2.5: Preventing Medication Errors

When a nurse administers medication, the ultimate goal is to provide patient safety and to prevent harm from medications. However, medical errors and adverse effects of medication therapy continue to be a significant problem in the United States. This section will discuss initiatives established by the Institute of Medicine (IOM), the World Health Organization (WHO), the Institute for Safe Medication Practices (ISMP), and Quality and Safe Education for Nurses (QSEN).

Institute of Medication (IOM)

IOM Report: To Err is Human

The national focus on reducing medical errors has been in place for almost two decades. The Institute of Medicine (IOM) released an initial report in 1999 titled To Err is Human: Building a Safer Health System. The report stated that at that time, errors caused between 44,000 and 98,000 deaths every year in American hospitals and over one million injuries. Health care appeared to be far behind other high-risk industries in ensuring basic safety. The IOM report called for a 50% reduction in medical errors over five years. Its goal was to break the cycle of inaction regarding medical errors by advocating a comprehensive approach to improving patient safety. The IOM 1999 report changed the nature of the patient safety conversation from focusing on dispensing blame to improving systems. [1]

IOM: Preventing Medication Errors

Despite the progress made in patient safety since the To Err is Human report, medication errors remain extremely common, and the national health care system continues to implement initiatives to prevent error. In 2007, the IOM
published a followup report titled *Preventing Medication Errors*, reporting that more than 1.5 million Americans are injured every year in American hospitals, and the average hospitalized patient experiences at least one medication error each day. This report emphasized actions that health care systems, providers, funders, and regulators could take to improve medication safety. These recommendations included actions such as having all U.S. prescriptions written and dispensed electronically, promoting widespread use of medication reconciliation, and performing additional research on drug errors and their prevention. The report also emphasized actions that patients can take to prevent medication errors, such as maintaining active medication lists and bringing their medications to appointments for review.

The *Preventing Medication Errors* report included specific actions for nurses to improve medication safety. Figure 2.2 lists these key actions.

**Improving Medication Safety: Actions for Nurses**

- Establish safe work environments for medication preparation, administration, and documentation; for instance, reduce distractions and provide appropriate lighting.
- Maintain a culture of rigorous commitment to principles of safety in medication administration (for instance, the five rights of medication safety and cross-checks with colleagues, where appropriate).
- Remove barriers and facilitate the involvement of patient surrogates in checking the administration and monitoring the medication effects.
- Foster a commitment to patients’ rights as coconsumers of their care.
- Develop aids for patients or their surrogates to support self-management of medications.
- Enhance communication skills and team training to be prepared and confident in questioning medication orders and evaluating patient responses to drugs.
- Actively advocate for the development, testing, and safe implementation of electronic health records.
- Work to improve systems that address “near misses” in the work environment.
- Realize they are part of a system and do their part to evaluate the efficacy of new safety systems and technology.
- Contribute to the development and implementation of error reporting systems, and support a culture that values accurate reporting of medication errors.

**WHO Global Patient Safety Challenge: Medication Without Harm**

Unsafe medication practices and medication errors are a leading cause of injury and avoidable harm in health care systems in America and across the world. Globally, the cost associated with medication errors has been estimated at $42 billion USD annually. Errors can occur at different stages of the medication use process. Multiple interventions to address the frequency and impact of medication errors have already been developed, yet their implementation is varied. In 2019, the World Health Organization (WHO) identified “Medication Without Harm” as the theme for the third Global Patient Safety Challenge with the goal of reducing severe, avoidable medication-related harm by 50% over the next five years. As part of the *Global Patient Safety Challenge: Medication Without Harm*, WHO has prioritized three areas to protect patients from harm while maximizing the benefit from medication:

- Medication safety in high-risk situations
• Medication safety in **polypharmacy**

• Medication safety in transitions of care [4]

**The World’s Health Organization’s Patient Safety Page**

A summary of these three areas and the strategies to reduce harm is provided below. View the patient video explaining how to avoid harm from medications, or click on the “Real Life Stories” link to read patient stories about harm caused by medications.

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**Medication Without Harm**

[5]

Media, iframe, embed and object tags are not supported inside of a PDF.

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**Real Life Stories**

Figure 2.3 [6] describes the key steps for ensuring medication safety.
Medication Safety in High-Risk Situations

Medication safety in high-risk situations include high-risk medications, provider-patient relations, and systems factors.

High-risk (High-Alert) Medications

High-risk medications are drugs that bear a heightened risk of causing significant patient harm when they are used in error. Although mistakes may or may not be more common with these medications, the consequences of an error are more devastating to patients. High-risk medication can be remembered using the mnemonic “A PINCH.” Figure 2.4 describes these medications included with the “A PINCH” mnemonic.

<table>
<thead>
<tr>
<th>High-Risk Medicine Group</th>
<th>Examples of Medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Anti-infective</td>
<td>Amphotericin</td>
</tr>
<tr>
<td></td>
<td>Aminoglycosides</td>
</tr>
<tr>
<td>P: Potassium and other electrolytes</td>
<td>Injections of potassium, magnesium, calcium, hypertonic sodium chloride</td>
</tr>
<tr>
<td>I: Insulin</td>
<td>All insulins</td>
</tr>
<tr>
<td></td>
<td>Hydromorphone, oxycodone, morphine</td>
</tr>
<tr>
<td>N: Narcotics &amp; Other Sedatives</td>
<td>Fentanyl</td>
</tr>
<tr>
<td></td>
<td>Benzo diazepines</td>
</tr>
<tr>
<td>C: Chemotherapeutic Agents</td>
<td>Methotrexate, Vincristine</td>
</tr>
<tr>
<td>H: Heparin &amp; Anticoagulants</td>
<td>Warfarin, Enoxaparin</td>
</tr>
</tbody>
</table>

Figure 2.3 Key Steps for Ensuring Medication Safety
**Figure 2.4 Demonstrating “A Pinch”**

**Note:** Based on research, the Institute of Safe Medication Practices (ISMP) has expanded this list. The list can be viewed at:
ISMP List of High-Alert Medications in Acute Care Settings

**Provider-Patient Relations**

In addition to high-risk medications, a second component of medication safety in high-risk situations includes provider and patient factors. This component relates to either the health care professional providing care or the patient being treated. Even the most dedicated health care professional is fallible and can make errors. The act of prescribing, dispensing, and administering a medicine is complex and involves several health care professionals.

The patient should be the center of what should be a “prescribing partnership.”[^7] See Figure 2.5.[^8]

**Figure 2.5 Prescribing partnership**

Patients also can present risk factors. For example, it is well-known that adverse drug events occur most often at the extremes of life (in the very young and in older people). In the older population, frail patients are likely to be receiving several medications concurrently, which adds to the risk of adverse drug events. In addition, the harm of some of these medication combinations may sometimes be synergistic and be greater than the sum of the risks of harm of the individual agents. In neonates (particularly premature neonates), elimination routes through the kidney or liver may not be fully developed. The very young and those of old age are also less likely to tolerate adverse drug reactions, either because their homeostatic mechanisms are not yet fully developed or may have deteriorated. Medication errors in children, where doses may have to be calculated in relation to body weight or age, are also a source of major concern. Additionally, certain medical conditions predispose patients to an increased risk of adverse drug reactions, particularly renal or hepatic dysfunction and cardiac failure. Interprofessional strategies to address these potential harms are based on a systems approach with a “prescribing partnership” between the patient, the prescriber, the pharmacist, and the nurse, as outlined in Figure 2.5.

**Systems Factors**

In addition to high-risk medications and provider-patient relations, systems factors also contribute to medication safety in high-risk situations. Systems factors, also called the environment in hospitals, can contribute to error-provoking
conditions for several reasons. The unit may be busy or understaffed, which can contribute to inadequate supervision or failure to remember to check important information. Interruptions during critical processes (e.g., administration of medicines) can also occur, which can have significant implications for patient safety. Tiredness and the need to multitask when busy or flustered can also contribute to error and can be compounded by poor electronic medical record design. Preparing and administering intravenous medications is also particularly error prone. Strategies for reducing errors include checking at each step of the medication administration process; preventing interruptions; electronic provider order entry; and utilizing prescribing assessment tools, such as the Beers Criteria for potentially inappropriate medication use in older adults.

Medication Safety in Polypharmacy

A second area of the WHO Medications Without Harm initiative relates to medication safety in polypharmacy. Polypharmacy is the concurrent use of multiple medications. Although there is no standard definition, polypharmacy is often defined as the routine use of five or more medications. This includes over-the-counter, prescription and/or traditional, and complementary medicines used by a patient. As the population ages, more people are likely to suffer from multiple long-term illnesses and take multiple medications. It is therefore essential to take a person-centered approach to ensure that medications are appropriate for the individual to gain the most benefits without harm and to ensure that patients are integral to the decision making process. Appropriate polypharmacy is present when all medicines are prescribed for the purpose of achieving specific therapeutic objectives that have been agreed with the patient; therapeutic objectives are actually being achieved or there is a reasonable chance they will be achieved in the future; medication therapy has been optimized to minimize the risk of adverse drug reactions; and the patient is motivated and able to take all medicines as intended. Inappropriate polypharmacy is present when one or more medicines are prescribed that are not or no longer needed, either because there is no evidence-based indication, the indication has expired or the dose is unnecessarily high; one or more medicines fail to achieve the therapeutic objectives they are intended to achieve; one or the combination of several medicines put the patient at a high risk of adverse drug reactions; or because the patient is not willing or able to take one or more medicines as intended.

When patients move across care settings, medication review is important to prevent harm caused by inappropriate polypharmacy. Figure 2.6 includes the questions that should be addressed during a medication review with a multidisciplinary approach that includes the nurse.

Step-By-Step Approach to Conducting a Patient-Centered Medication Review

<table>
<thead>
<tr>
<th>Aims</th>
<th>Review diagnoses and identity therapeutic objectives with respect to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What matters to the patient?</td>
<td>• Understanding goals of medication therapy</td>
</tr>
<tr>
<td></td>
<td>• Management of existing health problems</td>
</tr>
<tr>
<td></td>
<td>• Prevention of future health problems</td>
</tr>
</tbody>
</table>
## Need

### 2. What are the essential medications?

Identify essential medications (not to be stopped without specialist advice) such as:

- Medications that have essential replacement functions (e.g., thyroxine)
- Medications to prevent rapid symptomatic decline (e.g., medications for Parkinson’s disease)

### 3. Does the patient take unnecessary medications?

Identify and review the (continued) need for medications:

- With temporary indications
- With higher-than-usual maintenance doses
- With limited benefit in general for the indication they are used for
- With limited benefit for the particular patient under review

## Effectiveness

### 4. Are therapeutic objectives being achieved?

Identify the effect of adding/intensifying medication therapy to achieve therapeutic objectives:

- To achieve symptom control
- To achieve biochemical/clinical targets
- To prevent disease progression/exacerbation

## Safety

### Does the patient have/is at risk of adverse drug reactions?

Identify patient safety risks by checking for:

- Drug-disease interactions
- Drug-to-drug interactions
- Robustness of monitoring mechanisms for high-risk medications
- Risk of accidental overdosing

### Does the patient know what to do if they are ill?

Identify adverse drug effects by checking for:

- Specific symptoms/laboratory markers (e.g.,
hypokalaemia

- Cumulative adverse drug effects
- Medications that may be used to treat adverse drug reactions caused by other medications

<table>
<thead>
<tr>
<th>Costs</th>
<th>Is therapy cost-effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Identify unnecessarily costly medication by:
- Considering more cost-effective alternative (but balance against effectiveness, safety, convenience)

Evaluate the patient understanding of the outcomes:
- Does the patient understand the rationale for taking their medications?
- Consider teach-back technique to ensure full understanding

Ensure medication changes are tailored to patient preferences:
- Is the medication route appropriate for this patient?
- Is the dosing schedule convenient for this patient?
- Consider what assistance the patient might have and when this is available
- Consider the patient’s ability to take the medicines as intended.

Agree and communicate plan:
- Discuss with the patient therapeutic objectives and treatment priorities
- Collaborate with the patient to determine which medicines are sufficiently effective to continue or consider discontinuation
- Inform relevant health care and social care change in treatments across care transitions

Figure 2.6 Step-by-step approach to conducting a patient-centered medication review
Medication Safety in Transitions of Care

A third area of the WHO *Medications Without Harm* initiative relates to medication safety during transitions of care. View the interactive activity below to see how medications are reconciled during transitions of care from admission to discharge in a hospital setting.

Interactive Activity

Medication errors can occur during these changes in settings. Figure 2.7 is an image from the World Health Organization showing ranges of percentage of errors that occur during common transitions of care.

Fig 2.7 Medication discrepancies at various transitions of care

Key strategies for improving medication safety during transitions of care include:
Critical Thinking Activity 2.5a

A nurse is performing medication reconciliation for an elderly patient admitted from home. The patient does not have a medication list and cannot report the names, dosages, and frequencies of the medication taken at home.

What other sources can the nurse use to obtain medication information?

Note: Answers to the Critical Thinking activities can be found in the “Answer Key” sections at the end of the book.

Institute for Safe Medication Practices (ISMP)

The Institute for Safe Medication Practices (ISMP) is respected as the gold standard for medication safety information. It is a nonprofit organization devoted entirely to preventing medication errors. ISMP collects and analyzes thousands of medication error and adverse event reports each year through its voluntary reporting program and then issues alerts regarding errors happening across the nation. The ISMP has established several prevention strategies for safe medication administration, including lists of high-alert medications, error-prone abbreviations to not use, Do Not Crush medications, look alike-sound alike drugs, and error-prone conditions that lead to error by student nurses. Each of these initiatives is further described below. [14]

ISMP website

High-Alert Medications

High-alert medications are drugs that bear a heightened risk of causing significant patient harm when they are used in error. Although mistakes may or may not be more common with these drugs, the consequences of an error are clearly more devastating to patients. As discussed earlier in the “WHO” section of this chapter, an acronym that can be used to remember the basic list of high-alert medication is “A PINCH.” The ISMP list contains additional medication to the mnemonic “A PINCH.”

Strategies for safe administration of high-alert medication include:

ISMP List of High-Alert Medications in Acute Care Settings
Error-Prone Abbreviations

ISMP’s List of Error-Prone Abbreviations, Symbols, and Dose Designations contains abbreviations, symbols, and dose designations that have been reported through the ISMP National Medication Errors Reporting Program as being frequently misinterpreted and involved in harmful medication errors. These abbreviations, symbols, and dose designations should never be used when communicating medical information. Note that this list has additional abbreviations than those contained in the Joint Commission’s Do Not Use List of Abbreviations. Click on the link below for the ISMP list of error-prone abbreviations to avoid. Some examples of abbreviations that were commonly used that should now be avoided are qd, qod, qhs, BiD, QID, D/C, subq, and APAP.¹⁵

Strategies to avoid mistakes related to error-prone abbreviations include not using these abbreviations in medical documentation. Furthermore, if a nurse receives a prescription containing an error-prone abbreviation, it should be clarified with the provider and the order rewritten without the abbreviation.

Do Not Crush List

The IMSP maintains a list of oral dosage medication that should not be crushed, commonly referred to as the “Do Not Crush” list. These medications are typically extended-release formulations. The list can be accessed by using the link below.¹⁶

Strategies for preventing harm related to oral medication that should not be crushed include requesting an order for a liquid form or a different route if the patient cannot safely swallow the pill form.

Look-Alike and Sound-Alike (LASA) Drugs

ISMP maintains a list of drug names containing look-alike and sound-alike name pairs such as Adderall and Inderal. These medications require special safeguards to reduce the risk of errors and minimize harm.

Safeguards may include:

Error Prone Conditions That Lead to Student Nurse Related Error

When analyzing errors involving student nurses reported to the USP-ISMP Medication Errors Reporting Program and the PA Patient Safety Reporting System, it appears that many errors arise from a distinct set of error-prone conditions or medications. Some student-related errors are similar in origin to those that seasoned licensed healthcare professionals make, such as misinterpreting an abbreviation, misidentifying drugs due to look-alike labels and packages, misprogramming a pump due to a pump design flaw, or simply making a mental slip when distracted. Other errors stem from system problems and practice issues that are rather unique to environments where students and hospital staff are...
caring together for patients. See the link to the list of these error prone conditions that should be avoided.

Error Prone Conditions That Lead to Student Nurse Related Error

Critical Thinking Activity 2.5b

A nurse is preparing to administer insulin to a patient. The nurse is aware that insulin is a medication on the ISMP list of high-alert medications.

What strategies should the nurse implement to ensure safe administration of this medication to the patient?

Note: Answers to the Critical Thinking activities can be found in the "Answer Key" sections at the end of the book.

Quality and Safety Education for Nurses (QSEN)

The Quality and Safety Education for Nurses (QSEN) project’s vision is to “inspire health care professionals to put quality and safety as core values to guide their work.” QSEN began in 2005 and is funded by the Robert Wood Johnson Foundation. Based on the Institute of Medicine (2003) competencies for nursing, QSEN further defined these quality and safety competencies for educating nursing students:

Learn activities that teach nursing students how to provide safe, quality care to their patients. 

QSEN website

Below are supplementary learning resources related to patient safety and preventing error during medication administration.

The Josie King Story and Medical Errors

[19]
As a student, when you prepare to administer medications to your patients during clinical, your instructor will ask you questions to ensure safe medication administration.

See an example of the typical questions that a clinical instructor might ask. [Enhancing Medication Safety in Clinical: A Video for Students and Nursing Faculty](https://med.libretexts.org/Bookshelves/Nursing/Nursing_Pharmacology_(OpenRN)/02%3A_Legal_and_Ethical/2.05%3A_Prev...

Watch a QSEN Powerpoint presentation related to the revision of hospital policies to reduce error prone conditions for student nurses when administering medication. [QSEN Powerpoint](https://med.libretexts.org/Bookshelves/Nursing/Nursing_Pharmacology_(OpenRN)/02%3A_Legal_and_Ethical/2.05%3A_Prev…

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**Summary of Nursing Considerations for Safe and Effective Medication Administration**

Medication administration by nurses is not just a task on a daily task list; it is a system-wide process in collaboration with the healthcare team to ensure safe and effective treatment. As part of the medication administration process, the nurse
must consider ethics, laws, national guidelines, and cultural/social determinants before administering medication to a patient. The nurse is the vital "last stop" for preventing errors and potential harm from medications before they reach the patient. A list of nursing considerations whenever administering medications are outlined below.

Nursing Considerations for Safe and Effective Medication Administration

BEFORE Administering Medication

Ethics

Legal and National Guidelines

DURING Administration

AFTER Administration

Supplementary Resources

For more information related to medication safety, go to these supplementary resources.

Culturally Competent Nursing Care: A Cornerstone of Caring. Free Educational Program.


Improvement Stories: Beyond the Five Rights.


• Implementing formal structured processes for medication reconciliation at all transition points of care. Steps of effective medication reconciliation are to build the best possible medication history by interviewing the patient and verifying with at least one reliable information source, reconciling and updating the medication list, and communicating with the patient and future health care providers about changes in their medications.

• Partnering with patients, families, caregivers, and health care professionals to agree on treatment plans, ensuring patients are equipped to manage their medications safely, and ensuring patients have an up-to-date medication list.

• Where necessary, prioritizing patients at high risk of medication-related harm for enhanced support such as post-discharge contact by a nurse.

[13]
• Standardizing the ordering, storage, preparation, and administration of these products
• Improving access to information about these drugs
• Employing clinical decision support and automated alerts
• Using redundancies such as automated or independent double checks when necessary
• Using both the brand and generic names on prescriptions and labels
• Including the purpose of the medication on prescriptions
• Changing the appearance of look-alike product names to draw attention to their dissimilarities
• Configuring computer selection screens to prevent look-alike names from appearing consecutively

• Patient-Centered Care
• Teamwork & Collaboration
• Evidence-Based Practice
• Quality Improvement
• Safety
• Informatics

• Will this medication do more good than harm for this patient at this point in time?
• Has the patient (or the patient’s decision maker) had a voice in the decision making process regarding use of this medication? Have they been informed about this medication and the potential risks/benefits to consider?
• If there are any ethical concerns, advocate for patient rights and autonomy and contact the provider and/or pursue the proper chain of command.
• Be sure the prescription/order contains the proper information according to CMS guidelines.
• Are there any FDA Black Box Warnings for this drug? If so, is the patient aware of the risks and what to do if they occur? This discussion should be documented.
• Is this a controlled substance? If so, follow guidelines for controlled substances in terms of counting, wasting, and disposal. For prescriptions for outpatient use, advocate that Prescription Drug Monitoring Program guidelines are followed.
• Be aware of signs of drug diversion in other healthcare team members and follow up appropriately in the chain of command. You can also directly submit an online tip to the DEA at Rx Abuse Online Reporting.
• Follow the Joint Commission “SPEAK UP” guidelines if you have any concerns about the safe use of this medication, including, but not limited to:
  ◦ Unclear or “do not use” abbreviations
  ◦ Strategies for look alike-sound alike medications
  ◦ Any other concerns for error
• Follow your state’s practice act regarding Scope of Practice and Rules of Conduct. Is administering this medication appropriate for your scope of practice and for this patient? If not, protect your patient from harm and your nursing license by notifying the appropriate contacts within your agency.
• Is this medication administration occurring during a transition of care from unit to unit, home to agency, or in preparation for discharge? If so, be sure proper medication reconciliation has been completed.
• Use the Nursing Process as you ASSESS if this drug is appropriate to administer at this time and PLAN continued monitoring. Consider lifespan and disease process implications. If you NOTICE any findings that this medication may not be appropriate at this time for this patient, withhold the medication and contact the provider.
• Assess if there are any cultural or social determinants that will impact the patient’s ability to use these medications
safely and effectively. IMPLEMENT appropriate accommodations as needed and notify the provider.

- Follow National Patient Safety Goals as you correctly identify the patient and follow guidelines to use medicines safely.
- If this is a "high-alert" medication, follow recommendations for safe administration (such as adding a second RN check, etc.).
- Reduce distractions in your environment as you prepare and administer medications.
- Do not crush medications unless safe to do so.
- Follow JC and CMS standards:
  - Check 5 rights before administering to patient
  - Educate the patient about their medication
  - Dispose of waste controlled substances appropriately
  - Document appropriately
- Continue to EVALUATE the patient for potential side effects/adverse effects, as well as therapeutic effects of the medications.
- Document and verbally share your findings during handoff reports for safe continuity of care.
- If an error occurs, file an incident report and participate in root cause analysis to determine how to prevent it from happening again.