Factors Contributing to Medication Administration Errors and Barriers to Self-Reporting among Nurses: A Review of Literature

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Abstract

Background

Medication Administration Errors (MAEs) are common among nurses and can threaten all patients' outcomes. Furthermore, MAEs are the leading cause of incidents in patient safety records worldwide.

Objective

To review the types of medication administration errors, factors contributing to MAEs and barriers to self-reporting among nurses.

Methods

A review of the literature was done and included original articles and grey literature from January 2011 until July 2017. An advanced search was done in Medline, HINARI, PubMed, CINAHL, Science direct, Google Scholar and gray literature using a Boolean combination of different keywords such as "medication administration error", "adverse drugs reactions", barriers and "self-reporting".

Results

257 articles were eligible for review but only27 articles met the inclusion criteria**.** Types of MAEs mainly focused on seven rights (right patient, right drug, right dose, right time, right route, right reason and right documentation). With regards to the types of MAEs, the wrong time was most prevalent in this study. Being overworked was the main factor contributing to medication administration errors. The barriers to self-reporting during MAEs were dominated by fear of disciplinary action. Nurses' characteristics such as age, experience, education, variations in how errors are defined and organizational factors such as power, distance and lack of reporting policies were found to be barriers to self-reporting. In addition to that, others were identified.

Conclusion

Globally, MAEs remain a pervasive problem among nurses. Contributing factors range from individual to organizational factors, and barriers to self-report are due to fear of legal action and punishment. There is a need to devise measures that will prevent these errors and to promote positive clinical outcomes of patients in healthcare settings.

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Keywords: contributing factors, medication administration errors, barriers, self-reporting, nurse.

Introduction

Medication administration error (MAE) is any preventable act that contributes to the failure of proper medication use or causes problems for the patient while in the care of a healthcare professional, clients, or consumer.[1] MAEs happen at different stages in the medication use process, including prescribing, provision and administration.[2,3] Such errors may be associated with healthcare professionals' practices or techniques, products or drugs and systems, including prescription, miscommunication, labeling, packaging and nomenclature, assembling, distributing and administration.[1]

MAE is a global challenge and 18.7%-56% of hospitalized patients face medication administration errors.[4]A study done in Australia found that 60% to 80% of patients faced MAEs and omission errors accounted for between 40% to 60%.[5] In Nigeria, the prevalence of MAEs among nurses was 64%, whilst 44% did not know of the existence of a reporting system, and a minority of 30% reported MAEs among pediatric nurses.[6]

MAEs impact negatively on patients in terms of morbidity, mortality, Adverse Drugs Reactions (ADRs), and increased the length of hospitalization. In the

report called "To Err is Human: Building a Safer Health System" published by the Institute of Medicine (IOM) located in the United States of America confirmed the fact that each year MAEs cause more than 7,000 deaths. [3] Additionally, the National Coordinating Council for Medication Error Reporting and Prevention of Medication Errors, USA, also revealed that medication errors cause injury to at least 1.5 million people, and to treat those injuries costs approximately 3.5 billion dollars per year.[7]

MAEs are common among nurses and can threaten all patients' outcomes, but mainly the pediatric population [8, 9], due to their physiological and developmental needs.[10] The available literature reported that nurses are reported to commit more MAEs as compared to other health care professionals like medicine and anesthesia.[11]

The first step to reduce MAEs among nurses is to identify the types of commonly occurring errors,[12, 13] assess the factors contributing to those errors, as well as barriers to self-reporting, and to set up appropriate preventive measures.[14, 15] However, there is no documented summative review of literature that identifies types of MAEs and factors contributing to medication administration errors, as well as barriers to self-reporting among nurses at the same time. Therefore, this current review aims to integrate studies that were done in relation to this topic and to identify the types of medication administration errors, factors contributing to MAEs and barriers to self-reporting. The identification of the aforementioned attributes will aid in implementing measures for the prevention of any MAEs and improving the management of patients in healthcare settings.

Methodology

A review of the literature was conducted and included original articles and grey literature from January 2011 until July 2017. An advanced search was done in Medline, HINARI, PubMed, CINAHL, Siencedirect, Google Scholar and gray literature using a Boolean combination of different keywords such as medication administration errors' AND 'factors' OR 'self-reporting' AND 'nurses' AND 'barriers'. For a comprehensive search, the following alternative words were used 'contributing factors to medication administration errors', 'medication errors', 'adverse drugs reactions' and 'barriers to self- reporting'. Both quantitative and qualitative studies written in English were included in this review to identify the factors contributing to MAEs and barriers to self-reporting among nurses. Comments, editorials, systematic reviews and studies with no outcome of interest were excluded from this review of the literature. Three authors did the first search and selection, and two other authors checked the articles and agreed on the included articles. All 27 articles were reported in the matrix which included authors, title and journal, study type, study design study population, and sample size (Table 1).

Data analysis

Descriptive analysis was used to identify the frequencies of MAEs, factors contributing to MAEs and barriers to self-reporting after committing an error. Tables were used.

Results

Studies included

Initially, 257 studies (Figure 1) were obtained from the research. Following inclusion and exclusion criteria, only 27 articles (Table 1) were considered including 26 quantitative studies and 1 qualitative study.

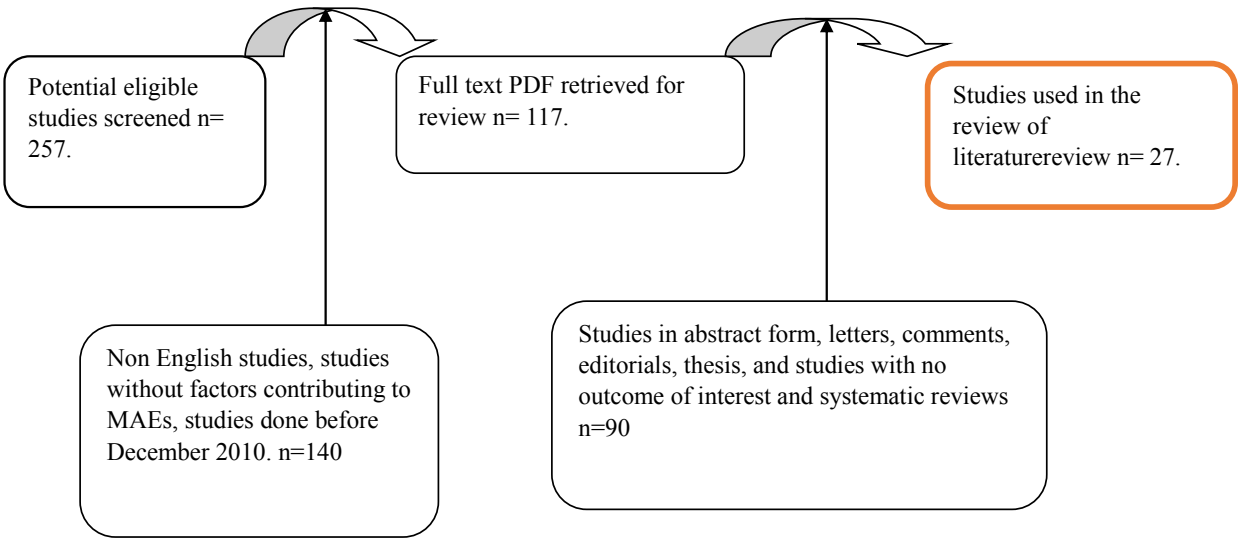

Figure 1. Diagram of studies selection flow

Table 1. Details of 27 articles reviewed

Author/Year/Title	Journal	Research approach and design	Country	Study population			Main results
					Types of MAEs	Factors contributing to MAEs	Barriers to self-reporting
Feleke, Mulatu and Yesmaw. 2015 Medication administration error: magnitude and associated factors among nurses	*BMC Nursing*	Quantitative Cross-sectional	Ethiopia	82	Documentation, technique and time	Age, experience, nurse to patient ratio, interruption, night shift and age of the patients	-
Aboshaiqah, 2014 Nurses' perception of medication administration errors	*American Journal of Nursing Research*	Quantitative Cross- sectional	Saudi Arabia	309	Time, technique, dose, medication without physician order and route	No knowledge on new medication, communication between nurses and physicians, change of orders frequently by physicians, some orders were not clear	-
Miladinia, Zarea, Baraz and Nouri, 2016. Pediatric nurses ' Medication Error : the Self-reporting of Frequency, Types and Causes	I*nternational Journal of Pediatric*	Quantitative Cross- sectional	Iran	53	Dose and drug	Poor medication knowledge and calculation skills.	-
Oshikoya et al., 2013 MAEs among pediatric nurses in Lagos public hospitals : An opinion survey	*International Journal of Risk & Safety in Medicine*	Quantitative Cross- sectional	Nigeria	75	Dose and time	Workload and no double checking	fear of intimidation, retribution or being punished and lack of policies in place to report errors.
Abdar, Tajaddini, Bazrafshan, Khoshab and Tavan, 2014 Registered nurses perception of medication errors: A cross-sectional study in Southeast of Iran.	*International Journal of Nursing Education*	Quantitative Cross- sectional	Iran	238	-	Workload, physician's and night shift	-
Bifftu et al., 2016 Medication administration error reporting and associated factors among nurses working at the University of Gondar referral hospital, Northwest Ethiopia	*BMC Nursing*	Quantitative Cross- sectional	Ethiopia	282	Route, time and patient	-	Level of education, disagreement over time - error definition, administrative reason and fear
Ebrahimipour et al., 2016 Evaluation of medication errors by nurses in hospitals affiliated with Mashhad University of Medical Sciences, Mashhad, Iran	*Patient Saf Qual Improv J.*	Quantitative Cross- sectional	Iran	530	Time, administration without physician order	-	Blame and fear of negative consequences

Rahimi et al., 205 Factors influencing medication errors according to nurses' decisions to do self-report	*Int J Basic Clin Pharmacol.*	Quantitative Analytical	Iran	100	Patient, dose, time, medication	Workload, unit and nurse-physician relationship	-
Zakharov, Tomas and Pelclova, 2012. Medication errors; an enduring problem for children and elderly patients	*Ups J Med Sci.*	Quantitative Retrospective	Czech Republic	215	Dose, drug and route	Sound-like drugs	-
Ojerinde and Adejumo, 2014. Factors associated with medication errors among health workers In University College Hospital, Nigeria	*Journal of Nursing and Health Science*	Quantitative Descriptive	Nigeria	333	Dose	Workload, interruptions, drug labeling and packaging	Fear of punishments
Khammamia and Rvangard, 2015. Medical errors and barriers to reporting in ten hospitals in Southern Iran.	*Malays J Med Sci*	Quantitative Cross-sectional	Iran	327	-	Largest hospital, internal wards, individual and organizational	Work experience
Vilela and Jerico, 2015 Medication errors : management of the medication error indicator toward a more safety nursing practice	*J Nurs UFPE line*	Quantitative Descriptive and Exploratory (Retrospective)	Brazil	90	Omission, patient and time	Lack of attention and workload	-
Johari et al., 2015 Medication errors among nurses in Government Hospital	*Journal of Nursing and Health Science*	Quantitative Cross- sectional	Malaysia	48	-	Personal neglect, heavy workload, new staff and complicated orders.	-
Tabatabaee et al., 2014 Barriers to medication error reporting from nurses' perspective: a private hospital survey.	*International Journal of Hospital Research*	Quantitative Cross-sectional	Iran	97	-	-	Fear of legal involvement, fear of losing a job, and fear of the consequences
Yung et al., 2016 Nurses' attitudes and perceived barriers to the reporting of medication administration errors.		Quantitative Cross-sectional	Taiwan	306	-	-	Fear of the negative consequences
Saleh Alduais et al., 2014 Barriers and strategies of reporting medical errors in public hospitals in Riyadh city: a survey-study.	*Journal of Nursing and Health Science*	Quantitative Survey approach	Saudi Arabia	467	-	-	Blame, punishment, filling in the form; poor knowledge
Bahadori et al., 2014 The factors affecting the refusal of reporting on medication errors from the nurses' viewpoints: a case study in a hospital in Iran.	*ISRN Nurs*	Quantitative Cross- sectional	Iran	100	-	-	Managerial factors, process of reporting and fear of the consequences of reporting.
Abou Hashish and El-Bialy, 2013. Nurses' perceptions of safety climate and barriers to report medication errors	*Life Science Journal*	Quantitative Correlational	Egypt	204	-	-	Disagreement over what a medication error is and its definition, and power distance.

Mohammad, Aljasser and Sasidhar, 2016. Barriers to Reporting Medication Administration Errors among Nurses in an Accredited Hospital in Saudi Arabia.	*British Journal of Economics, Management & Trade*	Quantitative Cross- sectional	Saudi Arabia	300			Administrative response and fear.
Hardmeier et al., 2014 Pediatric Administration Errors and Workflow Following Implementation of a Bar Code Medication Administration System.	*J Healthc Qual*	Quantitative Observational	California, USA	300	Route, technique, time and omission	-	-
Sears and Goodman, 2012. Risk Factors for Increased Severity of Paediatric Medication Administration Errors.	*Healthc Plicy*	Quantitative Observational	Canada	272	Time	Insufficient training, workload, teaching a student and off-service patient.	-
Abdel-Latif, 2016 Knowledge of healthcare professionals about medication errors in hospitals	*J Basic Clin Pharma*	Quantitative Cross- sectional	Saudi Arabia	151	Prescribing and administration errors	-	No clear mechanism available for reporting and poor knowledge about self-reporting.
Al-Youssif, Mohamed and Nabila, 2013 Nurses' experiences toward Perception of MAEs Reporting	*J Nurs Heal Sci*	Quantitative Cross- sectional	Saudi Arabia	253	-	Medication package, system, documentation-transcription, physician-nurse and pharmacy reasons.	Fear reasons, administrative reasons, disagreements over time - error definition reasons.
Zamanzadeh et al., 2012 Medication Error Reporting Rate and its Barriers and Facilitators among Nurses.	*J Caring Sci.*	Quantitative Descriptive		733	-	-	Blaming, negative consequences of reporting errors, and fear of reprimand and punishment.
You et al., 2015 Perceptions regarding MAEs among hospital staff nurses of South Korea.	*Int J Qual Heal Care.*	Quantitative Cross- sectional	South Korea	312	Patient, dose and drug	Workload and administering drugs with similar names or labels	Blaming and having too much emphasis on MAEs as a measure of nursing care quality.
Samsiah et al., 2015 Perceptions and Attitudes towards Medication Error Reporting in Primary Care Clinics : A Qualitative Study in Malaysia.	*PLoS One*	Qualitative Focus groups	Malaysia	31			The nature of the error, reporting system, organizational factors, provider factors, reporter's burden and benefit of reporting.
Abdullah and Sameen Barriers that Prevent the Nursing Staff from Reporting Medication Errors in Kirkuk City Hospitals.	*Kufa J Nurs Sci*	Quantitative Descriptive	Iraq	150	-	Physician orders are not clear, inadequate staff and absence of pharmacists	Fear, administrative process and lack of a clear definition of an error**.**

Types of medication administration errors

About 9 articles reported different types of medication administrations errors. The most reported medication administration error in this review was incorrect time.[5, 11–13, 15–19] The second error was the wrong dosage or wrong dosage calculation which was reported by 7 articles.[5, 9, 11, 15, 20–22] Other types of errors identified were incorrect medication,[9, 20–22]incorrect route,[12, 15, 18, 21]incorrect patient,[5, 12, 21, 22]error in technique,[16, 18, 23] omitting a drug due to drug availability[17, 18] and administration of a drug which is not prescribed.[13, 15]There was another type of error that was less apparent which is documentation.[16]

Table 2.Types of medication errors

Types of error	Number of articles
Incorrect time	9
Incorrect dosage	7
Incorrect technique	3
Incorrect medication	4
Incorrect route	4
Incorrect patient	4
Omission	2
Documentation	1
Administration of a drug which is not prescribed	2

Factors contributing to medication administration errors

Factors contributing to MAEs evident in this review can be categorized as follows; nurse-related factors, physician-related factors, nurse-physician related factors and organizational factors.

Table 3. Factors contributing to medication administration errors

Factors	Number of articles
Nurse factors	
Age	1
Work experience	1
Poor medication knowledge	2
Poor calculation skills	1
No double checking of drugs	1
Inattention, negligence	2
New staff	1
Medication package/similarity	4
Insufficient training	1
Teaching a student	1
Physician factors	
Physicians change orders	5
Nurse-physician factors	
Poor relationship between nurses and physicians	3
Organizational factors	
Nurse patients' ratio	1
Shift	2
Workload	8
Interruptions	2
Unit	1
Pharmacy reasons	1
Individual factors in the view point of manager	2
Patient factors	
Patient age	**1**
Off-service patient	1

Nurse-related factors

In this review, nurse related factors were factors such as demographic characteristics, including age,[16] work experience,[16] being new nurse,[24] individual knowledge and skills about a medication,[15, 20] and dosage calculation.[20] Other nurse related factors are linked to their daily work, such as lack of double checking of drugs, [11] inattention or negligence,[17, 24] how a medication is packaged/visible,[9, 21, 22, 25] insufficient training and teaching a student.[19]

Physician-related factors

Change of medication orders which sometimes are not clear were mentioned as factors related to MAEs in 5 articles.[11, 15, 24–26]

Nurse-physician related factors
Poor communication between nurses and physicians [5, 15, 25] is the only nurse-physician related factor contributing to medication administration error reported in this review.

Organizational factors
There were many errors related to organizations. Being overworked was most prominent.[5, 9, 11, 17, 19, 22, 24, 27] Nurse to patient ratio [16] was another factor where nurses claimed to care for more patients due to patient overcrowding. Nurses also reported that the night shift [16, 27] was contributing to medication administration errors. Medication errors also vary depending on the unit or the department.[14] They were also other organizational factors such as interruptions during medication administration,[9, 16] pharmacy procedures [25] and viewpoint of the manager regarding administration errors.[13, 14]

Patient-related factors
The factor reported here was age,[16] where errors in administration are commonly found in the pediatric department and off-service patient.[19]

Barriers to self-reporting
Regarding barriers to self-reporting evident in this review, they can be categorized as follows; reporting outcomes associated barriers, organizational barriers, nurse related factors and other various factors.

Table 4. Barriers to self-reporting

Self-reporting barriers	Number of articles
Self-reporting outcomes	
Fear of negative consequences	13
Blame	4
Organizational factors	
Lack of policies to report	1
Managerial/administrative factors	5
Process of reporting	4
having too much emphasis on MAEs as a measure of nursing care quality	1
Power distance	1
Nurse factors	
Level of education	1
Experience	1
Disagreement on what medication error is and its definition	4
Other	
Nature of the error	1

Self-reporting outcomes
In this review, fear of negative consequences such us punishment and losing a job after self-reporting [9,11, 32–34,12,13,25,26,28–31]and fear of blames [13,22,30, 33] were reported to be barriers to self-reporting.

Organizational factors
Lack of policies in different institutions,[11] managerial/ administrative factors,[12,25,26,31,32] unclear or long process to report,[23,30,31,34] such as having too much emphasis on MAEs as a measure of nursing care quality [22]were some of the factors that were reported in this review. Power distance,[35] the way nurses view and accept an unequal sharing of power from managers was another contributing factor.

Nurse-related factors

Disagreement of what medication error is and its definition[12,25,26,35]was reported as a barrier. Nurses who had less job experience were likely to report compared to those who have more experience.[14] It was also observed that nurses' level of education is a barrier to self-reporting,[12] with a bachelor's degree exhibiting higher perception levels of barriers in reporting MAEs
.

The nature of the error
The nature of the error was found to be a barrier to self-reporting[34] among nurses. But in the end, nurses agreed that actual errors and near misses should be reported as this will portray a complete picture of all sources of risks and events that are harmful to patients.

Discussion

This literature review found 27 articles reporting the types of errors in the administration of medications, factors contributing to those errors and barriers to self-reporting when errors are committed. This review has an added value as it aids the reader in identifying the types of errors in the administration of medications, factors contributing to those errors and barriers to self-reporting at the same time. The previous reviews were only focusing on one aspect; either on errors in the administration of medication,[36] factors contributing to those errors,[37] or on self-reporting.[38]

Medication administration is the last and key step in the medication process, and if not done correctly, it can harm patients. Identifying administration errors is very important to determine early interventions. The literature showed that there are many types of administration errors.[39] The articles in this review identified various types of errors and are mainly focusing medication administration rights. The incorrect time was the most prevalent in this study. However, there is an inconsistency in previous reviews[36, 40] about the most commonly occurring administration errors probably due to different methods used in the different studies.

Factors of MAEs found in this review were wide-ranging. Being overworked was the most prevalent. The studies revealed that it is impossible to expect nurses to avoid MAEs when they themselves are stressed out and fatigued.[2,4,5,8,13,24] The issue of overworking among nurses was reported in other reviews[41]and revealed that overworked nurses almost seem to be the norm rather than the exception, but this negatively impacts patient safety. Nurses are human beings and have to get sufficient time to rest to ensure safe drug administration. The other commonly contributing factors were unclear orders from physicians and other organizational factors. The findings are reported in other previous reviews.[16,36,42]

Nurses have the professional, legal and ethical responsibility to recognize and report errors that occur during medication administration.[12] However, nurses may be reluctant to report for various reasons.The barriers to self-reporting during medication administration reported in this review were dominated by fear of disciplinary actions. Nurses' characteristics such as age, experience, education, variations in how errors are defined were found to be additional barriers. In addition to that, other organizational factors such as power distance and lack of reporting policies were identified. These findings are supported by other reviews and studies about barriers to self-reporting but with different ranking order.[12, 22, 43]

Limitations of the review

There was only one qualitative study identifying factors contributing to medication errors and barriers to self-reporting. The search was limited to studies from 2011 to 2017. More contributing factors to medication errors and barriers to self-reporting might have been missed from studies dated 2010 and earlier. Fewer studies were identified from African countries . Due to different geographical locations and working conditions among nurses, medication errors and barriers to self-reporting cannot be generalized to Africa.

Conclusion

In conclusion, incorrect time was commonly found in literature as a MAE. Workload was the common contributing factor to the MAEs and fear of negative consequences after self-reporting was the common barrier to self-report after committing an error. Most of the researches that have been conducted to rule out the factors contributing to MAEs and barriers to self-reporting have urged that the prevention be based first on the identification of those factors and on finding a way forward. They have also proposed some strategies that are not negative but encourage nurses to self-report, such as appreciation in the nurses meeting, providing some awards, etc. These measures also prevent the future occurrence of MAEs and increase the level of reporting.

Authors' contribution

The authors contributed in this manuscript as follows: AN, GC and MM developed the concept and study design. MC. U, ML. U and F N did the literature search and data analysis. All authors discussed the results and commented on the manuscript. All authors participated in responding to the reviewers' comments and approving the final version.

Conflict of interest

The authors declare that they have no conflict of interest.

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