(6), 536-543.

Mansur, J. M. (2016). Medication safety systems and the important role of pharmacists. *Drugs & aging*, *33*(3), 213-221.

Mansouri, A., Ahmadvand, A., Hadjibabaie, M., Javadi, M., Khoee, S. H., Dastan, F., & Gholami, K. (2014). A review of medication errors in iran: sources, underreporting reasons and preventive measures. *Iranian journal of pharmaceutical research: IJPR*, *13*(1), 3.

MERP, N. (2010). National Coordinating Council for Medication Error Reporting and Prevention. *Accessed on January*, *7*.

MERP, N. (2014). National Co-ordinating Council for Medication Error Reporting and Prevention, 2005. *NCC MERP: The First Ten Years "Defining the Problem and Developing Solutions". United States Pharmacopeia, Rockville, Maryland (Retrieved from URl: http://www. nccmerp. org/pdf/reportFinal2005-11-29. pdf (accessed 2 February 2009)*.

McKeon, C. M., Fogarty, G. J., & Hegney, D. G. (2006). Organizational factors: impact on administration violations in rural nursing. *Journal of Advanced Nursing*, *55*(1), 115-123.

Miller, K. S. (2018). The Effect of Root Cause Analysis on Safe Medication Administration.

Miranda, J. S., & Olexa, G. A. (2013). Creating a just culture: recalibrating our culture of patient safety. *The Pennsylvania nurse*, *68*(4), 4-9.

Mohajan, H. (2018). Medical Errors Must Be Reduced for the Welfare of the Global Health Sector.

More, L. (2017). Transition to Practice--Part 2 Implementing an Ambulatory Care Registered Nurse Residency Program: Competency--It's Not Just a Task. *Nursing Economics*, *35*(6), 317-323.

Mostafaei, D., Marnani, A. B., Esfahani, H. M., Estebsari, F., Shahzaidi, S., Jamshidi, E., & Aghamiri, S. S. (2014). Medication errors of nurses and factors in refusal to report medication errors among nurses in a teaching medical center of Iran in 2012. *Iranian Red Crescent Medical Journal*, *16*(10).

Motycka, C., Egelund, E. F., Gannon, J., Genuardi, F., Gautam, S., Stittsworth, S., ... & Simon, L. (2018). Using interprofessional medication management simulations to impact student attitudes toward teamwork to prevent medication errors. *Currents in Pharmacy Teaching and Learning*, *10*(7), 982-989.

Mrayyan, M. T., & Al-Atiyyat, N. (2011, October). Medication Errors in University-Affiliated Teaching Hospitals as Compared to Non-University-Affiliated Teaching Hospitals in Jordan. In *Nursing forum* (Vol. 46, No. 4, pp. 206-217). Malden, USA: Blackwell Publishing Inc.

Mrayyan, M. T. (2012). Reported incidence, causes, and reporting of medication errors

in teaching hospitals in Jordan: A comparative study. *Contemporary nurse*, *41*(2), 216-232.

Mrayyan et al. (2007). Rate, causes and reporting of medication errors in Jordan: nurses' perspectives. *Journal of nursing management*, *15*(6), 659-670.

Muroi, M., Shen, J. J., & Angosta, A. (2017). Association of medication errors with drug classifications, clinical units, and consequence of errors: Are they related? *Applied Nursing Research*, *33*, 180-185.

Nanji, K. C., & Bates, D. W. (2016). Medication Errors in the Perioperative Setting. *Anesthesiology*, *125*(2), 432.

Nelms, T., Jones, J., & Treiber, L. (2011). A study to reduce medication administration errors using Watson's Caring Theory. *International Journal for Human Caring*, *15*(3), 24-33.

Omair, A. (2015). Selecting the appropriate study design for your research: Descriptive study designs. *Journal of Health Specialties*, *3*(3), 153.

Ong, W. M., & Subasyini, S. (2013). Medication errors in intravenous drug preparation and administration. *Med J Malaysia*, *68*(1), 52-57.

O'Shea, E. (1999). Factors contributing to medication errors: a literature review. *Journal of clinical nursing*, *8*(5), 496-504.

Oshikoya, K. A., Oreagba, I. A., Ogunleye, O. O., Senbanjo, I. O., MacEbong, G. L., & Olayemi, S. O. (2013). Medication administration errors among paediatric nurses in Lagos public hospitals: an opinion survey. *International Journal of Risk & Safety in Medicine*, *25*(2), 67-78.

Parry, K., Mumford, M. D., Bower, I., & Watts, L. L. (2014). Qualitative and historiometric methods in leadership research: A review of the first 25 years of The Leadership Quarterly. *The Leadership Quarterly*, *25*(1), 132-151.

Parry, A. M., Barriball, K. L., & While, A. E. (2015). Factors contributing to Registered Nurse medication administration error: A narrative review. *International journal of nursing studies*, *52*(1), 403-420.

Paquet, M., Courcy, F., Lavoie-Tremblay, M., Gagnon, S., & Maillet, S. (2013). Psychosocial work environment and prediction of quality of care indicators in one Canadian health center. *Worldviews on Evidence-Based Nursing*, *10*(2), 82-94.

Pazokian, M., Zagheri Tafreshi, M., & Rassouli, M. (2014). I ranian nurses' perspectives on factors influencing medication errors. *International nursing review*, *61*(2), 246-254.

Polit, D. F., & Beck, C. T. (2010). Generalization in quantitative and qualitative research: Myths and strategies. *International journal of nursing studies*, *47*(11), 1451-1458.

Polit, D., & Beck, C. (2017). Theoretical frameworks. *Nursing research: Generating and assessing evidence for nursing practice*, 117-136.

Polnariev, A. (2016). Using the Medication Error Prioritization System to Improve Patient Safety. *Pharmacy and Therapeutics*, *41*(1), 54.

Popescu, S., & Diugan, E. A. (2013). The relationship between behavioral and other welfare indicators of working horses. *Journal of Equine Veterinary Science*, *33*(1), 1-12.

Popescu, A., Currey, J., & Botti, M. (2011). Multifactorial influences on and deviations from medication administration safety and quality in the acute medical/surgical context. *Worldviews on Evidence‐Based Nursing*, *8*(1), 15-24.

Quélennec, B., Beretz, L., Paya, D., Blicklé, J. F., Gourieux, B., Andrès, E., & Michel, B. (2013). Potential clinical impact of medication discrepancies at hospital admission. *European journal of internal medicine*, *24*(6), 530-535.

Reid, J., & Catchpole, K. (2011). Patient safety: a core value of nursing-so why is achieving it so difficult? *Journal of Research in Nursing*, *16*(3), 209-223.

Resnik, D. B. (2018). Research Integrity. In *The ethics of research with human subjects* (pp. 235-256). Springer, Cham.

Salami, I. (2018). Nursing Students' Medication Errors and Adherence to Medication Best-Practice. *Open Journal of Nursing*, *8*(05), 281.

Sammer, C. E., Lykens, K., Singh, K. P., Mains, D. A., & Lackan, N. A. (2010). What is patient safety culture? A review of the literature. *Journal of Nursing Scholarship*, *42*(2), 156-165.

Samsiah, A., Othman, N., Jamshed, S., Hassali, M. A., & Wan-Mohaina, W. M. (2016). Medication errors reported to the National Medication Error Reporting System in Malaysia: a 4-year retrospective review (2009 to 2012). *European journal of clinical pharmacology*, *72*(12), 1515-1524.

Savvato, K., Efstratios, A. (2014). An inside look into the factors contributing to medication errors in the clinical nursing practice. *Health Science Journal*. 8, 1, 32-44.

Seki Y, Yamazaki Y (2006). Effects of working conditions on intravenous medication errors in a Japanese hospital. *Journal of Nursing Management*. 14, 2, 128-139.

Schwappach, D. L. B., Pfeiffer, Y., & Taxis, K. (2016). Medication double-checking procedures in clinical practice: a cross-sectional survey of oncology nurses' experiences. *BMJ open*, *6*(6), e011394.

Shahrokhi, A., Ebrahimpour, F., & Ghodousi, A. (2013). Factors effective on medication errors: A nursing view. *Journal of research in pharmacy practice*, *2*(1), 18.

Shehata, Z. H. A., Sabri, N. A., & Elmelegy, A. A. (2015). Descriptive analysis of medication errors reported to the Egyptian national online reporting system during six months. *Journal of the American Medical Informatics Association*, *23*(2), 366-374.

Sherwood, G. (2011). Integrating quality and safety science in nursing education and practice. *Journal of Research in Nursing*, *16*(3), 226-240.

Sitterding, M. (2011). Overview and summary: Creating a culture of safety: The next steps. *OJIN: The Online Journal of Issues in Nursing*, *16*(3), 64.

Stefanacci, R. G., & Riddle, A. (2016). Preventing medication errors. *Geriatric nursing (New York, NY)*, *37*(4), 307.

Stevenson, A. (Ed.). (2010). *Oxford dictionary of English*. Oxford University Press, USA.

Sulosaari, V., Kajander, S., Hupli, M., Huupponen, R., & Leino-Kilpi, H. (2012). Nurse students' medication competence—An integrative review of the associated factors. *Nurse Education Today*, *32*(4), 399-405.

Tang F, Sheu, S.J., Yu, S. et al. (2007). Nurses relate the contributing factors involved in medication errors. *Journal of Clinical Nursing*. 16, 3, 447-457.

Taherdoost, H. (2016). Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. *How to Test the Validation of a Questionnaire/Survey in a Research (August 10, 2016)*.

Taylor, C.R., Lillis, C., Lemon, P., Lynn, P. (2016). Fundamental of nursing the art and person-centered Nursing, (8th edition). Philadelphia: Wolters Kluwer Health/ Lippincott Williams & Wilkins.

Tingle, J. (2011). The WHO patient safety curriculum guide. *British Journal of Nursing*, *20*(22), 1456-1457.

Thompson, D. R., Hamilton, D. K., Cadenhead, C. D., Swoboda, S. M., Schwindel, S. M., Anderson, D. C., ... & Harvey, M. A. (2012). Guidelines for intensive care unit design. *Critical care medicine*, *40*(5), 1586-1600.

Treiber, L. A., & Jones, J. H. (2018). After the Medication Error: Recent Nursing Graduates' Reflections on Adequacy of Education. *Journal of Nursing Education*, *57*(5), 275-280.

Treiber, L. A., & Jones, J. H. (2010). Devastatingly human: an analysis of registered nurses' medication error accounts. *Qualitative Health Research*, *20*(10), 1327-1342.

Unver, V., Tastan, S., & Akbayrak, N. (2012). Medication errors: perspectives of newly graduated and experienced nurses. *International journal of nursing practice*, *18*(4), 317-324.

Valentin, A., Schiffinger, M., Steyrer, J., Huber, C., & Strunk, G. (2013). Safety climate reduces medication and dislodgement errors in routine intensive care practice. *Intensive care medicine*, *39*(3), 391-398.

Van Doormaal, J. E., Van Den Bemt, P. M. L. A., Mol, P. G. M., Zaal, R. J., Egberts, A. C. G., Haaijer-Ruskamp, F. M., & Kosterink, J. G. W. (2009). Medication errors: the impact of prescribing and transcribing errors on preventable harm in hospitalised patients. *BMJ Quality & Safety*, *18*(1), 22-27.

Vogelsmeier, A., Scott-Cawiezell, J., Miller, B., & Griffith, S. (2010). Influencing leadership perceptions of patient safety through just culture training. *Journal of Nursing Care Quality*, *25*(4), 288-294.

Westbrook, A., & Braver, T. S. (2015). Cognitive effort: A neuroeconomic approach. *Cognitive, Affective, & Behavioral Neuroscience*, *15*(2), 395-415.

Whitaker, L. (2006). The developing role of the night nurse practitioner: the impact of nurse prescribing. *Nurse prescribing*, *4*(4), 161-164.

Winterstein, A. G., Johns, T. E., Rosenberg, E. I., Hatton, R. C., Gonzalez-Rothi, R., & Kanjanarat, P. (2004). Nature and causes of clinically significant medication errors in a tertiary care hospital. *American Journal of Health-System Pharmacy*, *61*(18), 1908-1916.

World Health Organization. (2000). The world health report 2000: health systems: improving performance. World Health Organization.

World Health Organization. (2016). *Medication errors*. World Health Organization.

WMA-The World Medical Association. (2018). WMA Declaration of Helsinki–Ethical Principles for Medical Research Involving Human Subjects. *WMA—The World Medical Association: Ferney-Voltaire, France*.

Wu, A. W. (Ed.). (2011). *The value of close calls in improving patient safety: learning how to avoid and mitigate patient harm*. Joint Commission Resources.

Appendix 1

OPEN UNIVERSITY MALAYSIA

HOSPITAL PERMAISURI BAINUN (HRPB)

SURVEY FORM

PREVALENCE AND FACTOR ASSOCIATE MEDICATION ERROR AMONG REGISTERED NURSES

PART A: SOCIO DEMOGRAPHY

Instructions:

Please fill in the blank or circle/underline your appropriate background at ALL items.

1. Age:

25 – 30 years	
31 – 35 years	
36 – 40 years	
40 Years and above	

2. Level of education:

Diploma in Nursing	
Bachelor's degree in Nursing	
Master's degree	
PhD	

3. Marital Status:

Single	
Married	
Divorced	
Widowed	

4. Gender: Male / Female

5. Work Setting: Medical / Surgical

6. Working Experience:

5 years and less	
6 to 10 years	
11 to 15 years	
16years and above	

7. Completion of the course on medication error: Yes / No

PART B: THE MOST FACTOR INFLUENCE OF MEDICATION ERROR AMONG REGISTERED NURSES AT PUBLIC HOSPITAL IPOH.

Instructions:

Please tick (√) your score of satisfaction in the box provided based on the score below.

1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree

NO	FACTOR INFLUNCE OF MEDICATION ERROR	1	2	3	4	5
1	**Human Characteristic Factors**					
	a. Overworked or fatigued health care professionals					
	b. Nurse fails to check the patient's name band with the Medication Administration Record (MAR)					
	c. Nurse is confusion between two drugs with similar names.					
	d. Inadequate drug knowledge and experience					
	e. Inadequate knowledge of the patient					
2	**Environmental Factor**					
	a. Poor lighting					
	b. Inappropriate room temperature					
	c. Interruption/distraction affecting serving medication					
	d. High number of patients					
	e. Inadequate space for medication preparation					
3	**Management Factor**					
	a. Nurse shortage					

	b. Workload and time pressure					
	c. Lack of standardized protocols and procedures					
	d. A high number of patients					
	e. Lack of supplies or equipment for tab/injection and drop-rate calculation					

PART C: PREVALENCE OF MEDICATION ERROR AMONG REGISTERED NURSES AT PUBLIC HOSPITAL IPOH.

Instructions:

Please tick (√) your score of satisfaction in the box provided based on the score below.

4 Always	3 Sometimes	2 Occasionally	1 Never

NO	PREVALENCE OF MEDICATION ERROR		1	2	3	4
1	**Behavioural/attitude of the staff**					
	a. Positive Attitude					
	b. Uncertain Attitude toward Medication Error Reporting					
	c. Reporting of Others' Errors					
2	**Carrying out doctor's order**					
	a. Interprets and administer drug/medications accurately per doctor's order					
	b. Carefully verifies physician's written prescriptions that are not clear.					
	c. Checks relevant laboratory results, finds out if patient has any drug allergic and take a complete drug history					
3	**Transcribing**					
	a. Transmit doctor's order accurately and completely in the MAR chart, kardex, and endorsement sheet					
	b. Update new medications order in MAR charts, kardex, and endorsement sheet					
	c. Write/prepare medication charts correctly, general instruction and include special instructions e.g. as taking medicine with food or water					
4	**Endorsing**					
	a. Endorse documented adverse effects related to medication administration					
	b. Endorse any missed dose of patient's medication and intervention given					
	c. Identify high alert medications and endorse special precautions required with these drug					

5	**Preparing and administering**					
	a. Verifies MAR charts against doctor's order					
	b. Adhere infection control practice in handling medications					
	c. Use appropriate medication syringe, needles, dropper, cape base on the amount, consistency, and route of drug					
	d. Administer according to the 10 rights					
6	**Documenting**					
	a. Document each drug administered in patient's chart according to agency policy					
	b. Document and report results, side effects and adverse effects of medications					
	c. Writing incident report once a medication error occur in the unit					
7	**Monitoring**					
	a. Observe and assess for side effects, adverse reactions and effectiveness of administered drug and initiate appropriate nursing intervention					
	b. Monitors the patient for potential drug-to-drug or drug-to-food interactions					
8	**Educating/Health Teachings**					
	a. Establish rapport with patients					
	b. Teach patient about the drug he/she is receiving					
	c. Provide special interactions to patient and discuss interventions to avoid its occurrence					
	d. Disclose medication error to the patient and discuss interventions to avoids its occurrence					
9	**Evaluating**					
	a. Evaluate/assess patient's reactions to medication					
	b. Evaluates patients understanding regarding the medication regimen					
	c. Dose proficient technical ability in the use, care, maintenance and evaluation of medication-related devices/equipment					

Appendix 2

INFORMED CONSENT FORM

PREVALENCE AND FACTOR ASSOCIATE MEDICATION ERROR AMONG REGISTERED NURSES

I, _____ as a nurse, have read the research project invitation and information sheet and hereby consent to participate in this research. I am aware that:

- I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions
- The data will be identified and securely store throughout and upon completion of the project
- My participation is voluntary and that I am free to withdraw at any time, without giving reason

Signature below indicates that I have decided to volunteer as a research participant for this study, and I have read and understood the information provided above. The questionnaire will be submitted back to researcher hand by hand.

Participant's signature: _____

Name : _____

Date : _____

Researcher's signature: _____

Name : _____

Date : _____

Appendix 3

16.6.2020

Dr. Abdul Malek bin Osman

Director of Hospital Raja Permaisuri Bainun,

30450 Ipoh, Perak.

Dear Sir,

SEEK FOR APPROVAL TO CONDUCT RESEARCH PROJECT

I, Ezawaty bt. Mat Johor from UniKL, Royal College of Medicine Perak (RCMP) currently doing my Degree of Nursing at Open University Malaysia (OUM). I required undertaking a research project as a partial fulfilment of the programme.

2. Therefore, I would like to seek your kind approval for me to conduct my Research Project at Registered Nurse, Female/Male, at Hospital Raja Permaisuri Bainun (HRPB). My research topic is "Prevalence and Factor Associating Medication Error Among Registered Nurses at Public Hospital Ipoh".

3. This study will involve 80 nurses who qualified as a registered nurse to answer the questionnaire. A written consent obtained from the participants that they were asked to answer voluntarily and anonymously. Privacy would be maintained. Your approval to conduct this study will be greatly appreciated. If you require any information, please do not hesitate to contact me. My contact details are as follows: Email: ezawaty77@oum.edu.my / ezawatymatjohor@gmail.com / H/p No: 011-20754490,

Thank you.

Yours faithfully,

(Ezawaty bt. Mat Johor)

ID: 770501087564

Appendix 4

JAWATANKUASA ETIKA & PENYELIDIKAN PERUBATAN
(Medical Research & Ethics Committee)
KEMENTERIAN KESIHATAN MALAYSIA
d/a Kompleks Institut Kesihatan Malaysia
Blok A, No 1, Jalan Setia Murni u13/52,
Seksyen U13, Bandar Setia Alam,
40170 Shah Alam, Selangor
Tel: 03-3362 8888/8205

Ref : KKM/NIHSEC/P25-210 (3)
Date :16-July-2020

MDM. EZAWATY BT. MAT JOHOR
OPEN UNIVERSITY MALAYSIA-KUALA LUMPUR LEARNING CENTRE (OUM)

Dear Mdm,

ETHICS INITIAL APPROVAL: NMRR-20-74-52625 (IIR)

PREVALENCE AND FACTOR ASSOCIATING MEDICATION ERROR AMONG REGISTEREED NURSE AT PUBLIC HOSPITAL IPOH

This letter is made in reference to the above matter.

2. The Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH) has provided ethical approval for this study. Please take note that all records and data are to be kept strictly **CONFIDENTIAL** and only can be used for the purpose of this study. All precautions are to be taken to maintain data confidentiality. Permission from the District Health Officer / Hospital Administrators / Hospital Director and all relevant heads of departments / units where the study will be carried out must be maintained prior to the study. You are required to follow and comply with their decision and all other relevant regulations, including the Access to Biological and Benefit Sharing Act 2017.

3. The investigators and study sites involved in this study are:

OPEN UNIVERSITI MALAYSIA, IPOH, PERAK
MDM. EZAWATY BINTI MAT JOHOR (PENYELIDIK UTAMA)

4. The following study documents have been received and reviewed with reference to the above study:

Documents received and reviewed with reference to the above study:

1. Study Protocol Version 1.1. dated 16-Jun-2020
2. Study Clinical Report Form (CRF) / Data Collection Form Version 1.1. Dated 16-Jun-2020
3. Investigator's documents: Declaration of Conflict of Interest (COI). IA-HOD-IA. and CV.
   a) Mdm. Ezawaty bt. Mat Johor (Penyelidik Utama)

5. Please note that ethical approval is valid until 15-Januari-2021. The following are to be reported upon receiving ethical approval. Required forms can be obtained from the Medical Research Ethics Committee (MREC) website (http://www.nih.gov.my/mrec).

Continuing Review Form has to be submitted to MREC within 2 months (60 days) prior to the expiry of ethical approval.

i. **Study Final Report** upon study completion to the MREC.

ii. Ethical approval is required in the case of **amendments / changes to the study documents/study sites/ study team**. MREC reserves the right to withdraw ethical approval if changes to study documents are not completely declared.

KKM/NIHSEC/ P25- 210 (3)

6. This study involves the following methods:
   i. **Cross sectional study**

7. Please take note that the reference number for this letter must be stated in all correspondence related to this study to facilitate the process.

Comments (if any): **NIL**

Project Sites:

HOSPITAL RAJA PERMAISURI BAINUN, IPOH, PERAK

Decision by medical Research and Ethics Committee:

(√) Approve

( ) Disapproved

Date of Approval : 16 - July- 2020

DR HAJJAH SALINA BT ABDUL AZIZ
Chairperson
Medical Research & Ethical Committee
Ministry of Health Malaysia
MMC No: 28117

Surat Kebenaran MREC

Protokol (*full protocol*) **LAMPIRAN 2**

Ringkasan Projek Penyelidikan

Tajuk Penyelidikan: Prevalen dan kelaziman *medication error* dalam kalangan jururawat berdaftar di Ipoh, Perak

Nama dan Jabatan Ketua Penyelidik: Puan Ezawaty bt. Mat Johor

Nombor pendaftaran NMRR: NMRR-20-74-52625

Rujukan kelulusan MREC: KKM/NIHSEC/P25-210 (3)

Tarikh mula penyelidikan: 1-09-2019

Tarikh tamat penyelidikan: 30-08-2020

Objektif penyelidikan: Adalah untuk menilai prevalen dan kelaziman *medication error* dalam kalangan jururawat berdaftar.

Ringkasan metodologi penyelidikan: Kajian ini adalah kajian keratan rentas dengan menggunakan kaedah tijauan kuantitatif untuk mengkaji prevalen dan kelaziman *medication error* dalam kalangan jururawat berdaftar di sebuah hospital kerajaan di Ipoh. Peserta adalah jururawat pelatih yang bekerja di wad medikal dan surgikal. Pemberian ubat adalah tugas penting jururawat, sekiranya berlaku *medication error*, ia akan memberi kesan yang buruk kepada pesakit dan jururawat. Oleh itu, untuk meningkatkan pengetahuan jururawat, sesebuah instituisi itu perlu mengatur strategi yang berkesan kepada pemimpin atau ketua jururawat untuk mencegah berlakunya *medication error*.

OUM/2.1.1/469.3.1/ (163)/33719

Tarikh: 14/09/2020

Kepada yang berkenaan,

Tuan/Puan,

PENGESAHAN

Sukacitanya saya merujuk kepada perkara di atas.

Dengan ini adalah dimaklumkan bahawa penama di bawah telah mendaftar sebagai pelajar di Open University Malaysia. Berikut adalah butiran pelajar:

1. Nama	: **EZAWATY BINTI MAT JOHOR**
2. No Kad Pengenalan Pelajar	: **770501087564**
3. Rujukan Pendaftaran Pelajar	**: 770501087564001**
4. Jenis Kursus yang Ditawarkan	**:SARJANA MUDA SAINS KEJURURAWATAN DENGAN KEPUJIAN**
5. Semester Kemasukan	**: SEPTEMBER 2016**
6. Bilangan Semester	**: 10**
7. Jangkaan Semester Tamat	**: SEPTEMBER 2020**
8. Pusat Pembelajaran	**: IPOH LEARNING CENTRE**
9. Mod Pengajian	**: SEPARUH MASA**

Sekian, untuk makluman.

Yang benar,

ROHAIZAK BIN OMAR @ ABD RAHIM
Pengarah, Pusat Hal Ehwal Pelajar

Open University Malaysia,Menara OUM, Block C,Kompleks Kelana Centre Point,Jalan SS7/19,
Kelana Jaya,47301 Petaling Jaya, Selangor.
Tel: 603-7801 1800 Fax: 603-7887 9995 Email: enquiries@oum.edu.my www.oum.edu.my

Gmail

Ezawaty Mat Johor <ezawatymatjohor@gmail.com>

Re: Request for Questionnaires

2 messages

Noemi Giannetta <noemi.giannetta@uniroma1.it> 3 July 2020 at 22:21
To: ezawatymatjohor@gmail.com
Cc: Marco Dimuzio <marco.dimuzio@uniroma1.it>

Dear Ezawaty Mat Johor,
My name is Noemi Giannetta, I am an Italian Ph.D. student at the Tor Vergata, University of Rome. I got your e-mail address from Prof. Di Muzio (in cc).
I am really glad you are interested in our topic. You can use our instrument.
Furthermore, I am studying medication error in the international Intensive Care Units (ICU).
The aim of my study will be to assess the knowledge, attitudes and professional behavior of Italian and "international" nurses towards the preparation and administration of intravenous medications in ICUs. At the moment, Spain, Cordoba, Egypt, China, Pakistan, Iran, Nepal, Ecuador, Qatar, and Malta are the country involved.
I'm very grateful if you would participate in this international study. You could give us your data collection.
We will analyze and compare it with the other countries involved.
You can use our questionnaire, which is made of 33 items and 7 sections, and it was validated in Italy (Di Muzio, Tartaglini, De Vito, & La Torre, 2016). Data will collect from a heterogeneous sample of 100 nurses who work in ICU and that will analyze to establish reliability, construct validity, and criterion-related validity of each measure.
Thus, we can collaborate and I will get you a co-authorship during the publication of this international comparison.
I remain at your disposal for any other information.
I am hoping to hear from you about this the soonest.
King regards,
Noemi Giannetta

Noemi Giannetta
Ph.D. student in Nursing Science
Department of Biomedicine and Prevention
Tor Vergata University of Rome
Research Fellow at Vita-Salute San Raffaele University
Italy
email: noemi.giannetta@uniroma1.it

---------- Forwarded message ---------
Da: **Ezawaty Mat Johor** <ezawatymatjohor@gmail.com>
Date: mer 1 lug 2020 alle ore 14:49
Subject: Request for Questionnaires
To: <marco.dimuzio@uniroma1.it>

Dear Mr. Marco Di Muzio,

Greetings,

I am Ezawaty Mat Johor from Malaysia, persuading Degree studies in Nursing. I am doing research on "Prevalence and factor Associate medication error among Registered Nurse", general Hospital Ipoh. For research my humble request to share questionnaires from "Factor Affecting Medication Error among Staff Nurses: Basis in the formulation of Medication Information Guide".

Hope you will consider my request and will give permission to use the tools. Your consideration is highly appreciated.

Thank you in advance.

Thank you
Ezawaty Mat Johor,

Gmail **Ezawaty Mat Johor <ezawatymatjohor@gmail.com>**

(no subject)
3 messages

Ezawaty Mat Johor <ezawatymatjohor@gmail.com> 1 July 2020 at 20:42
To: edriph@gmail.com

Dear Mr. Ramadan Mohamed Elkalmi,

Greetings,

I am Ezawaty Mat Johor from Teluk Intan, Perak, persuading Degree studies in Nursing. I am doing research on "Prevalence and factor Associate medication error among Registered Nurse", general Hospital Ipoh. For research my humble request to share questionnaires from "Exploration of Nurses' Knowledge, Attitudes, and Perceived Barriers towards Medication Error Reporting in a Tertiary Health Care Facility: A Qualitative Approach".

Hope you will consider my request and will give permission to use the tools. Your consideration is highly appreciated.

Thank you in advance.

Thank you,
Ezawaty Mat Johor,

Ramadan M. Elkalmi <edriph@gmail.com> 1 July 2020 at 21:0
To: Ezawaty Mat Johor <ezawatymatjohor@gmail.com>

Salaam.,
Should be no problem .. with proper citation ... nasib baik ...
[Quoted text hidden]
--

Best Regards

Dr. Ramadan M. Elkalmi,

Asst. Professor

B.Pharm (Libya), M.Pharm (Clin Pharm) (USM, Malaysia), PhD (USM, Malaysia)

College of Pharmacy and Health Sciences

Fujairah University of Science and Technology

Sheikh Maktoum bin Rashid Al Maktoum street – Fujairah - UAE

H/P: 00971 50 9833 146

Tel: +971 9 222 2644 (ext. 553)

Fax: +971 9 222 7644

Ezawaty Mat Johor <ezawatymatjohor@gmail.com> 6 July 2020 at
To: "Ramadan M. Elkalmi" <edriph@gmail.com>

Thank you very much.
[Quoted text hidden]

Appendix 7

GANTT CHART PLANNING FOR RESEARCH PROJECT
PREVALENCE AND FACTOR ASSOCIATING MEDICATION ERROR AMONG REGISTERED NURSES AT PUBLIC HOSPITAL IPOH

MONTH	SEPT 2019		OCT 2019				NOV 2019				DEC 2019				JAN 2020				FEB 2020				MAR 2020				APR 2020				MAY 2020				JUN 2020				JULY 2020				AUG 2020				SEPT 2020				OKT 2020			
WEEK / PROCEDURES	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Preparing proposal																																																						
3. Return and corrections of proposal																																																							
4. Submission and return of early proposal from CRC, HRPB																																																						
5. Apply consent to conduct the research project -CRC, HRPB																																																						
6. Conducting a pilot study																																																						
7. Analyzing survey questionnaires																																																						
8. Conducting research project																																																						
9. Analyzing and interpreting data																																																						
10. Writing final reports, return and corrections																																																						
11. Submission of final reports to RPMU																																																						