Journal of Health and Social Behavior

Common Causes of Medication Administration Errors by Nurses

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Journal of Health and Social Behavior
ISSN: 0022-1465 (Print) ISSN: 02779536.18735347 (Online)

Journal of Health and Social Behavior

Abstract

Among the major threats to patient safety, medication administration errors (MAEs) still persist in various health care systems across the world. The nurses since they are the last in the medication delivery process are vital in the prevention of such errors. This research paper is an exploration of the most prevalent causes of MAEs among nurses that comprise excessive workload and staff understaffing, failure to communicate, look-alike/sound-alike (LASA) medications, interruptions during medication rounds, staff training shortages, and electronic health system errors. Based on the information provided by the international health agencies and recent empirical studies, it can be seen that MAEs are frequently system based, and are not necessarily the outcome of individual nurse behaviour. The results underline that more robust safety cultures, human-centred system design, ongoing training and enhanced communication methods are required. By empowering these areas, the number of medication errors can be reduced significantly, and the patient safety outcomes can be improved.

Keywords

Medication administration errors; Nursing practice; Patient safety; Look-alike sound-alike medications; Electronic medication systems; Healthcare workload; Human factors.

الملخص

من بين التهديدات الرئيسية لسلامة المرضى، لا تزال أخطاء إعطاء الأدوية (MAEs) قائمة في مختلف أنظمة الرعاية الصحية حول العالم. ويُعدّ دور الممرضات، كونهن آخر من يتولى عملية تقديم الدواء، بالغ الأهمية في منع هذه الأخطاء. وتستكشف هذه الورقة البحثية الأسباب الأكثر شيوعًا لأخطاء إعطاء الأدوية بين الممرضات، والتي تشمل زيادة عبء العمل ونقص الكادر الطبي، وضعف التواصل، وتشابه الأدوية (LASA)، والانقطاعات أثناء جولات إعطاء الأدوية، ونقص تدريب الكادر الطبي، وأخطاء نظام الصحة الإلكتروني. واستنادًا إلى المعلومات التي قدمتها وكالات الصحة الدولية والدراسات التجريبية الحديثة، يتضح أن أخطاء إعطاء الأدوية غالبًا ما تكون مرتبطة بالنظام، وليست بالضرورة نتيجة سلوك فردي للممرضة. وتؤكد النتائج على ضرورة تعزيز ثقافة السلامة، وتصميم نظام يركز على الإنسان، والتدريب المستمر، وتحسين أساليب التواصل. ومن خلال تمكين هذه المجالات، يمكن تقليل عدد أخطاء الأدوية بشكل كبير، وتحسين نتائج سلامة المرضى.

الكلمات المفتاحية

أخطاء إعطاء الأدوية؛ ممارسات التمريض؛ سلامة المرضى؛ الأدوية المتشابهة في النطق؛ أنظمة الأدوية الإلكترونية؛ عبء العمل في مجال الرعاية الصحية؛ العوامل البشرية.

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Introduction

Administering medication is a vital element of nursing practice and is where most likely the medication error may reach the patient. Nurses should be able to understand medication orders, arrange medication correctly, identify patients and administer medication safely. In spite of the developed standards like Five Rights and standardized medication regimes, MAEs are still widespread. This is not a problem in one region only; it is reported in the low-income countries, middle-income countries, and high-income countries. There are minor effects of medication administration errors, including short-term discomfort, and fatal results, including irreversible disability. They also cause emotional trauma in the nurses themselves who can experience guilt or career implications following a mistake. The factors behind these errors need to be clarified to create a solution that would help to lower the occurrence of MAEs and safeguard patients as well as assist nurses in their work.

Importance of Research

The relevance of research on MAEs is due to the fact that medication errors are one of the most reported incidents of patient safety in healthcare systems. The World Health Organization (WHO) has outlined unsafe medication practices along with errors as some of the main sources of injury and preventable harm in healthcare. They become a financial burden because they take up a lot of space and they require more treatments as well as legal claims to the hospitals. The value of this research is also that it offers a background on which healthcare leaders can adopt evidence-based measures. By knowing the prevailing causes of MAEs, policymakers, administrators and nursing educators can develop specific interventions, e.g., staffing changes, new educational initiatives, better reporting mechanisms, and better technology designs. Finally, the objective is to improve hospital safety culture, minimize avoidable harm and increase quality care with patients.

Research questions

1. What are the most common causes of medication administration errors committed by nurses?
2. How do system factors—such as workload, communication, interruptions, and technology—contribute to MAEs?
3. What evidence-based interventions can reduce MAEs in healthcare settings?

Definitions of the Research

Medication Administration Error (MAE)

Error in medication administration is a deviation that occurs in the final step of drug administration process, which may be throbbing the incorrect drug, dose, patient, time, or route. These are avoidable incidences that take place because of a system, human and environmental factors.

Look-Alike Sound-Alike (LASA) Medications

LASA drugs are drugs that have similar names or packaging. Such similarities might be confusing as they can be misread by nurses during preparation or administration particularly in times of rush in hospitals.

Safety Culture

The term safety culture denotes organizational values, attitudes, and practices that promote open communication, reporting errors, and life-long learning without blame. An effective safety culture helps to promote nurses to report errors and close call incidents.

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Electronic Health Record (EHR) Systems

EHRs contain patient data in electronic format, such as medications, lab findings and clinical notes. The mistakes might arise due to the outdated systems, bad design, absence of alerts, or insufficient training of nurses on electronic platforms.

Methodology

Research Design

The research design used in this study is a theoretical literature review research design because it aims to examine the prevalent causes of medication administration errors (MAEs) among nurses. The focal goal is to determine, evaluate, and synthesize literature, pointing to patterns, agreement, contradictions, and gaps in literature. The literature-based approach would be suitable in this study as it would be possible to review previously verified findings of various researches to obtain a complete picture of factors that contribute to MAEs. The factors are work load, lack of communication, look alikes sound alikes (LASA) medication, interruption, lack of proper training, and errors of electronic systems. It is an analytical as well as a descriptive study summarizing the reported causes of MAEs and critically assessing the similarities or differences between these results across the different contexts.

Data collection

The source of literature that was used in conducting the study was a systematic search on peer reviewed literature and reports on reputable health bodies such as the world health organization (WHO). The search was limited to articles published since 2010 and up to 2025 so as to use the up-to-date and relevant evidence. The databases that were used were PubMed, ScienceDirect, Google Scholar, and WHO library. The search terms included such keywords as medication administration errors, nursing errors, causes of medication errors, look-alike sound-alike medications, interruption in nursing, and electronic health system errors. Inclusion criteria were the studies that either studied the causes or the contributing factors of MAEs in a hospital setting and were published in English and in full text. The exclusion criteria were studies that dealt with only patient errors, opinion pieces, and those articles that were not directly related to the research objectives. This was a strategy that made sure high quality and relevant studies were selected to carry out the analysis.

Data Extraction and Analysis

Data were systematically retrieved and categorized into six topics after the identification of appropriate studies and they include; workload, fatigue, and staffing; communication failures; LASA medications; interruptions and environmental distractions; insufficient training and lack of knowledge; and electronic system errors. The studies were each studied to find out shared outcomes, areas of agreement, conflicting results, and research methods. Particular focus was put on the comparison of the outcomes in various hospital environments and groups, which made it possible to identify the patterns and gaps in the current literature. The synthesis of evidence was done with a thematic analysis approach that offers a systematic structure to discuss and analyze the contributing factors to MAEs. This approach allowed the research to critically review the past research and make conclusions about the most important reasons behind medication errors among nurses.

Ethical Considerations

The current study is based on the secondary data only, but the ethical aspects were taken into account. All the sources and studies made in the past were duly cited and recognized to prevent the plagiarism. Peer-reviewed sources that are reliable were incorporated to ascertain accuracy and validity of the information. Also, the outcomes of original research were analyzed with caution so that they are not misrepresented and the analysis can be the mirror reflection of what is in the literature.

Limitations

The use of secondary data only presents some limitations. The results are conditional on the quality, scope and methodology of primary studies, and differences in research settings, including the type of hospital, country, or experience of nurses, can be a limitation to generalizability. Variation in definitions, measurement tools, and reporting methods of MAEs among studies can have an impact on consistency. Moreover, the causal relationships are not possible because no primary data were developed. Irrespective of these shortcomings, the literature-based methodology offers an exhaustive description of available evidence, significant contributors of MAEs, and research gaps to be filled in the future.

Literature Review

1. Workload, Fatigue, and Staffing

One of the common messages in the literature on medication safety is that the shortage of staff and high patient to nurse ratios contribute greatly to the risk of medication administration errors (MAEs). Several nurses, which are on long shifts, claim that they are tired, less attentive, and lack time to conduct necessary verification procedures (Wudu et al., 2025). Research demonstrates that the better staffing a hospital is, the lower the number of medication errors and patient monitoring, as well as the overall result of patient management (World Health Organization, 2023). The high workloads can also lead to nurses multi-tasking, omitting proper safety inspections, and giving medications under time pressure, which reduce the compliance with safe medication practices.

The other aspect affecting MAEs is the effect of shift length and frequent overtime. Hospitals use 12-hour shifts in many instances and when the staff is insufficient the nurses are made to work overtime or on consecutive days without sufficient rest. Such prolonged changes decrease the recovery period and deteriorate cognitive performance, such as memory, attention, and clinical judgment (Schroers et al., 2021). It has been identified that cognitive impairment due to fatigue could be similar to impairment as a result of alcohol use which validates the severity of fatigue in clinical settings. In this case, even the regular medication processes will be exposed to error since a fatigued nurse will be unable to conduct dose calculations, decipher medication orders, or identify dangerous situations.

Furthermore, understaffing causes stressful working situations where nurses have to hurry up to fulfil their various duties in the shortest time possible. Task overload is also a major risk factor when multiple patients need medications simultaneously, especially in high-acuity units like in intensive care, emergency departments, or cancer inpatient units. Task overload is one of the psychological factors that causes decision fatigue, which is a condition where the quality of decisions decreases after a long period of exposure to complicated tasks (Coelho et al., 2024). This circumstance does not promote the use of comprehensive, rigorous approaches to the processes of double-checking and does not support the concepts of the Five Rights of medication administration (right patient, drug, dose, time, and route), which is the basis of medication safety in nursing.

One of the effects of workload strain on healthcare professionals is teamwork, communication, and collaboration. In cases of understaffing, the nurses will lack time to organize the care, engage in comprehensive handovers, or discuss unclear medication orders. Workloads are high, which means that there is a lack of time to cross-check work with peers, an evidence-based technique that can be used to minimize MAEs (Supapaan et al., 2024). Medication errors might remain unreported or unnoticed in the environments where nurses are overworked because of time constraints, fear of consequences, or a shortage of psychological safety. This is part of a cycle whereby systemic problems go unresolved. In addition, staffing-related chronic stress is also associated with burnout that is directly linked to decreased vigilance and the occurrence of more errors (Schroers et al., 2021). The problem of staffing level is thus not just a managerial choice but an important patient safety concern.

2. Communication Failures

The other most common cause of medication administration errors (MAEs) is miscommunication between nurses, physicians, and pharmacists. Orders spoken are particularly prone to misinterpretation especially during emergency or high-stress conditions when noise, interruptions and stress come in the way of interpretation. Ambiguous abbreviations, poor handwriting, or undone instructions may also be found in written orders, which exposes the risk of wrong dosage, route, or time to be taken. The lack of effective communication during the process of handovers of patients also leads to mistakes related to missed dosages, medication redundancy, or treatment delays.

The other cause of communication failures lies in the inconsistent application of the standardized communication tools like SBAR (Situation-Background-Assessment-Recommendation). Nurses may omit crucial clinical information when they use informal or absentee patterns of communication, which causes medication errors. The existing researches show that the preventable errors decrease significantly when structured communication models are implemented, yet not every health care provider is completely prepared to employ the tools to their daily routine because of the lack of training, time, or indisposition to change. There are also significant interprofessional communication failures that exist between nurses and pharmacists. Numerous medication errors receive incomplete clinical information or the failure of nurses to fully understand pharmacist recommendations by pharmacists. As an example, renal impairment or drug-drug interaction dosage change can be neglected in case of a hasty or imprecise communication. Close cooperation involves the exchange of pharmaceutical history, lab findings, and patient-specific issues, all of which are often undermined in a busy hospital environment (Howlett, 2020).

Technological communication failures are also a cause of MAEs. Despite the purpose of electronic health records (EHRs) and computerized physician order entry (CPOE) systems to be safe, ineffective interface design, alert fatigue, and downtime of the system may lead to new forms of communication errors. When the system does not synchronize with each other, nurses might skip critical alerts when there are too many alerts that appear on-screen or they might get half-finished electronic orders. These communication gaps in digital communications show that technology is not enough to stop errors without the right workflow, proper training and constant improvement of the system (Creswell & Creswell, 2018).

3. Look-Alike / Sound-Alike (LASA) Medications

Medication administration errors are largely caused by Look-Alike/Sound-Alike (LASA) medications, and global health organizations, such as the World Health Organization (WHO) caution against their use. Healthcare professionals can easily be confused with similarities in the names and packaging of drugs along with their labelled products. Nurses can make an incorrect choice of medication without any intention particularly in a hurry and high-stress situation. LASA errors have higher chances of happening with no standardization of labelling, color coding or even in the physical separation of storage facilities.

The problem is the abundance of pharmaceutical products at the market. Since new drugs are developed, drug names occasionally are similar and spelled or pronounced the same as the ones already in use. This adds cognitive overload to the nurses who have to recognize slight variations in dozens of medicines within their departments. Storing medications in alphabetical order or keeping them close to each other increases the chances of picking error enormously. Research has revealed that even seasoned nurses are prone to confusion of LASA drugs when they are in a pressure or are tired (Cloete, L., 2015).

Moreover, mistakes can be made when entering the order electronically at LASA. Auto-complete options may be used inaccurately when users do not pay all their attention when typing in the names of the medications in electronic health systems. There are also chances of sound-alike drugs showing up as similar drugs within drop-down lists and thus one may mis-select the drug. This is compounded by

the alert fatigue whereby the frequent system warnings accustom nurses to possible risks and this is likely to result to the LASA-related alerts going unnoticed.

Healthcare to healthcare provider communication also leads to the development of LASA complications. Verbal orders may be easily misinterpreted when the names of drugs sound similar especially in a noisy clinical environment or where there is a difference in accents and pronunciations. In the absence of strict read-back protocols, miscommunication is likely to occur. Such strategies proposed as Tall Man lettering (e.g. hydrOXYzine vs. hydrALAZINE), barcode scanning and separate LASA storage locations have been found to greatly reduce these errors. Nevertheless, numerous healthcare institutions cannot implement these safety precautions in their entirety because of financial or logistical reasons.

4. Interruptions and Environmental Distractions

It is common in the hospitals to have medication rounds that are held in an extremely busy hospital setting where the nurse is constantly interrupted with patients, the fellow nurses, alarms, and unexpected emergencies. These interruptions cause a workflow and concentration of a nurse, which makes it more likely to make an error, e.g., risk misreading a medication label, filling the wrong dosage, or omit necessary verification measures. Breaks are particularly unsafe in cases where nurses work with high-dangerous drugs that have to be calculated accurately, diluted, or even checked twice.

It has been found that cognitive processing can be seriously interrupted just by a few interruptions. The process of medication administration is not straightforward and requires taking several steps, and in case a nurse faces an interruption during the administration, they may forget the position at which they had left or believe that a step has been taken already. This intellectual processing increases the probability of error particularly when workload is heavy. Researchers indicate that nurses can be interrupted up to six or more times in a span of an hour and this poses an imminent threat of leaving behind safe medications. Medication safety is further compromised by environmental factors like noise, lack of proper lighting as well as congested work areas. Distracting noises and announcements, as well as conversations nearby, may decrease the concentration of a nurse when performing the critical tasks. Moreover, nursing stations that do not have privacy or sufficient space to medicate might compel nurses to remediate or re-verify medications under less-than-optimal circumstances (Lewandowski, 2023). Mental fatigue is brought about by these environmental stressors and it consequently predisposes an individual to make mistakes. Health care institutions have tried to curb interruptions by a number of measures which include no interruptive zones, medication rooms, no disturbance vests, and drug rounds during specific quiet times. Although these interventions are promising their success depends on the organizational culture, compliance of the staff and leadership support. Hospitals are not always able to adhere to the practices because of the emergency need, shortage of staff, or unawareness of non-nursing employees. Thus, it is necessary to minimize the number of interruptions not only through structural solutions but also through high interdisciplinary cooperation and employee training.

5. Inadequate Training and Knowledge Gaps

The safe nursing practice requires medication knowledge. In the event that new nurses or those who are not aware of particular medications are involved, they might find it difficult to comprehend the dosing requirements, contraindications or interactions and even side effects which expose patients to risks. Nurses might not be trained on high risks medications and therefore in cases of complex clinical situations they will be ill equipped to handle them. Furthermore, the absence of continuous professional growth ensures that nurses will fail to keep to date on medication guidelines or new drugs approved in the market. Another area of knowledge deficiency is seen through the use of complicated technologies, including infusion pumps, electronic medication administration records (eMAR), and barcode scanning machines, where nurses are expected to operate them. Nurses may switch off alarms without appropriate training, start entering the wrong settings, or evade the safety mechanisms. The implementation of technology is usually ahead of time before the staff is adequately trained and as a result, systems became very complex and users not competent enough. Research indicates that

preventable medication errors are highly associated with a lack of appropriate training on digital systems. Moreover, numerous healthcare organizations are constrained in such a way that they do not have many training opportunities or educational programs are ineffective. Nurses are burdened with high patient loads and staffing shortages such that attending the trainings turns out to be a challenge as it would jeopardize the care of the patients. In other hospitals, training is more theoretical and does not involve practical aspects of instilling confidence in the use of complex or high-risk medication. Such disparity in knowledge between theoretical knowledge and practice enhances the chances of mistakes in administration particularly in cases of emergency. Continuing education and competency assessment are also very important but not always implemented. Other hospitals do not have a well-organized system of assessing the nursing competence in medication administration as they are relying on informal supervision. Also, the temporary staff or float nurses might be deployed in specialized units without undergoing unit-specific medication training. This puts the nurses in a risky position where they end up administering drugs whose use has not been properly prepared. By making sure that consistent, standardized training is offered, the reduction of MAEs and the general outcomes of patient safety can be greatly enhanced (Toros & Aksu, 2019).

6. Electronic System Errors

Computerized physician order entry (CPOE) systems and electronic health records (EHRs) are electronic health systems aimed at minimizing medication errors. Nevertheless, these systems may cause additional risks that are not intended when they are not designed properly or when they are exploited improperly. System malconfigurations, drop-down menu errors, and wrongly auto-populated fields can lead to nurses choosing the inappropriate medication or dose of a specific drug. Also, in cases where barcode scanning systems fail or fail to scan, it is possible to bypass verification steps, which means that there is a higher risk of medication administration errors (MAEs).

The other significant issue is the problem of alert fatigue which is the problem in which nurses receive a large number of systems generated warnings, and most of them can be non-critical. Throughout time, nurses can also develop the tendency to ignore alerts and override them without consciously paying attention and noticing important notices on drug interactions, allergies, or dosage restrictions. Research shows that the concept of alert fatigue is becoming increasingly problematic in technologically intensive hospitals, and the override rates are occasionally above 90 percent in terms of non-interruptive alerts. This compromises one of the major safety benefits of electronic systems. The training and usability are also important in reducing the errors of the electronic systems. Nurses unfamiliar with effective training regarding eMAR systems or EHRs tend to commit a higher number of medication order errors when entering or interpreting the orders. Inappropriate user interfaces, inconsistent navigation, or non-understandable terminology also contribute to the number of mistakes made in the system. It has been demonstrated that user-centered design can be used to lower the rates of occurrence of electronic system-related MAEs with the help of extensive training and the regular updating of the system. Lastly electronic systems too can also generate new forms of communication gaps (Gluyas, H., 2015). As an example, the EHRs and pharmacy systems may not synchronize in time, which can lead to nurses using drugs that are already discontinued or changed. The system outage or network failure may be temporary and thus may force the nurses to use the manual method, hence they have a higher chance of making the mistake. These obstacles underscore the fact that technology is not sufficient to eradicate MAEs and instead, safe adoption will be achieved through a combination of workflow optimization, employee education, and company resources to make sure that electronic tools do not harm but complement patient safety.

Previous studies

WHO Medication Without Harm Initiative (World Health Organization, 2017–2023)

This international project noted that the workload, lack of communication, and LASA medications were the most common causes of MAEs. A change in the system, which included the enhanced training, the rise of labeling standards, and the culture that would encourage non-punitive reporting of error was identified by the WHO. Medication errors and unsafe medication practices are one of the

most common causes of injury and preventable harm in health care systems in the world. The medication error cost has been estimated to be 42 billion USD per year in the world. Mistakes may happen at various points in the usage of the medication. The errors of medication are the errors of the weak medication systems and/or human factors that may influence prescribing, transcribing, dispensing, administration and monitoring practices and subsequently lead to serious damage, impairment and even death. There are several interventions that have been developed to deal with the prevalence and effects of medication errors but their application is unequal. There is a need to have a broad mobilization of stakeholders who will favor long-term activities. In its reaction to this, WHO has selected Medication Without Harm as the theme of the third Global Patient Safety Challenge.

Coelho et al. (2024) – Scoping Review (MDPI, Nursing Reports)

his review has discussed predisposing factors to medication errors by nurses with a focus on interruptions, insufficient knowledge, inexperience, and environmental pressure. The authors also found that system level interventions are effective as opposed to individual blame. Medication errors are costly and life threatening to the system and the patient. Treatment process and treatment needed among sick patients who are critically ill is complicated and such patients are more susceptible to errors and possible consequences. The PRISMA-ScR guidelines reported a scoping review based on the JBI methodology performed in PubMed, CINAHL, and MEDLINE databases to investigate the strategies that can help to reduce medication errors committed by nurses. The search strategy was restricted to the references published since January 2012 until April 2023. A total of sixteen studies were used and the findings were clustered around thematic areas. Preparation, administration and documentation are some of the areas in which nurses commit medication errors, organizational, system, procedure, personal areas and knowledge and training areas are predisposing factors leading to medication errors, the areas of strategic intervention to reduce medication error are through educational intervention, verification and safety methods, organizational changes and error reporting. The data may be arranged in different ways since it is related to the experience of the reviewers. The awareness of the factors leading to medication errors and interventions to reduce them makes it possible to map the strategies to reduce their occurrence and enable the gain of health. The protocol that was made before this review is registered at the Open Science Framework and published.

Wudu et al. (2025) – BMC Nursing

High prevalence of MAEs and especially wrong-time, wrong-dose, and missed-dose errors was observed in a big cross-sectional study. Some factors associated with this were large patient load, lack of systems of double checking and lack of trained personnel. Background Although nurses are the primary providers of patient care, medication administration error (MAE) has been a significant threat to patient care in low-income nations, such as Ethiopia. Nevertheless, the last review was old, had less than 10 studies, was limited to tertiary hospitals and did not establish the pooling of determinants. Consequently, the study gaps addressed by this meta-analysis were the determination of the combined prevalence of MAEs and its determinants among nurses in Ethiopia, the time, and the study setting. The research plan was enrolled in PROSPERO. They included observational studies carried out in Ethiopia and published in English between 2010 and 2024. They were searched in PubMed, Scopus, EMBASE, and Google Scholar databases. The quality of studies was assessed utilizing the Joana Briggs Institute (JBI) checklist, and three authors were involved in the checklist. STATA 17 software was used to perform data analysis on the pooled magnitude of MAEs and determinants of the MAEs using the DerSimonian and Laird random-effects model. The heterogeneity was measured using the Q-test and I 2 statistic of Cochrane and the publication bias by the funnel plot, the Egger test, and the Doi plot. Out of 264 articles that were retrieved 18 studies with 4,314 nurses were selected as part of the meta- analysis.The combined strength of MAEs in Ethiopians nurses was 57% (95% CI: 4964%). Furthermore, insufficient work experience [OR = 3.64; 95% CI: (3.32, 3.96); I 2= 0.00%], interruption, [OR = 3.53; 95% CI: (3.19, 3.87); I 2= 0.00%], unavailability of guidelines, [OR = 2.14; 95% CI: (The scale of MAEs in the present review was much bigger than those reported on a global level and researches in Africa, which emphasize the necessity of immediate intervention. Moreover, poor work experience, interruption, unavailability of guidelines and training, working at night and nurse-patient

ratio of 1:10 were found to be the predictors of MAEs among nurses. It implies that training, sharing of guidelines in easily understandable formats, optimizing staffing ratios, and development of a safety culture are essential measures that can be taken to minimize MAEs.

Joint Commission Report (Schroers et al., 2021)

This qualitative research was aimed at investigating the perceptions of nurses on the causes of MAE. Heavy workload, organizational stress, technological issues, and fear of reporting mistakes due to punitive work environments were found to be significant contributors by nurses. The error in medication administration (MAE) is an acute patient safety concern. Nurses tend to be involved in the provision of medication to patients, hence, their understanding of reasons behind the occurrence of errors may be useful in the formulation of interventions that would reduce the error. Quantitative research may miss the less obvious factors; hence, a qualitative systematic review was undertaken to provide a synthesis of qualitative data of the perceived causes of MAEs by nurses. Four electronic databases were searched with publications published between 2000 and February 2019. The inclusion criteria included (1) articles must have reported findings of studies which utilized either qualitative or mixed methods design (2) articles must have provided qualitative information on the perceived causes of MAEs among nurses in the health care setting and (3) the articles must have been published in English. The inclusion criteria included sixteen separate articles. The quality of methodology of each article was evaluated with the help of the Critical Appraisal Skills Programme (CASP) tool. The data was thematically analyzed. Knowledge-based, personal and contextual factors were identified as the perceived causes of errors. Knowledge deficiency especially medication knowledge was the main knowledge-based factor. Individual reasons comprised exhaustion and complacency. Situational elements comprised of high workloads and disruptions. The studies that had been examined reported that the contextual factors were present in all the studies; they tend to be intertwined with the personal and knowledge-based factors. Nurses perceive causes of MAEs as multifactorial and interrelated and frequently have systems issues. Multifactorial interventions that focus on systems changes are needed to help counter medication errors. The results of this review can be utilized in future attempts to determine and alter aspects that lead to MAEs.

Supapaan et al. (2024) – Pharmacy Practice Journal

This paper has analyzed the problem of LASA medication mistakes in hospitals and made a conclusion that the similar packaging is one of the leading causes of errors. The authors suggested the use of color-coded labelling, physical distinction of drugs, and standard packaging of brands. ackground: Look-alike/sound-alike (LASA) drugs contribute significantly to the global healthcare issues and patient injuries and require a very thorough idea of LASA medication errors. Purpose: This paper examined the rates and nature of medication errors, as pertaining to LASA, in a general hospital with a bed capacity of 200. Methods: A mixed-methodology was used. The quantitative aspect tested the LASA data of drug errors through the hospital database. Regarding the qualitative part, the deep interviews with the pharmacists and staff at pharmacies were conducted in order to understand the perception of stakeholders and how they handled LASA-related problems. Findings: The quantitative analysis showed that there are three kinds of medication errors-related to LASA: confusion because of the similarity of the names of the drugs, the looks, and the packaging. Most errors (64.62 percent) were caused by drug name confusion, which proves the great danger of using similar names of medications. The number of errors related to packaging confusion was 24.61, which speaks of the relevance of a singular packaging design. In general, similar appearance was found to cause 10.77% of error pointing out that the visual similarity of medications contributed significantly to LASA errors. A total of forty-six LASA drug pairs were discovered with the most commonly used ones being simvastatin 10 mg and simvastatin 20 mg. These errors were categorized into two groups known as Category A and B where two pairs were associated with similarities in the name and packaging and the rest of the 44 pairs were associated with all forms of similarity. The distinction between these categories highlights that LASA errors are complicated. Semi-structured interviews indicated that the anticipatory errors were frequent during the periods of the high traffic, and they might lead to the situation when the most important information, including drug strengths, is omitted. Some of the

solutions proposed to cut down the LASA errors were the use of Tall Man lettering, the creation of movable LASA signage and the workforce distribution. The root-cause analysis revealed a number of factors that have a significant impact on LASA errors, with similarities of drugs and staffing being the most prominent among them, which makes the multipronged approach the most appropriate one. LASA medication errors, specifically errors related to drug names much resembling each other, are rather dangerous and they still occur even despite the safety measures that are already in place. Incorporation of specific measures like Tall Man letters, moving LASA sign and the close focus on high-risk medication pairs might help to solve these problems.

AHRQ / PSNet Primer (MacDowell, n.d.)

The AHRQ patient safety primer captured decades of evidence about errors being associated with system failures and not the negligence of individual nurses. It found communication problems, technological breakdowns and interruptions as the key contributors to MAEs and prescribed structured handoffs and BCMA technology. Medication errors have been a major area of safety improvement because the rates of adverse drug events (ADEs) and the association between medication error and ADEs in inpatients were reported by the Bates and colleagues in the 1990s. According to the description of related primers on medication errors and adverse drug events and the role of the pharmacist in medication safety, the medication-use process is a very complicated one with numerous stages and the possibilities of mistakes. This primer will target the nurse-related medication administration errors.

Medication administration errors are commonly considered as the violation of one of the five rights of medication administration (right patient, medication, time, dose and route). These five right have been historically included in the nursing curriculum as the standard procedures in order to make medication administration as a safe procedure. However, new literature has highlighted that medication administration is only one of the many processes involved in medication use, with a multidisciplinary care team collaborating with each other to bring about patient-centered care delivery. In this regard, it has been highlighted that the five right do not guarantee administration safety as an independent procedure. Hence, four more of the so-called rights were suggested to add right documentation, action/reason, form, and response.1 Since the modern systems of healthcare delivery also evolve, the focus on the design of the system (i.e. technology and clinical workflows) has been brought to the forefront of the medication administration process. The causes of medication administration errors related to the system might involve insufficient training, distracting factors, complex processes, and incorrect system set ups.

Discussion and Analysis

The literature on medication administration errors (MAEs) has consistently indicated a variety of factors that lead to errors and there is a high level of consensus between the studies on the impact of workload, communication failures, LASA medications, interruptions, ineffective training, and errors in the electronic systems. As an example, both the Wudu et al. (2025) and the WHO (2017- 2023) report that high nurse-to-patient ratio and long shifts are the main contributors to MAE because of fatigue and cognitive overloads. Likewise, Coelho et al. (2024) highlight the fact that the pressure of work can impose nurses with the necessity to multitask, omit the verification procedure, or administer the medication within the time limits, which can support the arguments of other researchers that the staffing level is also linked to patient safety outcomes. This overlap implies that workload and fatigue are the underlying causes of MAEs and should be a priority of intervention. Another aspect that is commonly recognised to be critical is communication failures. All of the studies by Schroers et al. (2021) mention that miscommunication in verbal orders, handovers, or even between nurses and pharmacists is a direct cause of errors. It is agreed that standardized communication tools, including SBAR, have the potential to eliminate these risks, but the application is uneven in reality. Although the literature unanimously understands the relevance of structured communication, certain studies (e.g., Gluyas, H. 2015) state that organizational culture and employee involvement tend to be the constraining factors that limit the successful implementation of these tools. It implies that supportive

human and organizational behaviors are necessary along with system level interventions. When it comes to LASA drugs, the literature also has a very strong consensus concerning the fact that similar names and packaging of drugs are a great source of error (WHO, 2016). It is agreed that the interventions like Tall Man lettering, use of color-coded labels, and storage of LASA drugs separately decrease misconducts. Nevertheless, the literature on the practicability and adherence of these strategies by resource constrained hospitals has certain variation. As much as these measures can be applied successfully in advanced hospitals, developing areas are characterised by logistical and financial constraints. Disruptions and distractions of the environment have been universally found to be critical risk factors of MAEs. Westbrook et al. (2010) and Biron et al. (2009) measure the frequency of interruptions that occur during medication administration and prove that they correlate with more mistakes. Although it is the consensus of all the studies that minimization of interruptions enhances safety, there is a disagreement in the recommendations on how to implement it. Others suggest putting up no interruption zones or Do Not Disturb vest, but some others insist on workflow redesigning and team-based approaches to allocate interruptions in a safer manner. The difference implies that the causal relationship is obvious, but the best mitigation approach can be different in a variety of clinical contexts. The lack of adequate training and the knowledge gap also is widely agreed upon throughout the literature. According to Keers et al. (2013), Brady et al. (2009), and Vaismoradi et al. (2015), the lack of knowledge about the types of medications, dosing, and medications with a high risk predisposes people to MAEs. Even the most appropriate way of filling these gaps is less agreed upon. There are studies that support the frequentness of the competency assessment and practical training, and there are studies that emphasize on the continuation education and mentorship programs as more effective. The division underscores the necessity of multifaceted training approaches that are context-specific. The situation with the electronic system errors is a bit more complicated. Even though the technology (EHRs, CPOE, and barcode medication administration (BCMA) systems) is meant to minimize errors, research findings suggest that improperly introduced systems may create new risks (Palojoki et al., 2017). Some of the causes of errors are alert fatigue, complexity of interface and poor use, but some studies recommend that electronic systems can greatly increase medication safety, in case of appropriate training and user-centred design. This explains a partial conflict: there is consensus in the literature that there is potential of technology but it is not in agreement as to whether the current applications are totally effective in real world situations. All in all, the literature shows that there is a great deal of consensus regarding the key types of factors that contribute to MAEs workload, communication, LASA medications, interruptions, training, and technology. It is clear, however, that there is a variance in the suggested mitigation measures, viability of interventions, and the importance of each variable in hospital-specific settings. Most of the research advocates a systematic approach instead of individual nurse-blame and stresses that any kind of intervention should be applied to the organization culture, workflow design, staffing, and optimization of technology in order to achieve significant declines in MAEs.

Conclusion

Medication administration errors (MAEs) continue to be a serious patient safety issue in the healthcare system of any country across the globe. This literature review presents six significant contributory factors, including workload, fatigue and staffing shortages, communication failures, look-alike/sound-alike (LASA) medications, interruptions and environmental distractions, poor training, and knowledge gaps, and mistakes of electronic systems. In all the literature, there is a general consensus that these factors tend to be mixed in a complex, multifactorial form of risks and not the cause itself. Overworking and understaffing are always revealed to be the main factors because they augment exhaustion, decrease alertness, and restrain compliance to verification procedures. Lack of effective communication, both oral and written, also increases the potential of making a mistake, particularly when handing over or in a clinical unit that is under intense pressure. LASA drugs and environmental distractions create more levels of risk to be systemic and thus necessitate interventions and knowledge gaps that underscore ongoing professional growth. Electronic systems can, despite being implemented to improve safety, end up causing mistakes accidentally provided there are poorly implemented or staff are undertrained. As highlighted in the literature, MAEs need a multifaceted approach through systems-based approach to tackle them. This involves proper staffing, use of systematic

communication guidelines, use of LASA elimination measures, minimizing interferences when carrying out medication rounds, offering extensive training, and use of technology. The incorporation of these strategies in hospitals produces a better patient safety outcome, and a lower error rate. Lastly, the relative effects of each of the factors depending on various hospital situations, particularly in resource-constrained ones, are still unaddressed. Future studies are required to study the efficacy of combined interventions, organizational culture impact, and technology-based solution application to particular clinical settings. It is possible to significantly decrease MAEs and improve the safety of patients by considering both human and systemic causes of the issues in healthcare organizations.

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