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## Abstract

Advancements in human healthcare are on an all time high. The treatment system is becoming hi-tech and sophisticated and vulnerable to errors at the same time. Various disasters have occurred due to medication errors at different levels of healthcare delivery. Ongoing quality improvement programs for monitoring medication errors are needed. Medication errors should be identified and documented and their causes studied in order to develop systems that minimize recurrence. Patient education and participation in their own healthcare decisions should be encouraged. Thus, it is the need of the hour to give a wake-up call and all those concerned should join hands to solve this gigantic problem. However, if a little bit of extra caution is observed by the various stakeholders these can be prevented largely.

**Keywords:** Medication Errors; Healthcare Delivery; Malpractice Litigation; Word Error; Failure in Communication.

Mistakes can occur in any setting, at any step of the drug administration continuum. Here's how to prevent them.

## Introduction

Medication administration is a complex multistep process that encompasses prescribing, transcribing, dispensing, and administering drugs and monitoring patient response. An error can happen at any step. Although many errors arise at the prescribing stage, some are intercepted by pharmacists, nurses, or other staff.

Administration errors account for 26% to 32% of total medication errors—and nurses administer most medications. Unfortunately, most administration errors aren't intercepted. Recent technological advances have focused on reducing errors during administration

### *Ten Key Elements of Medication Use [1,2]*

Many factors can lead to medication errors. The Institute for Safe Medication Practices (ISMP) has

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identified 10 key elements with the greatest influence on medication use, noting that weaknesses in these can lead to medication errors. They are:

- Patient information
- Drug information
- Adequate communication
- Drug packaging, labeling, and nomenclature
- Medication storage, stock, standardization, and distribution
- Drug device acquisition, use, and monitoring
- Environmental factors
- Staff education and competency
- Patient education
- Quality processes and risk management.

### *Patient Information*

Accurate demographic information (the "right patient") is the first of the "five rights" of medication administration. Required patient information includes name, age, birth date, weight, allergies, diagnosis, current lab results, and vital signs. Barcode scanning [4] of the patient's armband to confirm identity can reduce medication errors related to patient information. But initially, barcode technology increases medication administration times, which may lead nursing staff to use potentially dangerous "workarounds" that bypass this safety system. Also, the barcode method isn't fail proof;

the patient's armband may be missing or may fail to scan, or the scanner's battery may fail.

#### *Drug Information*

Accurate and current drug information must be readily available to all caregivers. This information can come from protocols, text references, order sets, computerized drug information systems, medication administration records, and patient profiles.

#### *Adequate Communication*

Many medication errors stem from miscommunication among physicians, pharmacists, and nurses. Communication barriers should be eliminated and drug information should always be verified. One way to promote effective communication among team members is to use the "SBAR" method (situation, background, assessment, and recommendations). Poor communication accounts for more than 60% of the root causes of sentinel events reported to the Joint Commission (JC).

A case for example, a patient died after labetalol, hydralazine, and extended-release nifedipine were crushed and given by NG tube. (Crushing extended-release medications allows immediate absorption of the entire dosage.) As a result, the patient experienced profound bradycardia and hypotension leading to cardiac arrest. Although she was successfully resuscitated, she received the drugs the same way the next day. Clinicians had failed to communicate to other team members that her initial cardiac arrest had occurred shortly after she'd received the medications improperly.

#### *Drug Packaging, Labeling, and Nomenclature*

Healthcare organizations should ensure that all medications are provided in clearly labeled unit-dose packages for institutional use. Packaging for many drugs looks similar. A tragic case stemming from such similarity occurred with heparin (one of the drugs on the JC's "high-alert" list, meaning it has a high potential for causing patient harm). A few years ago, several pediatric patients received massive heparin overdoses due to misleading packaging and labeling; three infants died. As a result, the Food and Drug Administration and Baxter Healthcare (the heparin manufacturer) issued a letter via the MedWatch program alerting clinicians to the danger posed by similarly packaged drugs. Baxter has since enhanced the labels on heparin and some other high-alert drugs; it now uses a 20% larger font size, tear-off cautionary labels, and different colors to

distinguish differing drug dosages.

Look-alike or sound-alike medications—products that can be confused because their names look alike or sound alike—also are a source of errors. The JC requires healthcare institutions to identify look-alike and sound-alike drugs each year and have a process in place to help ensure related errors don't occur.

#### *Medication Storage, Stock, Standardization, and Distribution*

Many experienced nurses remember when critical care units kept a medication "stash," which frequently caused duplication errors. Potentially, many errors could be prevented by decreasing availability of floor-stock medications, restricting access to high-alert drugs, and distributing new medications from the pharmacy in a timely manner. Also, hospitals can use commercially available products to decrease the need for I.V. compounding medications and I.V. admixing. Use of preprinted order sets and standardized formularies can reduce errors, too.

The Institute for Healthcare Improvement recommends standardized order sets and preprinted protocols for 75% of the drugs healthcare facilities use. These orders and protocols help clinicians promptly select correct dosing regimens, routes, and parameters while eliminating ambiguous abbreviations and the risk of misreading a prescriber's handwriting. However, errors can occur even when automated dispensing cabinets are stocked by technicians. Errors can happen when a technician filled an automated dispensing cabinet with the wrong concentration such as premixed potassium chloride I.V. solution.

#### *Drug Device Acquisition, Use, and Monitoring*

Improper acquisition, use, and monitoring of drug delivery devices may lead to medication errors. Some delivery systems have inherent flaws that increase the error risk. For example, at one time, I.V. medication tubing continued to flow or infuse when removed from the pump. Thus, patients could receive boluses of medications or I.V. solutions, which sometimes had deleterious outcomes. During the admission process, for instance, a patient receiving nitroprusside could receive a large infusion of this drug when the I.V. tubing was removed from the pump and the patient was transferred from one bed to another. This design flaw has since been resolved. In addition, syringes for administering oral medications should not be compatible with I.V. tubing.

### *Environmental Factors*

Environmental factors that can promote medication errors include inadequate lighting, cluttered work environments, increased patient acuity, distractions during drug preparation or administration, and caregiver fatigue (The fatigue factor). Distractions and interruptions can disrupt the clinician's focus, leading to serious mistakes. Heavier workloads also are associated with medication errors. The nursing shortage has increased workloads by increasing the number of patients for which a nurse is responsible. Also, nurses perform many tasks that take them away from the patient's bedside, such as answering the telephone, cleaning patients' rooms, and delivering meal trays. Absence of nurses from the bedside is directly linked to compromised patient care.

### *Staff Education and Competency*

Continuing education of the nursing staff can help reduce medication errors. Medications that are new to the facility should receive high teaching priority. Staff should receive updates on both internal and external medication errors, as an error that has occurred at one facility is likely to occur at another. As medication-related policies, procedures, and protocols are updated, this information should be made readily available to staff members. Also, nurses can attend pharmacy grand rounds. Some facilities now use nursing grand rounds as a way to keep staff members competent.

### *Patient Education*

Caregivers should teach patients, the name of each medication they're taking, how to take it, the dosage, potential adverse effects and interactions, what it looks like, and what it's being used to treat.

### *Quality Processes and Risk Management*

A final strategy for reducing medication errors is to establish adequate quality processes and risk management strategies. Every facility should have a culture of safety that encourages discussion of medication errors and near-misses (errors that don't reach a patient) in a non-punitive fashion. Only then can effective systems-based solutions be identified and used. Simple redundancies, such as using an independent double-check system when giving high-alert drugs, can catch and correct errors before they reach patients. According to the Institute of Medicine, organizations with a strong culture of safety are those that encourage all employees to stay

vigilant for unusual events or processes.

### *The Fatigue Factor [3]<sup>3</sup>*

Recent research highlights the role of caregiver fatigue in medication errors. Nurses who responded to a 2008 medication safety survey reported that fatigue, stress, and under staffing increased the risk of making a medication error. Fatigue and sleep deprivation are linked to decreases in vigilance, memory, information processing, reaction time, and decision making. A person who works about 12-hour shift and has a long commute may need to stay awake for up to 18 consecutive hours. According to U.S. Army studies, staying awake for 17 hours is equivalent to a blood alcohol level of 0.05%; staying awake for 24 hours equates to a blood alcohol level of 0.10%.

Nurses who work a 16-hour shift may be awake for up to 19 or 20 hours, especially if they have a long commute. Loss of even one night's sleep can lead to short-term memory deficits and omission errors and giving the wrong drug are common medication errors. Fatigue and sleep loss also may diminish a nurse's ability to recognize subtle patient changes. As a result, the nurse may not notice an adverse reaction to a drug quickly enough to avoid a devastating outcome.

### *Near-Misses*

Suppose a physician writes an order on the wrong chart, but you catch the error before the patient is harmed. A 2006 study found 350 such near-misses were reported, with drug administration implicated in 28.2%. Due to decreased vigilance and reduced information-processing ability, a severely fatigued nurse may not notice a potential problem that could make the difference between a near-miss and a medication error. Near-miss medication error reporting can be used to reduce medication errors. Failure to recognize and report near-misses impedes efforts to improve medication safety.

### *Inattentional "Blindness"*

Another case of a fatigue-related error involved misreading of drug labels. A nurse nearing the end of a 16-hour shift reached into the medication supply cabinet to obtain furosemide I.V. She thought she was grabbing a furosemide vial, but picked up a vial of potassium chloride instead. The vial was correctly labeled, and the nurse even read the label before administering the drug (which caused a fatal arrhythmia). The furosemide and potassium chloride

labels had similar colors and printing. The nurse was expecting to see "furosemide" on the label, so her brain processed what she expected to see. Such inattentive "blindness" occurs when the brain fails to distinguish something that should be easy to discern. To prevent information overload, the brain "searches and sweeps" until something grabs its attention. It's adept at filling in gaps when information is missing, compiling a comprehensive picture based on incomplete information. Thus, the nurse saw what she expected to see.

#### *Consequences for the Nurse [5]*

For a nurse who makes a medication error, consequences may include disciplinary action by the state board of nursing, job dismissal, mental anguish, and possible civil or criminal charges. In one study of fatal medication errors made by healthcare providers, the providers reported they felt immobilized, nervous, fearful, guilty, and anxious. Many experienced insomnia and loss of self-confidence.

#### *How to Avoid Medication Errors?[1,3,5]*

How can you safeguard your practice from medication errors? For starters, be conscientious about performing the "five rights" of medication administration every time—right patient (using two identifiers), right drug, right dosage, right time, and right route. Some experts have expanded this list to include:

- Right reason for the drug
- Right documentation
- Right to refuse medication
- Right evaluation and monitoring.
- Right to know about the medication

Be sure to use the safety resources available at your facility. Don't use workarounds to bypass safety systems. In a 2008 study, one-third of nurses reported they sometimes bypass safety systems. Nurses working in critical care and pediatrics were more likely to do this; yet medication errors in these settings can be particularly devastating. Where nurses routinely bypass safety systems and create workarounds, the employer must conduct a root-cause analysis to identify the reason for the workaround, and take action to correct the situation and prevent recurrences.

#### *Additional Steps you can Take to Promote Safe Medication use Include*

- Reading back and verifying medication orders given verbally or over the phone.

- Asking a colleague to double check your medications when giving high-alert drugs
- Using an oral syringe to administer oral or NG medications
- Assessing patients for drug allergies before giving new medications
- Becoming familiar with your facility's "do not use" list of abbreviations.

In 2004, the JC (Joint Commission) published a list of abbreviations that shouldn't be used because they can contribute to medication errors. For instance, in one documented case, a "naked" decimal point (one without a leading zero) led to a fatal tenfold overdose of morphine in a 9 month old infant. The dosage was written as ".5 mg" and interpreted as "5 mg."

#### *Reading Back Medication Orders*

The Joint Commission recommends care givers read back and verify all medication orders given verbally or over the telephone. Keep these tips in mind:

- ✓ Have the patient's chart available when calling the prescriber, and write down the order while you're still on the phone.
- ✓ Verify the patient's name.
- ✓ Read back and confirm the medication. If you're unfamiliar with the drug, ask the prescriber to spell the drug name.
- ✓ Confirm the medication dosage by stating each number individually.
- ✓ To help prevent sound-a like errors, verify with the prescriber the condition that the medication is being used to treat. For example, Actos is used for diabetes mellitus, where as the similar-sounding Actonel is used to treat osteoporosis.

#### *Eliminating Medication Errors*

Avoiding medication errors requires vigilance and the use of appropriate technology to help ensure proper procedures are followed. Computerized physician order entry reduces errors by identifying and alerting physicians to patient allergies or drug interactions, eliminating poorly handwritten prescriptions, and giving decision support regarding standardized dosing regimens.

#### **Conclusion**

Medicines cure, but they can also kill or cause severe adverse reactions if a wrong medicine is

administered or if the dosage is wrong. Many disasters have occurred due to the medication errors. Errors occur at all levels of the medication use system, from prescriber to the consumer through many intermediate levels. These errors are not usually due to incompetence but due to mostly preventable reasons. Be sure to use the safety practices already in place in your facility. Eliminate distractions while preparing and administering medications. Learn as much as you can about the medications you administer and ways to avoid mistakes. Finally, be aware of the role fatigue can play in medication errors.

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