

Simple Strategies to Avoid Medication Errors



Safe medication use is achievable and affordable if you follow these recommendations.

In any given week, four out of five U.S. adults will use prescription medicines, over-the-counter drugs, or dietary and herbal supplements. Nearly one-third of adults take five or more different medications.¹ Given the volume of medications being taken, medication-related injuries may seem inevitable; however, injuries due to errors in medication prescribing, dispensing and administration are preventable.

It is difficult to estimate how often preventable adverse drug events occur. The Institute of Medicine (IOM) report *Preventing Medication Errors* estimated that 1.5 million preventable adverse drug events occur each year in the United States.¹ Another study estimated that 530,000 preventable adverse drug events occur each year among outpatient Medicare beneficiaries.² The annual cost of treating preventable adverse drug events in Medicare enrollees aged 65 and older is estimated at \$887 million.³ ►



Inadequate drug information, such as outdated or limited references, is one of the most common causes of medication errors.

Although significant efforts are occurring in physician offices to improve medication safety, we are not where we should be. This article will focus on simple, low-cost strategies for safe medication use that can be incorporated into office-based practice. The recommendations are drawn from research conducted by the Institute for Safe Medication Practices (ISMP).

Patient information

Having accurate patient information is the first priority in medication safety, as it guides physicians to choose the appropriate medication, dose, route and frequency. The following tips can assist your practice in this area.

Use patient-specific identifiers. To help ensure that the right patient receives the right medication, instruct your staff to use at least two patient-specific identifiers, such as the patient's name and date of birth, when administering medications. Your practice should also have a "name alert" process to identify patients with the same or similar names. This could include a "name alert" sticker for the chart or a highlighted name alert for an electronic health record (EHR).

Verify allergies and reactions. While this may seem like a "no-brainer," it is often a neglected step in the medication process. Your practice should have a protocol that requires a clinical staff member to ask about allergies and reactions to medications, latex and food (e.g., egg allergies for some vaccines) before any prescriptions, samples or office-administered medications are given to the patient. Include the information on the front of a

paper chart (e.g., with an allergy label), on the top of each progress note page or on the EHR screen. When documenting allergies and other medication-related information, avoid using abbreviations or truncated names for the medications (e.g., PCN or HCTZ), as these can be easily misread.

Highlight critical diagnoses and conditions. Four important diagnoses have a significant impact on medication selection, dosing and frequency. They are diabetes mellitus, kidney disease, liver disease and psychiatric disease. Whether you use paper or electronic charts, put a system in place to highlight these conditions for easy reference when medications are administered or prescribed.

In addition, when prescribing teratogenic medications to female patients of childbearing age, document either their negative pregnancy test results or the education you provided regarding the need for effective birth control.

It's also important to highlight patients' smoking status and alcohol consumption, as these factors may affect medication selection, dosing and frequency.

Update current medications. A current medication profile listed in a standard prominent location on each patient's chart can be an important safety measure. This should be updated at each visit and should include a reminder to ask not only about prescription drugs but also over-the-counter medications, herbal medicines, supplements and vitamins. Structure the medication list to require that the drug, dose, route, frequency and purpose be recorded for each medication, herbal or vitamin.

Standardize height and weight measurements. ISMP recommends that health care professionals record information in metric units, which are commonly used in medication labeling and package inserts, as a way to standardize measurement. An easy reference chart for conversion of inches/pounds to metric measures can be made available in



An estimated 1.5 million preventable adverse drug events occur each year in the United States.



Accurate patient data, including updated allergy information and a current medication list, are critical to medication safety.



The patient chart should highlight critical diagnoses and conditions that may affect medication selection.

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each exam room, nursing station, etc. Simplify weights using the following formula: If the weight is less than 2 kg, carry out weight to two decimal places; if the weight is 2 kg to 10 kg, carry out the weight to one decimal place; if the weight is greater than 10 kg, round to the nearest whole number.

Drug information

Inadequate drug information, such as out-dated or limited references, is one of the most common causes of medication errors, with 35 percent of preventable adverse drug events caused by lack of drug information, according to one study. More than half of these events occurred because of a lack of drug information *at the time of prescribing*.⁴

Maintain drug references. It is unrealistic to expect any physician can be conversant on the tens of thousands of prescription and over-the-counter medications on the market. To help decrease risk to patients, make sure that all staff members who prescribe, dispense, administer or provide patient education on medications have easy access to current drug information and other decision support resources. Decide on a core set of drug information references that will be used (e.g., *Drug Facts and Comparisons*) and update them at least yearly or whenever a new edition is available. In addition, consider using personal digital assistants with frequently updated drug information software (e.g., Epocrates).

Establish guidelines. Written medication guidelines that outline the correct dosages, contraindications, precautions and other

critical information for frequently prescribed medications can be invaluable. Consult national guidelines (e.g., <http://www.guideline.gov>), product package inserts and other drug resources to create guidelines that will be easy for your group to follow.

Identify high-alert meds. Practices should identify a list of “high-alert” medications that require extra precautions when administered, prescribed, dispensed or refilled. High-alert medications are those that have a propensity to cause serious patient harm when used in error. They include warfarin, low-molecular-weight heparins, insulin and oral agents for diabetes, opiates and methotrexate. ISMP has compiled a list of 14 high-alert medications, shown on page 47, as well as a list of 19 high-alert drug classes/categories, which can be found online at <http://www.ismp.org/Tools/highalertmedications.pdf>.

Similarly, practices can refer to the Beers list when prescribing medications for older adults. This is a list of 48 individual medications or classes to avoid in patients over 65 years of age because the risk is unnecessarily high and safer alternatives exist.⁵ The Beers list includes daily fluoxetine (Prozac) because of its long half-life and risk of producing excessive stimulation to the central nervous system and increasing agitation; non-COX-selective NSAIDs because of their potential to produce gastrointestinal bleeding, renal failure, high blood pressure and heart failure; muscle relaxants because they are poorly tolerated by the elderly and cause anticholinergic adverse effects, sedation and weakness; and large doses of short-acting benzodiazepines (Ativan,

More than a third of preventable adverse drug events are caused by a lack of reliable drug information.

Every practice should have up-to-date drug references and written guidelines that remind physicians and staff of correct dosages, contraindications, etc.

Certain medications are considered “high alert” because they can cause great harm if used in error.

ERROR-PRONE ABBREVIATIONS

Abbreviation	Why it's a problem	Alternative
U (unit)	Mistaken for zero, number four or cc	Write “unit”
IU (international unit)	Mistaken for IV or number ten	Write “international unit”
QD (daily)	Mistaken for QID	Write “daily”
QOD (every other day)	Mistaken for QID and QD	Write “every other day”
Trailing zero (X.0 mg)	Decimal point is missed	Write X mg
Lack of leading zero (.X mg)	Decimal point is missed	Write 0.X mg

For a complete list developed by the Institute for Safe Medication Practices, go to <http://www.ismp.org/tools/errorproneabbreviations.pdf>.

Xanax, etc.) because seniors are especially sensitive to them.

Communication

An office culture that fosters open, effective communication is critical to medication safety.

Share information. Practices must promote an “equal team member” concept where communication flows in all directions. This encourages all physicians and staff to be vigilant and to detect and act on potential error signals, rather than dismissing them. Physicians can model this behavior simply by asking their nurses, medical assistants and others for input and by sharing information with other team members on a regular basis.

Improve your handwriting. A 1979 study estimated that one-third of physicians’ handwriting was illegible.⁶ Presumably little has changed over the years. To ensure that your orders and prescriptions are legible, try printing rather than using cursive, sit rather than stand when writing and work in what safety experts describe as a “sterile cockpit” (a quiet area for writing).

Avoid problematic abbreviations. The FDA and ISMP in July 2006 embarked on a joint campaign to eliminate the use of potentially confusing abbreviations, symbols and dose designations in various forms of medical communication. These abbreviations, symbols and dose designations have proven to be a barrier to effective communication and have resulted in significant harm to patients. For example, instead of writing “QD,” which is often misread as QID, it is recommended that health care professionals spell out the word “daily.” See a short list of the abbreviations to avoid on page 43.

Be aware of similar drug names. Handwritten medication prescriptions can be

difficult to interpret (see the image below), particularly if they involve medications that have similar names such as Isordil – Plendil, Celebrex – Cerebyx, Lamictal – Lamisil, and Zyprexa – Zyrtec – Zantac. Many, if not all, of these drugs with similar names carry different indications for use; therefore, including the indication with the medication can reduce confusion. The prescription pad shown on page 45 contains check boxes for common indication categories that can help communicate the purpose of the medication being prescribed. For example, if a physician were prescribing Zyrtec, he or she would check the box next to “allergic/immunologic.”

Require that orders be read back. Orders given verbally, rather than in written form, are inherently problematic because of different dialects and accents, misinterpretations of names and strengths, etc. The key to a safe process is using “read back.” The staff member should record the order directly onto the prescription pad/order sheet/computer as the prescriber is relaying it and then should read back the information to the prescriber. The prescriber should request the read back if it is not offered. During this process, spell the drug name and strength of the medication. For example, errors have been reported when the number 15 has been misinterpreted as 50. Always say “one five” for 15 or “five zero” for 50.

Consider using electronic systems. Electronic prescribing systems can produce computer-generated prescriptions or can electronically transmit the prescription directly to the pharmacy. These systems (e.g., iScribe, MEDeMORPHUS, TouchScript) not only eliminate illegible handwriting but also can automate screening for allergies, drug-drug interactions, duplication of therapy, etc. The technical aspects of implementing and

Effective communication between physicians and staff can help your practice prevent errors.

Some simple error-prevention steps include printing clearly, avoiding confusing abbreviations and including the indication on all prescriptions.

Your drug storage area should be well organized, with look-alike or sound-alike drugs stored away from one another.

GUESS THAT PRESCRIPTION

Handwritten prescriptions can be difficult to decipher. For example, in the following prescription the drug name Avandia was incorrectly interpreted as Coumadin.

Handwritten prescriptions can be difficult to interpret, particularly if they involve medications that have similar names.

using an e-prescribing system are beyond the scope of this article, but they are worth investigation. The IOM recently recommended that all prescriptions be electronic by 2010.

Labeling and storage

If you store and use any medications (e.g., samples) in the practice, follow these safe practices:

Separate problematic drugs. Do not store drugs with look-alike names or similar packaging in close proximity to each other in the medication storage area, exam rooms or sample closet. Alphabetized drug storage can cause inadvertent mix-ups. In addition, segregate any “high-alert” medications that may be used in the practice (e.g., sedating agents or anesthetics).

Separate and use auxiliary labels for different vaccines, tuberculin purified protein derivatives (PPD) and other injectable products that may be confused. ISMP has reported on several mix-ups with PPD being given in place of vaccines and vice versa.

Separate external solutions, non-drug items, testing solutions, reagents and chemicals from internal products. External products such as benzoin and podophyllin should be labeled “for external use only.” Hemocult developers and glucose monitoring chemicals have been mistakenly used as eye drops.

Keep the storage area well organized. Designate a staff member to routinely

check (at least quarterly) all medications (including samples), reagents and other products that carry an expiration date and discard any that have expired. The storage area should be maintained at temperatures between 57 and 84 degrees, it should not be cramped, shelves should be at eye level with labels facing forward, and the area should be well lit making it less likely the staff will misread labels.

Control access to medications. You should be able to lock and secure your practice’s medication storage area. In addition, your practice should have strict procedures for

INCLUDING THE INDICATION

Including a drug’s indication on the prescription is a simple safety measure. The indication, whether hand-written or communicated via check boxes, helps pharmacists and others avoid confusion between look-alike drug names. For example, if it is unclear whether a prescription says Celebrex or Cerebyx, a check mark in the “musculoskeletal” box would suggest that Celebrex is the desired drug.

MAIN STREET FAMILY MEDICINE
John Smith, MD LIC#1234567 DEA#AA123456
123 Main St., City, ST 01234
PHONE: (555) 123-4567 FAX: (555) 123-4567

Patient name _____
Address _____ Date _____

Rx _____

INDICATION TYPE	
☐	Allergic/Immunologic
☐	Cardiovascular
☐	Ears, Nose, Throat
☐	Endocrine
☐	Gastrointestinal
☐	Genitourinary
☐	Hematologic/Lymphatic
☐	Musculoskeletal
☐	Neurologic
☐	Psychiatric
☐	Respiratory
☐	Skin
☐	Other: _____

Refill NR 1 2 3 4 5 Void after _____
☐ Do not substitute. Dispense as written.

Physician signature

Forty-two percent of patients could not understand simple instructions on a prescription bottle.

logging, storing and monitoring drug samples. All medications dispensed to patients should be properly labeled with the name of the medication, strength, dose, frequency, purpose, lot number, expiration date and quantity of medication, along with the patient's name, date of dispensing and prescribing, and prescribing information. Patients should receive written and oral drug information for all sample medications.

Any vaccines dispensed or administered by the practice must be documented in a log that contains the name of the vaccine, lot number, expiration date, the patient name, dose and the date administered.

All multiple-dose vials of injectable medication (e.g., lidocaine, dexamethasone, prochlorperazine, vitamin B12) should be labeled with the date opened and the date on which the unused product will be discarded (ideally no later than 30 days after opening).

Drug devices

The use of proper drug devices, along with adequate training, can have a significant impact on patient safety.

Use the right syringes. All liquid oral medications prescribed or dispensed in the office should be administered using a proper measuring device. The use of parenteral syringes to administer oral medications, a common but dangerous practice, has resulted in aspiration of the syringe tips when they are not removed. (Liquid medications can be drawn into parenteral syringes without removing the tip of the syringe.)

Train staff to use the devices properly. All office personnel who dispense or prescribe any device (multiple daily injection devices, glucose monitoring devices, etc.) should be educated on its use. If staff members cannot educate the patient on how to use and maintain the device, they should instruct the patient to speak with the pharmacist.

Patient education

Medication-related errors are often the result of the patient not knowing the proper way to take medications. One study found that 42 percent of patients could not understand simple instructions on a prescription bottle.⁷ To help improve patients' understanding, follow these tips:

Evaluate patients' medical literacy. In some cases, you may be able to determine that a patient has low health literacy simply by the way he or she fills out the new patient questionnaire or other forms in your practice. In other cases, you may need a formal assessment. One tool to accomplish this is the "Newest Vital Sign,"⁸ which presents patients with a common scenario (e.g., reading a nutritional label) and then requires them to answer several basic questions (e.g., how many calories are in a single serving?). It is possible to accomplish this assessment in approximately three minutes during the initial intake evaluation of a patient. Knowing the patient's medical literacy level can help you tailor your patient education efforts to their needs.

To download two videos that can help educate your staff on the importance of paying attention to patients' health literacy, go to <http://www.ama-assn.org/ama/pub/category/8035.html>.

Do not rush medication counseling.

Patients should be given both oral and written instructions on the use of their medications, and they or their caregivers should be asked to repeat back the information to demonstrate complete understanding. While it may seem unnecessary, prescribers need to stress to patients the importance of getting the prescription filled and taking the medication as ordered. Patients should also be asked about their ability to pay for the medication. Many patients may not have insurance or their co-pays may be excessive, which may affect whether they fill their medications. Noncompliance is a significant cause of medication errors of omission.

Proper use of drug devices is critical; for example, using parenteral syringes to administer oral medicines can cause aspiration of the syringe tips.

Medication errors sometimes occur because patients misunderstand instructions.

A quick assessment of patients' medical literacy and proper medication counseling can be invaluable.

Culture change

In addition to the specific actions outlined above, there are steps the practice as a whole can take to support and complement patient safety. These help foster a “culture of safety.”

Assess your practice’s performance.

Using this article as your guide, assess how well your office is currently doing at following known safe practices. This assessment process should allow all team members to share information openly and honestly. You may also want to complete the *Physician Practice Patient Safety Assessment* available at <http://www.physiciansafetytool.org>, which includes a section on medication use. The tool was developed by ISMP, the Medical Group Management Association and the Health Research and Educational Trust.

Make it easy to learn from errors. Your staff should feel comfortable disclosing information on errors that have occurred, discussing unsafe practices and sharing external reports on medication errors. Make sure you have a system in place for reporting errors, and make it clear to your staff that errors will

be considered opportunities for education, not punishment. When errors or near misses take place, include all clinicians and non-clinical personnel in educational efforts, rather than including only those involved in the event.

Look for system changes that will help prevent future errors. Office personnel should share past experiences and follow the literature for errors that have been reported in articles or case presentations. This mix of internal and external information can be effective in leading you to system changes that will ensure safe patient care.

Conclusion

Safe medication use in physician practices can be achieved with many simple, low-cost system changes. The key concepts in all of these strategies are to *simplify* and to *standardize* your systems related to medications. While it does take effort, it doesn’t necessarily involve a large financial investment, and it will improve the way your practice functions and the level of safety you can offer your patients. **FPM**

This article can help you assess how well your office is implementing known safe practices.

When errors occur in your practice, talk about them openly and see what you can learn from them.

You can make your practice safer by simplifying and standardizing your medication systems.

HIGH-ALERT MEDS

The Institute for Safe Medication Practices has compiled a list of “high-alert” drugs. These medications require extra precaution because they can cause serious patient harm when used in error.

- amiodarone, IV
- colchicine injection
- heparin, low molecular weight, injection
- heparin, unfractionated, IV
- insulin, subcutaneous and IV
- lidocaine, IV
- magnesium sulfate injection
- methotrexate, oral, non-oncologic use
- nesiritide
- nitroprusside sodium for injection
- potassium chloride for injection concentrate
- potassium phosphates injection
- sodium chloride injection, hypertonic (more than 0.9% concentration)
- warfarin

Send comments to
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1. Institute of Medicine. *Preventing Medication Errors: Quality Chasm Series*. Washington, DC: National Academies Press; 2007.
2. Gurwitz JH, Field TS, Harrold LR, et al. Incidence and preventability of adverse drug events among older adults in the ambulatory setting. *JAMA*. 2003;289(94):1107-1116.
3. Field TS, Gilman BH, Subramanian S, et al. The costs associated with adverse drug events among older adults in the ambulatory setting. *Medical Care*. 2005;43(12):1171-1176.
4. Leape LL, Bates DW, Cullen DJ, et al. Systems analysis of adverse drug events. *JAMA*. 1995;274(1):35-43.
5. Fick DM, Cooper JW, Wade NE, et al. Updating the Beers criteria for potentially inappropriate medication use in older adults. *Arch Intern Med*. 2003;163:2716-2724.
6. Anonymous. A study of physicians’ handwriting as a time waster. *JAMA*. 1979; 242:2429-2430.
7. Williams MV, Parker RM, Baker DW, et al. Inadequate functional health literacy among patients at two public hospitals. *JAMA*. 1995;274(21):1677-1682.
8. Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: the newest vital sign. *Ann Fam Med*. 2005;3:514-522.