

**MEDICATION ERRORS INVOLVING GERIATRIC PATIENTS, PERCEIVED
CAUSES AND REPORTING BEHAVIOURS BY NURSES**

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Abstract

Background: Drug administration is a main duty of a nurse's clinical role. It involves great risk in patients' lives and can potentially cause great harm. Despite many safeguards, preventable medication errors still occur. The aim of this descriptive quantitative study is to explore geriatric nurses' perceptions of medication errors, perceived causes and their reporting behaviours.

Methods: A self-report standardized survey was used to collect data from a purpose sample of nurses (n=17) working on geriatric wards at the Montfort hospital located in the province of Ontario. Data entry and analysis were done by using Statistical Package for the Social Sciences (SPSS) version 12 and presented using frequencies, number and percentage.

Results: The most frequently identified causes of medication errors were failure to check patient's name band with the patient's medication administration record (MAR), nurses' tiredness, illegible physician handwriting, and nurses' miscalculations of medication doses. In general, nurses were usually sure of constitutes a medication error and when to report it. However, only 30% of errors were perceived by nurses to be reported to the nurse manager. More than half (64.7%) of participants perceived that, some errors are not reported because nurses are afraid of the reaction they will receive from the nurse manager and the majority of them will notify the physician than to complete an incident report.

Conclusion: Recognizing a medication error is the first step to reduce report and eliminate them, especially in acute care settings. Finding suggests that nurses need more educational re-enforcement as to various issues related to medication errors, particularly defining and reporting these errors. Furthermore, the introduction of hospital policies and the development of structured protocols on drug administration may decrease medication errors. The hospital administration system needs to stress the importance of reporting errors and adopt a non-punitive approach to safeguard patient safety.

Keywords: [Drug Administration, Medication Errors, Malpractice, Nursing, Perceptions and Reporting Behaviours]

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List of Abbreviations

AE	Adverse Events
ADE	Adverse Drug Events
IR	Incident Report
IOM	Institute of Medicine
ISMP	Institute for Safe Medication Practices
IV	Intravenous
LOS	Length of Stay
MAR	Medication Administration Record
MEs	Medication errors
mg	Milligram
ml	Milliliter
ml/hr	Milliliter Per Hour
N	Number
NCC MERP Prevention	National Coordinating Council – Medication Error Reporting and Prevention
REB	Research Ethics Board
USP	United States Pharmacopeia

1 Introduction

Patient safety, defined as the reduction and mitigation of unsafe acts within health care systems (Davies, Hebert & Hoffman, 2003), became an important issue in healthcare, particularly after the publication of the 2000 Institute of Medicine (IOM) report entitled, *To Err Is Human: Building a Safer Health System*. This report determined that between 44,000 and 98,000 people die annually in the United States due to preventable medical errors. Prior to this report in 1993, medication errors were estimated to have accounted for only 7,000 patient deaths per year (Phillips, Christianfield & Glynn, 1998). A similar study of adverse events (AEs) in Canadian hospitals conducted by Baker et al. (2004) estimated an annual rate of 9,000 to 24,000 deaths due to preventable medical errors with medication (drug- or fluid-related) errors being the second leading cause of these errors.

1.1 Prevalence

According to the Harvard Medical Practice (1997), MEs, defined as an injury resulting from medical intervention related to a drug, were the single most frequent cause of all types of adverse events (AE) accounting for 19.4% of all disabling adverse events (Leape et al., 1991,1995; Brennan et al., 1991). Specifically, Bates et al. (1995) reported that 2 to 14% of patients experienced at least one medication error during hospitalization, which is equivalent to 0.3 errors per patient-day. A 1997 analysis by Lesar, Briceland, and Stein of nearly 300,000 medication prescriptions written during one year in a teaching hospital, the overall error rate was estimated to be 3.13 errors per 1,000 prescriptions, with the rate of significant errors to be 1.81 per 1000 prescriptions. More recently, the Institute of Medicine (2006) reported that at least one medication error occurs every day for every hospitalized patient, implying that the error rate has not fallen over the last decade.

The frequency of medication errors has been found to be the highest at patient care transition points. Transition points include: admission to the hospital, transfer from one unit to another, change in the caregiver responsible for a patient, and during discharge to the home or another facility. These errors are most frequently related to incomplete or inaccurate medical information (Rosich & Resar, 2003). Pronovost et al. (2003) estimated the medication error rate at transition points to be 46% of all errors. In the case of medication administration errors committed by nurses, one observational study found that one of every five doses administered by nurses was in error (Barker et al., 2002).

1.2 Costs

Although most errors do not result in harm to patients, the ones that do are can be very costly (IOM, 2000). According to IOM (2006) adverse drug events (ADE) in all health care settings harm approximately 1.5 million people in the US, costing \$3.5 billion annually (IOM, 2006). For hospital settings, one study demonstrated that an extra cost of \$5,857 per patient in inpatient care was due to ADEs (Field et al., 2005). For ambulatory setting, another study (Field et al., 2005) concluded that 1000 older adults would have an additional annual costs related to ADEs in the ambulatory setting of \$65,631 For long-term care, Gurwitz and colleagues (2005) projected an annual incidence of 800,000 preventable ADEs. However, there is no estimate of the associated health care costs for this group of preventable ADEs.

Besides increased hospital costs, MEs can be psychologically devastating to the nurse. It can harm the nurse's professional and personal status, confidence, and practice (O'Shea, 1999). Nurses experience many negative feelings as a result of their mistake. Some authors report that the most common ones are related to guilt, horror, terror, concern about effects for the patient, loss of confidence in one's ability, anger, victim of circumstances and anger about oneself (Gladstone, 1995).

1.3 Interceptions of Medication Errors

Medication errors in hospital settings occur at every step of the five-step medication process, however errors most frequently occur during the prescribing and administration steps (IOM, 2006). This study focuses on the last two steps, as this is nurses' main duty at the hospital.

1. Medication prescribing by physician, nurse practitioner, and/or pharmacist. This step usually involves clinical decision-making, drug choice, drug regimen determination, medical record documentation and medication order prescribing.
2. Medication transcribing involving checking medication prescription on the Medication Administration Record (MAR) for correctness by nurse, pharmacist and unit clerk with a supervision (co-signature) of registered nurse or pharmacist.
3. Medication preparing and dispensing by pharmacist. This step usually requires medication data entry and screening, preparing, mixing, compounding, followed by a second check and dispensing to the unit.
4. Medication administering by nurse. This step usually consists of drug preparation for administration, order-patient verification, drug administration, and finally MAR documentation. This step requires the nurses to follow the five rights ("5Rs") of medication delivery system (right patient, right medication, right dose, right route, and right time).
5. Medication monitoring including therapeutic effects and adverse drug events (ADEs), review of laboratory results if necessary, treatment of ADEs and MAR documentation.

All medication errors need to be eliminated to assure patient safety in health care. The first step in avoiding MEs is gaining a greater understanding of the types MEs and their

underlying causes, before reaching the patient. According to Pape (2001), there is a need to identify all causes of medication errors by asking nurses what they perceive as the causes of these errors, what they believe constitutes an error because there is inconsistency, and to determine what risk factors contribute most to medication errors. Because of the core role of nurses in the medication administration process, they are key links to identifying errors (Pape, 2001). Nurses' knowledge, along with the intimate relationships they establish with their patients (Balas, Scott, & Rogers, 2004), puts them in an excellent position to identify and intercept these potential errors (Leape et al., 1995).

Reporting of errors by health care professionals is of paramount importance for improving patient safety (Weiner, Hobgood, & Lewis, 2008). Traditional mechanisms of error reporting consist of verbal reports and paper-based incident reports in order to detect and document clinically significant medical errors. The quality of design of these incident reports is dependent upon individual healthcare facilities. A sophisticated design will emphasize on how and what information is collected, and will use the information for investigating specific errors to understand the nature and magnitude of the problem (Ferner, 2006). Also, these reporting system must meet the needs of those who be accessing them (Evans et al., 2007). The analysis of reported incidents and their root causes can generate useful information on system problems while also increasing front line staff awareness of safety issues in the delivery of care (Benn et al., 2009; Evans et al., 2007; Weiner et al., 2008).

Studies have found nurses habitually report incidents and are more likely to access formal incident reporting systems than physicians (Jeffe et al., 2004; Kingston et al., 2004). Drug administration, defined as preparing, giving, and evaluating effectiveness of prescription and non-prescription medications (Bulecheck et al., 2008), is a main duty of a nurse's clinical role. It involves great risk in patients' lives and despite many safeguards medication errors can occur.

Consequently, nurses are obligated by hospital policies to report MEs through incident reporting system in the hospital. Nurses have been studied in the literature on incident reporting yet little is known about incident reporting in various practice contexts.

There is limited knowledge about nurses' perceptions of MEs and reporting behaviour within the specific practice context of geriatric nursing. Geriatric nurses are those nurses who provide care to aged (65 years and older) individuals. These nurses practice in various settings, such as hospital nursing units, long-term care facilities, rehabilitation centers and retirement communities. The Canadian Nurses Association (CNA) (2007) discloses there are 26,044 nurses employed in geriatric areas of practice; the majority (75 %) works in long-term care facilities and nursing homes. The average age of such nurses is 46.4 years and 91.17% are female. Over 10% of geriatric nurses are employed in hospitals as staff nurses. Most of these nurses (75.4%) have achieved a diploma as the highest level of education, while 23.1% hold a baccalaureate degree, with the remaining 1.4% holding Master's or Doctoral degrees. There is no existing literature to date on medication errors and incident reporting by nurses working in gerontology. In order to improve the safety of geriatric patients through improved incident reporting it is important to gain an understanding of the perceptions of medication errors, causes and reporting behaviours of geriatric nurses.

1.4 Significance of the Problem

Although several studies have revealed common themes regarding nurses' views of MEs, they have also demonstrated that confusion exists regarding what constitutes a medication error. Understanding the epidemiology of MEs, that is, the type of medication errors and where they originate is essential to reducing them and improving the safety of our health care system (Leape, 2002; Baker et al., 2004). Agreement among studies does exist, however, regarding nurses' views on reporting medication errors. These studies have demonstrated that under

reporting of medication error is of common occurrence amongst nurses (Gladstone, 1995; Osborne, Blais & Hayes, 1999; Wakefield, 1996). The failure to report leads to a lack of accurate data on the number of errors that have occurred and the contributing factors to errors (Uribe, et al., 2002). While various areas of nursing practice in acute care settings have been studied in regards to nurses' perceptions of medication errors, causes, and incident reporting practices, geriatric nursing practice in geriatrics has not. There is no literature to date exploring geriatric nurses' perceptions of MEs, perceived causes and reporting behaviour.

Geriatric nurses are of particular interest, because patients involved in their care have the highest rate of death from medication errors (Phillips et al., 2001) in this area of practice. Though some studies have not found a link between age and medication errors, in general, the elderly have more ADEs than other age groups because they consume the greatest quantity of medications and their exposure to a greater number of medications provides more opportunities for medication errors and drug-drug interactions (Phillips et al., 2001). Since the elderly population continues to increase in number, the number MEs and ADEs may also continue to increase (Leape et al., 1991). Gaining an understanding of geriatric nurses' perceptions regarding MEs, causes and their reporting practices, is important to identify causes of MEs and factors that affect incident reporting for this population of nurses (Fraser & Rubin, 2007; Leape, 2002; Miller, 2003; Pape, 2001). Increased knowledge will ultimately lead to the development of safer geriatric nursing units, which will benefit both the care of patients and the practice of geriatric nursing.

1.5 Problem Identification

There have been no published research studies involving geriatric nurses in relation to perceptions of MEs, perceived causes and reporting behaviour. Knowledge is also needed about MEs and incident reporting in unique practice contexts because it has been shown in the

literature that contextual factors do impact incident reporting (Leape, 2002). The purpose of this study is to gain a greater understanding of geriatric nurses' perceptions of medication errors, their causes of and their reporting practices. Understanding their perspective is important to improve reporting rates and ultimately improve the safety of geriatric care. In addition, the findings will add to the literature on perceptions of MEs and incident reporting by nurses by providing new information about a population that has yet to be studied.

1.6 Statement of Purpose

The main purpose of this study is to explore nurse's perceptions regarding medication errors involving geriatric patients, their perceived causes and their reporting behaviors.

1.7 Research Questions

This study specifically aims to answer these following questions:

1. What are nurses' perceptions of the causes of medication errors?
2. Which scenarios do nurses perceive as having had a medication error occur and whether or not that error needs to be reported to the physician and/or nurse manager?
3. What are nurses' views about reporting medication errors?

2 Review Of Literature

2.1 Definitions of Medication Errors

There are various definitions of a medication error across the literature (Armitage & Knapman, 2003; O'Shea, 1999). One of the earliest definitions was by Barker and McConnell (1962):

The administration of the wrong medication, drug, diagnostic agent, chemical or requiring the use of such agents, to the wrong patient or at the wrong time or failure to administer such agents at the specified time or in the manner prescribed or normally considered as accepted practice (p.361).

The aforementioned definition did not take into account errors made during the original prescription.

More than two decades later, Wolf (1989) described a more inclusive definition of medication errors. Medication errors are “mistakes associated with drugs and IV solutions that are made during the prescription, transcription, dispensing, and administration phases of drug preparation and distribution” (p. 8). Likewise, Bates et al. (1995) defined medication error as an error in the process of ordering or delivering a medication, regardless of whether an injury occurred or the potential for injury was present. Both of these definitions encompassed all stages of medication errors occurring from prescribing to administration.

The more widely accepted definition of a medication error, however, was that by National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) (1997):

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 healthcare professional, patient, or consumer. Such events may be related to professional practice,

healthcare products, procedures, and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; administration; education; monitoring; and use.

For the current study the aforementioned definition will be used for the term medication error, as it is most comprehensive.

2.2 Classifications of Medication Errors

Along with the definition of medication errors, categories of medication errors also vary across the literature. A psychological approach to MEs can be divided into two main categories: mistakes, and skill-based errors such as slips and lapses (Ferner & Aronson, 2006; Betz & Levy, 1985; Reason, 1995). Mistakes happen when an error is made in the planned action. It may be due to lack of knowledge (knowledge-based errors), due to misapplication of a good rule, or application of a bad rule (rule-based error). For example, a knowledge-based error occurs, when a doctor prescribes the wrong dose of a drug due to unfamiliarity. An example of a rule-based error is when a penicillin related drug is prescribed to a patient with a known drug allergy to penicillin, despite a system warning. On the other hand, skill based errors are committed when executing correctly planned actions. A skill-based error could be a slip (action-based) where, for example, a pharmacy technician intends to dispense amoxicillin but picks the wrong bottle and dispenses ampicillin instead. It could also be a lapse (memory-based) where for example; a nurse intends, but forgets to administer the evening dose of a drug to a patient.

Medication errors are also classified according to the stage in the medication use process in which they occur. The most common categories in this classification are; prescribing, dispensing and drug administration errors (Betz & Levy, 1985, Ferner & Aronson, 2006). Some further subdivide each category to more specific groups, such as wrong drug, wrong dose, wrong frequency, wrong route and wrong patient (Ferner & Aronson, 2006).

Another important way of classifying a ME is by the severity or harm caused by the error. The NCC MERP (1998) introduced the most widely used severity scoring system for medication errors. It categorized MEs from A – I, where for example, a category C is an error that occurred and reached the patient but did not cause any harm, while a category G is an error that occurred and needed interventions necessary to sustain life (NCC MERP, 1998).

2.3 Nurses' Perceptions of Medication Errors

Drug administration forms a major part of the clinical nurse's role. As such, it is vital to explore nurses' perceptions of what constitutes a medication error, why it occurs and when it should be reported. While several studies have identified common themes regarding nurses' views of MEs, there is disagreement in what constitutes or qualifies as a medication error (Balas, Scott, & Rogers, 2004; Hackel, Butt, & Banister, 1996; Gladstone, 1995).

Hackel et al. (1996) conducted a study seeking to pinpoint what constitutes a medication error according to 400 nurses from an urban community hospital. Respondents (n=146) were requested to select what they considered to be medication errors from ten items. All of the items were considered to be medication errors according to current nursing textbooks. Results showed nurses viewed medication errors differently from the current literature. The majority of nurses agreed that wrong medication (97%), wrong time (78%), wrong patient (97%), wrong dose (97%), wrong route (94%), and erroneous omission (88%) constituted medication errors, while a much lower percentage of the same nurses identified assessment of needs (23%), effect not documented (30%), omission not documented (47%), and teaching not documented (27%) as medication errors. Nurses also identified that the hospital did not have guidelines specifying what constitutes a medication error.

In a study by Balas, Scott, and Rogers (2004), a major aim of the researchers was to describe the nature and prevalence of all errors (procedural, transcription, charting, failure to

prevent injury, and medication) and near errors reported by hospital nurses. Participants (n=393) kept logbooks for a two week period and were asked to complete a maximum of 40 questions per day when working, and 17 questions on non-work days. On workdays, nurse participants were asked, “Did you make any medication or other errors today?” and “Did you catch yourself before you were about to make an error today?” If nurses responded yes to these questions, they were asked to describe the incident. The findings indicated that the majority of nurse (58%-59%) reported MEs and near misses. Approximately 34% of the actual errors were due to late administration, because of high patient acuity and heavy workloads. Other errors included 24% due to a wrong dose, 17% wrong medication, 16% due to omission of a medication, 8% to the wrong patient, and 2% by the wrong medication route. Nurses described frequent interruptions and distractions while preparing medications, as well as lack of communication between health care providers as contributing factors in making a medication error. Balas et al. (2004) also concluded that nurses would report errors when they felt safe, when the reporting system was not cumbersome, and the nurses’ identity was kept confidential.

A revolutionary study by Gladstone (1995) sought to identify common themes contributing to the occurrence and reporting of medication errors in a district general hospital in England. This study was conducted in three sections: a) a review of incident reports (n= 79) completed by nurses b) an analysis of questionnaire surveys completed by nurses (n=81) and c) an analysis of a different questionnaire completed by nurse managers (n=17) and 14 nurses who had made a medication error volunteered to be interviewed. A review of the incident reports showed that over 50% of the medication errors were dose related: 18% were incorrect infusion rates of intravenous fluid (IV), 17% were non-prescribed/extra dose, 11% were incorrect doses, and 6% were omitted doses. Questionnaire participants were asked to rank ten statements about the

causes of medication errors in order of perceived frequency. The four highest ranked statements by the nurses included:

1. Drug errors occur when the nurse fails to check the patient's name band with the prescription chart.
2. Drug errors occur when the doctor's writing on the prescription chart is difficult to read or illegible.
3. Drug errors occur when nurses are distracted by other patients/events on the ward.
4. Drug errors occur when a nurse miscalculates the dose.

Although, nurse managers agreed with the first three ranked statements by the nurses, they differed on their fourth ranked statement. Their fourth ranked statement included errors being made when the nurse sets up or adjusts an infusion device incorrectly. In addition, nurses were asked to evaluate four scenarios to decide whether or not a medication error had been made. Findings revealed two major areas of concern. First, confusion existed among nurses regarding the definition of medication errors, when such errors should be reported to the physician, and when they should be reported to the nurse manager. The majority (63%) of the nurses were not sure as to what constituted a medication error or when errors should be reported. Second, due to fear of management reaction, 74% of the nurses identified they did not report medication errors. Finally, interviews with the nurses who had made an error identified perceived contributing factors to the mistake. The following four contributing factors were identified as the most prevalent: workload, poor skill mix, interruptions, and loss of concentration.

Likewise, several researchers have also demonstrated that nurses continue to disagree about what constitutes a medication error, while utilizing the survey designed by Gladstone (1995) with modifications. For example, Osborne et al. (1999) study revealed the two major causes of medication errors as identified by nurses were failure to identify the patient's name-band with

the MAR and when nurses are tired and exhausted. Also, 84% of the nurses felt they were usually sure of what constitutes a medication error, 86% reported they knew when an incident report (IR) should be completed, 84% felt medication errors were not reported because nurses were afraid, and 58% did not report medication errors if they did not consider the mistake to be serious. Lastly, 25% identified they had failed to report a medication error because they were afraid of repercussions (Osborne et al., 1999).

Another example is Mayo and Duncan (2004) who aimed to explore nurses' perceptions of medication errors using the modified Gladstone questionnaire. The highest ranked factors underlying medication errors were:

1. Physicians' writing is difficult to read.
2. Nurses are distracted by patients, coworkers or events.
3. Nurses are tired and exhausted.

Though the nurses in this study highly disagreed about what defines a medication error, 93% felt they were usually sure what constituted an error and when to report an error (91%). In addition, nurses were asked their perception of the percentage of MEs reported to the nurse manager using a written IR. Only 46% of the nurses believed that all medication errors were reported using a formal IR. Nurses indicated that being afraid of managers (77%) and coworkers reactions (61%), and not considering an error was serious enough (53%) were reasons for under-reporting errors. Most of the nurses (80%) did not fear losing their job due to an error (Mayo & Duncan, 2004).

A 1999 analysis by Wakefield, Wakefield, Uden-Holman and Blegan of individual statements by nurses and nurse managers of reasons why medication errors occur, demonstrated being interrupted while administering medications and doctor's orders not legible as the main perceived reasons of errors. Furthermore, nurse managers were more likely than staff nurses to

perceive individual factors as reasons for medication errors, ranking it second highest in importance as compared to staff nurses who ranked it fourth highest in importance (Wakefield et al., 1999).

2.4 Contributing factors to medical errors

A pioneering literature review by O'Shea (1999) identified ten factors contributing to medication errors: mathematical skills of nurses, knowledge of medications, length of nursing experience, length of nursing shifts, workload and staffing levels, nursing care and medication delivery systems, single nurse drug administration, adherence to policies and procedures, distractions and interruptions, and quality of prescriptions (O'Shea, 1999). A subsequent review utilized O'Shea's framework to expand upon and re-analyze contributory factors in drug errors (Armitage & Knapman, 2003)

In the following sections, the review of the literature will be organized around some of O'Shea's (1999) original review and Armitage and Knapman's (2003) expansion on O'Shea's review followed by a discussion of other and more recent research findings.

2.4.1 Mathematical Skills of Nurses

According to Bayne and Bindler (1988) basic math skills are a prerequisite to performing various nursing interventions, such as medication administration, regulation of intravenous therapy, calculating intake and output, along with conversion of temperature and weight scales. While various studies have focused on clarify the link between nurses' performance on mathematics tests and medication errors, the result have proven to be conflicting. Conti and Beare (1988) assessed the performance of nurses on drug calculation tests and subsequent errors, concluding that tests cannot be used as a reliable tool to screen for those nurses most likely to make a medication error. In contrast, Calliari (1995) study revealed that nurses who made medication errors were more likely to have failed a medication test. However, a subsequent

study was in agreement with Conti and Beare (1988), implying that the absence of a medication test did not significantly change reported medication error rates (Ludwig-Beymer et al., 1990). These researchers concluded a written test assessed the ability to pass the test versus assessing the ability of the nurses in a real world scenario (Ludwig-Beymer et al., 1990).

A study by Wright (2004), investigated nursing students learning styles and needs concerning mathematics. He concluded that while these students have various learning styles and needs, the majority were able to integrate the essential mathematical skills into their nursing practice by having different strategies that allowed them to develop their conceptual, mathematical, and practical skills in tandem, while increasing their confidence. The most commonly used strategies were a drug calculation workbook and a two-hour lecture. Other strategies utilized included online learning sessions and practice sessions in the skills laboratory with actual equipment (intravenous infusions, syringes, ampules). Students identified the least useful strategies as the initial questionnaire identifying their weaknesses at the beginning of the course and private study (Wright, 2004).

2.4.2 Knowledge of Medications

A nurse's main duty is to safely administer medications. As such, they must have substantial knowledge of the drug classification, physiological action, dosage, pertinent side effects, and parameters to be checked (e.g. blood pressure, heart rate, respiratory rate) prior to administration (O'Shea, 1999).

King's 2004 study exploring nurses' perceptions of their pharmacology educational needs revealed five major areas of needs for clinical practice. These included the need for knowledge in a) accurate medication administration, b) patient assessment, c) patient education, and d) prescribing. In addition, nurses were unhappy with the way pharmacology was taught; with nine out of ten participants feeling their basic nursing program did not spend enough time

on pharmacology education (king, 2004). The findings also suggest that there is a theory-practice gap causing a number of identified anxieties related to insufficient preparation (King, 2004).

Likewise Bullock and Manias (2002) surveyed pharmacology lecturers regarding their perceptions and experiences with undergraduate nursing students' pharmacology preparation from 12 Australian university campuses. Findings suggest these participants were unhappy with the preparation and knowledge base of the graduates. Plus, there was much discrepancy in the numbers of hours each institution devoted to pharmacology and where in the curriculum it was offered, which caused considerable variability in what student nurses experience in their undergraduate pharmacology education (Bullock & Manias, 2002).

2.4.3 Distractions and Interruptions

Nurses administer medication in continuously changing and chaotic environments, which puts them at a higher risk in making MEs (Potter al., 2005).

Potter et al. (2005) examined the cognitive work of nursing in the acute care setting and how environmental factors create disruptions that increase the risk for medical errors. The findings were that nurses practiced multitasking, on average walking from one location to another 13 times every hour, and performing approximately two activities before moving on to the next location. Also, nurses averaged nine cognitive shifts per hour, meaning each nurse was required to change focus from one patient to another about once every six to seven minutes. In addition, the researchers observed an average of 151 or (3.4 per hour). Interruptions occurred in the medication room (22%) during medication preparation. Some of these included staff questions, missing medications or administration supplies, phone calls or pagers alarming, with no attempt by the nurses to control interruptions during medication preparation. The majority of medication room in this research were in highly visible and located in high traffic areas. Finally,

this study also revealed the importance of identifying interventions to reduce or eliminate interruptions during the medication process and thereby reduces the risk of errors (Potter et al., 2005).

Another study by Cohen et al (2003) seeking to investigate nurses' perceptions of the reasons of MEs identified distractions and interruptions during medication administration as the top reason. Other important factors identified included: inadequate staffing and high nurse/patient ratios, illegible written medication orders, incorrect dosage calculations, and similar drug names and packaging (Cohen et al., 2003).

2.4.4 Workload and Staffing

Workload and staffing have been frequently cited in the literature as common factors contributing to medication errors. Only one research study cited in O'Shea's review found no relationship between workload, staff absenteeism, relief duty, and medication errors (Taunton, Kleinbeck, Stafford, Woods, & Bott, 1994).

In 2000, the United States Pharmacopeia (USP) released the Summary of 1999 Information Submitted to MedMarx(SM): A National Database for Hospital Medication Error Reporting. This report was released one year after the IOM drew national attention to medical errors occurring in hospitals throughout the U.S. The report summarized the 1999 data of 6,224 medication error records from 56 facilities, including community, government and teaching hospitals. This report identified the primary contributing factors to medications errors were distractions and workload increases.

In 2006, Seago, Williamson, and Atwood examined nurse staffing and patient outcomes in medical-surgical units in a university teaching hospital over a four-year period. They, not only compared nurse staffing and positive patient outcomes, but also explored a new outcome, failure to rescue (FTR), particularly FTR from medication errors. The results demonstrated that as

nurses' hours of care per patient day increased, there was an increased FTR from medication errors (Seago et al., 2006).

Lastly, a study by Potter et al. (2003) also looked at nurse staffing and patient outcome relationships. Adverse occurrences investigated included patient falls and medication errors. Medication errors were identified through the hospital's incident reporting system and through the pharmacy's audit system. Data were collected from 32 inpatient units over a period of 12 months. These researchers found no significant correlation for percentage of RN hours and medications errors or falls.

2.4.5 Nursing Shift Work

As cited in the literature reviews by both O'Shea (1999) and Armitage and Knapman (2003), few studies are mentioned have distinguished a number of working conditions that could lead to medication errors (Girotti, Garrick, Tierney, Chesnick, & Brown, 1987; Markowitz, Pearson, Kay, & Lowenstein, 1981; Pearlson, 1988; Raju, Kecskes, Thorton, Perry, & Feldman, 1988). Raju et al. (1988) study concluded that there was a higher rate of MES on day shift as compared to the evening or night shift. Equally, an earlier study by Girotti et al. (1987) also confirmed that significantly more errors did occur on the day shift, though results were very similar between day and night shifts. Both researchers related these findings to be possibly due to the large number of prescriptions ordered and administered during this part of the day or a lower rate of identification of errors on the night shift, perhaps due to fatigue (Girotti et al., 1987; Raju et al., 1988). Girotti et al. (1987) have also found a link between the number of admissions, deaths, and discharges per shift and the number of errors, which occurred.

Suzuki et al. (2004) studied daytime sleepiness and occupational accidents among 4,279 hospital nurses. The findings revealed excessive daytime sleepiness (EDS) among 26% of hospital nurses. Using multiple logistic regression, significant associations between EDS and

occupational accidents were identified and included: (a) medication administration errors, shift work, and age; (b) incorrect operation of medical equipment, EDS, and age; and, (c) needle stick injuries, age, and EDS.

A more current study by Scott et al. (2006) examined the effects of critical care nurses' work hours on vigilance and patients' safety. The results determined there was no link between decreased vigilance and increased risk of errors. It did however, identify the following results: (a) nurses left work at the end of their shift only 13% of the time, averaging almost an additional hour with each shift worked; (b) almost two-thirds of the nurses had difficulty staying awake at least once during the 28 day period, with 20% of nurses falling asleep at least once during their shift; and (c) greater than one-quarter of the nurses made at least one error, while one-third reported making one near miss during the study period, with the majority of these errors associated with medication administration. In addition, the risk for making an error almost doubled when nurses worked over 12.5 hours or worked more than 40 hours per week.

2.4.6 Quality of Prescriptions

A poor quality prescription, or one that is illegibly written, increases the risk and responsibility of the nurse who is accountable for administering that medication (Howell, 1996). Both of the reviews have found numerous studies relating to poor quality of written prescriptions and their relationship with MEs (Cavel & Hughes, 1998; Cooper, 1995; Farrar, 1999; Howell, 1996; Kawamura, 2001; Lyons, Payne, McCabe, & Fielder, 1998).

In 1997, Lesar, Briceland, and Stein published study on factors related to medication prescribing. In this study a physician and two pharmacists reviewed every third prescribing error, which was originally detected and diverted by a pharmacist, for factors related to the error. Participants have chosen the following factors to be main cause of MEs: alteration of drug dose needed due to hepatic or renal function, patient history of allergy to the same medication class,

using the wrong drug name, dosage form or abbreviation, incorrect dosage calculation, and atypical or unusual critical dosage frequency considerations. A nine-year study by Lesar, Lomaestro, and Pohl (1997) carried out from January 1987 through December 1995 found that the rate of errors per written order, per admission, and patient day significantly increased during the duration of the study. The annual number of errors in 1987 at 522 increased to 2,115 errors in 1995, all with the potential for adverse patient consequences. The most frequent type of errors included: dosing errors, prescribing medications to which the patient was allergic, and prescribing inappropriate dosage form. Likewise, a later study by Bobb et al. (2004), also found prescribing errors to be of high occurrence in the inpatient setting. In this study, pharmacists saved all orders that contained a prescribing error for one week (1,111 errors) for a rate of 62.4 errors per 1,000 medication orders. Only 30.8% of these mistakes were considered clinically significant with the majority relating to antibiotic orders, incorrect dose, and medication knowledge deficiency.

A recent study investigating the causes of prescribing errors uncovered that prescribing errors were made due to slips in attention (due to business or interruptions) or because prescribers did not follow relevant rules of prescribing (absence of necessary knowledge) (Dean et al., 2002). Another study, after providing a refresher on prescribing guidelines, suggested there was a slight improvement in the following of prescriptions guidelines of trainees coming into a new specialty area (Kripalani et al., 2007). This research study has also identified the need for minimal national prescription guidelines. (Kripalani et al., 2007).

The purpose of Allison et al. (2005) study was to identify conditions that could affect the accuracy in which phone orders are transmitted, received, and documented by pharmacists. Participants spent an average of 35 minutes per 8-hour shift and an average of 42 minutes per 12-hour shift resolving problems with telephone transmitted medication orders. Furthermore, 31

dispensing errors occurred per month with an average of 3.6 errors attributed to telephone orders. Findings of this study suggested that background noise (people talking, interruptions), information exchange (lack of knowledge of caller and pharmacist about patient), and scheduling (number of technicians working in pharmacy, time of day of call) were all commonly significant barriers that affected pharmacy accuracy (Allison et al., 2005).

2.4.7 Policy and Procedures

Although numerous researchers have found that medication errors are the result of failure to follow policy (Conklin et al., 1990; Fuqua & Steven, 1988; Keill & Johnston, 1993). Others believe that the nature of some policies may contribute to the increase of MEs (Cooper, 1995; Baker & Naphine, 1994; Greenwood & King, 1995; Mulhall, Alexander, & Le May, 1997; Mayo, Chang, & Omery, 2002).

For instance, Baker and Naphine (1994) article suggests that rules can lead to ritualistic practices, which can lead to error. A succeeding article by Cooper (1995) also states that some policies may be impractical and burdensome for nurses with heavy workloads and high patient turnover rates. Others suggest that structured protocols threaten nurses' ability to think and take initiative, especially for those who are more experienced (Greenwood & King, 1995; Mulhall, Alexander, & Le May, 1997; Mayo, Chang, & Omery, 2002), while Wolf (1989) argues that policies and procedures provide nurses with a sense of responsibility and security.

On the other hand, a literature search has uncovered only one new research article regarding the graduate nurses' use of protocols to manage patients' medications (Manias, Aitken, & Dunning, 2005). It was found that the adherence to medication protocols widely varied amongst graduated nurses: (a) graduate nurses adhered to medication protocols when they were perceived not to interfere with other nursing activities; (b) when the protocols helped the nurses with autonomous decision making; and, (c) if there was a decreased likelihood

disciplinary action would be taken if an error was made. Also, the researchers suggest that a vital component of quality care rests on the effective utilization of protocols by experienced nurses and provision of peer support to newer colleagues (Manias, Aitken, & Dunning, 2005).

2.4.8 Length of Experience

A study by Walter (1992) on the occurrence and reporting of medication errors, uncovered that nurses over the age of 35 years reported making fewer errors than those under age 35, though this result was not statistically significant. It was also found that nurses who had been in nursing over one year or employed in the same hospital for more than one year reported fewer medication errors. Furthermore, the researcher stated that nurses new to a hospital system were more likely to make medication errors, probably due to a different or new environment. Likewise, Farrar (1999) also concluded that error occurrence increased as familiarity of the nurse administering the medications decreased.

A current review of the nursing medication error literature found no research articles addressing length of experience as an independent variable, though age and length of experience are frequently addressed as demographic factors. At last, length of experience as a contributing factor to medication errors appears to be inconclusive.

2.5 Reporting Practices

Nurses appear to exercise considerable judgment in deciding whether or not to formally report an incident (Antonow et al., 2000; Covell et al. 2009; Jeffe et al., 2004; Kingston et al., 2004; Walker & Lowe, 1998). Reporting systems are depend on (1) the nurse's ability to recognize an error was committed, (2) belief that the error warrants reporting, (3) belief that he/she committed an error, (4) willingness to overcome the embarrassment and fear of retaliation of having committed an error (Kapborg et al. 1999). Throughout the literature, nurses' believe that the reported rate of error through formal incident reporting systems range from 30.5 to 90

percent of incidents (Antonow et al., 2000; Blegen et al., 2004; Covell et al., 2009; Kim et al., 2007; Stratton et al., 2004; Walker & Lowe, 1998).

2.5.1 Factors Affecting Reporting Practice

Previous studies have demonstrated that nurses widely report reluctance to disclose medication errors (Gladstone, 1995; Osborne et al., 1999; Wakefield, 1996). A recent study revealed that the majority (66%) of nurses would always report mistakes resulting in patient harm, while only 20% of nurses would report near miss events not causing harm to patient (Kim et al., 2007). Subsequent studies have also demonstrated a significant link between MEs causing patient harm and increased rates of reporting by nurses (Antonow et al., 2000; Elder et al., 2008; Espin et al., 2010; Kreckler et al., 2009; Walker & Lowe, 1998). Other researchers found that nurses were more likely to report events such as falls, pressure ulcers, and those that are sudden and attributable to a single event (Blegen et al., 2004; Walker & Lowe, 1998). At the same time there was a low reporting rate of events that did not harm patient and near misses (Antonow et al., 2000; Blegen et al., 2004; Espin et al., 2010; Evans et al., 2006; Jeffe et al., 2004; Kreckler et al., 2009). In contrast, another study uncovered nurses were three times more likely than physicians to always report incidents that do not cause patient harm (Kreckler et al., 2009). While the literature cited most nurses reported events that are harmful to patients, some nurses would still informally reported un-harmful events (Covell & Ritchie, 2009; Espin et al., 2010; Espin et al., 2007). Nurses would informally report by communicating the error to a nursing colleague, a manager, a senior staff member, or an interdisciplinary team member to validate their concerns (Espin et al., 2010; Espin et al., 2007). According to Covell and Ritchie (2009) there were several factors, such as relationship of the nurse with colleagues, physicians, and managers, and characteristics of the nurse, associated with the decision to report informally or formally (Covell & Ritchie, 2009).

2.5.2 Relationships

Covell and Ritchie (2009) imply that relationships dynamics strongly influence nurses' decision to report informally or formally. In this study, a nurse stated, "if we have good relationships, we prefer not to do incident reports" (Covell & Ritchie, 2009 p. 290). Nurses favoured informal reporting mechanisms because they allowed them to address their fear with reporting and obtain emotional support from their colleagues (Covell & Ritchie, 2009; Espin et al., 2010). Consequently, errors that were informally reported did not have a successive formal report (Espin et al., 2010). This is of concern because informal reporting does not allow systemic learning to occur in relation to the error; therefore others may be at risk of making the same error (Espin et al., 2007).

2.5.3 Nurse Characteristics

Researchers found that nurses' characteristics significantly influenced reporting practices (Blegen et al., 2004; Evans et al., 2006; Kim et al., 2007; Jeffe et al., 2004; Kingston et al., 2004). For instance, nurses were more likely to report incidents if they have more years of nursing experience, a longer length of employment at their hospital, or occupy a management position (Blegen et al., 2004; Evans et al., 2006; Kim et al., 2007). In contrast, junior nurses were less likely to report incidents, due to concerns about being blamed and punished for their part in an incident (Jaffe et al., 2004; Kingston et al., 2004). The lack of willingness to report may indicate the hierarchical structure of hospitals impacts nurses' comfort in reporting incidents, as those with less experience generally have less seniority within the institution; lack of willingness may also be a reflection of the workplace culture that exists in the majority of health care institutions (Blegen et al., 2004; Edmondson, 1996; Rathert & May, 2007).

2.6 Barriers to Reporting

Even though, barriers to incident reporting affect both physicians and nurses; there are significant differences in how these health care professionals handle incident reporting due to

their different professional cultures and values (Espin et al., 2007). Nurses are more likely to cite fear of organizational response as a barrier to reporting, which may be a reflection of the culture of nursing to follow protocols and directives as organizational employees (Kingston, et al., 2004; Uribe et al., 2002). In contrast, the culture of medicine emphasizes physician autonomy and self-regulation (Kingston et al., 2004). Physicians were less likely than nurses to know what should be reported, how to report errors, and to believe that reporting contributed to quality improvement efforts (Jeffe, 2004; Uribe et al., 2002). They were also more likely to cite forces external to the organization, such as litigation or coroner's inquests, as barriers to incident reporting (Kingston et al., 2004). At last, the following barriers to incident reporting have been identified in the literature.

2.6.1 Educational and Training Barriers

Numerous studies have highlighted inadequate education and training of nurses as an important barrier to reporting. Because usually only managerial and support personnel who are part of an established improvement team receive such training (American Association of Colleges of Nursing, 1998; Human Resources and Services Administration, 2000; Huq and Martin, 2000; McFadden et al., 2004, 2006) efforts in safe medication delivery have been unsuccessful (Nursing Management Brief Report, 2007). These studies also point out the need to increase knowledge of the philosophy and principles of continuous improvement and interpersonal skills to improve problem solving abilities at all levels of organization (Huq and Martin, 2000; McFadden, 2006). Though, these studies have intensely advocated to increase emphasis on improving medication safety, limited effort has been focused to improve or optimize the operations of medication delivery systems in terms of patient safety and systems efficiency and productivity (American Association of Colleges of Nursing, 1998; Human Resources and Services Administration, 2000). In fact, health care education in patient safety has

seen no dramatic improvements over the last twenty years (National Patient Safety Foundation (NPSF), 2004). As a result, a small number of administrators, managers, nurses or technicians are equipped to analytically view their medication delivery processes as a system, nor appreciate the relevance and benefits of systems engineering approach for systems improvement (IOM, 2005).

2.6.2 Vigilance and Compliance Barriers

According to IOM (2006) vigilance and compliance are strongly associated with effective medication error detection and improvement efforts (IOM, 2006). Frontline workers of highly reliable and safe organizations, have continuously demonstrated high vigilance and proved it to be essential for detecting threats to safety before they actually become errors and/or adverse events (Roberts, 1990; Roberts and Bea, 2001; Aiken et al., 2002; Needleman et al., 2002).

There is support in the literature for the premise that individual's cognition mediates antecedent conditions and behaviour, in general (Bem, 1981; Nelson, 1981; Argyris, 1993; Eagly and Chaiken, 1998;). Reason (2004), a leading researcher in organizational safety counsels nurses and doctors to use their 20 mental skills to analyze, detect and prevent errors. Additional authors have also recommended that healthcare professionals use cognition as a personal mediator through which the reward system and/or group-behaviour influence motivation for improvement efforts (Tucker & Edmondson, 2002).

2.6.3 Communication and Psychological Safety Barriers

Personal fear arising from embarrassment, concern about reputation, and fear of reprimand appear to be the strongest personal barriers to reporting for nurses (Blegen et al., 2004; Espin et al., 2010; Evans et al., 2006; Jeffe et al., 2004; Kingston et al., 2004; Walker & Lowe, 1998). Edmondson (1999) showed that psychological safety enables willingness to engage in "second-order problem solving" behaviour because improvement efforts are

inherently risky and can have negative consequences for the person who raises their concerns. Plus, health care professionals feel that being linked with problems and change efforts can result in damage to one's reputation (Dutton, 1993). Therefore, psychological safety occurs when employees do not fear retribution for expressing their thoughts and opinions and is created through empowering employees; it is strongly influenced by leadership and management (Naveh et al., 2006; Wakefield et al., 2001). One study demonstrated that leader inclusiveness- words and actions exhibited by leaders that invite and appreciate others' contributions -can help healthcare individuals and teams overcome the inhibiting effects of psychological safety, allowing members to collaborate in process improvement (Nembharth & Edmondson, 2006). In another study, unit managers who encouraged discussions about incidents were more highly trusted by staff members (Vogus & Sutcliffe, 2007).

2.6.4 Productivity and Efficiency Barriers

In response to financial pressure and incentives driving health care organizations, increasing pressures on nurses with respect to efficiency requirements has become important (Tucker and Edmondson, 2002; Needleman et al., 2002; IOM, 2005). Consequently, this has significantly impacted on nurses' ability to accomplish daily tasks and resolve under-lying causes of problems that arise in daily activities (Tucker and Edmondson, 2002; Uribe et al., 2002; IOM, 2005). Research shows that a heavy nursing workload adversely affects patient safety (Lang et al, 2004). Furthermore, it negatively affects nursing job satisfaction and, as a result, contributes to high turnover and the nursing shortage (Duffield & O'Brian-Pallas, 2003). A 1998–1999 survey of more than 43,000 nurses in five countries found that 17 percent to 39 percent of respondents planned to leave their job within a year because of job demands (Aiken et al., 2001).

In addition, to required responsibilities nurses are also expected to perform nonprofessional tasks such as delivering and retrieving food trays; housekeeping duties; transporting patients; and ordering, coordinating, or performing ancillary services (Aiken & Patrician, 2000; Aiken et al., 2001; Aiken et al., 2002). It is estimated that 35% of the total nurse's time during medication administration is spent dealing with interruptions (Hillsden & Fenton, 2006). A total of 28 interruptions were recorded across five medication rounds, with 15 (54%) being classified as 'unavoidable' and 13 (46%) being rated as 'avoidable'. Moreover, research has shown that autonomy has been linked to higher nurse satisfaction/productivity and therefore higher improvement efforts (Havens and Aiken, 1999; Scott et al., 1999; Whitley and Putzier, 1994; Aiken and Patrician, 2000) because it promotes self-management which accordingly increases motivation by empowering them to make decisions that affect their productivity (Campion et al., 1993; Hackman, 1987; Janz et al., 1997). Autonomy can be defined as the amount of job-related independence, initiative, and freedom either permitted or required in daily work activities (Slavitt et al., 1978).

2.6.5 Organizational Barriers

It is recognized that organizational factors are considerable barriers to incident reporting. Several studies who have examined the relationship between organizational context, structures, systems design and management strategies (including aspects of process, technology and human factors) and patient mortality/adverse events revealed that nursing surveillance, quality of working environment, and quality of interaction were three organizational process variables consistently related to lower mortality (Mitchell & Shortell, 1997; IOM 2005, 2006). Another exploratory study of relationships between organizational culture, continuous quality improvement, and medication administration error reporting rates found smaller institutions were more likely to have group-oriented cultures, where the focus is affiliation and trust, and to

have higher perceived reporting rates (Wakefield et al., 2001). Wakefield et al. (2001) found that two culture types: hierarchical (cultures that are controlling and focused on rules and stability) and rational (cultures focused on achievement, productivity and efficiency), were negatively associated with reported errors. The study supports other findings where a fear of repercussion from superiors had a negative influence on reporting (Uribe et al.; & Vogus & Sutcliffe).

Weingart and Page (2003) highlighted that there is limited knowledge on how to implement effective organizational and/or managerial structures/systems that could produce the necessary changes in healthcare industry. Other authors suggested that the desired changes could be potentially achieved via dedicated organizational structures for patient safety that promote data collection and analysis, employee feedback and continuous support for redesign/improvements. In addition, shared vision, goals, trust, and expanded competencies of managers and staff with teamwork can lead to organizational improvements (Ramanujam & Rousseau, 2006).

In 2006 analysis of the seven improvements strategies proposed by Agency for Healthcare Research and Quality (partnership with stakeholders, reporting errors free of blame, open discussion of errors, cultural shift, education and training, statistical analysis of data, and system redesign), a cultural shift toward patient safety in the acute care setting was identified as a top priority (McFadden & colleagues, 2006). The second highest priority should involve developing a partnership with all stakeholders, followed by creating a reporting system free of blame. Additionally, lack of top management support, lack of resources, lack of incentives and lack of knowledge were also found to significantly hinder the implementation of improvement strategies (McFadden & colleagues, 2006).

3 METHODS

3.1 Research Design

A descriptive quantitative research design was used for the study. This method involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection (Glass & Hopkins, 1984). It often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution.

Because I was seeking to understand geriatric nurses' experiences with MEs and incident reporting, I chose a quantitative descriptive design using a standardized survey. This methodology proved to be an efficient means of gathering data without introducing threats to reliability that can occur with other collection means. Due to the nature and length of the study, observations and personal interviews would not have provided the honesty that the anonymous survey allowed. In addition, observations, interviews, or focus groups would add the potential for bias and inconsistency in the administration of the survey instrument, and the data collected would not have provided the concrete data needed for statistical analysis.

3.2 Research Instrument

The Modified Gladstone (1995) was utilized to collect data. This standardized instrument measured (1) nurse perceived causes of medication errors; (2) percentage of drug errors reported to nurse managers; (3) types of incidents that would be classified as (a) medication errors, (b) reportable to physicians, or (c) reportable using an incident report; and (4) nurse views about reporting medication errors (6 items). The last portion of the instrument captured nurse demographic data such as; age, gender, level of education, years of experience in drug administration, years of experience in nursing,

number of medication errors that nurses recall making over the course of their entire career, type of work commitment, shift worked, and area of work. Instrument content validity was deemed acceptable by previous investigators (Osborne et al., 1999). In addition, Osborne et al (1999) established reliability using the test-retest method (0.78) in their sample.

3.3 Research Respondents and Context of the Study

For the purposes of my study, the population of interest was nurses currently caring for elderly patients on a medicine ward. This population represented the most knowledgeable individuals to best answer the research questions.

I recruited participants for my study from the population of nurses, caring for elderly patients and currently employed at the Montfort hospital. Nurses care for the elderly on many different units and settings in the healthcare system, which I assumed could influence their perceptions and experiences of medications errors and incident reporting. To reduce variation and allow for a more focused inquiry, I decided to use homogenous sampling, a type of purposive sampling, to only include nurses who currently worked on a medicine unit as staff nurses (McLafferty, 2004; Polit & Beck, 2008). To maximize the breadth and diversity of the perceptions of these nurses towards MEs and incident reporting there were no restrictions placed on level of experience or background for those participating in the study (Polit & Beck, 2008).

3.4 Data Collecting Procedures

I purposefully chose the Montfort hospital after consultation with my thesis supervisor. The selected hospital offered a wide range of care and services,

including geriatrics with 128 long-term care beds assigned to this speciality allowing for a quick recruitment of participants. The data contained within this study were collected using the Modified Gladstone Questionnaire.

Approval was obtained from the Ethics Committee at University of Ottawa and from the Research and Ethics board (REB) of the Montfort hospital. A short invitation letter was subsequently prepared for participants describing the objectives and importance of the study. It was placed at the nursing station of the selected unit. Next, at a staff meeting, I verbally briefed the potential participants about the nature of the study, a person's right to refuse participation, the responsibilities of the researcher and the likely risks and benefits to participating in the study. Afterwards, I presented a consent form to participants who fulfilled the inclusion criteria and reviewed it briefly with him or her during our initial contact. The participants were asked to review the documents. If they were still interested in participating, I instructed them to place completed consent form in a locked box located in the manager's office. Next, I individually distributed survey questionnaires to those who signed the consent form. Participants were again instructed to place survey questionnaires in the locked box, located in the manager's office. Lastly, completed surveys questionnaires were collected from the locked box after each week for a period of twelve weeks.

3.4.1 Inclusion Criteria

The inclusion criteria for the study incorporated: staff nurses at the Montfort hospital caring for patients 65 years old and above, and having the ability to read, write and speak English and/or French. As such the questionnaire to be completed by the

nurses were available in both English and French. It was assumed that participants would have different levels of experience, which would contribute to the richness of data. It was not a requirement to have past experience with MEs and incident reporting.

3.4.2 Confidentiality

My office at the Interdisciplinary School of Health Sciences was used to store the data. The office had a secured lock as well as file cabinet with a lock. Data collected in surveys were recorded and downloaded to computer secured with password. Transcription files were protected with password. Consent forms were stored electronically with password protection and original paper forms were destroyed. Data will be conserved for a minimum of 5 years following completion of the research project and thesis defense. All transcripts and written notes will be shredded. The data was stored on computer secured with password. A backup copy of the data was stored on external hard drive. This will remain locked in the supervisor's office at the Interdisciplinary School of Health Sciences accessible only by the supervisor. The second one will be with the Principal Investigator with password protection and encryption.

3.4.3 Ethical Considerations

The study was conducted following Tri-Council Ethical Guidelines (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, Social Sciences and Humanities Research Council of Canada, 2015).

3.5 Data Analysis

The researcher has applied quantitative methods to analyze and interpret this descriptive data numerically. The statistical package for social sciences (SPSS) version 12 was used for coding, data entry, and to compute the descriptive statistics.

4 FINDINGS

4.1 Demographic Data of Participants

Table 1 displays the demographic data of sample. Seventeen nurses (n=17) responded to the survey, representing a 57% return rate. Female nurses participant were 88.2% (n= 15), while male nurses participant were 11.7% (n = 2). Most of the nurses (n= 11, 64.7%) were 28 to 55 years old. The majority (n =11, 64.7%) had a bachelor of science in nursing degree. Many of the participants (n =10, 58.8%) had more than five years of nursing experience. Fifty percent worked full-time. Forty-seven percent worked days, 35% evenings, and 18% night shift. Thirty-five percent (n = 6) remembered making 1 to 2 medication errors, and 29% (n = 5) remembered making no errors. Four nurses remembered making 3 to 4 errors, and 2 remembered making more than 5 errors in the course of their careers.

Table 1. Demographic data of nurses

Demographic data (n=17)	Number	%
1- Gender		
Female	15	88.2
Male	2	11.7
2- Age		
20-25	4	23.5
26-30	4	23.5
31-45	5	29.4
46-56	2	11.7
57-65	2	11.7
3- Education level		
Diploma	6	35.2
Associate Degree	0	0
Bachelor	11	64.7
Master's	0	0
4- Years of experience in Nursing		
1-5	3	17.6
6-10	10	58.8
11-15	3	17.6
16-20	1	5.8
4- Work Schedule		
Part time	6	35.2
Full time	9	52.9
Other	2	11.7
5- Work Shift		
Day time	10	58.8
Evening time	5	29.4
Night time	2	11.7

4.2 Causes of Medication Errors

Table 2 portrays the ranked causes of medication errors as perceived by the participants. Nurses ranked the listed causes from 1 to 10, with 1 indicating most frequent cause and 10 indicating least frequent cause. The number 1 perceived cause of medication errors identified in this study was when the nurse failed to check the patient's name band with the patient's medication administration record (MAR) (29.4%). The number 2 perceived cause of medication errors was when a nurse was tired and exhausted

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(17.6%). The third top ranked causes of drug errors were when the physician's writing on the doctor's order form is difficult to read or illegible (11.7%) and when the nurse miscalculates the dose. None of the nurses believed that medication errors occurred when nurses are confused by the different types and functions of infusion devices or when the medication labels/packaging are of poor quality or damaged.

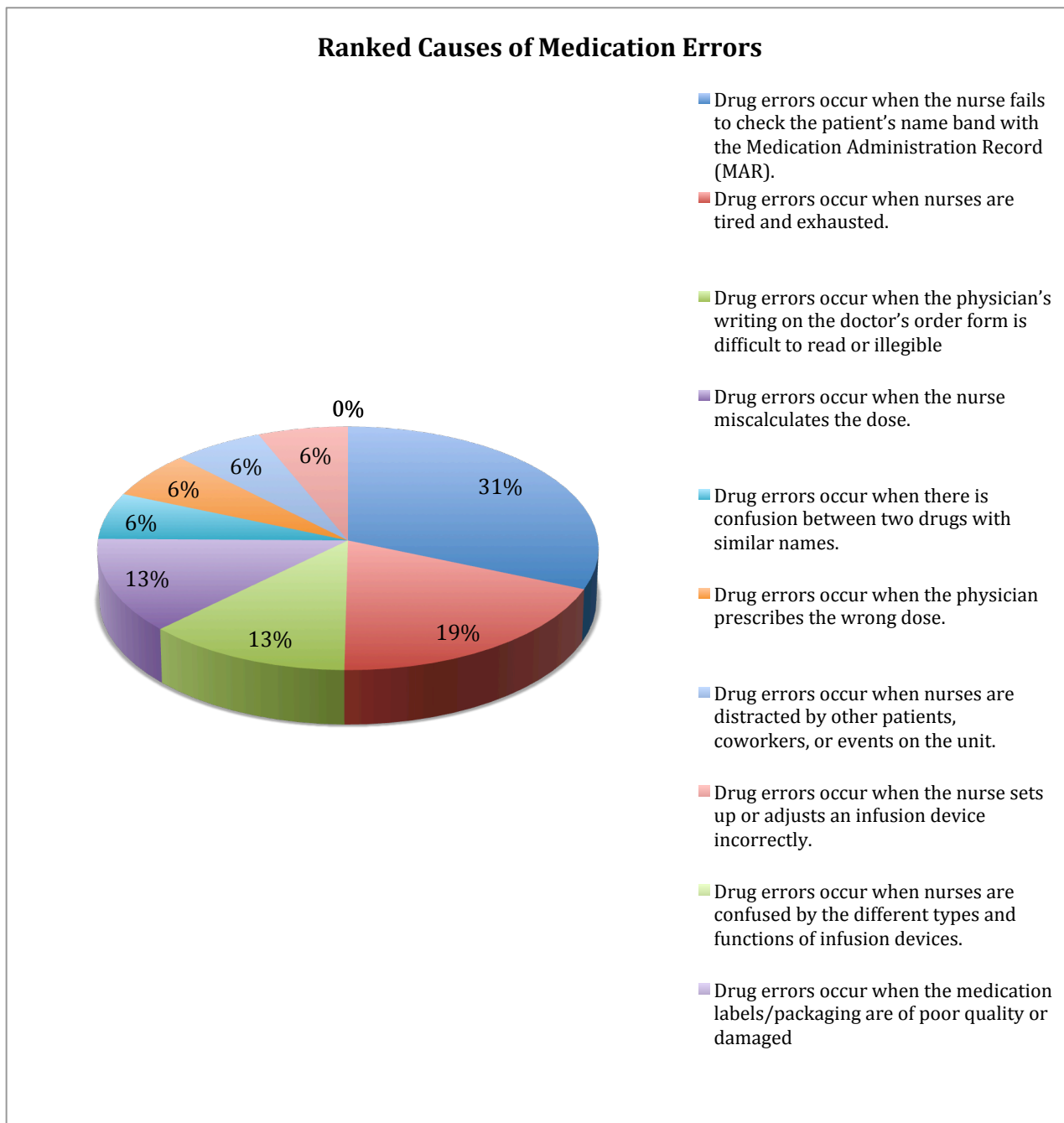
In addition to causes of medication errors, nurses were also asked "In your estimation, what percentage of all drug errors is reported to the Nurse Manager by the completion of an incident report?" The percentage rate was 30%, indicating that very few nurses believed that MEs are reporting to nurse manager using an incident report. In Mayo and Duncan's (2004) study, nurses perceived that only 25% of all medication errors were reported to the nurse manager using an incident report. Both study results are of concern for quality and patient safety.

Table 2a. Ranked causes of medication errors *

Rank	Item	Scores of the most frequent causes of medication errors	%
1	Drug errors occur when the nurse fails to check the patient's name band with the Medication Administration Record (MAR).	5	29.4
2	Drug errors occur when nurses are tired and exhausted.	4	17.6
3	Drug errors occur when the physician's writing on the doctor's order form is difficult to read or illegible	2	11.7
4	Drug errors occur when the nurse miscalculates the dose.	2	11.7
5	Drug errors occur when there is confusion between two drugs with similar names.	1	5.8
6	Drug errors occur when the physician prescribes the wrong dose.	1	5.8
7	Drug errors occur when nurses are distracted by other patients, coworkers, or events on the unit.	1	5.8
8	Drug errors occur when the nurse sets up or adjusts an infusion device incorrectly.	1	5.8
9	Drug errors occur when nurses are confused by the different types and functions of infusion devices.	0	0
10	Drug errors occur when the medication labels/packaging are of poor quality or damaged	0	0

* Ranking: 10, indicates least frequent cause; 1, indicates most frequent cause.

Table 2b. Ranked causes of medication errors (n=17)



4.3 Classifications and Reporting of Medication Errors

Based on 6 quite different scenarios presented to the nurses, Table 3 represents how nurses classified each scenario as a medication error (yes or no responses) and if they would or would not report the situation to a physician or complete an incident report. Some scenarios elicited common responses in terms of classifying medication scenarios. For example, most nurses (88.2%) responded that they would classify a fast running TPN (total parental nutrition) rate (200 mL/h for 3 hours instead of the correct 125 mL/h) as a drug error; 76.4% would notify the physician; and 64.7% would complete an incident report. On the other hand, most nurses (76.4%) would not classify as a medication error the withholding of a routine morning dose of digoxin because the digoxin blood level report was late. However, in this case 88.2% would notify the physician, but only 17.6% would complete an incident report.

For other scenarios, nurses had quite disparate responses. For example, nurses were split (47.1% versus 52.9%) in their classification of a scenario involving pain control medication. However, once again more nurses would notify the physician (64.7% versus 35.2%), yet were split (52.9% versus 47.1%) when it came to completing an incident report.

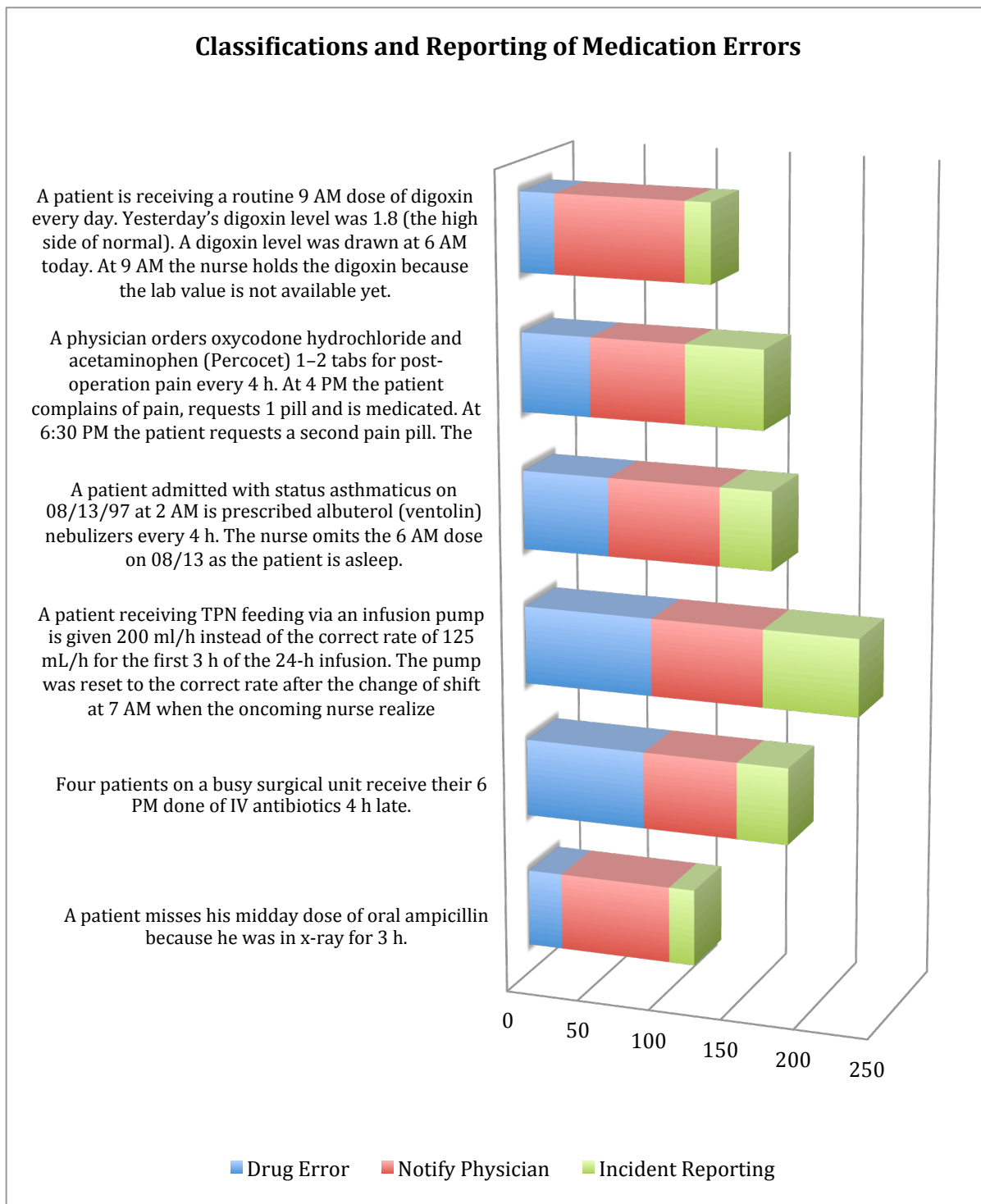
In the all six scenarios, more nurses would notify physicians than not notify them no matter how they first classified the scenarios. In 4 out of the 6 scenarios, more nurses would not complete an incident report; this decision mirrored their original classification of the scenario as either being a medication error or not being a medication error.

Table 3a. Classifications and reporting of medication errors

Classifications and reporting of medication errors (n=17)		
Item	Yes % (n)	No % (n)
1- A patient misses his midday dose of oral ampicillin because he was in x-ray for 3 h. - Drug error - Notify physician - Incident report necessary	23.5 (4) 76.4 (13) 17.6 (3)	76.4 (13) 23.5 (4) 82.3 (14)
2- Four patients on a busy surgical unit receive their 6 PM dose of IV antibiotics 4 h late. - Drug error - Notify physician - Incident report necessary	82.3 (14) 64.7 (11) 35.2 (6)	17.6 (3) 35.2 (6) 64.7 (11)
3- A patient receiving TPN feeding via an infusion pump is given 200 ml/h instead of the correct rate of 125 mL/h for the first 3 h of the 24-h infusion. The pump was reset to the correct rate after the change of shift at 7 AM when the oncoming nurse realized that the pump was set at the incorrect rate. - Drug error - Notify physician - Incident report necessary	88.2 (15) 76.4 (13) 64.7 (11)	11.7 (2) 23.5 (4) 35.2 (6)
4- A patient admitted with status asthmaticus on 08/13/97 at 2 AM is prescribed albuterol (ventolin) nebulizers every 4 h. The nurse omits the 6 AM dose on 08/13 as the patient is asleep. - Drug error - Notify physician - Incident report necessary	58.8 (10) 76.4 (13) 35.2 (6)	41.1 (7) 23.5 (4) 64.7 (11)
5- A physician orders oxycodone hydrochloride and acetaminophen (Percocet) 1–2 tabs for post-operation pain every 4 h. At 4 PM the patient complains of pain, requests 1 pill and is medicated. At 6:30 PM the patient requests a second pain pill. The nurse administers the pill. - Drug error - Notify physician - Incident report necessary	47.1 (8) 64.7 (11) 52.9 (9)	52.9 (9) 35.2 (6) 47.1 (8)
6 A patient is receiving a routine 9 AM dose of digoxin every day. Yesterday's digoxin level was 1.8 (the high side of normal). A digoxin level was drawn at 6 AM today. At 9 AM the nurse holds the digoxin because the lab value is not available yet. - Drug error - Notify physician - Incident report necessary	23.5 (4) 88.2 (15) 17.6 (3)	76.4 (13) 11.7 (2) 82.3 (14)

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Table 3b. Classifications and reporting of medication errors (n=17) *



* Chart represents only Yes % of answers to classifications and reporting of MEs.

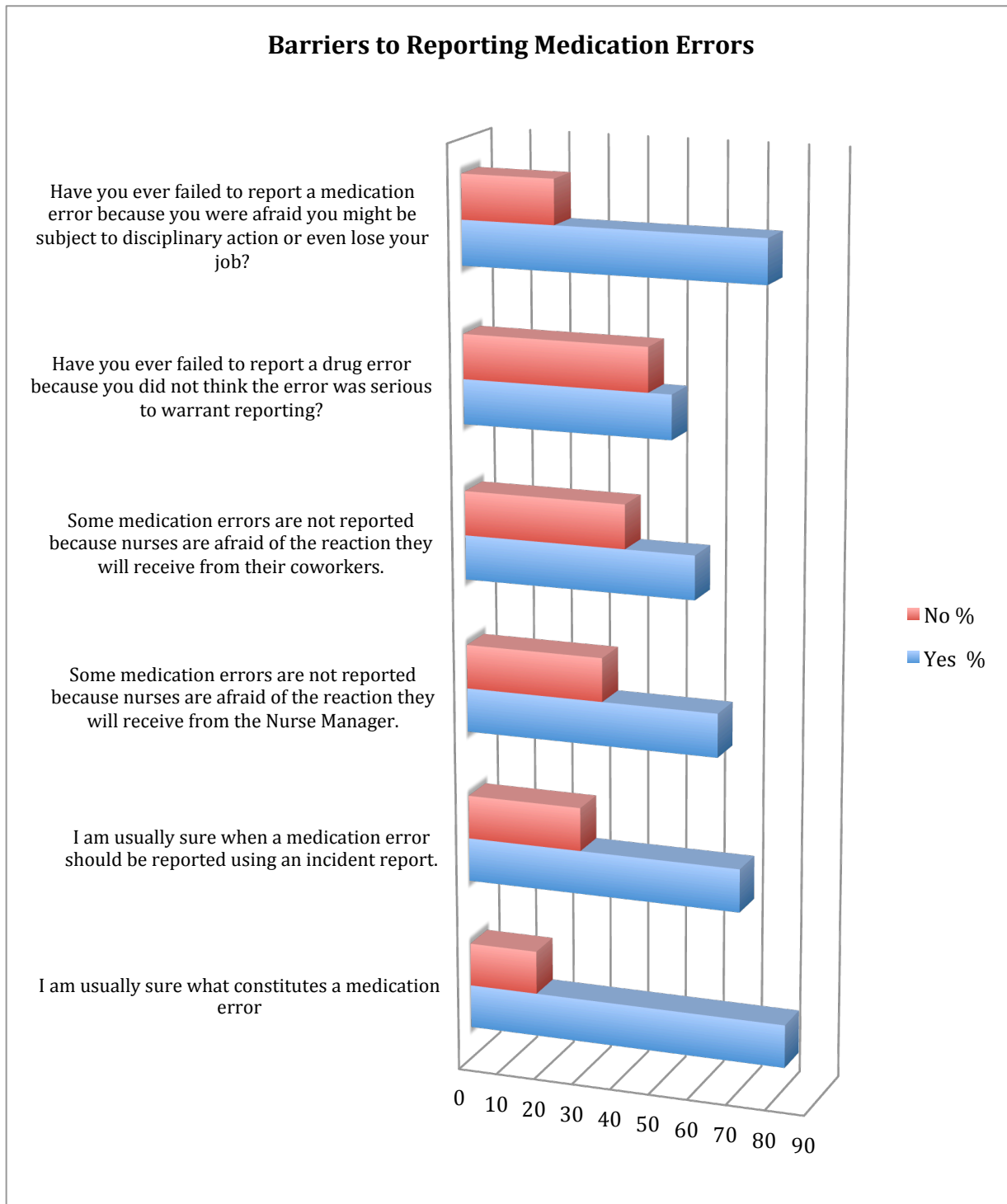
4.4 Barriers to Reporting Medication Errors

Table 4 presents additional nurse responses to statements about reporting medication errors. Most nurses indicated that they knew what constituted a medication error (82.3%) and when to report an error using an incident report (70.5%). Reasons for not reporting errors included “afraid of manager reaction” (64.7%), “afraid of coworkers’ reactions” (58.8%), and “not thinking an error was serious enough” (52.9%). Similarly, the majority of nurses (76.4%) fear disciplinary action (losing one’s job) because of committing an error.

Table 4a. Barriers to reporting medication errors

Barriers to reporting medication errors (n=17)		
Item	Yes % (n)	No % (n)
1- I am usually sure what constitutes a medication error	82.3 (14)	17.6 (3)
2- I am usually sure when a medication error should be reported using an incident report.	70.5 (12)	29.4 (5)
3- Some medication errors are not reported because nurses are afraid of the reaction they will receive from the Nurse Manager.	64.7 (11)	35.2 (6)
4- Some medication errors are not reported because nurses are afraid of the reaction they will receive from their coworkers.	58.8 (10)	41.1 (7)
5- Have you ever failed to report a drug error because you did not think the error was serious to warrant reporting?	52.9 (9)	47 (8)
6- Have you ever failed to report a medication error because you were afraid you might be subject to disciplinary action or even lose your job?	76.4 (13)	23.5 (4)

Table 4b. Barriers to reporting medication errors (n=17)



5 DISCUSSION

Medication errors are a common problem in many health care systems. Health care professionals share the responsibility in MEs. However, nurses play major roles because they have the longest and most direct contact with patients. Reducing MEs requires a multidisciplinary-layered approach; it should be a shared responsibility between every person involved in the medication process (prescribing-transcribing-administration/dispensing).

5.1 Participant Data Demographics

The demographic characteristic of the participants was collected using a short survey. Information obtained included age, gender, length of experience as a nurse, and highest level of education achieved. The mean age of the participants, 41.5 years, was slightly younger than the provincial average of 46.0 years. Across Ontario most of the nurses practicing in this area have achieved a diploma as the highest level of education, which differed from my sample of perinatal nurses. In my sample, 35% had achieved a diploma as the highest level of education, and 65% had a Bachelor of Science degree in nursing.

5.2 Causes of Medication Errors

In regard to the causes of medication errors consistent with other studies (Gladstone, 1995; Osborne et al, 1999; Mayo & Duncan, 2004; Ulanimo et al, 2007), this research identified differences in causes of medication errors and their reporting. The findings are similar to those of the study conducted by Osborne et al (1999). These researchers used a
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Modified Gladstone instrument for their study of medical-surgical nurses and identified the 2 most frequent causes of medication errors as failure to check the patient's name band with the medication administration record and fatigue or exhaustion on the part of the nurse. The third top ranked causes of drug errors were when the physician's writing on the doctor's order form is difficult to read or illegible and when the nurse miscalculates the dose. Similarly, these causes were also identified as the 3 most frequent causes of MEs by various researchers (Mayo & Duncan, 2004; Ulanimo et al, 2007). Concerning nurses' views of reported rate of medication errors. Consistent with Osborne et al (1999), the majority of nurses believed only 30% of errors were reported to nurse manager via an incident report. Inconsistent with Stratton et al (2004) who found pediatric nurses estimated that 67% of medication errors on their patient care unit are actually reported.

5.3 Classifications & Reporting of Medication Errors

Also, similar to the previously mentioned studies (Gladstone, 1995; Osborne et al, 1999; Mayo & Duncan, 2004; Ulanimo et al, 2007) there were differences identified in reporting of MEs and perceived barriers to reporting. Although the majority (82.3%) knew what constitutes a medication error and when to report it, strong barriers to reporting were linked with interpersonal reactions from managers and staff, and disciplinary action. This low reporting rate can reflect nurses' ability to recognize an error and willingness to report it through formal mechanisms of reporting. Inconsistent finding in the literature is that nurses and physicians can identify error events, but nurses are more likely to submit

written reports or use other error-reporting systems than are physicians (Wolf & Hughes, 2008).

6 LIMITATIONS & CONCLUSION

6.1 Limitations and Challenges

We acknowledge several delimitations and limitations that could make vulnerable the internal and external validity of this study. Although this study was designed to provide an initial picture of nurses' perceptions of MEs involving geriatric patients and their reporting behaviour, there were several challenges encountered throughout this process. First and foremost, the sample size of this study was small, and therefore, the findings may not be generalizable. Habitually, this may result in a selection bias whereby there is an inaccurate representation of the population sample. As such, the use of convenience sample as a method may have increased the probability of selection bias and affected the results. For example, participants chosen for the sample may be unwilling or unable to participate in the survey, which can result in a nonresponse bias. The data were collected within a 12-week time span. Keeping the survey window open longer may have allowed additional nurses to participate. There also was no space for participants to make comments or elaborate on the answers that they provided. Regarding the ranking of medication errors, there may be additional causes that were not identified on this study's survey. However, the top ranked causes from this study could be a starting point for

organizations to address system issues. In addition, the scenarios were brief and did not provide situational details.

Some challenges of this study include: inability of nurse to participate due to lack of time, overwhelming amount of work and other professional priorities, shortages of staff and interest.

6.2 Conclusion

In conclusion, this study was the first to explore the perceptions of geriatric nurses towards medication errors, causes and incident reporting. There are differences amongst these nurses as to what constitutes a medication error and when it should be reported. It is evident that nurses should be supported and provided numerous training and educational opportunities throughout their career. Health care systems must now have an accurate representation of medication errors with the reporting of errors. In order for this to occur de-stigmatization of those who commit medication errors is necessary. In the long-term, this will change the attitudes of nurses and will significantly increase medication errors reporting.

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Appendix A



uOttawa

Université d'Ottawa

Faculté des sciences
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École interdisciplinaire
des sciences de la santé

University of Ottawa

Faculty of Health
Sciences

Interdisciplinary School
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25 juillet 2014

Comité d'éthique de la recherche
Hôpital Montfort
713 Chemin Montréal
Ottawa, ON K1K 0T2

Objet: Medication Errors Involving Geriatric Patients: Perceived Causes and Reporting Behaviors by Nurses

This letter confirms that the Thesis Advisory Committee comprised of S. Yaya (Supervisor), R. Deonandan (member) and A. Konkle (member) has reviewed and approved the proposal submitted by Idil Ahmed.

The primary responsibilities of the committee are to ensure that the student has the proper academic preparation to carry out the thesis research and to provide appropriate guidance on the progress of the research and the standards expected.

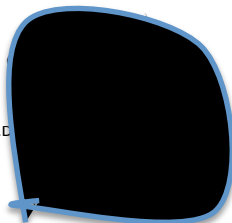
The proposed study examines the perceptions of medication errors among a number of randomly selected nurses at Montfort Hospital. The student will be recruiting nurses who will be asked to fill out a standardized questionnaire. Based on a margin error of 5%, a confidence level of 95% and a population size of 30 nurses, the minimum recommended size of this survey is 28 respondents.

The committee is confident that the sample size is appropriate and in line with established standards.

Sanni Yaya, Ph.D.

Raywat Deonandan, Ph.D.

Anne Konkle, Ph.D.



Appendix B

INVITATION

Titre du projet : Les Erreurs Médicamenteuses chez les Personnes Âgées : Causes perçues et habitudes de signalement chez les Infirmiers et Infirmières.

Nom du chercheur principal : Idil Ahmed, étudiante à la maîtrise, École Interdisciplinaire des sciences de la santé

Nom Du Superviseur : Dr. Sanni Yaya, Professeur agrégé et directeur adjoint, École Interdisciplinaire des sciences de la santé

Idil Ahmed, étudiante à la maîtrise en Sciences Interdisciplinaires de la Santé, sous la supervision de Dr. Sanni Yaya, Professeur agrégé et directeur adjoint, École Interdisciplinaire des sciences de la santé, vous invite à participer à la recherche titrée *Les Erreurs Médicamenteuses chez les Personnes Âgées : Causes perçues et habitudes de signalement chez les Infirmiers et Infirmières.*

Les critères d'inclusions de l'étude sont : Les infirmiers et infirmières à l'hôpital Montfort qui prennent soins des personnes âgées de 65 ans et plus et qui ont la capacité de lire, d'écrire et de comprendre l'anglais et/ou le Français. Le questionnaire d'enquête par conséquent disponible dans les deux langues, soit l'anglais et le français.

Le but de cette étude est d'examiner les perceptions des infirmiers et infirmières concernant les erreurs médicamenteuses chez des personnes âgées, des causes perçues et des habitudes de signalement chez ceux et celles-ci. La compréhension de leurs perceptions est importante d'autant plus que ceci permettrait d'améliorer les taux de déclaration et la sécurité des patients.

La durée prévue de ce projet est du 1^{er} septembre 2014 au 1^{er} novembre 2014.

L'étude contribuera à la recherche dans un domaine largement inexploré. Aussi, le projet fournira de nouvelles informations et des données pratiques sur les perceptions qu'ont les infirmiers et infirmières qui s'occupent des personnes âgées au sujet des erreurs médicamenteuses et les attitudes de ces derniers.

Pour tout renseignement additionnel concernant cette étude, les participant(e)s peuvent communiquer avec le chercheur ou son superviseur aux coordonnées ci-après :

Idil Ahmed
School Of Interdisciplinary Health
Sciences
25 University Street, Rm 140
Ottawa, Ontario, K1N 6N5
(613) 562-5800 ext. 8903

Sanni Yaya, Ph.D.
École interdisciplinaire des sciences de la
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Appendix C

INVITATION

Title of Study: Medication Errors Involving Geriatric Patients, Perceived Causes and Reporting Behaviours By Nurses.

Student Principal Investigator: Idil Ahmed, M.Sc. Student, Interdisciplinary School of Health Sciences, University of Ottawa

Faculty Supervisor: Dr. Sanni Yaya, Associate Professor, Interdisciplinary School of Health Sciences.

Idil Ahmed, M.Sc. Student at the Interdisciplinary Health Sciences, University of Ottawa, invite you to participate in a research project entitled *Medication Errors Involving Geriatric Patients, Perceived Causes and Reporting Behaviours By Nurses*.

The inclusion criteria for the study are staff nurses at the Montfort hospital caring for patients 65 years old and above, and having the ability to read, write and speak English and/or French. As such the questionnaire to be completed by the nurses will be available in both English and French.

The purpose of the study is to explore perceptions of nurses regarding medication errors involving elderly patients, their perceived causes and their reporting behaviours. Understanding their perspective is important to improve self-reporting rates and ultimately improve patient safety.

The expected duration is from September 01, 2014 to November 01, 2014.

The research will contribute to research in a largely unexplored field. It will also provide new insights and practical information about the views of medication errors and self-reporting behaviours of nurses caring for the elderly population.

For any further information concerning this study, please contact the researcher or the researcher's supervisor at one the coordinates below:

Idil Ahmed
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Appendix D

Informed Consent Form

1. GENERAL INFORMATION

Project Title: Medication Errors Involving Geriatric Patients, Perceived Causes and Reporting Behaviours By Nurses.

Principal Investigator's Name

Idil Ahmed, Master's Student
Interdisciplinary School of Health Sciences
University of Ottawa, 25 University Street, Room 140
Ottawa, Ontario, K1N 6N5
Tel. (613) 562-5800 ext. 8903

Co-Investigator's Name

Sanni Yaya, Ph.D., Associate Professor
Interdisciplinary School of Health Sciences
University of Ottawa, 25 University Street, Room 140
Ottawa, Ontario, K1N 6N5
Tel. (613) 562-5800 ext. 8903

2. INTRODUCTION

Before agreeing to participate in this research project, please take the time to read and understand the following information. This document explains the purposes of the research project, its benefits, risks and drawbacks, the estimated time required to answer the questions, confidentiality issues and alternatives to participation. Please ask any of the research team members whose contact information is given above any questions you consider relevant.

3. INVITATION TO PARTICIPATE

You are being invited to participate in the above-named research project conducted by Idil Ahmed, Master's Student at the Interdisciplinary Health Sciences at the University of Ottawa under the supervision of Dr. Sanni Yaya, Associate Professor at the Interdisciplinary School of Health Sciences.

4. PURPOSE

The purpose of the study is to explore perceptions of nurses regarding medication errors involving elderly patients, their perceived causes and their self-reporting behaviours. Understanding their perspective is important to improve reporting rates and ultimately improve patient safety. This study specifically aims to answer these following questions:

NURSES' PERCEPTIONS OF MEDICATION ERRORS INVOLVING

1. What are nurses' perceptions of the causes of medication errors?
2. Which scenarios do nurses perceive as having had a medication error occur and whether or not that error needs to be reported to the physician and/or nurse manager?
3. What are nurses' views about self-reporting of medication errors?

5. INCLUSION AND EXCLUSION CRITERIA

The inclusion criteria for the study are staff nurses at the Montfort hospital caring for patients 65 years old and above, and having the ability to read, write and speak English and/or French.

6. PARTICIPATION

Basically, my participation will consist of reading and signing the consent form and answering the questionnaire given to me. The researchers estimate that it will take you approximately 30 minutes.

7. BENEFITS

Participants will not gain any personal advantages or any direct benefits by participating in this study. However, participating in this research will allow the opportunity to provide input on the causes of medication errors and reporting behaviours of nurses in Canada. The study will contribute to research in a largely unexplored field and will provide new insights and practical information about the views of medication errors and reporting behaviours of nurses caring for the elderly population.

8. RISKS

There are no major risks associated with participating in this research other than those related to a breach of confidentiality. This is why we have put in place strict measures in this regard. Please note that there is the risk that you may find some of the survey questions to be sensitive and this may cause emotional discomfort. If you experience emotional discomfort, you are encouraged to call the Ottawa Mental Health Crisis Line at 1-866-996-0991 or the Ottawa Distress Centre at 613-238-3311 to seek assistance.

9. DATA CONSERVATION

The data gathered in hardcopy (i.e. questionnaires) will be kept in a secure manner. The questionnaires will be locked in cabinet in a locked room at the University of Ottawa for at least five years. After this point data gathered in hardcopy will be shredded. Data on computers will be permanently deleted from servers and all hard drives will be re-formatted to completely erase data. All computer files will be stored on password protected hard drives and all files are password protected and encrypted. Only the principal investigator and the thesis supervisor will have access to the data.

10. CONFIDENTIALITY AND ANONYMITY

I have the researcher's assurance that the information I share with him/her will be kept strictly confidential. I expect that the content to be used only for research and in accordance with confidentiality provisions. Surveys, identifying data, and transcribed notes, will be in locked cabinets, in a locked room where there is no public access. Anonymity will be assured in the following ways: The identity, names or initials of participants will not be identified on the questionnaires and the identity will not be disclosed in publications.

Since participants' responses to the questionnaire are confidential and anonymous, participants do not have to worry about possible legal implications that could result from their participation in this project.

11. VOLUNTARY PARTICIPATION

Your participation in this research is entirely voluntary. You are free to answer the questionnaire(s) or not, or to refuse to answer certain questions, without exposing yourself to any negative consequences to your work. Your decision not to continue participating will not influence your relationship with your employer either now or in the future. You may choose to withdraw at any time, upon verbal or written notice and without giving reasons. If you decide to do so, please contact the investigators. If you stop participating in this study, all files containing the participant's information and all associated data collected will be immediately destroyed. Participants will be notified in a timely manner if new information is likely to affect their willingness to continue participation in the study.

12. COMPENSATION

Participants do not receive any compensation in return for their participation in the proposed study.

13. NOTIFICATION OF RESULTS

Results of the study will be available in the form of summarized reports and its accessibility will be ensured for those interested.

14. CIVIL LIABILITY

My consent to participate in this study does not affect my right to seek legal recourse in any manner whatsoever. If my participation causes me any prejudice, I reserve the right to take any available legal recourse against the various research partners.

15. CONSENT

Acceptance: I, _____, agree to participate in this research conducted by Idil Ahmed, under the supervision of Dr. Sanni Yaya. For any further information concerning this study, I can contact the researcher or the researcher's supervisor.

For information concerning ethical aspects of this research, I may contact the Montfort Hospital Research Ethics Board, 713 Montreal Road, Ottawa, Ontario by telephone at 613-746-4621, extension 2221, or by email at ethique@montfort.on.ca.

There are two copies of the consent form. I understand that I will be given a copy of this form duly signed and dated.

Signature of Participant:

Date:

Signature of Investigator:

Date:

(*for paper forms, you may simply refrain from answering or returning the questionnaire(s) in order not to participate).

Appendix E

Formulaire de consentement

1. RENSEIGNEMENTS GÉNÉRAUX

Titre du projet : Les Erreurs médicamenteuses chez les personnes âgées : Causes perçues et habitudes de signalement chez les Infirmiers et Infirmières.

Nom du chercheur principal

Idil Ahmed, Étudiante à la maîtrise
École interdisciplinaire des sciences de la sante
Université d'Ottawa, 25 Université, pièce 140
Ottawa, Ontario, K1N 6N5
Tel. (613) 562-5800 ext. 8903

Nom du Co-chercheur

Sanni Yaya, Ph.D., Professeur agrégé
École interdisciplinaire des sciences de la sante
Université d'Ottawa, 25 Université, pièce 140
Ottawa, Ontario, K1N 6N5
Tel. (613) 562-5800 ext. 8903

2. INTRODUCTION

Avant d'accepter de participer à ce projet de recherche, veuillez prendre le temps de lire et de comprendre les renseignements qui suivent. Ce document vous explique le but de ce projet de recherche, ses procédures, avantages, risques et inconvénients, le temps requis pour compléter le questionnaire d'enquête, les enjeux relatifs à la confidentialité et à votre participation. Nous vous invitons à poser toutes les questions que vous jugerez utiles à l'un des membres de l'équipe de recherche dont les coordonnées sont indiquées ci-dessus.

3. INVITATION À PARTICIPER

Vous êtes invité(e) à participer au projet de recherche ci-dessus, menée par Idil Ahmed, étudiante à la maîtrise à l'École Interdisciplinaire des sciences de la santé, sous la supervision de Sanni Yaya, Professeur agrégé au sein de la même école.

4. BUT DE L'ÉTUDE

Le but de cette étude est d'examiner les perceptions des infirmiers et infirmières au sujet des erreurs médicamenteuses chez les personnes âgées, les causes perçues et des habitudes d'auto-déclaration chez ceux et celles-ci. La compréhension de leurs perceptions est importante d'autant plus que ceci permettrait d'améliorer les taux de déclaration et la sécurité des patients.

Cette étude vise précisément à répondre aux questions suivantes:

1. Quelles sont les causes des erreurs médicamenteuses chez les infirmiers et infirmières?
2. Quelles situations les infirmiers et infirmières perçoivent comme étant une erreur médicamenteuse et dans quelles mesures ils/elles évaluent si celle-ci doit être signalée au médecin et /ou au gestionnaire clinique ou non?
3. Quels sont les points de vue des infirmières sur la signalisation des erreurs médicamenteuses?

5. CRITÈRES D'INCLUSION ET D'EXCLUSION

Les critères d'inclusions de l'étude sont : Les infirmiers et infirmières de l'hôpital Montfort qui prennent soins des patients âgés de 65 ans et plus et qui ont la capacité de lire, d'écrire et de comprendre l'anglais et ou le français.

6. PARTICIPATION

Ma participation consistera essentiellement à prendre connaissance du formulaire de consentement et à le signer. Je serai aussi appelé(e) à compléter un questionnaire d'enquête. Nous estimons que l'exercice vous prendra approximativement 30 minutes de votre temps.

7. BIENFAITS

Les participants ne retireront aucun bénéfice personnel lié à leur participation à ce projet de **recherche**. Toutefois, leur participation permettra de mieux comprendre les causes des erreurs médicamenteuses et les attitudes des infirmiers et infirmières au chapitre de l'auto-déclaration au Canada. Ce projet de recherche contribuera à améliorer les connaissances sur un domaine qui demeure largement inexploré et fournira nouvelles idées et des informations pratiques sur les perceptions des erreurs médicamenteuses et l'attitude du personnel infirmier qui prend soin de la clientèle âgée à cet égard.

8. RISQUES

Nous estimons qu'il n'existe pas de risque majeur lié à votre participation à cette recherche autre que celle relative au bris de confidentialité. C'est pourquoi nous avons mis en place des mesures rigoureuses afin de protéger vos renseignements personnels. Veuillez prendre note que certaines questions auxquelles vous serez appelé(e) à répondre pourraient être sensibles, ce qui pourrait engendrer de l'inconfort sur le plan psychologique. Si tel venait à être le cas, vous pourriez communiquer avec la ligne de soutien psychologique de la ville d'Ottawa au 1-866-996-0991 ou encore le Centre de détresse psychologique au 613-238-3311 afin d'avoir accès à du soutien.

9. CONSERVATION DES DONNÉES

Les données qui sont recueillies en format papier (ex. questionnaires) seront conservées de façon sécuritaire. Elles seront verrouillées dans un classeur pendant une période de cinq ans dans un local de l'Université d'Ottawa. Par la suite, les données en format papier seront déchetées. Les données sur les ordinateurs seront et effacées de façon permanente à partir de serveurs et les disques durs seront reformatés afin d'effacer complètement toutes les données. Tous les fichiers informatiques seront stockés sur des disques durs protégés par mot de passe et cryptés avec un mot de passe. Seul le chercheur principal et le superviseur de la thèse auront accès aux données.

10. CONFIDENTIALITÉ ET ANONYMAT

J'ai l'assurance du chercheur que l'information que je partagerai avec elle (lui) restera strictement confidentielle. Je m'attends à ce que le contenu ne soit utilisé que pour les fins de la présente recherche. L'anonymat est garanti de la façon suivante : l'identité, noms ou initiales du participant n'est pas requis pour le questionnaire(s) et ne sera pas dévoilée dans des publications.

Puisque les réponses fournies aux questionnaires par les participant(e)s sont confidentielles et que l'anonymat est respecté, les participant(e)s n'ont pas à craindre les possibles implications légales qui pourraient résulter de leur participation à ce projet

11. PARTICIPATION VOLONTAIRE

Votre participation est entièrement volontaire. Vous avez le choix de répondre ou non au questionnaire ou de ne pas répondre à certaines questions sans avoir à subir des conséquences pour votre emploi. Votre refus de participer à l'étude n'affectera par ailleurs d'aucune façon votre relation avec votre employeur ni maintenant et encore moins dans un proche avenir. Vous êtes libre de vous retirer en tout temps par avis verbal ou écrit, sans préjudice et sans devoir justifier votre décision. Si vous décidez de vous retirer de la recherche, veuillez svp communiquer avec les chercheurs. Si vous vous retirez de la recherche, les renseignements personnels et les données de recherche vous concernant et qui auront été recueillis seront détruits. Les participants seront informés en temps opportun si de nouveaux renseignements sont susceptibles d'affecter leur consentement à participer à l'étude.

12. REMBOURSEMENT/INDEMNISATION

Les participants ne recevront aucune indemnisation en échange de leur participation au présent projet de recherche.

13. COMMUNICATION DES RÉSULTATS

Les résultats de l'étude seront disponibles sous la forme de rapports sommaires et seront diffusés aux participant (e)s intéressé (e)s.

14. RESPONSABILITÉ CIVILE

En acceptant de participer à cette étude, je ne suis privé d'aucun droit au recours judiciaire. Si je devais subir un préjudice en lien avec ma participation, je conserverais tous mes recours légaux à l'encontre des différents partenaires de la recherche.

15. CONSENTEMENT

Acceptation : Je, _____, accepte de participer à cette recherche menée par Idil Ahmed sous la supervision de Dr Sanni Yaya. Pour tout renseignement additionnel concernant cette étude, je peux communiquer avec le chercheur ou son superviseur.

Pour tout renseignement sur les aspects éthiques de cette recherche, je peux m'adresser au Comité d'éthique de la recherche de l'Hôpital Montfort, 713 chemin Montréal, à Ottawa, Ontario par téléphone 613-746-4621, poste 2221 ou par courriel à ethique@montfort.on.ca

Il y a deux copies du formulaire de consentement. Je comprends que je vais recevoir une copie de ce formulaire dûment signé et daté.

Signature du participant :

Date :

Signature du chercheur :

Date :

(* pour les formulaires papier, vous pouvez tout simplement s'abstenir de répondre ou de retourner le questionnaire (s) afin de ne pas participer).

Appendix F

Nurse Perception of Medication Errors Modified Gladstone 2001

Why Do You Think Medication Errors Occur?

1. The following ten statements are all possible causes of medication errors.

* Please read them carefully and Rank #1 to #10. (#1 is the most frequent and #10 the least frequent.

- a. _____ Drug errors occur when the nurse fails to check the
_____ patient's name band with the Medication Administration
Record (MAR.)
- b. _____ Drug errors occur when the physician's writing on the
_____ doctor's order form is difficult to read or illegible.
- c. _____ Drug errors occur when the medication labels/packaging
_____ are of poor quality or damaged.
- d. _____ Drug errors occur when there is confusion between two
_____ drugs with similar names.
- e. _____ Drug errors occur when the physician prescribes the
_____ wrong dose.
- f. _____ Drug errors occur when the nurse miscalculates the dose.

- g. _____ Drug errors occur when the nurse sets up or adjusts an
_____ infusion device incorrectly.
- h. _____ Drug errors occur when nurses are confused by the

different types and functions of infusion devices.

- i. Drug errors occur when nurses are distracted by other
_____ patients, coworkers or events on the unit.
- j. Drug errors occur when nurses are tired and exhausted.

2. **In your estimation, what percentage of all drug errors is reported to the Nurse Manager by the completion of an incident report? (Please write the percentage that corresponds most closely to your estimation on the line below.)**
- _____

NURSES' PERCEPTIONS ABOUT MEDICATION ERRORS:

*** It is not always clear to nurses whether what they view as a minor drug discrepancy should be reported as a medication error. In the following examples you are asked to indicate:**

- a. Whether or not a medication error occurred.
- b. Whether or not the physician should be notified.
- c. Whether or not an incident report should be completed.

*** Please answer "YES" or "NO" for each of the following statements:**

- 1. A patient misses his midday dose of oral ampicillin because he was in X-Ray for three hours.**

- a. Drug Error _____ Yes _____ No
- b. Notify Physician _____ Yes _____ No
- c. Incident Report Necessary _____ Yes _____ No

- 2. Four patients on a busy surgical unit receive their 6:00pm doses of IV antibiotics 4 hours late.**

- a. Drug Error Yes No
- b. Notify Physician Yes No
- c. Incident Report Necessary Yes No
- 3. A patient receiving TPN feeding via an infusion pump is given 200 ml/hr instead of the correct rate of 125 ml/hr for the first three hours of the 24-hour infusion. The pump was reset to the correct rate after the change of shift at 7:00am when the oncoming nurse realized that the pump was set at the incorrect rate.**
- a. Drug Error Yes No
- b. Notify Physician Yes No
- c. Incident Report Necessary Yes No
- 4. A patient admitted with status asthmaticus on 08/13/97 at 2:am is prescribed ventolin nebulizers every four hours. The nurse omits the 6:00am dose on 08/13/97 as the patient is asleep.**
- a. Drug Error Yes No
- b. Notify Physician Yes No
- c. Incident Report Necessary Yes No
- 5. A physician orders Percocet 1-2 tabs for post-op pain every 4 hours. At 4:00pm the patient complains of pain, requests one pill and is medicated. At 6:30pm the patient requests the second pain pill. The nurse administers the pill.**
- a. Drug Error Yes No
- b. Notify Physician Yes No
- c. Incident Report Necessary Yes No

15. Age _____ Gender _____M _____F

16. Check highest level of education

_____ Diploma in Nursing (1)

_____ Associate Degree in Nursing (2)

_____ Bachelor of Science Degree in Nursing (3)

_____ Master of Science in Nursing (4)

_____ Other: (specify) (5)

17. How long have you been qualified to administer medications? _____ Years

18. How long have you been a practicing nurse? _____ Years

19. How many medication errors do you remember making over the course of your career? (Circle the correct answer.)

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, more than ten please specify _____.

20. What is your work schedule? _____ Full-time _____ Part-time

21. Which shift do you work?

_____ 7:00am-7:00pm (12 hour shift) (1)

_____ 7:00pm-7:00am (12 hour shift) (2)

_____ Day shift (8 hour shift) (3)

_____ Evening shift (8 hour shift) (4)

_____ Night shift (8 hour shift) (5)

_____ Other

22. What is your primary hospital work setting?

Appendix G

Perception des Infirmières sur les Erreurs de Modes d'Administration de Médicaments (Médication)

Gladstone 2001, adapté

Selon vous, pourquoi se produisent-elles, les Erreurs de Médication ?

3. Les dix propositions suivantes sont toutes des causes possibles d'erreurs de médication.

*** Veuillez les lire attentivement afin de les classer de #1 à #10. (Le #1 étant la cause la plus fréquente et le #10 la moins)**

- _____ b. Les erreurs de médication se produisent surtout quand l'infirmière ne procède pas à la vérification de l'identité du patient et de sa fiche d'administration des médicaments.
- _____ b. Les erreurs médicamenteuses se produisent lorsque l'écriture du médecin sur l'ordonnance médicale est difficile à lire ou illisible.
- _____ c. Les erreurs médicamenteuses se produisent lorsque les étiquettes et / ou emballages de médicaments sont de mauvaise qualité ou endommagés.
- _____ d. Les erreurs médicamenteuses se produisent quand il y a une confusion entre deux médicaments avec des noms similaires.
- _____ e. Les erreurs médicamenteuses se produisent lorsque le médecin prescrit la mauvaise dose.
- _____ f. Les erreurs médicamenteuses se produisent lorsque l'infirmière a mal calculé la dose.
- _____ g. Les erreurs médicamenteuses se produisent lorsque l'infirmière met en place ou adapte un dispositif de perfusion de façon incorrecte.
- _____ h. Les erreurs médicamenteuses se produisent lorsque les infirmières ne

- _____ maîtrisent pas les différents types et fonctions des dispositifs de perfusion
- i. Les erreurs médicamenteuses se produisent lorsque les infirmières sont
_____ distraits par d'autres patients, les collègues de travail ou par tout autre événement se produisant dans la salle.
- j. Les erreurs médicamenteuses se produisent lorsque les infirmières sont
_____ fatiguées et épuisées

4. **Selon vous, quel est le pourcentage de toutes les erreurs de médication faisant l'objet de déclaration à l'infirmière gestionnaire pour l'accomplissement d'un rapport d'incident? (S'il vous plaît écrivez le pourcentage qui correspond le mieux à votre estimation sur la ligne ci-dessous.)**
- _____

PERCEPTION DES INFIRMIÈRES SUR LES ERREURS DE MEDICATION :

*** Il n'est pas toujours évident pour les infirmières de savoir si ce qu'elles considèrent comme un léger écart de drogue doit être signalé comme une erreur de médication. Dans les exemples suivants, vous êtes invités à indiquer:**

- d. Qu'il y ait une erreur de médication ou non
- e. Que le médecin en soit informé ou non
- f. Qu'un rapport d'incident soit rempli ou non.

*** S'il vous plaît répondre «OUI» ou «NON» pour chacune des affirmations suivantes:**

7. **Un patient manque sa dose de midi de l'ampicilline orale parce qu'il était au service de radiographie pour trois heures.**

- | | | | |
|----|-----------------------------------------------------|-----|-----|
| a. | Erreur de médicament | OUI | NON |
| b. | Nécessité de prévenir le médecin | OUI | NON |
| c. | Nécessité d'un rapport de déclaration de l'incident | OUI | NON |

8. Dans un service de chirurgie très occupé, quatre patients y reçoivent par IV leurs doses d'antibiotiques de 18 :00 avec un retard de 4 heures de temps.

- | | | | |
|----|-----------------------------------------------------|-----|-----|
| a. | Erreur de médicament | OUI | NON |
| b. | Nécessité de prévenir le médecin | OUI | NON |
| c. | Nécessité d'un rapport de déclaration de l'incident | OUI | NON |

9. Un patient sous une nutrition parentérale exclusive, doit recevoir par l'intermédiaire d'une pompe à perfusion 200ml/h au lieu du taux correct de 125 ml / h pendant les trois premières heures des 24 heures de perfusion . La pompe a été remise à la bonne vitesse après le changement d'équipe de travail de 07h00 quand l'infirmière assurant la relève s'est rendu compte que la pompe a été fixée à un débit incorrect.

- | | | | |
|----|-----------------------------------------------------|-----|-----|
| a. | Erreur de médicament | OUI | NON |
| b. | Nécessité de prévenir le médecin | OUI | NON |
| c. | Nécessité d'un rapport de déclaration de l'incident | OUI | NON |

10. Un patient admis pour une crise d'asthme le 08/13/97 à 2 H du matin, est mis sous traitement de nébuliseurs ventolin toutes les quatre (4) heures. Comme le patient s'est endormi, l'infirmière omet la dose de 6:00 de la matinée du 08/13/97.

- | | | | |
|----|-----------------------------------------------------|-----|-----|
| a. | Erreur de médicament | OUI | NON |
| b. | Nécessité de prévenir le médecin | OUI | NON |
| c. | Nécessité d'un rapport de déclaration de l'incident | OUI | NON |

11. Un praticien prescrit 1-2 tablette de Percocet contre la douleur post-op toutes les 4 heures. A 16h00 le patient se plaint de douleurs, demande une pilule qui lui est administrée. A 18h30 le patient demande une deuxième pilule de douleur. L'infirmière lui administre la pilule.

- | | | | |
|----|----------------------------------|-----|-----|
| a. | Erreur de médicament | OUI | NON |
| b. | Nécessité de prévenir le médecin | OUI | NON |

c. Nécessité d'un rapport de déclaration de l'incident OUI NON

12. Un patient est sous un traitement de routine de la digoxine, en raison d'une dose à 9h pour chaque matin. Son taux de digoxine d'hier était de 1,8 (la plus haute valeur normale). Ce taux digoxine s'est établi aujourd'hui à 6 H du matin. A 9h, l'infirmière retient la digoxine car les résultats de test de laboratoire ne sont pas encore disponibles.

a. Erreur de médicament OUI NON

b. Nécessité de prévenir le médecin OUI NON

c. Nécessité d'un rapport de déclaration de l'incident OUI NON

*** Quels sont vos points de vue sur la déclaration des erreurs de médication? S'il vous plaît choisissez la réponse la plus appropriée:**

9. Je suis sûr de ce qui peut conduire à une erreur de médication OUI NON

10. Je suis sûr qu'une erreur de médication devrait être déclarée dans un rapport d'incident
OUI NON

11. Si certaines erreurs de médication ne font pas l'objet de déclaration, c'est parce que les infirmières auraient peur de la réaction de l'infirmière gestionnaire.
OUI NON

12. Certaines erreurs de médication ne sont pas signalées parce que les infirmières ont peur de la réaction qu'elles recevront de leurs collègues.
OUI NON

13. Avez-vous déjà omis de déclarer une erreur de médicament parce que vous ne pensiez pas que l'erreur était grave pour la justifier dans un rapport d'incident
OUI NON

14. Avez-vous déjà omis de déclarer une erreur de médication parce que vous aviez peur que de faire l'objet de mesures disciplinaires, voire de perdre votre emploi?
OUI NON

Votre formation et expérience:

* S'il vous plaît fournir des informations ci-dessous.

23. Age _____ Genre _____ M _____ F

24. S'il vous plaît, veuillez indiquer votre plus haut niveau d'instruction :

_____ Diplôme en soins infirmiers (1)

_____ Diplôme associé en sciences infirmières (2)

_____ Baccalauréat ès sciences en soins infirmiers (3)

_____ Maîtrise ès sciences en soins infirmiers (4)

_____ Autres : (à spécifier) (5)

25. Combien de temps avez-vous été qualifié pour administrer des médicaments?

_____ Ans

26. Combien de temps avez-vous été infirmière praticienne? _____ Ans

27. Souvenez-vous de combien d'erreurs de médication commises au cours de votre carrière ? (Encerclez la bonne réponse.)

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, _____. Si plus de dix, spécifiez s'il vous plaît.

28. Quel est votre programme de travail? ____ Temps plein ____ Temps partiel

29. Quels sont votre horaire et équipe de travail?

_____ 7:00-19:00 (équipe travaillant 12heures) (1)

_____ 19 :00- 7 :00 (équipe travaillant 12heures) (2)

_____ Equipe de jour (travaillant 8heures) (3)

Poste de jour

_____ Equipe de soir (travaillant 8 heures) (4)

_____ Equipe de nuit (travaillant 8 heures) (5)

_____ Autres

30. Quel est votre premier centre-hospitalier de travail?
