Improving patient safety through identifying barriers to reporting medication errors among nurses: an integrative review

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Abstract

Background: The aim of the third WHO challenge released in 2017 was to attain a global commitment to lessen the severity and to prevent medication-related harm by 50% within the next five years. To achieve this goal, comprehensive identification of barriers to reporting medication errors is imperative.

Objective: This review aimed to identify studies that investigated barriers to reporting medication administration errors among nurses, systematically summarize the findings to make recommendations for improving error reporting, and for future investigation.

Design: An integrative review

Review methods: PubMed, Web of Science, EMBASE and the Cumulative Index to Nursing and Allied Health Literature (CINAHL) including Google scholar were searched to identify published studies on barriers to medication error reporting from January 2016 to December 2020. The reviewers independently assessed the quality of all the included studies using the Mixed Methods Appraisal Tool (MMAT) version 2018.

Results: Of the 10937 articles reviewed, 14 studies were included. The main themes and subthemes identified after the integration of results from qualitative and quantitative studies were; organizational barriers (inadequate reporting systems, management behavior, and unclear definition of medication error), and professional and individual barriers (fear of management/colleagues/lawsuit, individual reasons and inadequate knowledge of errors).

Conclusion: It is not expected that nurses will freely report medication errors in a fearful, punitive, and blaming culture. Providing an enabling environment void of punitive measures and blame culture is imperative for nurses to report medication errors. To minimize the burden on nurses reporting medication errors, an effective, non-time consuming, and uncomplicated anonymous system is required. An open feedback system for motivating or rewarding nurses for reporting medication errors is imperative and will therefore increase the rate of error reporting. Policymakers, managers, and nurses should agree on a uniform definition of what constitutes medication error to enhance nurses' ability to report.

Introduction

Improving patient safety remains an ongoing global health challenge for more than two decades after the beginning of the new wave of attention by the United States (US) Institute of Medicine (IOM) in 1999 report "To err is human" [1-4]. According to the National Coordinating Council for Medication Error Reporting and Prevention, medication error is defined as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer" [5]. In March 2017, the World Health Organization (WHO), released an article called "Medication Without Harm, WHO Global Patient Safety Challenge", to gear up the process of change to reduce the impact of patient harm associated with unsafe medication practices by health care practitioners [6]. The aim of the third WHO challenge released in 2017 was to attain a global commitment, involvement, and prevention strategies to lessen the severity and to prevent medication-related harm by 50% within the next five years [6-8]. One of the 10 leading causes of disability and deaths in the world is the occurrence of adverse events arising due to errors [9]. In developed countries, approximately one in every 10 patients suffers harm while receiving care [10, 11] in the hospital with 50% of them being preventable [9]. It is also estimated that each year, 134 million adverse effects occur in hospitals within developing countries resulting in 2.6 million deaths due to unsafe care.

Medication error reporting is a major issue in the health care system and may become indispensable if adequate measures are not taken to ensure an enabling environment in reporting medication errors. Reporting medication

administration errors would help identify potential patient harm and risk, and provide data for clinicians, managers, and researchers to identify and rectify defective systems. A plethora of studies documents that an organizational culture that encourages the reporting of medication administration error is closely concomitant to patient safety [7, 12, 13].

Nurses are the largest healthcare workforce in the healthcare sector and the primary caregivers of patients, and play a vital role in the prevention and detection of adverse events in patients [4] because they are directly involved in the administration of the vast majority of the medications ordered in hospitals [12]. Thus, ensuring a culture in which nurses are empowered to report and challenge unsafe medication administration practices, is fundamental to improve safe practice in health facilities [14].

Nurses reporting medication administration errors is crucial as the incidence garnered could be used to analyze the root causes of medication errors which will further allow for the development of complex medication error prevention mechanisms to improve patient safety. One major limitation to patient safety is the failure to report or underreporting of medication errors and the key step to improve this is to identify the barriers to reporting medication errors among nurses.

Objective

This review aimed to identify studies that investigated barriers to reporting medication administration errors among nurses, to systematically summarize the findings to make recommendations for improving error reporting, and for future investigation.

Methods

An integrative review method based on Whittemore and Knafl's [15] methodological approach was employed to identify primary studies that included 12 quantitative studies, one qualitative study, and one mixed-method study using both qualitative and quantitative designs. The review was guided by the five steps of Whittemore and Knafl's which fostered a thorough methodological approach focusing on problem identification, literature search, data evaluation, data analysis, and presentation of study characteristics [15]. The first step focused on why this review is important. The second step detailed how the reviewers conducted a robust literature search using the Preferred Reporting Items for Systematic reviews and Meta-Analysis guidelines (PRISMA). The third step detailed how the articles were assessed for rigor using the Mixed Method Appraisal Tool (MMAT) version 2018 [16]. The last step involved data analysis and presentation of findings from the reviewed articles.

Problem Identification

The reviewers observed that nurses' inability to report medication administration errors is hindered by multiple organizational and individual barriers. Therefore, the need to systematically synthesize current available studies from a wider international perspective to inform nurses and policymakers on strategies to improve medication administration error reporting and the prevention of patient harm in health facilities.

Literature Search

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was used for the identification and screening of articles [17, 18]. A deep search of electronic databases included; PubMed, Web of Science, EMBASE, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). Articles published between January 2016 to December 2020 were included. To determine the correct search parameters the Population Intervention Comparison Outcome (PICO) framework was used. Nurses were the population for this review, the intervention was reporting medication administration error, there was no comparison and the Outcome was barriers to reporting medication error. The following keywords and combinations were used: medication error*/medicine error*/drug error*;

report*/disclosure; nurs*. The search yielded 10937 articles. Citations for the articles were imported into Endnote X9 (version 1.19.6) reference manager for screening, removal of duplicates, and storage. Additional articles (n=3) were searched from Google Scholar and manually tracing relevant literature from the list of references in the included studies. A total of 7840 non-duplicate articles were screened by title and abstract using the standard integrative review process (inclusion and exclusion criteria). Following the title and abstract screening, 28 articles were included. Of the remaining 28 sources, 14 articles were excluded following full-text review. The reviewers scheduled a meeting to agree on the finalized articles and any discrepancies were resolved through discussions. Finally, a total of 14 studies were included in the review. [Figure 1](#) displays the PRISMA diagram.

Inclusion and exclusion criteria

Inclusion criteria

- Studies published from January 2016 to December 2020.
- Studies focused on barriers to reporting medication errors among nurses in hospitals.

Exclusion criteria

- Studies not published in the English language.
- Studies focused on barriers to reporting medication errors among other health professionals but not nurses.

Data evaluation and analysis

The reviewers independently assessed the quality of all the included studies using the Mixed Methods Appraisal Tool (MMAT) version 2018 [16]. The MMAT tool evaluates the appropriateness of the study aim, study design, methodology, recruitment of participants, data collection, analysis of data, presentation of results, discussions by authors, and conclusions. The studies were rated as high, moderate, and low in quality. The researcher did not assign the overall quality score as it was not recommended by Hong et al. [16].

For data analysis, a matrix was developed to extract relevant information from the studies which included; information about the authors, study aim, study design, sample size and characteristics, key findings concerning barriers to reporting medication errors. A convergent synthesis design was adopted to integrate results from qualitative, quantitative, and mixed-method studies and transformed them into qualitative findings [19]. A thematic approach was used to synthesize key findings emerging from the literature in relation to barriers to reporting medication errors among nurses, which were read thoroughly and coded. Codes were reviewed and similar codes were categorized to form descriptive themes. The descriptive themes were assessed to generate meaning beyond the original data leading to the development of new, interpretive analytical themes. The reviewers synthesized the data independently, discrepancies were discussed and consensus built before finalizing the overarching themes and subthemes.

Table 1: summary of study findings

First Author/year	Country	Aim of study	Design	participants	Theory	Key findings (Barriers)
Alrabadi (2020) [20]	Jordan	to explore nurses' understanding, perception, attitude, and prevalence of MEs and thereafter defining the main factors associated with its occurrence and needed for designing proper policies for its sufficient prevention.	cross-sectional study design	156 nurses	Theoretical Domains Framework	Underreporting was related to fear of losing job. Nurses not acknowledging the gravity of the medication error to necessitate reporting. Fear of colleague nurses' actions. Nurses' knowledge about what constitutes medication error. The use of medication incidence reporting was a barrier to underreporting of medication errors.
Lee (2017) [21]	South Korea	To identify differences in what nurses consider as medication administration errors, to examine their willingness to report these errors, and to identify barriers to reporting medication errors by hospital type.	Cross-sectional, study design	548 nurses		Fear of negative consequences was a major barrier to medication error reporting. Fear of legal actions against nurses by patients or their families. Medication error reporting consumed much time. Fear of criticism from colleagues or other professionals was also a barrier to medication error reporting. Fear of managers' reactions or punitive measures against nurses. No feedback is given after reporting medication administration errors.
Alamrani, (2020) [22]	Saudi Arabia	To investigate barriers to medications administration errors reporting and to identify the reasons for medication administration errors among nurses' in Saudi Arabia.	Cross-sectional study design	321 nurses	-	Nursing administration focuses on the individual rather than using the systems approach to solve the problems. Lack of feedback from authorities. Nurses felt they could be blamed if something negative happens to the patient. Much emphasis is placed on medication errors as a measure of the quality of nursing care. Nurses feared negative consequences from reporting medication

					administration errors. Medication error is not clearly defined. Nurses did not think the error was important enough to report. Disagreement with the hospital's definition of a medication error. Nurses were unaware of the occurrence of medication administration errors.
Dyab et al. (2018) [23]	Malaysia	to explore nurses' knowledge on MER by determining their attitudes towards reporting and studying the implicated barriers and facilitators.	Exploratory qualitative design	23 nurses	Lack of time to report medication errors. Tiredness and heavy workload. Nurses felt they will be embarrassed if they report medication administration errors. Fear of being blamed. Fear of punitive actions/investigations. Fear of negative impact on job records. lack confidentiality in the reporting system. No feedback on previously reported medication errors.
Yung et al. (2016) [24]	Taiwan	To explore the attitudes and perceived barriers to reporting medication administration errors and (2) to understand the characteristics of – and nurses' feelings – about error reports.	A cross-sectional, descriptive survey	306 nurses	Nurses with no reporting experience. Medication administration error occurrence without patient harm. Nurses who could not identify errors did not report. Fear of blame from superiors. Fear of being labeled as incompetent and inadequate nurses.
Nourian et al. (2020) [25]	Iran	aimed to determine the barriers of reporting medication administration errors from the point of view of nurses in neonatal and neonatal intensive care units.	Cross-sectional study design	157 nurses	Fear of legal action by patient or relatives. Afraid of the adverse consequences of reporting medication errors. No positive feedback is given for passing medications correctly. Nursing administration focuses on the individual rather than looking at the systems as a potential cause of the error.

Bifftu et al. (2016) [26]	Ethiopia	<p>This study aimed to assess the prevalence of medication administration error reporting</p> <p>and associated factors among nurses working at The University of Gondar Referral Hospital, Northwest Ethiopia</p>	Cross-sectional study design	282 Nurses		Level of education. Disagreement overtime error definition. Fear of consequence and for administrative reasons.
Shahzadi et al. (2017) [27]	Pakistan	<p>to assess the barrier in reporting medication administration error</p> <p>among nurses.</p>	Cross-sectional study design	222 Nurses	Theory of planned behavior	Did not recognize medication error. Nurses did not take medication error to be significant. Reporting takes much time. Negative response from the hospital administration. No proper medication error reporting system.
Abdullah et al. (2017) [28]	Iraq	<p>1. To assess the causes of medication errors.</p> <p>2. To assess the barriers that prevent nurses to report medication errors.</p> <p>3. To find out the association between nurses' demographic data and causes of medication errors.</p> <p>4. To find out the association between nurses' demographic data and barriers to reporting medication errors.</p>	Cross-sectional study design	150 Nurses	-	<p>Negative attitude toward the nurse by either patient or relatives.</p> <p>The fear of patients complaining that an error has occurred due to negligence. Nursing administration focuses on the individual rather than looking at the systems as a potential cause of the error. Too much emphasis is placed on medication errors as a measure of the quality of nursing care provided. There is no support for the nurse when an error occurs. The lack of an administrative system. Lack of instruction in the hospital on the definition of errors resulting from giving drugs.</p>
Rutledge et	United	The study	Cross-	359 nurses		Extra time involved in

al. (2018) [29]	States	purpose was to report medication error reporting barriers among hospital nurses and to determine the validity and reliability of an existing MERB questionnaire.	sectional study design		documenting a medication error. System for forms used to report medication errors is long and time-consuming. Fear of liability or lawsuits. Fear of being blamed. Fear of disciplinary action.
Dirik et al. (2019) [30]	Turkey	To investigate hospital nurses' involvement in the identification and reporting of medication errors in Turkey.	A descriptive survey design	135 nurses	Afraid/hesitant to be seen as incompetent by peers. Afraid/hesitant of being punished by managers. Unaware a mistake has been made. Belief that reporting is unnecessary if the patient was not harmed. Afraid/hesitant of a negative reaction from the patient or relatives. No positive feedback was given to the person who reports the error. Considering the error not serious enough to report. Afraid/hesitant of physicians' negative reactions. Fear of losing his/her job. Lack of a clear definition of medication errors in the institution. Lack of training for nurses about medication errors. Unaware an error reporting form/process. Completion of error reporting form takes too long.
Hammoudi et al. (2018) [31]	Saudi Arabia	To assess the factors contributing to the occurrence and reporting of medication errors from the nurse's perspective.	Cross-sectional study design	367 nurses.	Nurses do not agree with the hospital's definition of a medication error. Medication error is not clearly defined. Nurses did not see the error to be important enough to report. Filling out an incident report for a medication error takes too much time. Too much emphasis is placed on medication

					errors as a measure of the quality of nursing care. Nursing administration focuses on the individual rather than looking at the systems as a potential cause of the error. Nurses fear adverse consequences from reporting medication errors.
Amrollahi, et al. (2017) [32]	Iran	to determine nurses' perspectives on the reasons behind medication errors and the barriers to error reporting	Cross-sectional study design	213 nurses	<p>Fear over the negative effects of error reporting on salaries. Unfair supervisory reactions are disproportionate to error seriousness. Forgetting to report medication errors. Fear over the negative effects on annual staff evaluation. Fear of blame from the supervisor. Unclear definition of medication errors.</p>
Albukhodaah, et al. (2016) [12]	Saudi Arabia	To identify potential barriers or challenges that may influence reporting of medication administration errors among nurses in Saudi Arabia	Mixed method design (qualitative and quantitative)	366 nurses	<p>Fear of punishment from the administration. The administration focuses on the individual, not the system. No feedback after reporting medication errors.</p> <p>Nurses are concerned about patients or families developing a negative attitude towards them with a loss of confidence in their nursing abilities. Nurses are concerned about facing lawsuits or legal action by patients or family. Nurses felt they might be seen as criminals when they report medication errors.</p>

Results

Before we initialized the qualitative synthesis, the researchers sorted out the most occurring or common barriers to reporting medication errors among the included studies. The researchers then quantified the barriers by presenting them in frequencies and rank-ordered them from the most to the least occurring. We believe this will give a clearer picture of

the main issues serving us impediments in reporting medication errors among nurses. If these bottlenecks identified are given much attention by policymakers and other relevant stakeholders it will go a long way to improve patient safety. Fear of negative consequences/lawsuit/punitive actions were the most frequent (64%) barrier to reporting medication errors among nurses [12, 21-23, 25, 26, 29, 31, 32]. Facilities not having a clear definition of medication error [26, 28, 30-32] and nurses not being aware or not able to identify errors [20, 24, 27, 30, 31] were the second most reported barriers among the included studies.

Study characteristics

The study approaches used were mainly quantitative descriptive cross-sectional (12), mixed-method (1), and qualitative study explorative design (1). The cumulative sample size comprised 3,299 nurses. The sample size for the quantitative studies ranged from 135 to 548 and the qualitative study involved 23 nurses. Three studies were conducted in Iran [25, 28, 32] and Saudi Arabia [12, 22, 31], and a study each in Malaysia [23], Jordan [20], South Korea [21], Taiwan [24], United States [29], Ethiopia [26], Pakistan [27] and Turkey [30]. Two studies utilized a theoretical or conceptual framework. The Theoretical Domains Framework model was utilized by Alrabadi et al. [20] and the Theory of Planned Behavior was utilized by Shahzadi et al. [27] (See Table 1).

Table 2: Themes generated from data analysis	
Main themes	Subthemes
Organizational barriers	Reporting system
	Definition of medication error
	Management behavior
Professional and behavioral barriers	Personal reasons/ lawsuit
	Knowledge/recognition of error

During the data analysis two major themes and five subthemes regarding barriers to medication errors reporting emerged. The two major themes included organizational barriers and professional/behavior-related barriers to reporting medication error as shown in table 2.

Organizational barriers

Organizational barriers were categorized into three subthemes of barriers to medication error reporting; reporting system, definitions of medication error, and management behavior.

Reporting system

The researchers identified in the studies that there was no clear or proper medication error reporting system [27] therefore making the process of reporting cumbersome, especially the use of the medication incidence reporting which served as a major barrier to underreporting [20]. Some studies documented that medication error reporting consumed much time [21, 27, 29-31] while Dyab et al. [23] reported lack of time, tiredness, and heavy workload as barriers to reporting medication errors. Rutledge et al. [29] revealed that the forms used to report medication errors are long which posed as a barrier to reporting medication errors.

Definitions of medication error

It was indicated in some studies that because there was no precise definition of medication error within the hospital [26, 28, 30-32], there were disagreements regarding the definition of medication error and what should constitute a reporting event [22, 26, 30, 31].

Management behavior

Several studies revealed that reporting medication administration errors may result in punitive actions by management or negative consequence [12, 21-23, 25, 26, 29, 31, 32] thereby creating fear among nurses [21, 23, 25, 26, 29]. Also, a negative response from the hospital administration was identified by Shahzadi et al. [27] as a key deterrent to reporting medication errors by nurses. Nurses indicated in several studies that they were not given feedback after reporting medication administration error [12, 21-23, 25, 30] which contributed to underreporting or not barrier medication errors. The researchers also observed that the nursing administration focuses on the individual rather than using the systems approach to solve the problems [12, 22, 25, 28, 31] which served as a major barrier to reporting medication error. Nurses indicated that too much emphasis is placed on medication errors as a measure of the quality of nursing care [22, 28, 31] therefore impeding error reporting. Nurses fear being blamed by management [23, 24, 29, 31] for reporting medication errors. Lack of confidentiality in management in reporting medication errors [23].

Professional and behavioral barriers

Under the professional behavioral barriers two subthemes were identified; personal reasons, and knowledge of error.

Individual reasons/lawsuit

Personal reasons such as criticism from colleagues or other professionals was a barrier to medication error reporting [21, 30] because they felt they will be embarrassed or discriminated against if they report medication administration errors [23]. Nurses personally felt they could be blamed [29] if something negative happens to the patient [22] so they were not encouraged to report medication errors. Nurses feared that reporting medication errors will negatively impact their job records [23] or they might lose their job [20, 30] which served as an impediment to reporting medication errors. Nurses without reporting experience on medication error reporting were a barrier [24]. A tag on their professional identity or fear of being labeled as incompetent and an inadequate nurse [24] was also identified as a barrier to medication error reporting. One major key factor impeding medication error reporting in some studies was the fear of legal actions against nurses by patients or their families [12, 21, 25, 29]. Forgetting to report medication errors was another individual barrier [32].

Knowledge of error/unawareness of error

Inadequate knowledge of nurses about what constitutes medication error [20] leads to underreporting. Nurses did not see the gravity of the medication error to warrant reporting [20, 27, 31]. The inability of nurses to identify that an error has occurred hindered reporting of medication errors [20, 24, 27]. Medication administration errors that occurred without patient harm did not warrant reporting [24]. Unawareness of the occurrence of medication errors [30] also leads to nurses not reporting medication errors.

Discussion

This study reviewed and synthesized results of studies from different countries ranging from low- middle-, and high-income countries, therefore, the findings from this review can be vital for the global healthcare communities to improve patient safety as it remains one of the biggest global challenges in healthcare. The majority of the studies included in this review were rated as strong, and moderate inferring that the evidence produced from this integrative review has a strong and justified conclusion, meaning that implications can be drawn for nursing research and practice. Also, this

study aligns with the WHO 'Global Patient Safety Challenge' emphasizing the promotion and improvement of patient safety actions to reduce severe, preventable medication-related harm by 50% in the next five years [8]. To develop an effective and robust intervention to improve patient safety, medication administration error reporting is essential and grounded through the identification of barriers based on the consideration of behavioral change theories [33]. This information garnered from the key clinical practicing professionals will go a long way to inform policy, healthcare organizations, and other stakeholders on measures to mitigate these barriers and improve patient safety within our healthcare settings across the globe.

The current review found organizational barriers to be the most prominent barrier for nurses not reporting/underreporting medication administration errors. Barriers such as lack of proper reporting systems, no clear definition of medication administration errors (MAEs), and punitive actions against nurses after reporting MAE were identified as organizational barriers to reporting MAEs. Many MAEs go unreported due to the lack of reporting systems or lack of proper reporting systems. It is imperative to know that if there are no proper reporting systems for MAEs in health facilities then nurses will find it difficult to duly report errors. Therefore, an established system for reporting medication errors in hospitals is important to improving patient safety measures. Established good reporting systems are avenues for collecting vital and sufficient information about MAEs from different reporters. This information gathered will help reporters understand the factors that influence errors and will therefore subsequently help to prevent their recurrence [34]. Generally, it is observed that nurses' failure to report medication errors is related to the aftermath consequences they may suffer after reporting depending on the severity of the incidence of injury [35]. It is observed that some health practitioners fail to report errors due to the intense follow-up investigations on persons that commit these errors rather than the system. Nurses believe that reporting errors negatively impact their future job appraisals and professional development due to the punitive actions taken against them. Non-punitive actions against health care professionals who report errors are recommended to improve patient safety care [35-37]. Several studies have documented that health professionals who are rewarded and motivated for reporting errors during healthcare are encouraged to further improve on their reporting behavior which subsequently improves patient safety in the organization [36, 37]. It is also noted that many organizations have been challenged to provide an environment that is free and safe to admit errors and to understand why they occur void of reprisal and punishment [38].

Criminal prosecution of health-care professionals in the line of duty remains an astonishing event. Over the years the number of healthcare professionals facing legal actions continues to increase [39] indicating that health care professionals should take strong actions to address these issues. This review revealed that nurses were afraid to report medication errors due to possible lawsuits and lack of confidentiality or anonymity in the reporting system. When designing a reporting system, anonymity has been considered to be an important factor [37] because an anonymous system means a non-punitive reporting culture [40] and no traceable follow-up procedures after reporting medication incidents [41]. An anonymous medication error reporting system could help to overcome these barriers of not reporting. A study by Hurley and Berghahn [39] reported two cases in which nurses were prosecuted for criminal negligence related to medication administration errors. In order to enhance medication error reporting, addressing systemic issues and problems in the institutions but not the individual is imperative.

Inadequate knowledge of nurses about what constitutes medication error [20] and their inability to identify medication error necessitating error reporting [20, 24, 27] were barriers to error reporting. Nurses' knowledge of medication error reporting is an important factor that determines the success of the medication reporting system [23]. It has been recommended that a blend of formal educational seminars (patient safety lectures), and informal educational sessions (lunchtime educational sessions or an online tutorial on using a new reporting system) could improve error reporting [36]. Therefore, Organizations should develop educational interventional programs tailored toward continuous professional education of nurses on medication errors reporting systems to improve medication safety. As some studies have found a

strong correlation between healthcare workers attending patient safety training workshops and the increased rate of error reporting [36, 42].

Limitations

This review had several limitations. First, 12 of the studies included in this review were clustered in Asia (Iran, Saudi Arabia, Jordan, South Korea, Taiwan, Iraq, Turkey, Malaysia, and Pakistan) one each in the United State and Ethiopia. These countries captured in this review are not sufficient for the entire world. Second, this study included only published articles in English which might have excluded relevant evidence published in other languages. Finally, authors may have unintentionally omitted relevant studies from this review although extensive database and hand searches were conducted. Nonetheless, this study provides a comprehensive insight into barriers to reporting medication errors among nurses. The findings can also inform policy decision-making in order to improve patient safety through reporting medication errors.

Conclusion

Providing an enabling environment void of punitive measures and blame culture is imperative for nurses to report medication errors. The institutionalization of a proper reporting system for medication error reporting provides an avenue to gather data for root cause analysis of errors. This will further enhance a systems approach in dealing with the problems and issues with medication errors without focusing on the individual. It is not expected that nurses will freely report medication errors in a fearful, punitive, and blaming culture. To minimize the burden on nurses reporting medication errors, an effective, non-time consuming, and uncomplicated anonymous system is required. Continuous professional education on medication error reporting systems would improve nurses' knowledge and skill in the handling of errors when they occur and will therefore bridge the barrier of underreporting. An open feedback system for motivating or rewarding nurses for reporting medication errors is imperative and will therefore increase the rate of error reporting. Policymakers, managers, and Nurses should agree on a uniform definition of what constitutes medication error to enhance nurses' ability to report.

Abbreviations

CINAHL: Cumulative Index to Nursing and Allied Health Literature

MMAT: Mixed Methods Appraisal Tool

US: United States

IOM: Institute of Medicine

WHO: World Health Organization

MAE: Medication Administration Error

PRISMA: Preferred Reporting Items for Systematic reviews and Meta-Analysis guidelines

Declarations

Ethics approval and consent to participate

Not applicable

Consent to publish

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

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Authors' contributions

AA KDK and HKD conceived the idea and conceptualised the study. AA and KDK wrote the manuscript. KDK provided expert review in the context of patient safety. All authors read and gave final approval for the version to be published, and agreed to be accountable for all aspects of the work

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Competing interests

The authors declare that they have no competing interests

References

1. Donaldson MS, Corrigan JM, Kohn LT: **To err is human: building a safer health system**, vol. 6: National Academies Press; 2000.
2. Amaral RT, Bezerra ALQ, Teixeira CC, de Brito Paranaguá TT, Afonso TC, Souza ACS: **Risks and occurrences of adverse events in the perception of health care nurses**. *Rev Rene* 2019(20):51.
3. D'Amour D, Dubois CA, Tchouaket E, Clarke S, Blais R: **The occurrence of adverse events potentially attributable to nursing care in medical units: cross sectional record review**. *Int J Nurs Stud* 2014, **51**(6):882-891.
4. Liu X, Zheng J, Liu K, Baggs JG, Liu J, Wu Y, You L: **Hospital nursing organizational factors, nursing care left undone, and nurse burnout as predictors of patient safety: A structural equation modeling analysis**. *Int J Nurs Stud* 2018, **86**:82-89.
5. **Medication errors** [<https://apps.who.int/iris/bitstream/handle/10665/252274/9789241511643-eng.pdf>]
6. Donaldson LJ, Kelley ET, Dhingra-Kumar N, Kieny MP, Sheikh A: **Medication Without Harm: WHO's Third Global Patient Safety Challenge**. *Lancet* 2017, **389**(10080):1680-1681.
7. Stewart D, Thomas B, MacLure K, Wilbur K, Wilby K, Pallivalapila A, Dijkstra A, Ryan C, El Kassem W, Awaisu A *et al*: **Exploring facilitators and barriers to medication error reporting among healthcare professionals in Qatar using the theoretical domains framework: A mixed-methods approach**. *PLoS One* 2018, **13**(10):e0204987.
8. **Medication Without Harm-Global Patient Safety Challenge on Medication Safety**. [<https://apps.who.int/iris/bitstream/handle/10665/255263/WHO-HIS-SDS-2017.6-eng.pdf?sequence=1>]
9. **Patient Safety** [<https://www.who.int/news-room/fact-sheets/detail/patient-safety>]

10. Stewart D, Thomas B, MacLure K, Pallivalapila A, El Kassem W, Awaisu A, McLay JS, Wilbur K, Wilby K, Ryan C *et al*: **Perspectives of healthcare professionals in Qatar on causes of medication errors: A mixed methods study of safety culture.** *PLoS One* 2018, **13**(9):e0204801.
11. Jha AK, Larizgoitia I, Audera-Lopez C, Prasopa-Plaizier N, Waters H, Bates DW: **The global burden of unsafe medical care: analytic modelling of observational studies.** *BMJ Qual Saf* 2013, **22**(10):809-815.
12. Albukhodaah AA: **Barriers and perceptions to medication administration error reporting among nurses in Saudi Arabia.** 2016.
13. de Paiva MC, Popim RC, Melleiro MM, Tronchim DM, Lima SA, Juliani CM: **The reasons of the nursing staff to notify adverse events.** *Rev Lat Am Enfermagem* 2014, **22**(5):747-754.
14. Andrew S, Mansour M: **Safeguarding in medication administration: understanding pre-registration nursing students' survey response to patient safety and peer reporting issues.** *J Nurs Manag* 2014, **22**(3):311-321.
15. Whitemore R, Knafl K: **The integrative review: updated methodology.** *J Adv Nurs* 2005, **52**(5):546-553.
16. Hong QN, Pluye P, Fàbregues S, Bartlett G, Boardman F, Cargo M, Dagenais P, Gagnon MP, Griffiths F, Nicolau B *et al*: **Improving the content validity of the mixed methods appraisal tool: a modified e-Delphi study.** *J Clin Epidemiol* 2019, **111**:49-59.e41.
17. Shamseer L, Moher D, Clarke M, Ghera D, Liberati A, Petticrew M, Shekelle P, Stewart LA: **Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation.** *Bmj* 2015, **350**:g7647.
18. Moher D, Shamseer L, Clarke M, Ghera D, Liberati A, Petticrew M, Shekelle P, Stewart LA: **Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement.** *Syst Rev* 2015, **4**(1):1.
19. Pluye P, Hong QN: **Combining the power of stories and the power of numbers: mixed methods research and mixed studies reviews.** *Annu Rev Public Health* 2014, **35**:29-45.
20. Alrabadi N, Haddad R, Haddad R, Shawagfeh S, Mukatash T, Al-rabadi D, Abuhammad S: **Medication errors among registered nurses in Jordan.** *Journal of Pharmaceutical Health Services Research* 2020, **11**(3):237-243.
21. Lee E: **Reporting of medication administration errors by nurses in South Korean hospitals.** *Int J Qual Health Care* 2017, **29**(5):728-734.
22. Alamrani HH: **Nurses' Perspectives on Causes and Barriers to Reporting Medication Administration Errors.** *Health Science Journal* 2020, **14**(2):707.
23. Dyab EA, Elkalmi RM, Bux SH, Jamshed SQ: **Exploration of Nurses' Knowledge, Attitudes, and Perceived Barriers towards Medication Error Reporting in a Tertiary Health Care Facility: A Qualitative Approach.** *Pharmacy (Basel)* 2018, **6**(4).
24. Yung HP, Yu S, Chu C, Hou IC, Tang FI: **Nurses' attitudes and perceived barriers to the reporting of medication administration errors.** *J Nurs Manag* 2016, **24**(5):580-588.
25. Nourian M, Babaie M, Heidary F, Nasiri M: **Barriers of Medication Administration Error Reporting in Neonatal and Neonatal Intensive Care Units.** *Journal of Patient Safety & Quality Improvement* 2020, **8**(3):173-181.
26. Biftu BB, Dachew BA, Tiruneh BT, Beshah DT: **Medication administration error reporting and associated factors among nurses working at the University of Gondar referral hospital, Northwest Ethiopia, 2015.** *BMC Nurs* 2016, **15**:43.
27. Shahzadi S, Afzal MM, Kousar MR, Waqas MA: **Barriers to Reporting Medication Administration Errors among Nurses in Services Hospital Lahore.** 2017.
28. Abdullah HDA, Sameen FY: **Barriers that Preventing the Nursing Staff from Reporting Medication Errors in Kirkuk City Hospitals.** *Kufa Journal for Nursing Sciences* 2017, **7**(1).

29. Rutledge DN, Retrosi T, Ostrowski G: **Barriers to medication error reporting among hospital nurses.** *J Clin Nurs* 2018, **27**(9-10):1941-1949.
30. Dirik HF, Samur M, Seren Intepeler S, Hewison A: **Nurses' identification and reporting of medication errors.** *J Clin Nurs* 2019, **28**(5-6):931-938.
31. Hammoudi BM, Ismaile S, Abu Yahya O: **Factors associated with medication administration errors and why nurses fail to report them.** *Scand J Caring Sci* 2018, **32**(3):1038-1046.
32. Amrollahi M, Khanjani N, Raadabadi M, Hosseinabadi M, Mostafaei M, Samaei S: **Nurses' perspectives on the reasons behind medication errors and the barriers to error reporting.** *Nursing and Midwifery Studies* 2017, **6**(3):132-136.
33. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M: **Developing and evaluating complex interventions: the new Medical Research Council guidance.** *Int J Nurs Stud* 2013, **50**(5):587-592.
34. Wolf ZR, Hughes RG: **Advances in Patient Safety Error Reporting and Disclosure.** In: *Patient Safety and Quality: An Evidence-Based Handbook for Nurses.* edn. Edited by Hughes RG. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008.
35. Alves MFT, Carvalho DS, Albuquerque GSC: **Barriers to patient safety incident reporting by Brazilian health professionals: an integrative review.** *Cien Saude Colet* 2019, **24**(8):2895-2908.
36. Gleeson L, Dalton K, O'Mahony D, Byrne S: **Interventions to improve reporting of medication errors in hospitals: A systematic review and narrative synthesis.** *Res Social Adm Pharm* 2020, **16**(8):1017-1025.
37. Vrbnjak D, Denieffe S, O'Gorman C, Pajnkihar M: **Barriers to reporting medication errors and near misses among nurses: A systematic review.** *Int J Nurs Stud* 2016, **63**:162-178.
38. Browne F, Hannigan B, Harden J: **A realist evaluation of a safe medication administration education Programme.** *Nurse Education Today* 2020:104685.
39. Hurley SP, Berghahn MJ: **Medication Errors and Criminal Negligence: Lessons from Two Cases.** *Journal of Nursing Regulation* 2010, **1**(1):39-43.
40. Lin YH, Ma SM: **Willingness of nurses to report medication administration errors in southern Taiwan: a cross-sectional survey.** *Worldviews Evid Based Nurs* 2009, **6**(4):237-245.
41. Force MV, Deering L, Hubbe J, Andersen M, Hagemann B, Cooper-Hahn M, Peters W: **Effective strategies to increase reporting of medication errors in hospitals.** *J Nurs Adm* 2006, **36**(1):34-41.
42. Ramírez E, Martín A, Villán Y, Lorente M, Ojeda J, Moro M, Vara C, Avenza M, Domingo MJ, Alonso P *et al*: **Effectiveness and limitations of an incident-reporting system analyzed by local clinical safety leaders in a tertiary hospital: Prospective evaluation through real-time observations of patient safety incidents.** *Medicine (Baltimore)* 2018, **97**(38):e12509.

Figures

Figure 1

Search strategy using PRISMA flow diagram