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Medication Error Prevention

Section 1: Introduction

Medication errors are a major contributor to errors made in healthcare. It is estimated that 1 in 30 patients are affected by a medication error and that in 25% of these instances, the consequences were determined to be severe or life-threatening (WHO, 2023c). It is estimated that medication errors result in at least one death each day and injure 1.3 million people annually in the United States (Schroers et al., 2021). The World Health Organization claims that half of all preventable harm patients experience is due to medication errors (WHO, 2023c). The estimated cost of adverse drug events is $1.56 to $5.6 billion annually, and patients experience an added $2,852-$8,116 cost for each incidence (Hanson & Haddad, 2023). These statistics may be inaccurate, as one study found that many medication errors are left unreported, and the most common issue for nursing medication errors is the administration of the wrong dose (Alandajani et al., 2022). There are several different types of medication errors and causes of these errors, but it is essential to remember that medication errors are preventable. Evidence-based research has identified multiple strategies to reduce medication errors and increase patient safety. Nurses can help prevent medication errors by recognizing the various types of medication mistakes, knowing the appropriate steps to take when an error occurs, identifying high-risk medications and best practices for administering them, outlining safe medication administration techniques to reduce errors, and enhancing skills to prioritize patient safety.

Section 2: Types of Medication Errors - Acute Care

The National Coordinating Council for Medication Error Reporting and Prevention defines a medication error 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 health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labeling, packaging, and

nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use" (National Coordinating Council for Medication Error Reporting and Prevention, 2025).

Medication errors are a type of medical error that results in preventable adverse events. Adverse events are further categorized into subgroups. A negligent adverse event occurs when a reasonably qualified and competent healthcare professional fails to meet reasonably expected standards of care. This can include negligent adverse events that meet the legal criteria for neglect and cause harm to the patient. A near-miss event is a situation that could have caused harm to the patient but did not occur due to intervention or chance. Near-miss events provide valuable information in developing strategies to reduce future errors. A potentially compensable event is an adverse event that could lead to a malpractice claim. A never event is an adverse event that should never occur, like a pressure ulcer. A noxious episode is a treatment or diagnostic method that leads to adverse events, usually due to a lack of medical prioritization (Rodziewicz et al., 2024).

Medication errors can occur at any point in the medication process. Mistakes in prescribing/ordering, documenting, transcribing, dispensing, administering, and monitoring can all contribute to medication errors. Even though nurses are not the prescribers or pharmacists, they play a vital role in a system of multiple checks. They are often the individuals who catch a medication error before it occurs. Nurses and pharmacists are estimated to identify 30-70% of medication ordering errors (Tariq et al., 2024). Nurses must be able to identify the different types of medication errors.

Manufacturing

This type of error occurs when the wrong strength, wrong packaging, or misleading packaging is used. It can also happen when contaminants are present in the medication during manufacturing (Pharmaceutical Press, 2024).

Prescribing

It is estimated that 21% of medication errors occur when the medication is prescribed. This type of error includes irrational, inappropriate, or ineffective prescribing, under and over-prescribing, and omitted or delayed medications. It may also be caused by failing to check allergies, not adjusting the dose for the patient's weight, or not adjusting the dose due to the patient's renal function (Pharmaceutical Press, 2024).

Omission Errors

An omission error occurs when a scheduled medication dose is not administered (Tariq et al., 2024).

Timing Error

A timing error can occur when the nurse fails to administer the medication at the prescribed time or when the patient fails to take their medication on time. This term may also be used when a medication should be taken with a particular meal, and it is not taken at that time, resulting in potential changes in drug metabolism (Tariq et al., 2024).

Unauthorized Medication

This type of error occurs when a patient receives a medication that was not prescribed for them (Shitu et al., 2020).

Improper Dose

An improper dose error occurs when the patient receives the incorrect dose of a medication ordered for them (Tariq et al., 2024).

Wrong Dose Prescription or Wrong Dose Preparation

This type of error occurs when the incorrect dose is prescribed, but it can also occur when the dose is being prepared. A compounded medication prepared incorrectly can cause a wrong dose error (Tariq et al., 2024).

Administration Errors

Administration errors account for approximately 51% of medication errors (Pharmaceautical Press, 2024). There are several types of administration errors. These include using the incorrect route of administration, administering the drug to the wrong patient, administering an extra dose, or using the incorrect rate of administration (Tariq et al., 2024).

Monitoring Errors

This type of error occurs when the patient is not adequately monitored before or after receiving a dose of medication. Failure to document medication allergies or identify potential drug interactions can be a type of monitoring error. It is also a monitoring error when the patient does not receive specific monitoring after receiving a particular medication, like vital signs or renal functioning tests (Tariq et al., 2024).

Compliance Errors

A compliance error occurs when the clinician does not follow protocol or policies when prescribing, dispensing, or administering a medication (Tariq et al., 2024). Patients can also experience compliance errors when they fail to follow instructions for using a particular medication.

Section 2 Personal Reflection

Why are medication errors considered preventable? Why do you think documenting near-miss errors is important? What types of medication errors have you experienced in your career or as a patient yourself?

Section 3: High-Risk Medications

High-risk medications are drugs that, when used in error, have a high risk of causing significant harm or death to the patient. Errors in administering these medications do not necessarily occur more frequently than with other medications, but the results are likely to be more devastating when an error is made. The harm that could result from an error made with these medications is due to the potential toxicity, low therapeutic threshold, or high likelihood of drug interactions. In 2015, the New South Wales Clinical Excellence Commission developed a mnemonic device to help remember the different types of high-risk drugs: A PINCH (Donaldson et al., 2021), which was updated to APINCHS to account for high-risk medication systems (Nursing and Midwifery, 2024).

A: Antimicrobials

Some antimicrobial medications carry a high risk for toxicity. These include amphotericin, aminoglycosides, and vancomycin. Amphotericin formulations can be confused, leading to subtherapeutic effects or renal toxicity. Aminoglycosides and vancomycin are dosed carefully based on age, weight, and renal function. Patients on these medications for more than 72 hours should also have serum levels carefully monitored. Errors can lead to toxicity, antimicrobial resistance, subtherapeutic levels, or “red man’s” syndrome (Zafar, 2020). Red man’s syndrome is currently known as vancomycin flushing syndrome and is an erythematous, anaphylactoid rash associated with rapid infusion of Vancomycin (Martel et al., 2023).

P: Potassium and other electrolytes

Intravenous administration of potassium and other concentrated electrolytes can lead to serious harm, including cardiac arrest. An administration that is too rapid, an increased concentration, a prescribed dose that is too high, or mistakenly choosing the incorrect electrolyte can cause devastating harm. Excessive potassium chloride can lead to hyperkalemia, which may cause muscle paralysis, ECG changes, or cardiac arrest. Excessive potassium phosphate can cause hyperphosphatemia, causing serum calcium levels to drop drastically. Rapid administration or excessive doses of sodium chloride can lead to hypernatremia, congestive states, or central pontine myelinolysis (CPM) (Zafar, 2020). CPM, also known as osmotic demyelination syndrome, is due to a rapid increase in sodium levels that leads to damage to the myelin sheaths of nerve cells. This condition can lead to muscle weakness, paralysis, difficulty speaking, behavioral changes, or death (Cleveland Clinic, 2022). When an infusion of magnesium sulfate that is too rapid or an incorrect loading dose is given, the patient can experience hypermagnesemia and neuromuscular blockade. Ampules of electrolytes can be easily confused, as they have similar names, like potassium chloride and sodium chloride 0.9%, resulting in harm due to the unintended administration of electrolytes (Zafar, 2020).

I: Insulin

All types of insulin, including intravenous and subcutaneous formulations, are considered high-risk medications. Incorrect dosing, incorrect administration, or misidentifying a type of insulin can cause serious harm or death. Mix-ups can occur due to look-alike, sound-alike medication names, like Humalog and Humulin, leading to unintended variations in blood glucose levels. Mix-ups can also occur with heparin because insulin and heparin are ordered in units. Mistakenly administering insulin instead of heparin can lead to hypoglycemia, and mistakenly administering heparin instead of insulin could lead to bleeding.

Incorrect dosing or incorrect administration timing of insulin can lead to hypoglycemia or hyperglycemia. Incorrect IV infusion rate of insulin can also cause unintended changes in blood glucose levels (Zafar, 2020).

N: Narcotics

Narcotics and other sedating medications, such as hydromorphone, morphine, fentanyl, alfentanil, remifentanil, oxycodone, diazepam, midazolam, thiopentone, propofol, and other drugs with sedating effects can cause harm when incorrect dosages are used. This can be due to subtherapeutic levels, causing inadequate analgesia, or due to overdose, causing respiratory depression. Drug interactions with other medicinal or herbal products can cause complications. Anti-emetics and laxatives should be used with these medications to avoid nausea, vomiting, and diarrhea. Lack of monitoring when using these high-risk medications can lead to cumulative sedation. Patches of narcotic medications can lead to increased absorption when exposed to high heat or when the patient is febrile. This increased absorption rate can cause respiratory depression. Patients using a patch formulation of one of these medications are at increased risk for harm (Zafar, 2020).

C: Chemotherapeutic agents

Chemotherapeutic agents include both oral and intravenous formulations of cytotoxic drugs. Incorrect dosing or administration rate may lead to a lack of therapeutic effect or toxicity. An incorrect administration route can cause administration site reactions, increased serum concentrations, organ toxicity, and death. Some of these medications have similar names, like vincristine, vinblastine, vindesine, and vinorelbine, which can be easily confused. Infusing the incorrect medication would inhibit a therapeutic effect and delay appropriate treatment for the patient (Zafar, 2020).

H: Heparin and other anticoagulants/antithrombotics

Anticoagulants, such as warfarin, low molecular weight heparin, and IV unfractionated heparin, as well as factor Xa inhibitors, direct thrombin inhibitors, thrombolytics like alteplase, reteplase, and tenecteplase, and glycoprotein IIb/IIIa inhibitors, like eptifibatide, are considered high-risk medications because incorrect dosing can have serious adverse effects on the patient. An overdose can lead to bleeding and increased clotting times. Underdosing can increase the risk of thrombus formation and cause a lack of thrombolytic effect. These medications also commonly interact with other drugs, herbal products, and food, which can lead to increased or decreased therapeutic levels. Tablet strengths may be easily confused, and inappropriate patient monitoring can lead to harm. Patients who are at risk for bleeding may experience potentially fatal bleeding episodes (Zafar, 2020).

S: Systems

Some systems can contribute to medication errors. Nurses must consider the systems in place to improve patient safety. Some medications may require independent double checks, and nurses should be cautious with liquid medications, using oral syringes or infusion pumps when possible. Standardized order sets and medication charts can also increase safety (Nursing and Midwifery, 2024).

O: Other

Local healthcare systems and regional boards of medicine and nursing may identify other high-risk medications specific to the area. Nurses should know about high-risk medications they use in their practice that are not included in the general A PINCH S mnemonic.

A meta-analysis published in 2024 found that medication errors among nurses could be categorized into three groups: preparation errors, administration errors, and documentation errors. Preparation errors included incorrect labeling, expired infusions, and errors made when diluting medications. Administration errors included errors of omission, non-interruption of the medication, which means the medication was not stopped when it was ordered to be stopped, incorrect administration rate or time, drug incompatibility, unauthorized and duplicate medication administration, non-aseptic technique, interruptions during medication administration, errors in form, like when a tablet should be crushed but it is not, incorrect frequency, incorrect dose, incorrect route, and using the wrong medication. Documentation errors included transcription errors made when transferring the prescription to the medication plan, often due to abbreviations, lack of dose, route, and schedule, and incorrectly documenting the medication administered (Coelho et al., 2024).

Section 3 Personal Reflection

What high-risk medications do you encounter in your work setting? Why are they considered high-risk? What are the implications if an error is made? How can systems help to prevent medication errors? What protective systems are in place in your workplace?

Section 4: Risk Factors

In addition to high-risk medications, circumstances can create a higher-risk environment for medication errors. The environment where patient care occurs can determine specific risk factors. The types of medications used on a particular inpatient unit can also determine the risk of a medication error. Nurse-specific problems, like stress and fatigue, can also impact medication errors. To work

toward medication error prevention, nurses should understand the risk factors associated with medication errors so they can work to avoid these errors.

Identifying specific risk factors that apply to all areas of healthcare and nurses who administer medications can be difficult. A meta-analysis of nurse-associated medication errors was done to determine if factors from many different settings could be summarized. Researchers identified five major categories of factors that increase the risk of a medication error: organizational factors, knowledge and training, system-related factors, personal factors, and procedure-related factors (Coelho et al., 2024).

Organizational risk factors vary. Nurse-to-patient ratios can affect workload. It was identified that this was particularly true of night shift nurses when there is often a reduced number of nursing staff available. This factor contributed to the difficulty in implementing improvement strategies but also lessened the nurses' ability to meet expected standards of care. Nurses with increased workloads were forced to prioritize care tasks, which increased the risk of medication errors (Coelho et al., 2024).

Lack of knowledge and training contributed to medication errors made by nurses. This lack of knowledge was related to the patient's rights of medication administration and lack of understanding of the risk factors associated with errors. Nurses unfamiliar with medications used in the ICU increased the risk of medication errors in that setting (Coelho et al., 2024). This may be due to inadequate training in the workplace, in general, or for administering a particular medication (Osler et al., 2024). One study reported that a novice nurse in a neonatal intensive care unit administered an infusion over three hours rather than 20 minutes. When interviewed, the nurse stated that the error was due to a lack of knowledge on how to set up the syringe pump used for infusions in that unit (Schroers et al., 2021). Research found that nurses with more experience tended to utilize safe medication practices more frequently than less experienced nurses and were less likely to make a medication error. Researchers were surprised to

discover that nurses with a university degree were more likely to demonstrate incorrect medication management behaviors than those without a university degree (Coelho et al., 2024). Poor communication with patients, especially due to language barriers, can increase the risk of misunderstanding the patient's report of their current medications (Tariq et al., 2024).

System-related factors can contribute to medication errors. An inadequate physical work environment or deficiencies in workflow systems can increase the risk of mistakes (Coelho et al., 2024). Medication room overcrowding increases the risk of an error (Osler et al., 2024). When documentation policies are not specific, nurses may not document uniformly, leading to misinterpretation of medication records. When nurses are not given effective feedback regarding their medication documentation methods, they may be unaware that their method increases the risk of error (Coelho et al., 2024). When nurses must interpret handwritten medication orders, the risk of errors is increased. Distortions in the intended medication occur due to poor handwriting, misunderstood symbols, non-standard abbreviations, or improper translation (Tariq et al., 2024).

Personal factors have a substantial impact on the drug administration process. These factors include fatigue, distractions, interruptions, and poor interpersonal relationships, which can all impact the medication administration process's safety (Coelho et al., 2024). Other personal factors identified were complacency, stress, lack of confidence in approaching the prescriber for order clarification, making assumptions, and intentionally deviating from protocols (Schroers et al., 2021). One review found that of 38 studies reviewed, 82% of the studies identified fatigue as a factor contributing to a medication error or a near miss. When a nurse experiences fatigue, their performance is affected since their attention and vigilance are altered. Shift work contributes to fatigue, as this work schedule alters circadian rhythm. Rotating shifts were found to be an especially high contributor to fatigue in nurses. Overtime work also contributes to nurses' fatigue. Nurses frequently engage in cognitively demanding tasks, which can also lead to fatigue (Bell et al., 2023). Interruptions interfere with the nurse's ability to focus and

increase the nurse's risk of making a medication error. Nurses reported that stopping and starting again due to interruptions during medication review and administration processes led to medication errors. Nurses also noted that these interruptions were often non-emergent calls, non-medication-related conversations, or when healthcare team members came to the bedside to assess the patient (Melvin Bacchus & Sims, 2024).

Interruptions were a common theme among nurses when researchers asked about their perceptions of the causes of medication errors. One nurse stated she was administering medications when the charge nurse interrupted and needed her to switch tasks. The resulting distraction contributed to her administering the wrong medication (Schroers et al., 2021).

Procedural-related factors may have various sources. One potential risk factor occurs when nurses must manually prepare an infusion. This can lead to a concentration inconsistent with what was ordered. Ambiguous instructions and unclear dosages can also contribute to procedural-related factors. When the provider or pharmacy does not provide the necessary administration details, mistakes can also occur (Coelho et al., 2024). Lack of protocols and standardized procedures in the clinical setting and inadequate labeling of medications can also contribute to procedural-related risks for medication errors (Tariq et al., 2024).

A retrospective analysis of medication errors provided information about other risk factors that contribute to medication errors. When surveyed, nurses who practice in the hospital felt that the major contributing factors that led to medication errors were the similarity between drug names and drug packages (Brabcová et al., 2023).

Medications that are known to be potentially confused due to the name or packaging being similar to other drugs are called Look-Alike Sound-Alike drugs, or LASA. Look-alike drugs may have similar packaging, shape, color, or size. Sound-alike drugs have names that sound similar when spoken or have similar dosing and units for administration. Errors due to LASA drugs can occur at any stage of the

medication process, from prescribing to administration and monitoring. Factors that may lead to mistakes with these medications are handwritten orders, verbal orders, non-standard abbreviations, and whenever LASA drugs are part of a computerized order entry. Sound-alike medications include hydralazine and hydroxyzine or cyclosporine and cycloserine (WHO, 2023b).

Some populations are at increased risk for medication errors. Most medication errors occur in inpatient settings (Hanson & Haddad, 2023). Research that studied medication errors in patients with chronic illnesses found that patients greater than 60 years of age, an overburdened healthcare system, the number of prescribed medications, comorbidities, and multiple prescribers for a single patient increased the risk for medication errors (Rasool et al., 2020). Medication errors are also more common in pediatric populations, as most medications are administered using weight-based dosing, which can vary from patient to patient (MacDowell et al., 2021).

Some clinical environments increase the risk of medication errors. Geriatric care settings, emergency medicine, highly specialized care, surgical care, and intensive care units had increased rates of preventable medication errors. This is likely due to the inherently higher rates of morbidity, polypharmacy, and decreased patient participation in these settings (WHO, 2023a).

Medication safety checks are in place to protect patients and allow nurses to provide safe care. Any factor that increases the risk of medication errors can lead to a nurse taking shortcuts or bypassing medication safety checks (Osler et al., 2024).

Section 4 Personal Reflection

How do different circumstances contribute to medication errors? What are examples of organizational, knowledge and training, system-related, personal, and

procedure-related factors? How do LASA drugs contribute to medication errors? Why are some clinical settings at higher risk for medication errors?

Section 5: Taking Accountability for Errors

Preventing medication errors requires data that helps us understand the factors that led to the medication error. This data can only be collected when nurses and other healthcare professionals report the errors that occur. They also may not realize that an event should be reported, especially events considered a "near miss." Education regarding what should be reported can contribute to a safety-oriented culture and more accurate data regarding medication errors (Tariq et al., 2024).

Many nurses are hesitant to report errors due to fear of retribution. In a survey of nurses in Washington state, 50% of respondents felt that if they reported their medication error, their mistake would be held against them. Approximately one-third of the nurses surveyed reported that they feared harsh retribution from their managers if they reported an error (Osler et al., 2024). In another study, nurses stated they did not always report medication errors because they did not want to be blamed for a decline in the patient's status (Brabcová et al., 2023).

Healthcare organizations can prevent medication errors by creating a professional environment that does not shame nurses and other staff who make errors but focuses on high-quality care and patient safety. Individual blame should be avoided, as medication errors are a multi-disciplinary responsibility. An environment focused on what is best for the patient requires prompt and complete reporting of an error once identified. Disclosure of these errors to regulatory agencies and safety committees within the organization can help lead to process changes that create a safer environment for all patients. The Agency for Healthcare Research and Quality has established a standardized method for reporting errors, near misses, and events that could affect a patient (Tariq et al.,

2024). Medication errors should be reported to the pharmacy and physician to prevent further harm, and to the nurse manager so procedures and systems can be evaluated to avoid future errors (Coelho et al., 2024).

The patient and family should be informed of the medication error, what harm occurred, and information about measures taken to minimize the harm caused. They should also be allowed to ask questions regarding the error (Tariq et al., 2024). One reason nurses fail to report a medication error is that they do not want the patient or family to have negative feelings toward them, or they fear their mistake will have legal consequences (Brabcová et al., 2023).

Section 5 Personal Reflection

Why are nurses hesitant to report errors? How can healthcare organizations prevent medication errors by changing the workplace culture? Why do errors need to be reported to the multidisciplinary team? What would you say to a colleague who is nervous about reporting an error?

Section 6: Following Safe Clinical Processes

All healthcare team members are vital to the medication process, and nurses play a critical role. Nurses are usually the last layer of protection before an error made by any multidisciplinary team member reaches the patient. Nurses can contribute to error prevention by identifying interventions and strategies that improve safety.

There are four categories of medication prevention strategies that healthcare teams may use. Educational interventions aim to bridge the knowledge gap that contributes to medication errors. Verification and security interventions establish standard operating procedures to reduce workflow risks associated with medication errors. Large-scale organizational and functional changes are implemented to minimize the risk of errors. Error notification interventions ensure

that data regarding medication errors is accurate and accurately reflects their prevalence and potential causes in the workplace (Coelho et al., 2024).

Educational interventions involve sharing knowledge with nurses and other healthcare professionals in a strategic way. This may require informative posters in places where nurses will see them and, preferably, where they typically prepare medications for administration so that the information can be referred to easily. Pamphlets and leaflets can also remind nurses of important information regarding medication safety interventions, like medications that require a second check, verifying expiration dates, and proper patient identification. Training sessions can be an effective method of communicating information so that nurses have the opportunity to ask questions. Other educational methods include discussion groups, online resources, educational videos, and simulation training (Coelho et al., 2024). Healthcare professionals have also expressed that being notified of medication errors made within the organization can increase their awareness in the workplace (Schroers et al., 2021).

Verification and security interventions can help to standardize processes and reduce errors. Multifunctional forms, where the medication prescription can be seen when the nurse refers to the administration record and documents any notes to the provider or notifies the pharmacy of changes, help streamline the administration process and contribute to continuity. Evidence-based protocols and checklists used to verify each step of preparation and administration are measures that can reduce errors. Nurses should be encouraged to verify an order with a provider if they have a question. Disruptions during the medication preparation and administration process can lead to errors, so these should be minimized for the sake of safety. Only essential communication should be utilized during these critical tasks. Checking medication preparation by a second nurse significantly reduces errors and contributes to a safety-focused culture in the workplace (Coelho et al., 2024). Any unsafe practice norms should be addressed, and support should be provided for novice nurses to integrate best practices into their workflow (Schroers et al., 2021).

Organizational and functional changes are necessary at times to prevent medication errors from happening. Color coding, label design, and medication storage processes can all affect medication error risk. Bar-coded medications and electronic documentation are examples of organizational and functional changes that have reduced medication errors in many settings (Coelho et al., 2024). Staffing and workloads should be regularly assessed, as increased nursing staff has been shown to decrease medication errors and lower patient mortality. Appropriate supervision for inexperienced nurses should be available. Physical working conditions must be assessed to ensure they are conducive to safe medication practices, including proper lighting and adequate physical space where medications are prepared for administration (Schroers et al., 2021).

As previously stated, error notification is necessary for the healthcare community to learn how to prevent medication errors in the future. A robust and easily accessible incident reporting system is essential to make error reporting as simple and time-efficient as possible, which can increase the likelihood of errors being reported. It is vital that error reporting be considered a tool for growth rather than a method to identify punishable behavior. Anonymous reporting systems are effective in encouraging staff to report errors. Staff should be well-educated on how reports are used and how they contribute to patient safety in the organization. Reports may identify an unsafe process, a staffing shortage, or workload imbalances, all issues nurses care about (Coelho et al., 2024).

There are a range of specific interventions to prevent medication errors. Low-tech and high-tech interventions have been identified to target weaknesses in the processes and contributing factors that lead to medication errors. Many of these interventions address more than one risk factor in their implementation (MacDowell et al., 2021).

Examples of low-tech solutions include standardized communication, patient education, optimizing nursing workflows, and focusing on high-risk contributing factors. Standardized communication may include tall man lettering on medication

orders and labels for look-alike, sound-alike drugs. Adherence to standard abbreviations and standard ways of writing numbers are also effective communication interventions. Trailing decimals are discouraged, as 3.0mg could be easily mistaken for 30mg (MacDowell et al., 2021).

Patient education is a low-tech solution that empowers patients to be involved in their own care and allows for an additional layer of safety checks. Patients and their caregivers should be notified when a change has been made to their medication regimen. Effective patient education can reduce errors in the acute care setting and prevent the patient from making a medication error once they are home (MacDowell et al., 2021).

Optimizing workflow decreases distraction from critical tasks. Research has found that minimizing interruptions in the workplace is challenging and not always sustainable. Individual organizations should evaluate their processes when determining a method to decrease nurse interruption during critical tasks (MacDowell et al., 2021). Double checks are another workflow process that can prevent medication errors. Double checks should be done independently and do not only include dosage verification. In settings where intravenous medications are used, the lines should be “walked” to verify all infusion lines are connected to the vascular access appropriately. Some medications are available in multiple formats; for example, insulin may be available in a pen or a vial, which could increase the risk of an error, while other medications, like an epinephrine auto-injector, are specifically designed not to be compatible with IV infusion tubing to prevent a medication error (MacDowell et al., 2021).

It is known that high-risk agents contribute to severe and sometimes fatal medication errors. Interventions that focus on these factors can reduce errors and sentinel events. Administration protocols are recommended for high-risk medications. Standardized labeling, clear storage, and clinical support are all strategies to reduce errors. Standardizing medication appearances across

manufacturers is another way to prevent errors from high-risk medications (MacDowell et al., 2021).

High-tech solutions have increased in their implementation in the last two decades. These interventions include medication barcode scanning, barcoded patient ID bands, and smart infusion pumps. Barcode technology reduces errors by electronically linking the patient to a medication and a specific dose at a particular time. One study found that barcode medication administration reduced medication errors by 41% and reduced potential adverse drug events by 51%. Errors related to administration time were reportedly reduced by 27% (MacDowell et al., 2021).

Smart infusion pumps are widely implemented in the United States. Pumps with the patient's information prepopulated from the medication administration profile are most effective. Smart pumps bypass some of the complexity of manual pumps, but nurses must use the pump appropriately to ensure the safety features can be effective (MacDowell et al., 2021).

Computerized order entry and clinical decision support systems are high-tech solutions that work to prevent medication errors. Computerized order entry implemented in many organizations has effectively reduced medication errors by eliminating errors associated with legibility and transcription issues. Other prescribers can observe real-time order changes, preventing prescription duplications. Clinical decision support systems, especially for high-risk medications, are also ways to reduce errors (Tariq et al., 2024).

Section 6 Reflection Questions

What are the four categories of interventions that can reduce medication errors? What is an example of each type? What is the advantage of low-tech interventions to reduce errors? How have you seen high-tech interventions implemented in

your nursing practice? Why is it necessary to use a smart pump properly to utilize its ability to prevent errors? What are the benefits of computerized order entry?

Section 7: Skills to Prioritize Patient Safety

As clinicians and researchers have learned more about the complex and multidisciplinary nature of medication use, new methods to prevent medication errors have been identified. The five “rights” of medication administration were updated in 2018 to include four additional “rights” (MacDowell et al., 2021). This update to the rights of nursing medication administration is controversial, as some say the original five rights have not been effective in reducing medication error occurrences. In contrast, others state that the institution of the nine rights concept is not solely intended for nurses but should include all members of the multidisciplinary team, as they share accountability for medication errors. Sources may cite anywhere from five to twelve patient rights when discussing nursing medication administration, which can be confusing (Hanson & Haddad, 2023).

The five traditional rights of medication administration that most nurses were taught in their nursing school curriculum include:

Right Patient

Nurses must ensure that the intended recipient of a medication is, in fact, the correct patient. The best practice is to have the patient confirm their full name aloud and check their wristband to ensure the name and identification number match (Hanson & Haddad, 2023).

Right Drug

This step ensures that before a medication is administered, the nurse confirms that the name of the medication exactly matches what was prescribed. It is a best

practice recommendation that nurses confirm medication allergies with the patient with each medication administration interaction (Hanson & Haddad, 2023).

Right Route

Nurses must confirm the medication's intended route of administration. Medication administration has become more complex, with many less common routes being used more routinely, including intranasal medications, epidural infusions, and patient-controlled analgesia (Hanson & Haddad, 2023).

Right Time

Medications should be administered at the time intended by the prescriber. Certain medications need to be administered at specific intervals to maintain therapeutic effects. Other medications need to be administered with meals for proper drug metabolism. Some medications may not be administered too closely to other medications, which could inhibit the actions of that drug (Hanson & Haddad, 2023).

Right Dose

A dosage error may occur due to an incorrect dosage, conversion of units, or incorrect concentration used of the medication. Misplaced decimals and arithmetic errors can also contribute to this type of medication error (Hanson & Haddad, 2023).

Additional rights found from various sources include the right documentation, the right indication for prescription, the right patient response, and the right form of administration for a given route. There have also been proposals to include the right to have legible orders, correct drug dispensing, timely access to information,

right to procedures in place to support safe medication administration, and the right to have problems with the medication administration system to be addressed (Hanson & Haddad, 2023). While the utility of medication rights may be contentiously debated, nurses can still benefit from understanding these specific focus areas for patient safety.

Specific interventions to help nurses prevent medication errors at the bedside include:

- Always use the barcode verification system
- Be aware of high-risk inpatient settings: Short-stay units, emergency departments, infusion clinics, ICUs, and radiology
- Use double-checks for high-risk medications
- Verify the accuracy of the patient's medication list before administering the first medication doses (except for emergencies)
- Frequently inquire about allergies and adverse reactions
- Ask patients to disclose any prescription medications, over-the-counter medications, herbal products, dietary supplements, and non-oral medications
- Address any medication discrepancies.
- Document medication lists at admission, transfers, and discharge.
- Consider the patient's medication rights with every medication administration.
- Contribute to safety culture.
- "If you see something, say something"

  (Osler et al., 2024)

Section 7 Reflection Questions

What are the patient rights of medication administration? Why do some people think there are more rights needed? Why do you think some people do not see the rights as an effective way to prevent medication errors? What changes can you make in your clinical practice to prevent medication errors?

Real Life Scenario

When I was a new graduate nurse and only had a few shifts left of my orientation period, I received a patient transfer from the pediatric ICU to the pediatric intermediate care unit. The patient had experienced a months-long stay in the ICU, was technology-dependent, and had many medications. Social services were also involved in the case, and police were investigating the parents concerning the events that led to the patient's hospitalization. As a novice nurse, I was already nervous about administering medications independently, especially for a very complex patient, and, honestly, the fact that the patient's parents were involved in a criminal investigation intimidated me. I scanned the medications using the electronic medication management system. There were no problems. As I finished scanning and began administering the multiple drugs requiring various routes, the patient's father approached me at the bedside. He pointed to his incredibly edematous feet and asked what I thought about them. He also mentioned that he had a sexually transmitted infection and wasn't sure if that contributed to the swelling in his feet. I told him I didn't know if it was related, and I recommended he seek medical care due to the excessive edema. This interaction further flustered and distracted me. As a result, I quickly administered all the patient's medications via her gastrostomy tube, even the antibiotic that was supposed to be administered intravenously.

As soon as I finished administering the medications, I realized my error. I reported the error to the pharmacy and physician and documented the incident per our facility guidelines. The patient did not experience any harm, but I learned a hard

lesson that day. Before this event, I would have thought giving an IV med via G-tube would have been impossible. Still, inexperience and lack of confidence, combined with a transition in care, high patient acuity, polypharmacy, and a significant distraction, all contributed to my medication error. Seventeen years later, I don't believe I would have made this same mistake. Still, veteran nurses are also at risk for making medication errors due to complacency and systems bypassing, in addition to many other contributing factors to medication errors. Upon reflection, my mistake could have possibly been prevented by expressing to my preceptor my apprehension to be in the patient's room alone with the parents, a reminder from my preceptor that there was a mix of routes in this med pass, or greater attention paid by myself to the routes of the medications before I gave them, rather than assuming since I had five GT meds to administer, the sixth med would also be a GT med. If I had had more confidence and experience then, I probably wouldn't have rushed through the administration process due to nerves.

–Mary Harris, RN, MSN

Reflection

What are some other ways I could have prevented making this mistake? Reflect on a medication error or near-miss you have experienced. What factors do you think contributed to the error? How could it have been prevented? Would you make the same mistake now? What did you learn from your mistake, and how did you use it to improve your practice?

Section 8: Conclusion

Nurses play a critical role in preventing medication errors. Their involvement in the medication administration process uniquely positions nurses to catch many medication errors. Nurses who are knowledgeable about the different medication error types are better prepared to identify them. It is essential that nurses follow their organization's policy when reporting medication errors and that those

procedures are simple and time-efficient. Encouraging a culture of safety and collaboration can reduce nurses' hesitancy in reporting errors. By being capable of identifying high-risk medications, nurses can prioritize critical tasks and avoid catastrophic mistakes. Safe medication administration techniques, including minimizing interruptions, barcode scanning, and electronic medication management systems, can help to prevent medication errors. Nurses who implement what they have learned about medication error prevention can prioritize patient safety more effectively.

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