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INVESTIGATING NURSES STRATEGIES FOR REDUCING MEDICATION ERRORS.

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Abstract:

There are serious dangers to patient safety in the healthcare system from medication errors. These mistakes, which can happen at different points during the prescription process, are frequently the consequence of miscommunication, system malfunctions, or human error. The frequency, causes, and effects of pharmaceutical errors are examined in this abstract, along with preventative measures and initiatives. Adoption of technologies that have demonstrated promise in lowering error rates, such as electronic prescriber order entry, automated drug distribution, and barcode medicine delivery, are important areas of focus. Another important aspect of mistake identification and prevention that is emphasized is the role that clinical pharmacists play in medication management. Further initiatives to improve pharmaceutical safety include addressing staffing difficulties, strengthening communication between healthcare practitioners, and putting in place double-check procedures. Raising awareness and supporting best practices in medication administration is greatly aided by healthcare professionals' education and training programs. Medication errors persist despite continuous efforts, making research, alertness, and cooperation among healthcare stakeholders necessary to further decrease their frequency and improve patient safety.

Key words: Medication errors, patient safety, healthcare, technology, clinical pharmacists, communication, human error, medication administration, healthcare professionals, intervention strategies.

Introduction:

Medication errors are defined as unintentional drug-related deviations that either hurt the patient or have the potential to do so [1]. Across all levels of healthcare delivery, patients, healthcare professionals, administrators, and the pharmaceutical industry have a shared responsibility to reduce the risk of drug errors [1]. Preventable cases of medication mistake are the leading cause of death and morbidity in healthcare settings, making it a persistent concern in

the healthcare sector [2]. These mistakes—which are considered accidents—endanger patient safety and are a factor in more than 7,000 deaths per year [3]. Furthermore, the "Institute of Medicine" has said that drug errors result in roughly 98,000 deaths each year [4]. Medication mistakes have a financial cost associated with them that ranges from $32.59 to $136.40 per hospitalization for a patient in healthcare settings [5]. An estimated 1% to 2% of pharmaceutical errors result in harm to the patient, extending their hospital stay by 4.6 to 10.3 days on average [6]. Medication administration is a critical part of the duties performed by nurses, who devote about 16% of their working hours to this task [7]. High rates of medicine delivery combined with additional responsibilities make nurses more vulnerable to medication errors. Providing education and training to nurses makes it possible for them to properly handle unique human errors, which highlights the importance of this for other healthcare professionals, such as physicians and pharmacists, working in different types of healthcare facilities [8]. Safety is still the top priority for medical professionals everywhere.

The National Coordinating Board for Drug Error Reporting and Prevention's main goal is to improve knowledge of medication errors and maximize safe medication use through open communication, strengthened reporting procedures, and support for error prevention tactics [9]. The overall objective of this is to minimize error rates, which means identifying the causative factors and putting mitigation methods into place that are especially designed for pharmaceutical administration problems [9]. Moreover, acquainting nurses with these mistakes is essential to getting them ready for the reality that they might face in healthcare environments [9]. Medication errors are defined as any avoidable incident that could lead to improper medication use or patient harm while the medication is being administered under the supervision of a healthcare provider, patient, or consumer, according to the National Coordinating Council for Medication Errors Reporting and Prevention. These instances cover prescribing, order communication, product labeling, packaging, nomenclature, compounding, dispensing, distribution, administration, monitoring, and usage, among other aspects of healthcare items, procedures, and systems [9]. Concurrently, a medication error is defined by the European Medicines Agency as an inadvertent breakdown in the drug treatment process that results in or has the potential to cause harm to patients. Prescription, distribution, storage, preparation, and administration errors are the most common avoidable causes of adverse events in medication practice, with substantial public health consequences [10].

A new definition of medication error is proposed: "an unintentional failure in the drug therapy process resulting in or causing harm to the patient." This definition aims to reduce paperwork related to pharmacovigilance duties and encourage patients and healthcare professionals to report medication errors for regulatory purposes. According to this concept, failure is not defined as ineffective medication but rather as an error that is enabled by human or process variables. Furthermore, it is imperative to distinguish clearly between prescription errors and intentional overdoses, off-label use, misuse, and abuse for the purposes of recording and reporting in pharmacovigilance [1].

Types of Errors:

Active Errors: An individual's performance lapses are the cause of active errors. Medication errors can be caused by inaccurate drug calculations, mistakes made when operating or preparing pharmaceutical equipment (such as intravenous pumps), nurses who disregard medication administration policies and procedures, pharmacies that dispense the wrong medications, and problems reading handwritten medication orders [12].

Latent Errors: These errors are caused by systemic flaws in organizational structures that allow active errors to happen and endanger patients. In the context of pharmaceutical errors, examples include high workloads that lead to mistakes, poor training for nurses on new medications, particularly those with identical names or looks, and inadequate facilities for medication preparation [12].

Medication Errors: While medications are necessary for the treatment of many illnesses, they also carry the risk of unintentional side effects, such as adverse drug reactions and adverse drug occurrences. Medication errors are a common type of medical error that impact at least 1.5 million people each year. At least $3.5 billion is spent on increased healthcare costs each year in hospitals treating drug-related injuries alone [13]. In a study that used direct observation techniques in 20 hospital wards in Iran, 8,000 medicine doses were examined at several phases, such as prescribing, transcribing, and administering. The findings showed that inadequate data, including patient names, dose, prescription units, administration methods, and timing, were responsible for 73% of prescribing errors. Furthermore, transcription errors accounted for 15% of errors, medicine administration errors for one-third of errors, and dispensing errors for 1.4% to 2.2% of errors [14].

Prescription errors accounted for up to 90.5% of error events across different stages, whereas administration errors accounted for up to 80% of error incidents in a review that included 54 research from 10 Middle Eastern nations. Inappropriate dosage, frequency, and strength were among the most common mistakes made during the prescribing stage [15]. Providing high-quality patient care and safety depends on ensuring pharmaceutical safety. Many factors, including competency, adherence to the nursing process, prescription practices, patient-related issues, and safety culture, have been linked to medication errors among nursing staff, according to a comprehensive study of medication errors from 2001 to 2011. As a result, "The Joint Commission established its National Patient Safety Goals (NPSGs) program in 2002 to assist accredited organizations in addressing specific patient safety concerns" [16,17].

Medication Processing in Hospitals:

Prescriptions, dispense, and administering medication requires coordination amongst multiple healthcare providers, starting with doctors, moving via pharmacists, and ending with nurses [18]. Medication errors can happen at any point in the procedure, although the largest rates of error are seen in the prescription and administration processes, where they make up

about 39% and 38% of the total, respectively [19]. In the Surgical Intensive Care Unit (SICU), a one-month prospective observational study was carried out to measure and describe medication mistake events. 634 observations were made for the study throughout the morning, noon, and night shifts on weekdays and weekends. 245 drug mistakes in all were recorded and were divided into the following categories: 52 prescription errors, 44 administration technique problems, 10 administration record omissions, 97 incorrect preparations, 1 default prescription dose, and 3 overdosing cases were all related to medication errors. Furthermore, two of the errors were inappropriate medication monetarization, five were related to wrong administration routes, and 29 were transcribing errors [20].

Stage of Physician Ordering and Prescribing: When a doctor orders medication, therapy, or therapeutic equipment, he or she must first obtain authorization from a duly designated individual and then forward that authorization to another authorized party for implementation or dispensing. A prescription usually consists of a written document, electronic order, or phone call with all the necessary information including the patient's name, date, recommended drug, frequency, and method of administration, as well as instructions for the pharmacist or dispenser and the patient. It requires the signature of the prescriber and, in certain situations, an identifying number [21]. Prescriptions are typically written out by a doctor immediately on a patient's chart or by a nurse after she gets an order over the phone or verbally. The patient's entire name, the time and date, the medicine name, the dosage, the frequency, the route, and the prescriber's signature are all important details of a medication order [22]. Prescription errors can include giving the wrong medication, dosage, or quantity, which can have a negative impact on the patient's health, especially if there are drug interactions or allergies [23]. The most frequent causes of prescribing errors are frequently poor handwriting and the use of abbreviations. A number of best practice guidelines are suggested to help reduce these errors: using plain language; staying away from acronyms; making sure that printing is readable; using generic drug names; staying away from chemical symbols; using words or numbers instead of fractions; following metric units; and placing a leading zero before decimal points. Numerous other nations also enforce comparable regulations [24].

Pharmacists' Dispensing and Delivery Stage: Prescription medications are prepared, packaged, labeled, transferred to the patient or an intermediary who is responsible for delivering them, and records are kept by pharmacists as part of their medication process [21]. When a prescription is filled in a different way than intended, it is known as a dispensing error. This is frequently the result of a prescription being misinterpreted with regard to the medicine, dose, or quantity. If labels are printed incorrectly or applied to the wrong packages or containers, more mistakes may occur. In the final stage of the prescription dispensing procedure, when mistakes might still happen, making sure the right patient receives the medication is essential [23].

Nurses Administering Stage: A number of procedures are followed by nurses when administering medication: First, wristbands, vocal confirmation from the conscious patient, or

confirmation of the hospital medical number are used to verify accurate patient identification. Second, nurses inform patients about possible adverse effects and the drug. Third, nurses double-check with another nurse the drug name, dosage, and expiration date before administering it. Fourth, interventions—such as suggesting more fluid intake or taking medication on an empty stomach—may be offered to minimize adverse effects or improve the effectiveness of medication. Fifth, the process of recording medicine administration and associated patient comments is finished. Before a drug is administered, nurses are accountable for responding to orders that are unclear or wrong [22]. When any of the rights related to the administration of medication are violated, administration errors happen. This stage is the most error-prone phase; common mistakes include giving the medication at the wrong time, giving it in the wrong amount, and leaving out part of the dose. Similar to dispensing errors, administration errors can also result from transcription errors, misheard spoken commands, and illegible medicine orders [23].

Factors Affecting Medication Errors:

Misinterpretation and subsequent medication errors are greatly increased by the use of error-prone acronyms while administering medications. This is a common practice, especially when prescribing medications for inpatients. Three Australian hospitals provided data, which showed that 76.9% of patients received prescriptions that had erroneous abbreviations. Of these prescriptions, 29.6% had a high chance of causing serious injury, and only 8.4% had a single error-prone abbreviation [25]. Incorrect doses and infusion errors are the most common pharmaceutical errors among nurses. However, using acronyms rather than full names or related medicine names is frequently cited as the main contributing factor. As a result, inadequate understanding of pharmacology becomes evident as a major cause of drug errors [26]. Factors pertaining to delivery, handling, storage, and packaging might potentially have an impact on medication safety. comparable pharmaceutical packaging raises the risk of error, and keeping comparable medications in close proximity can accidentally confuse them, especially in hectic healthcare settings when doctors, nurses, and pharmacists are fetching prescriptions [23].

1. **Nurse Fatigue:** Nurses' tiredness due to excessive workload is a significant contributing factor to medication errors. Similarly, doctors' indecipherable handwriting and interruptions during drug administration can also lead to errors [27].
2. **Complexity of Medication Administration:** The intricate nature of medication administration makes individuals more susceptible to mistakes when distracted or interrupted during the process. For example, a nurse may become sidetracked by a patient's request while preparing to administer morning insulin, leading to a delay or omission in medication administration [23].
3. **Nursing Practice Factors:** Factors within nursing practice, spanning from 1988 to 2007, contribute significantly to medication errors. These encompass individual and systemic factors such as reconciliation processes, excessive workload, prescription complexities,

nurses' drug knowledge, adherence to policies and procedures, and distractions during administration [28].

4. **Workload Impact:** Workload directly influences healthcare providers and patient outcomes, impacting practice, safety, and quality. Heavy nursing workloads can compromise patient safety and contribute to errors [29].

5. **Categorized Contributing Factors:** Medication errors can be categorized into individual and organizational factors. Individual factors include forgetfulness, inadequate knowledge, communication errors, drug abuse, non-compliance with policies and procedures. Organizational factors encompass medication similarities, lack of guidelines, workload overload, interruptions/distractions, and pressure from colleagues and patients [30].

6. **Environmental Factors:** Environmental factors such as heavy workloads, rapidly changing situations (e.g., acute care, emergency scenarios), frequent changes in orders and care plans, staff shortages, and working in unfamiliar clinical contexts contribute to interruptions and distractions, increasing the likelihood of medication errors [23].

7. **Fatigue's Impact on Patient Care:** Reduced capacity for work, decreased efficiency, and feelings of tiredness among nurses can adversely affect patient care. Fatigued nurses are three times more likely to make serious errors while attending to patients, underscoring the importance of managing fatigue to enhance patient safety [31].

Strategies to Reduce Medication Errors:

Healthcare providers can benefit from participating in continuing education sessions held at major professional meetings. These sessions cover a wide range of topics, including strategies for preventing medication errors in specialty settings, error-prevention tactics for drug naming, labeling, and packaging, as well as the utilization of automation and electronic prescribing systems to mitigate error risks [32]. Implementing successful interventions to minimize medication management errors requires a thorough understanding of how and why these errors occur. While nurses often bear the blame for errors as the last link in the chain of drug therapy, it is essential to recognize that organizational circumstances and strategic decisions play significant roles in error occurrence. Frameworks for error analysis and categorization of medication errors have been developed to acknowledge this distinction [34, 35]. To determine the root cause of an error, it is crucial to understand the intentions of the individual responsible for it. This can be achieved through direct inquiry or observation of error occurrences without directly implicating the individual involved. Direct observation is considered the most effective method for assessing the prevalence of drug administration errors and identifying potential causes and associated factors that may not be apparent otherwise [36]. The strategies aimed at reducing medication errors encompass various approaches, including the implementation of computer-based entry systems, programmed dispensing cabinets, and barcoding systems. Additionally, nurses can adopt systematic approaches to medication usage, engage in medication reconciliation processes,

undergo education and training, and collaborate with clinical pharmacists [37]. Orientation regarding medication administration policies and procedures is crucial to ensure consistent and accurate medication use. A permanent chart record documenting all medications administered, known as the policy and procedure, serves to delineate best practices in medication administration, storage, ordering, receipt, and return [38, 39].

1. **Medication reconciliation (MR)** emerges as a key strategy across various healthcare specialties, with pharmacists playing a significant role. MR involves formally examining a complete and accurate list of a patient's medications and comparing them with prescriptions after transitions of care or at discharge [40]. The Irish government pioneered the use of medication reconciliation during patient transfers. Clinical pharmacists conducted a trial phase among randomly selected patients within 24 hours of admission, utilizing pre-admission medication lists and communicating any changes. Ultimately, 50% of interventions were accepted, and discrepancies were resolved [41]. Given the potential for conflicts during patient admission and discharge, medication reconciliation plays a crucial role in identifying and rectifying discrepancies, thus minimizing adverse drug events [42].
2. **Training and promoting safe practices** are integral in preventing medication errors. Educating all healthcare professionals involved in the medication process about contributing factors that increase error likelihood is paramount. By ensuring comprehensive education throughout the healthcare continuum, the likelihood of errors can be significantly reduced [32].
3. **Double Check Procedure:** Even in cases when a mistake has occurred, the implementation of double-check procedures include having a second person watch the person preparing medication and report any inconsistencies pertaining to safe medication delivery. According to this policy, every step in the work process needs to be checked by two people [43]. The efficiency of the double-check technique as a strategy has been demonstrated by research, which indicates that it can reduce medicine administration errors [15]. Another tactic to reduce error risks is to implement standards that require drug administration permissions to be double-checked throughout dispensing and administration [23].
4. **Working hours and staffing (patient-nurse ratio):** The increase in medication errors highlights the necessity for nursing leaders to address staffing concerns in order to reduce the problem. Medication mistakes can be effectively reduced by increasing the percentage of registered nurse (RN) hours while decreasing the percentage of licensed practice nurse (LPN) hours, according to retrospective studies evaluating hospital administrative databases [44]. A survey of almost 500 nursing staff members at three hospitals revealed that a lack of resources, especially LPNs, contributed to missed cases, which can have an impact on patient care. However, it's been observed that when there aren't enough nurses on staff, there's a greater chance that people would cut corners, stop short of accepted standards, and omit steps, which will ultimately lower the quality of

care provided [45]. Based on observations of medication delivery, it has been found that there is an increased risk of errors when nurses disregard drug rights and do not follow policy and procedure. Sufficient staffing numbers are essential to prevent overwork among nurses, which may prompt them to take short cuts [46].

5. **The Medication Administration Rights Rule:** Nursing professionals are in charge of guaranteeing patient safety and high-quality care. The five rights of medication administration have historically been observed by nurses: the correct patient, route, drug, dose, and time. But scholars have enlarged these rights to include seven: Right Action, Right Form, and Right Response—in order to improve efficiency, documentation, and justification. Some academics support adhering to the ten rights of pharmaceutical administration, which include rights related to patient education, drug-drug interactions, and refusal [47, 48].
6. **Distraction/Interruption during Medication Administration:** Medication mistakes and procedure failure are strongly connected with the frequency of disruptions during the administration of medication. Medication safety must be ensured by minimizing distractions during administration [49]. prescription errors have been shown to be significantly reduced by the use of barcoding technology in computerized prescriber orders, automated prescription dispensing, and barcode medication administration. Research has confirmed that barcode verification and scanning technologies are useful in reducing medication mistakes [50]. Barcoding is an excellent tool for managing pharmaceutical mistakes, as demonstrated by reviews and evaluations of controlled trials [51]. Nursing personnel scans the code on patients' identification bands as part of the barcode verification procedure, displaying prescribed medical information and individual patient identities on the screen. The medication's name and dosage are then displayed upon scanning the barcode, guaranteeing that the information is in line with the patient's order. Barcode verification helps reduce but does not totally eliminate drug errors during administration and patient identification [52]. More efforts are necessary despite the numerous steps taken to improve medication safety, including automated medication distribution, computerized physician order entry, medication reconciliation, and smart pumps [53].
7. **Clinical Pharmacist:** Clinical pharmacists are essential to include in the effort to decrease drug mistakes. The involvement of clinical pharmacists in ward rounds enhances the planning and execution of high-quality care, specifically in terms of guaranteeing high-quality medication administration [54]. Furthermore, they play a crucial role in error avoidance in the emergency room by recognizing and evaluating the interdisciplinary team's activities [55]. The identification of prescription errors is a critical function of clinical pharmacists, underscoring their significance as interdisciplinary team members. They play a crucial role in preventing pharmaceutical errors because of their unique contribution to error detection when compared to other healthcare practitioners [56]. The exchange of information among healthcare providers,

including physicians, nurses, and pharmacists, is crucial for enhancing patient safety and improving healthcare practices. In order to eradicate miscommunication problems in healthcare settings, academics stress the significance of comprehending communication challenges and creating evidence-based tools [57]. When healthcare workers deal with one another on a regular basis, effective communication is critical. Without it, patient care can be jeopardized because a breakdown in communication is frequently seen as the main reason why patients are neglected [58]. Nurses identified a number of factors that contribute to prescription errors, such as not adhering to the five rights, nursing incompetence, interruptions, diversions, limited staffing, poorly written orders, miscalculated dosages, identical medication names, and packaging [59]. Furthermore, because inexperienced nurses may be unwilling to confront more seasoned colleagues, respect for authority may make it more difficult to identify errors during high-risk drug screenings [59]. Erroneous dosages, administration times, rates, and omissions are among the typical types of errors observed in studies where ICU nurses provide medications directly [60].

Conclusion:

In conclusion, medication errors remain a significant concern within the healthcare system, posing risks to patient safety and well-being. These errors can occur at various stages of the medication process, from prescribing and dispensing to administration, and can be attributed to a multitude of factors, including human error, system failures, and communication breakdowns. The consequences of medication errors can be severe, leading to adverse drug reactions, prolonged hospital stays, and even mortality. Efforts to mitigate medication errors have been multifaceted, encompassing a range of strategies and interventions. These include the adoption of technology such as computerized prescriber order entry, automated medication dispensing, and barcode medication administration, which have shown promising results in reducing error rates. Additionally, the involvement of clinical pharmacists in medication management has proven beneficial in error detection and prevention. Moreover, addressing staffing issues, enhancing communication among healthcare providers, and implementing double-check procedures have been identified as crucial steps in improving medication safety. Education and training programs for healthcare professionals also play a pivotal role in raising awareness and promoting best practices in medication administration. Despite these efforts, medication errors persist as a complex and multifaceted challenge. Continued research, vigilance, and collaboration among healthcare stakeholders are essential to further reduce the occurrence of medication errors and enhance patient safety in healthcare settings. By implementing comprehensive strategies and fostering a culture of safety, healthcare providers can work towards minimizing medication errors and ensuring the highest standard of care for patients.

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