PERCEPTIONS REGARDING MEDICATION ADMINISTRATION ERRORS AMONG MEDICAL AND SURGICAL NURSES IN HOSPITAL USM

by

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TABLE OF CONTENTS

PAGES

CERTIFICATE ii
DECLARATION iii
ACKNOWLEDGEMENT iv
TABLE OF CONTENTS v
LIST OF TABLE viii
LIST OF FIGURES ix
LIST OF ABBREVIATIONS x
ABSTRACT xi

CHAPTER 1 : INTRODUCTION

1.1 Background of Study 1
1.2 Problem Statement 3
1.3 Research Objective 6
1.4 Research Question 6
1.5 Research Hypothesis 7
1.6 Definitions of Terms (Conceptual/Operational) 8
1.7 Significance of Study 9

CHAPTER 2 : LITERATURE REVIEW

2.1 Introduction 10
2.2 Definition of Medication Errors 10
2.3 Incidence and Prevalence of Medication Errors 11
2.4 Categories of Medication Errors 12
2.5 Medication Administration Errors (MAEs) 13
2.5.1 Types of Medication Administration Errors (MAEs) 14
2.6 Factors Contributing to Medication Administration Errors (MAEs) 15
2.6.1 External and Internal Factors 15
2.7 Guideline to Prevent Medication Administration Errors (MAEs) 18
2.8 Theoretical and Conceptual Framework 19
2.8.1 Theoretical Framework 19
2.8.2 Conceptual Framework 22
2.9 Summary 24

TABLE OF CONTENTS

PAGES

CHAPTER 3 : METHODOLOGICAL & METHODS

3.1 Introduction 26
3.2 Research Design 26
3.3 Population and Setting 26
3.4 Sampling Plan 27
3.4.1 Sample 27
3.4.2 Sampling Method 27
3.4.3 Sample Size 28
3.5 Variables 29
3.5.1 Variable Measurement 29
3.6 Instrumentation 30
3.6.1 Instrument 30
3.6.2 Translation of Instrument 31
3.6.3 Validity and Reliability of the Data Collection Instrument 31
3.7 Ethical Consideration 32
3.8 Data Collection Plan 32
3.8.1 Flow Chart of Data Collection 34
3.9 Data Analysis 35

CHAPTER 4 : RESULTS

4.1 Introduction 36
4.2 Socio-Demographic Characteristics 36
4.3 Factors Causing MAEs 39
4.4 Factors for Underreported MAEs 40
4.5 Types of MAEs Reported 40
4.6 Different Factors that Contributed to MAEs between Medical and Surgical Wards 42
4.7 Association between Selected Socio-demographic with MAEs in Medical and Surgical Wards 42

CHAPTER 5 : DISCUSSION

5.1 Introduction 44
5.2 Socio-demographic Characteristics 44
5.3 Factors in Causing MAEs 45

TABLE OF CONTENTS

PAGES

5.4 Factors for Underreported MAEs 46

5.5 Types of MAEs Reported 46

5.6 Different Factors Contributed to MAEs between Medical and Surgical Wards 46

5.7 Association between Selected Demographic with MAEs in Medical and Surgical wards 47

5.8 Strength and Limitations 47

5.8.1 Strength of the Study 47

5.8.2 Limitations of the Study 48

CHAPTER 6 : CONCLUSIONS AND RECOMMENDATION

6.1 Introduction 49

6.2 Summary of the Study Findings 49

6.3 Implications and Recommendations 50

6.3.1 Implication of Conceptual Framework 50

6.3.2 Nursing Practice 51

6.3.3 Nursing Education 51

6.3.4 Nursing Research 53

6.4 Conclusion 54

REFERENCES 55

APPENDIXES 60

Appendix A: Questionnaire in English 60

Appendix B: Questionnaire in Malay 65

Appendix C: Permission from Original Author 70

Appendix D: Permission Letter to Conduct The Study 71

Appendix E: Ethical Approval 72

Appendix F: Research Information for Participant 74

Appendix G: Maklumat Kajian Peserta 77

Appendix H: Participant Information and Consent Form 80

Appendix I: Borang Maklumat dan Keizinan Peserta 81

Appendix J: Gantt Chart of The Research Project 82

Appendix K: Raosoft Sample Size Calculator 83

LIST OF TABLE

		PAGES
Table 1.1	Definition on Terms (Conceptual/ Operational)	8
Table 3.1	Data Analysis	35
Table 4.1(a)	Demographic Profile	37
Table 4.1(b)	Common Route of Medication Administration	38
Table 4.1(c)	Experience on MAE	38
Table 4.2 (a)	Causes of MAEs in the Medical Ward	39
Table 4.2 (b)	Causes of MAEs in the Surgical Ward	40
Table 4.3(a)	Causes of Underreported MAEs in Medical Ward	40
Table 4.3(b)	Causes of Underreported MAEs in Surgical Ward	40
Table 4.4	Types of MAEs Reported	41
Table 4.5	Comparison Between Mean Factors That Contributed To Medication Administration Errors Between Medical and Surgical Wards in Hospital USM	42
Table 4.6	Association Between Selected Socio-Demographic and Factors Contributed To Medication Administration Errors in Medical And Surgical Wards In Hospital USM	43

LIST OF FIGURES

		PAGES
Figure 2.1	Theory of Accident Causation Model (Swiss Cheese Model)	20
Figure 2.2	Study framework based on the Theory of Accident Causation Model	23
Figure 3.1	Flow chart of Data Collection	34
Figure 6.1	Application Of Swiss Cheese Model In The Study Of Perceptions Regarding Medication Administration Errors Among Medical And Surgical Nurses In Hospital USM	51

LIST OF ABBREVIATIONS

Hospital USM	-	Hospital Universiti Sains Malaysia
MAEs	-	Medication Administration Errors
SPSS	-	Statistical Package for Social Science
Non-IV	-	Non-Intravenous
IV	-	Intravenous

PERCEPTIONS REGARDING MEDICATION ADMINISTRATION ERRORS AMONG MEDICAL AND SURGICAL NURSES IN HOSPITAL USM

ABSTRACT

Medication administration errors (MAEs) has been a major global issues as it caused serious health threatening which increase mortality rates, length of hospital stay, and related costs for the patients as well as affecting the nursing professionalism. This study was aimed to identify the factors that contributed to MAEs and determine the association between selected socio-demographic and MAEs in medical and surgical wards nurses in Hospital USM. The research design used for this study was quantitative cross-sectional survey design by using an adapted self-administered questionnaire. Ninety-eight nurses were recruited through simple random sampling from medical and surgical based wards. This research was approved by ethical approval department from Research Ethics Community (Human), USM. The findings showed that the factor that causing MAEs in medical and surgical based wards were medication packaging (59.2% agreed, n = 58) and physician communication (52.4% agreed, n = 51). The items that was common to cause errors based on the two factors above were medication look alike (M= 3.79, SD = 1.44) and physician medication orders are not clear (M=3.85, SD= 1.58), respectively. There were no significant difference between medical and surgical wards in terms of factors causing MAEs with $p > 0.05$ for all the identified factors. Socio demographic played a role in modifying the frequency of occurrence of MAEs in both wards. With $p < 0.05$ in relationship between working experience and factors MAEs, this showed that increase in years of working experience will reduce the frequency of MAEs to occur. However, gender and age did not have any affect towards factors causing MAEs. The study recommended that the continuation of nursing education and practice of guidelines on medication administration as well as mentorship program about medication administrations should be applied to ensure patient safety and the credibility of nursing.

PERSEPSI MENGENAI KESALAHAN PEMBERIAN UBAT ANTARA JURURAWAT MEDIKAL DAN SURGIKAL DALAM HOSPITAL USM

ABSTRAK

Kesilapan pemberian ubat telah menjadi satu isu yang utama dalam global kerana ia penyebab ancaman serius terhadap kesihatan pesakit yang meningkatkan kadar kematian, tempoh di hospital dan kos-kos yang berkaitan serta menjejaskan professional kejururawatan. Kajian ini bertujuan untuk mengenalpasti faktor yang menyumbang kepada kesalahan pemberian ubat dan menentukan hubungan antara sosio-demografi dan kesalahan pemberian ubat dalam medikal dan surgikal wad di Hospital USM. Reka bentuk kajian yang digunakan adalah kuantitatif keratan rentas dengan menggunakan soal selidik 'adapted self-administered'. Seramai sembilan puluh lapan jururawat telah diambil melalui persampelan rawak mudah dari wad berasaskan perubatan dan pembedahan. Kelulusan etika telah diperolehi daripada Jawatankuasa Etika Penyelidikan (Manusia), USM. Hasil kajian menunjukkan bahawa faktor yang menyebabkan kesalahan pemberian ubat di medikal dan surgikal wad adalah pembungkusan ubatan (59.2% setuju, n=58) dan komunikasi antara doktor dan jururawat (52.4% setuju, n=51). Berdasarkan faktor-faktor tersebut, perkara-perkara yang biasa menyebabkan kesalahan pemberian ubat adalah ubatan kelihatan sama (M=3.79, SD =1.44) dan arahan ubat dari doktor tidak jelas (M=3.85, SD=1.58). Tiada perbezaan yang signifikan antara wad medikal dan surgikal dari semua faktor yang menyebabkan kesalahan pemberian ubat dengan p >0.05. Sosio-demografi juga memainkan peranan dalam mengubah kekerapan berlakunya kesalahan pemberian ubat di medikal dan surgikal wad. Dengan p <0.05 dalam hubungan antara pengalaman bekerja dan faktor-faktor kesalahan pemberian ubat, ini menunjukkan bahawa peningkatan dalam pengalaman bekerja akan dapat mengurangkan kekerapan kesalahan pemberian ubat. Walau bagaimanapun, jantina dan umur tidak memberikan apa-apa kesan terhadap faktor menyebabkan kesalahan pemberian ubat. Kajian ini mencadangkan bahawa penerusan pendidikan kejururawatan dan amalan garis panduan pemberian ubat serta program mentor mengenai pemberian ubat hendaklah diaplikasikan untuk menjamin keselamatan pesakit dan kredibiliti kejururawatan.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Medication errors are a well-known problem in hospital and among the most prevalent medical errors leading to morbidity and mortality worldwide, as it harmed at least 1.5 million people in every year (Manal & Hanan, 2012). Medication errors has caused serious direct and indirect consequences and leading to breakdown in a system of care. Direct consequences include the risk of harm to the patient and increments of healthcare costs while for indirect consequences are affecting nurses' credibility. Incidence and economic impact of medication errors have become major issues among healthcare consumers in recent years (Manal & Hanan, 2012). Medication errors are identified as the failure in the treatment process that can lead to harm to the patient.

According to Galicinao (2011), medication error is defined as any type of error in the prescription, transcription, dispensing, and administration which it could harm the patient's safety. Interception of medication errors occurs more commonly in the early stages of medication processing (prescription and preparation); whereas errors originating in the later stages of the process (administration) have fewer system checks and are at a greater risk for remaining undetected (Youssif, Mohamed, & Mohamed, 2013). These errors can be assorted as either acts of commission or omission and may include the negligence of guidelines or rights when dealing with the medication as well as it can happen in either an intentional or unintentional manner.

Jaykare et al. (2013) stated that the problems and sources of medication errors are multidisciplinary and multifactorial as it can occur due to lack of knowledge, substandard performances, as well as failures in systems. There are several clinical

factors that associated to the medication errors incidents. According to Abdar et al. (2014), their research revealed that lack of staff to patients ratio, nurses' fatigue from work, having difficulty to read physician's writing in the patient's medication chart, nurses' heavy workload and working at night shifts were most common factors of medication errors that determined by Iranian registered nurses. Meanwhile, Petrova, Baldacchino, and Camilleri (2010) found that most common cause for medication errors among nurse is the deliberate violation for guidelines rather than written documents, and that nurses' lack of perceived risk and poor role model were other factors.

Administration of medication is one of the vital parts within patient safety due to its contribution towards patient morbidity and mortality. In most of the published research and literature, multiple definitions of what represent medication administration errors were established and viewed. One definition often used by the medical doctors of medication administration errors is any deviation from the doctor's medication order as written on the patient's medication chart. However, from the view of nurses, they identified medication administration errors as mistake associated with drugs and intravenous (IV) solutions that are made during the prescription, transcription, dispensing, and administration phases of drug preparation and distribution (Youssif, Mohamed, & Mohamed, 2013). It can be stated that medication administration is one of vital job for nurses in the clinical settings area and play a core role in the maintenance of the patient safety and quality of care.

In view of the fact that the prevalence of medication administration errors is increasing globally, the serious action should be taken to minimize it from occur (Johari, Shamsuddin, Idris, & Hussin, 2013). Data compiled by the Joint Commission on Accreditation of Healthcare Organizations (2009) showed that 334 out of 378 (88.35%) cases that resulted in deaths or permanent loss of function were caused by

medication use. In addition, according to Johari et al. (2013) stated that the statistic only show one hospital in Malaysia, which was Sik Hospital and no statistic available in Malaysia as whole. Hence, there is a lack in research on medication administration errors in developing countries such as Malaysia. Therefore, this study will be conducted to identified factors associated with medication errors in a Malaysian teaching hospital ward as a health care system in Malaysia may dissent from that of developed countries.

1.2 Problem Statement

Medication errors are considered as a global problem as it increase mortality rates, length of hospital stay, as well as affect patient care and safety. These errors also have adverse influences on nurses and healthcare organizations. The medication process starts with the physicians' decision on the administration of the right medication to a patient and completed with the medication administration to patient, as well as monitored the effects of the medication by a nurse (Karavasiliadou & Athanasakis, 2014). Medication errors include errors that can happen during prescribing, dispensing and administering medication. A study point out that some of previous researches reported that medication errors happened most often at the prescribing phase, followed by administration, transcription, and dispensing phase, however prescribing errors can be avoided unlike administration errors (Chua, Tea, & Rahman, 2009).

Detection and interception of medication errors occurs more commonly in the early stages of medication processing (prescription and preparation); however, errors originating in later stages of the process (administration) due to have fewer system checks and are at a greater risk for remaining undetected (Youssif et al., 2013). This is due to administration of medication is the last phase of medication process and any errors cannot be evaded. According to Saghafi and Zargarzadeh (2014), the definition of administration error used by the team is "any inconsistency, whether in dosage form,

dose, administration route, dosing interval, between what has been ordered by a physician and what the patient receives by nurse". As Youssif et al. (2013) proposed, medication administration is always performed in chaotic and stressful surroundings and is almost certainly the highest risk activity for a nurse to carry out as it needs a specific knowledge and attitude if it is to be implemented correctly to the patient.

A lot of causes contributed to medication administration errors which are individual factors and organization or system related factors, and problem of underreporting. These factors can affect not only the patient but also on nurses and hospitals as well. The category of individual factor more focuses on the interpretation of individual nurses' factors and their connection for medication administration errors to be occurred. Karavasiliadou and Athanasakis (2014) acknowledge that:

> Subcategories of these factors involve: miscommunication factors, medication package labelling misreading, medication dosology miscalculation, non-adherence of the proper steps of medication preparation (checking-rechecking, application of the five rights which includes the right patient, right drug, right route, right time, right dose), personal neglect, difficulties in using infusion devices, nurses' physical exhaustion, and problems with physicians' prescription (illegible handwriting, unclear verbal orders). (p. 34-35)

For the external factors, it present with a holistic view of the medication administration errors issues as it concentrates more on the interpretation of healthcare system factors as well as their association and interaction with medication administration errors. System failure includes poor hospital and ward environment, bureaucratic operation system, ineffective means of communication, inadequate staffs and equipment (Abu bakar, Chedi, Simbak, & Haque, 2014).

Ministry of Health Malaysia (2009) stated that medication errors may be carry out by both inexperienced and experienced personnel such as doctors, nurses, pharmacists and other healthcare providers, patients, manufacturers, caregivers and others. Karavasiliadou and Athanasakis (2014) explained that, even though, in whole, other healthcare professionals such as doctors and pharmacist also involve in the medication process, however nurses have an active responsibility in the management of the patients' medication.

Nurses are primarily involved in the administration of medications in clinical settings and they can also be involved in both the dispensing and preparation of medications (in a similar role to pharmacists), such as crushing pills and drawing up a measured amount of medication (Hughes & Blegen, 2008). They are required to give full and complete attention when administering medication in order to forbid any errors from occurring as 40% of their working time are related with medication. Administration errors account for 26% to 32% of total medication errors and nurses administer most medications but unfortunately, most administration errors aren't intercepted (Anderson & Townsend, 2010).

1.3 Research Objective

1.3.1 General Objective

The aim of the study is to determine the factors associated to medication administration errors among medical and surgical nurses in Hospital USM.

1.3.2 Specific Objectives

The specific objectives are:

1. To identify the factors that contributed to medication administration errors in medical and surgical wards nurses in Hospital USM.
2. To determine the differences of factors contributed to medication administration errors in medical wards compared to surgical wards in Hospital USM.
3. To determine the association between selected socio-demographic (genders, age, and number of years in working experience) with medication administration errors in medical and surgical wards nurses in Hospital USM.

1.4 Research Question

1. What are the factors that contributed to medication administration errors in medical and surgical wards nurses in Hospital USM?
2. Are there any differences of factors that contributed to medication administration errors in medical wards compared to surgical wards in Hospital USM?
3. Is there any association between selected socio-demographic (genders, age, and number of years in working experience) with medication administration errors in medical and surgical wards nurses in Hospital USM?

1.5 Research Hypothesis

1. H° = There are no significant differences of factors contributed to medication administration errors in medical wards compared to surgical wards in Hospital USM.

   H^{Λ} = There are significant differences of factors contributed to medication administration errors in medical wards compared to surgical wards in Hospital USM.

2. H° = There is no significant association between selected socio-demographic (genders, age, and number of years in working experience) with medication administration errors in medical and surgical wards nurses in Hospital USM.

   H^{Λ} = There is a significant association between selected socio- demographic (genders, age, and number of years in working experience) with medication administration errors in medical and surgical wards nurses in Hospital USM.

1.6 Definitions of Terms (Conceptual/Operational)

Table 1.1 Definitions of Terms (Conceptual/Operational)

Terms	Conceptual	Operational
Registered nurses	Registered nurses (RNs) provide and coordinate patient care, educate patients and the public about various health conditions, and provide advice and emotional support to patients and their family members (U.S. Bureau of Labor Statistics, 2015).	Registered nurses working in medical and surgical wards of Hospital USM
Medical ward	An area where in-patients are admitted under the care of a physician for investigation or treatment of medical condition as not requiring surgical intervention (Maxfield & Parker, 2012).	Medical wards selected for this study were 7 Utara and 7 Selatan
Surgical ward	The area in a hospital where patient are cared for post-operative complications including pain management, wound care and nutritional needs. (Northern NSW Local Health District, 2013).	Surgical wards selected for this study were 3 Utara and 2 Intan
Medication administration errors	Medication error refers to any unintentional error in the prescribing, dispensing, or administration of a medicinal product while in control of the healthcare professional, patient or consumer (Goedecke, 2013).	Error done by nurses in administering of a medication, may lead to adverse consequences. The questionnaire used to identify MAEs was an adapted questionnaire permitted from original author. The measurement will be based on 5 responses of Likert scale.

Continued Table 1-1

Medication administration guidelines (ex: 5Rs)	The right patient, the right drug, the right dose, the right route, right documentation and the right time form the foundation from which nurses' practice safely when administrating medications to our patients in all health care settings (Cook, 2016).	The questionnaire will be used to identify the error in medication administration among the registered nurses in medical and surgical wards.

1.7 Significance of Study

A medication administration is a major job assignment for nurses in every shift and it caused serious issue such as medication errors in nursing profession. The errors have most contribution in risking of the patient's safety as well the health care professionals. Although there are many studies done for this issue around the global, however in Malaysia as a developing country, there are very few studies done on drug administration errors. Hence, this research is aimed to determine the factors of medication administration errors as well as to identify the association between selected socio-demographic (genders, age, and number of years in working experience) with medication administration errors in medical and surgical wards nurses in Hospital USM.

In Malaysia, the nurses will rely on their clinical experiences due to lack in education programmes involving medication issues. Therefore, these errors may remain silently and not highlighted, unless there is some serious harm that affects the patient's live. Hence, identifying types and factors that contributed to medication administration errors as well as determine the percentage of errors will be the foremost step in order to deeply understand the problem and scope in Malaysia. This result for this study can be a foundation for the nurses to implement solutions and strategies as to minimize and solve the problem as well guidance for future researchers who will have interest for this issue.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter, literature reviews, consists of the definition, prevalence and categories of medication errors. Specifically, this chapter discuss the issues of types; factors contribute to MAEs as well as the guideline to prevent MAEs and the conceptual and theoretical framework.

2.2 Definition of Medication Errors

Patient safety is the most importance part for every health care provider to assure the quality of its care services and it contributes a substantial challenge in facing our healthcare system today.

According to Jaykare et al. (2013), they acknowledged medication error as the events correlate to professional practice, processes involved during prescribing, product labelling, packaging, compounding, dispensing, distribution, and administration of drugs and drug-related products. These errors have the possibility to cause risks to patient safety and resulting general public's distrust of the medical institution. There were several definitions that had been identified on medication errors. Galicinao (2011) described medication errors as any type of error in the phases of prescription, transcription, dispensing as well as administration which it can cause serious effect and consequences. While, European Medicines Agency stated as the errors are unintended omission in the prescribing, dispensing and administration of a medicine that could cause harm to a patient. However, the most common definition for medication error is defined by National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) in 2015 stated that:

> A medication 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 (p. 2-3).

Hence, safe medication use process with precise information is one of the key accountability of health care professionals, especially nurses. In nursing field, medication errors are a significant issue, since nurses are the last barrier before patients gets their medicines especially in administration medication process (Sanchez, 2011).

2.3 Incidence and Prevalence of Medication Errors

In Southeast Asia, the number of research done on medication errors was very limited, as only 17 researches were conducted. Salmasi, Khan, Hong, Ming, and Wong (2015) claimed the 17 included studies reported data from six of the eleven Southeast Asia countries: five studies in Singapore, four in Malaysia, three in Thailand, three in Vietnam, one in the Philippines and one in Indonesia and there was no data on medication errors in Brunei, Laos, Cambodia, Myanmar. Timor Carandang, Resuello, Hocson, Respicio, and Reynoso (2015) claimed that the absence of statistical data on medication errors in the Philippines is a big hindrance in the creation of a solid recommendation on policy changes in order to achieve a safer environment for medication users. According to Sik Hospital, Quality Control Unit, between January to June 2012, there were three incidence of medication error among nurses. Furthermore, the statistic only shows one hospital in Malaysia, which was Sik Hospital and no statistic available in Malaysia as whole (Johari et al., 2013). In Malaysia, as a developing country, it was still lacking of research concerned about medication administration errors as the health care professionals especially nurses were still

practiced the culture of blame and silence. Hence, this study should be increasing their awareness on relationship between medication administration errors and patient safety.

2.4 Categories of Medication Errors

There are five categories of the medication errors would occur in the medication process. The categories are ordering or prescribing; transcribing and verifying; dispensing and delivering; administering and monitoring and reporting (Institute of Medicine, 2007). Among the five categories, the most errors frequently occurred during the prescribing and administering phases of the medication. Sanchez (2011) believed that medication errors occurred when the processes of medication, prescribing, dispensing or administering orders are not followed or when the indications followed are incorrect.

According to Aronson (2009), the adapted definition of medication errors, prescribing fault defined as 'a failure in the prescribing process that leads to, or has the potential to lead to, harm to the patient'. In the other hand, the dispensing fault occurred when pharmacist or other healthcare professional dispensing the wrong drug or the correct drug but at the wrong strength (Hameli, 2010). The Academy of Managed Care Pharmacy's (2010) also stated that these errors may include errors of commission such as dispensing the wrong drug, wrong dose or an incorrect entry into the computer system) and those of omission (e.g. failure to counsel the patient, screen for interactions or ambiguous language on a label). Between these two faults, it can be intercept from the beginning however, if it related to medication administration, it cannot be intercept once it had been administered to patient.

2.5 Medication Administration Errors (MAEs)

According to Divya et al. (2014), nursing staff is considered as essential in medication administration process and as the last link in the drug therapy chain where an error can reach the patient. In general, medication administration is an increasingly complex process as it related with the number of medications on the market, the number of medications prescribed for each patient, and the numerous policies and procedures created for their administration (Garrett & Craig, 2009) to ensure patient safety guaranteed. Chua, Tea, and Rahman (2009) concluded that administration error is an inconsistency between the drug given to the patient by the health care professionals as followed to standard hospital policies and procedures.

In addition, administration error defined by Divya et al. in 2014 as any deviation from the physician's medication order as written on patient's treatment chart during medication administration to patient and the plan for administering a drug begins with identifying the patient, drug, dose, route, and time. In the medication-use process, this phase of medication administration is frequently referred as the "sharp edge" as it will directly lead to patient receiving the medication in error due to errors may intercept at the prescribing, dispensing or transcribing phase (Shane, 2009). There are more chances for error during medicine administration than during the prescribing and dispensing stages of medicine use (National Patient Safety Agency, 2007).

The higher the incidence of medication administration errors occur will result in higher probability of morbidity of the patients as in many studies showed that the frequency of medication administration errors ranges from 14 to 59%. This statement is supported by Divya et al. (2014) as they revealed administration errors are one of the most frequent types of medication errors affecting around 5% of all administered doses and their study indicated frequency of MAEs was calculated as 26.87%. Furthermore, in

the United Kingdom, National Patient Safety Agency (NPSA) verified that 56.5% of reported errors associated with severe harm or death occurred at the administration step and the most serious incidents were caused by errors in medicine administration which was 41% and, to a lesser extent, prescribing showed only 32% (National Patient Safety Agency, 2007).

In 2012, Mrayyan emphasized from the previous studies, the researchers reported that the error rate for drug prescription was at least 3% and about 19% in drug administration during admission of patients to the hospital. However, the literature on medication administration errors showed vary in definition, errors categories as well as methods and criteria, hence leaving the researcher with incomplete knowledge of the actual rate of medication administration errors.

2.5.1 Types of Medication Administration Errors (MAEs)

The types of medication administration errors are also different across the literature. In 1995, National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) classified administration errors into several types such as wrong drug, wrong route, wrong dose, wrong strength, wrong techniques, wrong patient, wrong timing of drug administration, contraindicated drug, wrong site, wrong dosage form, wrong infusion rate and expired medication (Divya, et al., 2014). Similarly, Chua et al. (2009) remarked that drug administration errors in this study were categorized into 11 categories, which are incorrect time, incorrect administration technique, unauthorized or unordered drug, incorrect drug preparation, incorrect dose, omission, incorrect rate, incorrect drug, deteriorated drug, extra dose and other errors which were not specified. However, according to Youssif et al. (2013), among 126 nursing administration errors, the majority of errors were associated with wrong dose, wrong technique, and wrong drug.

2.6 Factors Contributing to Medication Administration Errors (MAEs).

A standard medication procedure and standard time table for administering medication to the patients are the keys for successful medical care. There are numerous factors were identified in the literatures as the responsible for factors of the error in the process of routine medication administration. According to Shane (2009), administration of wrong medication, dose, dosage form, route, rate, as well as frequency are the examples of factors contributing the errors that due to misinterpretation, ambiguity, or lack of knowledge or misunderstanding of elements of the medication order sentence. Most studies had identified internal and external factors of nurses may contribute to the occurrence of medication administration errors. However, review and evaluation of this literature makes it clear that identifying causes is extremely complicated due to the many variables identified.

2.6.1 External and Internal Factors

External administration-related factors are the causes to medication administration errors which are the unclear usage of policies, unclear protocols and guidance, context and organisation of care in health care system (Tsang, 2013). Karavasilidou and Athanasakis (2014) stated these factors more direct on the interpretation of a number of healthcare systems factors such as working environment and organizational factors with their relationship and correlation on medication administration errors. The subcategories of this factor include interruptions/distractions, heavy workload, high nurse-patient ratio, new staff and medication related topics (poor labelling and similar names). Furthermore, some other studies listed important external related factors contributing to medication administration errors such as lack of knowledge, abuse in protocols, stress as well as problems with handover process.

Some researchers ascertained that the commonest cause of medication administration errors (MAEs), as highlighted in their study, was the appalling hand-writing of the doctors making it difficult to understand the prescription, which in turn was attributed to the heavy workload they bear (Jaykare et al., 2007). In 2008, Hughes and Blegen verified that from 583 causes, 469 deaths were classified as miscommunication, name confusion, similar or misleading in labelling, human factor (lack in knowledge and performance), and inappropriate packaging or device design and human factors showed a total of 65.2% and followed by miscommunication was 15.8%. The results in a study done by Aboshaiqah in 2014, provided evidence that the communication with physician, nurses staffing and lack of knowledge about new medication are the notable factors that lead to medication administration errors at Saudi health care settings.

However, in the present study done by You, Choe, Park, Son, and Kim (2015), nurses believed that the most common factor for medication administration errors was inadequate number of staff nurses at each working shift as this study verified that nurse-staffing adequacy was correlated with medication errors. A study conducted by Divya et al. (2014) proved that many international literature findings states that performance deficit, poor calculation competency, poor adherence to protocols, poor knowledge of medications and of the nurses are the main factors for medication administration errors.

In the context of internal administration–related errors, it more focuses in an individual to cause medication administration errors due to poor knowledge and concentration, heavy work load, miscommunication, lack of understanding of errors and others. These were supported by Abu Bakar et al. (2014) as common errors done by nurses include were wrong-patient, wrong dosage, wrong-time and wrong-calculations. According to Karavasiliadou and Athanasakis (2014), the subcategories of the internal

factors that lead to medication administration errors are miscommunication, medication package labelling misreading, non-adherence of the proper guidelines of medication preparation, personal neglect, difficulty in equipment devices, physical exhaustion as well as difficulty with physicians' prescription (illegible handwriting and unclear verbal orders).

Medication administration errors happened when human and system factors interact with the complex process of administration of medication to create unintended and potentially harmful consequences. A review done by Karavasiliadou and Athanasakis (2014), it is evident that both individual and organizational factors responsible for almost the same to the medication administration errors incident. A study done by Divya et al. (2014) acknowledge for the related causes for administration errors include inadequate staffing (19%), lack of training (17%), lack of communication between health care professionals (9%), and high noise level (2%) and others (11%) while leading factors responsible for medication administration errors were recognized as knowledge and performance deficit (57.70%) which is more than half of the total, stress (15.83%) and remaining contains the other factors.

In the context of route of administration medication, it also may give effect on the patients' safety. From the present study done by You et al. (2015), the most common non-intravenous and intravenous related medication administration errors included administering the drugs to the wrong patient, followed by incorrect medication doses and rates as well as incorrect choices of medication. Chua et al. (2009) also point out that IV drug administration is significantly more highly to be associated with medication administration errors than the oral routes (21.3% and 7.9%).

Referring to these factors, nurses should give valuable perception in explaining how these factors may use to analyse the administration errors in the health care

settings. Therefore, these factors regardless of either external or and internal should be give more attention by healthcare professionals to overcome the impact of medication administration errors such as potential of mortality, morbidity and health care costs.

2.7 Guideline to Prevent Medication Administration Errors (MAEs).

Medication administration constitutes most of the nurses' daily work and they have to face a complex mixture of demands related to administering medication as it need to be completed within their shift work. As it is an important aspect, nurses are uniquely positioned to intercept medication administration errors as well as to promote a positive patient outcome. Kim and Bates (2012) stated that administration of medication included oral, intramuscular injection and intravenous (IV), by the nurses from verbal or written order by physicians in a health care setting. Harris (2011) points out that the original and golden standard for medication administration is that nurses must compliance with the right patient, the right drug, the right dose, the right time and the right route.

In order to ensure adequate medication administration and intercept errors, the medication administration process provides a basic standard for safe medication practice generally known as "five rights" principle which includes right patient, medication, dose, route, and time (Pirinen et al., 2015). Tsang (2013) emphasized that nurses must always aware the importance of the checking principle to achieve these "five rights" which are right drug in the right dose must be administered to the right patient by the right route at the right time. This principle must be maintained whenever the medication administration procedure is performed.

In contrast, Krucik (2013) explained that before any medication given either via intravenous or non-intravenous, a health care professional must follow the six "rights" of medication administration such as the right patient with the right medication at the

right dose and right time by the right route and following up with the right documentation. While, Bonsall (2011) added that some experts have included three more to the well-known five "rights" of medication administration, which are right documentation, right reason and right response.

On the contrary, Elliott and Liu (2013) claimed that seven rights include the five rights plus right response and right documentation have been proposed, but errors still occur and due to this, the authors propose the nine rights of medication administration which added the right form and right action. Meanwhile, Brady (2013) stated that medication administration errors can be minimize by adhering to ten rights as it added from six rights include right assessment, right education, right evaluation and right to refuse medication.

Therefore, according to Harris (2011), throughout time the "rights" have evolved and in the present literature it is ambiguous as which of the "rights" are considered standard due to there is no national or international consensus.

2.8 Theoretical and Conceptual Framework

2.8.1 Theoretical framework

The Accident Causation Model or known as "Swiss Cheese Model" originally proposed by James Reason was used for this study. He propounded this model as a theoretical framework to explain how errors occur within systems and it focuses on both organisational hierarchy as well as human errors (Reason, 2000). The model suggested that a typical accident can happen due to several human errors that occurred in the organizational hierarchy in a way that made such accident unavoidable.

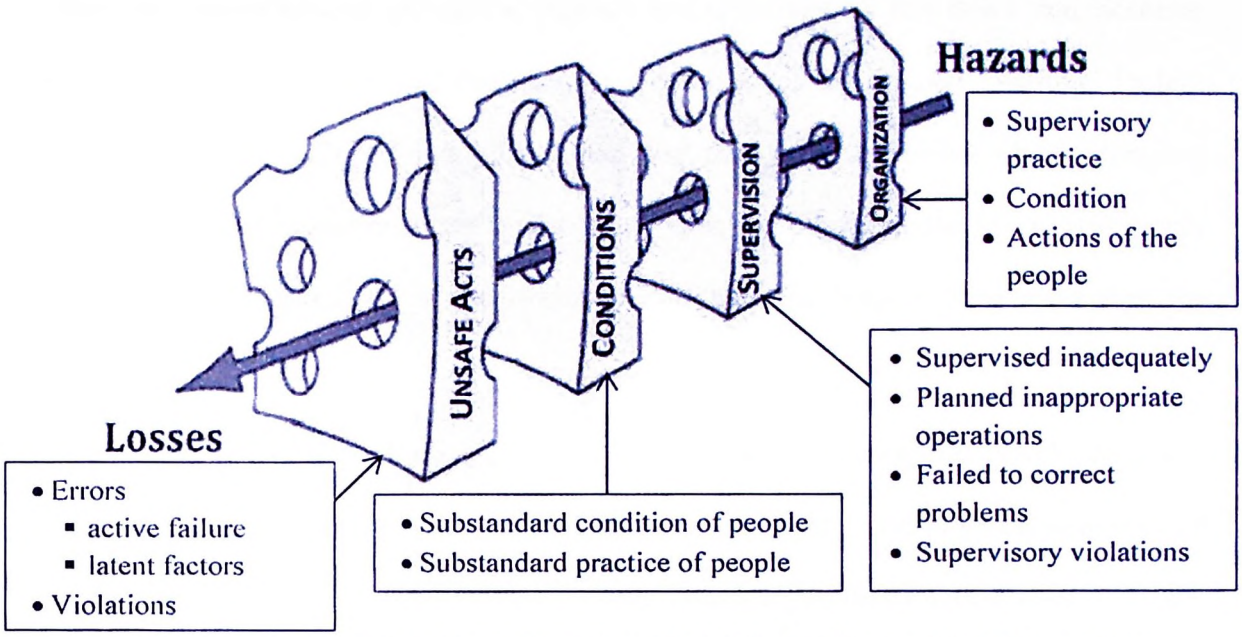

Figure 2.1 Theory of Accident Causation Model (Swiss Cheese Model) from James Reason (Cited in: Ducut, 2011)

According to Reason (2000), the model has four different slices of cheese that represent the layers of defences or safeguards. The four different slices of cheese are unsafe acts, condition, supervision, and organization. Reason hypnotized that the most errors can be discover to one or more of four failure domains such as specific unsafe acts, preconditions of unsafe acts, supervision, and organizational influences within the major layers of a system (Reason, 2000).

Unsafe acts consisted of two types which are errors and violations. While, conditions such as substandard condition of people and substandard practice of people may cause to the errors. For the supervision slice, it contained of supervised inadequately, planned inappropriate operations, failed to correct problems and supervisory violations. The organization slice consisted of supervisory practice, condition, and actions of the people.

The system as a whole creates errors when the holes in all the slices align, which permit 'a trajectory of accident opportunity' and lead to an accident to be occurred. The

inevitable imperfections an all the barriers are perceived as the holes and accident occurs when through from of circumstances of all holes are aligned (National Patient Safety Agency, 2002). Ducut (2011) also add that there are holes which represent opportunities for failure as it can lead to error when these holes in the layer are aligned, while each slice is a layer of the system which can perceived as chances to stop the error.

For the specific unsafe acts, it can classify into two categories which are errors and violations. The errors are generally represent the mental and physical activities of an individual that fail to achieve their desired outcome, while violation refer to wilful disregard for the rules and regulations that established by the organizational. Reason explained that errors resulted from two reasons which are active failures and latent condition (Moyen, Camiré, & Stelfox, 2008). Angheluta (2010) stated that the literature describes two types of errors: active errors caused by errors or procedural violations and latent errors, which do not produce a direct effect in themselves, until certain conditions are met locally or active mistakes are made, finally causing an accident. Active failures are unsafe acts that take variety of forms such as slips, mistakes, and lapses. Latent conditions arises primarily from decisions at a higher organizational level which may be limited by inadequate regulatory or financial constraints, however they do not immediately lead to accidents, instead they lie passively for long periods of time and revealed on when they combine with active failures to cause accidents (Keers, Williams, Cooke, & Ashcroft, 2015).

Precondition of unsafe acts can be categorized into two categories which are substandard conditions people and substandard practices of people. Ducut (2011) explained that substandard conditions of people closely related to adversely mentality or mental states such as stress, personality traits, adverse physiology and physical/ mental

limitations. While, substandard practice of people involves the human resource management and personal readiness.

Unsafe supervision can be divided into four areas, which are supervised inadequately, planned inappropriate operations, failed to correct problems and supervisory violations. When people supervised inadequately, there is a general failure as it hinders the opportunity to succeed. Planned inappropriate operation occurred when personnel are generally put an unacceptable risks, such as improper pairing of team while unsafe condition will be continue unabated if a supervisor failed to correct the problem(s). Lastly, violations of supervisor arise when there is mismanagement of the assets, resulted an accident of events by people those who under supervision. The absence of the supervisors can be categorized as possible unsafe supervision and the organization may have unknowingly contributed to the accident by having ambiguous supervision rules, lack of policy and lack of safety culture (Mohamed & Ideris, 2012).

Organizational influences are the fallible decisions of upper-management that directly affects supervisory practices, conditions, and actions of people, which encompass resources management, organizational climate and organizational process (Ducut, 2011).

2.8.2 Conceptual Framework

The study framework of this research will be based on Reason's model of accident causation. It consists of four domains which are organization, supervision, conditions, and unsafe acts. For the first domain, it begins with organization such as written policy and guideline of medication administration, the conditions of the wards and others. The second domain which is supervision such as proper supervision from high authority (ex: sister) and fail to correct any problems regarding the medication administration practices. While, for third domain is conditions that may lead to unsafe

acts such as age, working years, substandard practice, genders, types of wards discipline (medical and surgical based wards). Lastly, the last domain is unsafe act which can directly cause the errors such as knowledge of medication administration process and adherence to guidelines.

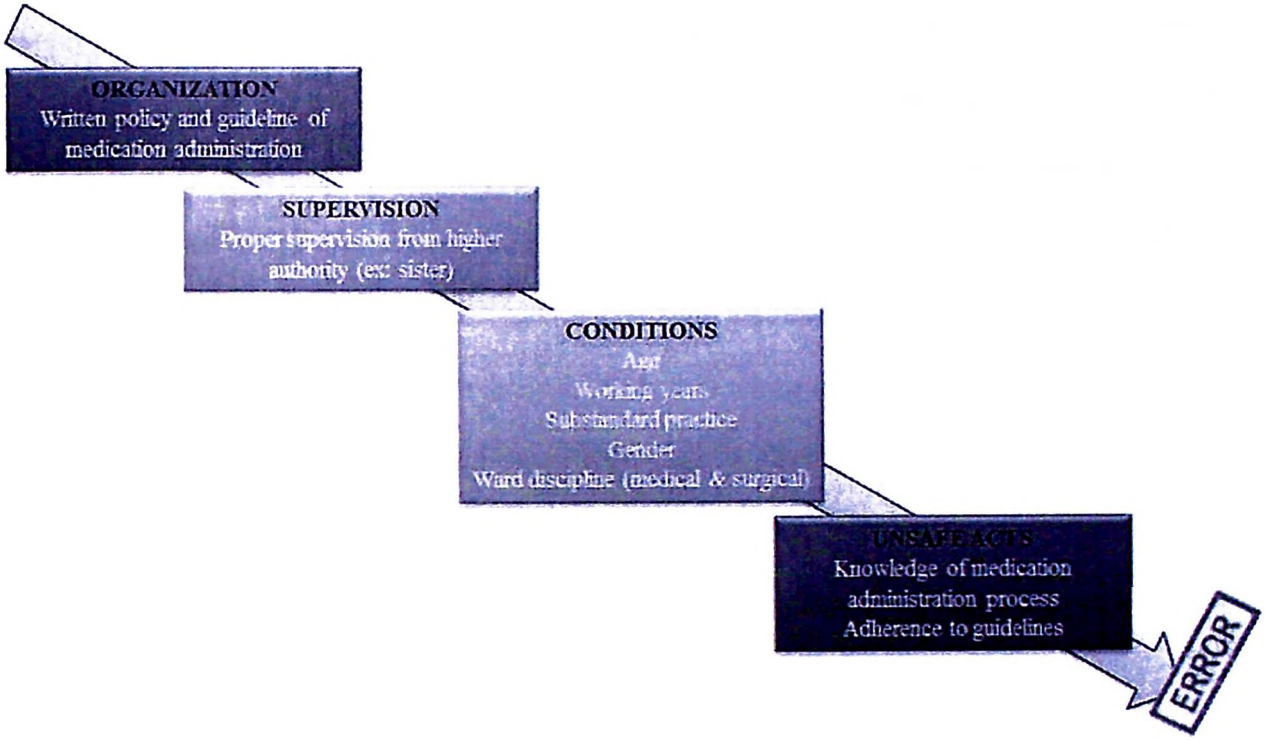

Figure 2.2 Conceptual Framework to study the Perceptions Regarding Medication Administration Errors Adapted from Theory of Accident Causation Model (Swiss Cheese Model) by James Reason (2011)

The first domain begins with the organizational domain in the original model. Inside this domain, the factors that play crucial role are written policy and guideline of medication administration. These are latent factors which are resident pathogens within the system, thus affecting the rate at which nurses carry out the active failures and the risks associated with it. In second domain, involvement of supervision such as proper supervision from high authority (ex: ward sister) and fail to correct any problems regarding the medication administration practices. The factors that are mention earlier will add up to the failures that occur in the first domain. This is because the second

domain also contributes to the latent factors. Medication administration errors may occurred when supervision by high authority to the nurses are lacking which make them susceptible to commit mistakes without them knowing about it.

For the third domain, condition is the precondition of unsafe acts committed by persons who perform their duty directly contact with the patient. Within this study framework, substandard conditions of the nurses, such as genders, age, and working in years and substandard practice of people involves the condition of the ward discipline may lead to the medication administration errors. The last domain is unsafe acts, which are the last factors on before the occurrence of the medication administration errors. The unsafe acts are included knowledge of medication administration process and adherence to guidelines. A nurse has a right idea but performs the wrong execution and may lead to medication administration errors to be occurred. Adherence to guideline may intercept the errors to be occurred, thus with the interception within the domain, the outcome will be different as the medication administration errors can be avoided. But, when a combination of all these four domains occurs, direct impact of medication administration errors on the patient cannot be intercept and patient safety incident will be occurs.

2.9 Summary

In summary, this purpose of this chapter was to examine the literature on prevalence, types and factors as well as the guidelines of medication administration errors and the frameworks. Since 2000, when IOM report was issued, many changes are currently taking place in the health care settings, specifically in the context of medication for the patients. Due to that, the National Patient Safety Goals are now with several of the goals dealing specifically with safer medication administration practices. From these findings, several solutions can be designed and implemented as to overcome