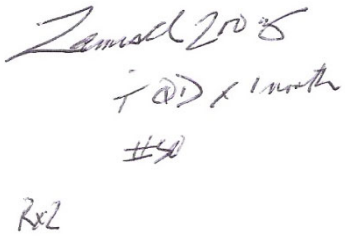
Technician Tutorial:
Preventing Med Errors

Your role as a pharmacy technician can encompass a variety of functions. Depending on the practice setting, technicians can process orders or prescriptions, prepare IV admixtures or other compounds, order stock and manage inventory, work with payers, be involved in med delivery, etc. Through all of this, preventing medication errors is vital. In fact, it's a responsibility shared by ALL healthcare professionals.

To help prevent medication errors, it's important to understand what a medication error is, and how medication errors occur.



You get a prescription for a 52-year-old female patient. As you enter the prescription into the computer, you don't see that she has had this med before. In the past, she filled prescriptions for oral contraceptives (but not for a few years), and now she gets Premarin. *She also gets a water pill, hydrochlorothiazide. Once, after a car accident, she filled a prescription for a three-day supply of oxycodone/acetaminophen.*

What would you type into the computer if you received a prescription like this? What questions do you have about this prescription?

What is a medication error?

A medication error is defined 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 healthcare professional, patient, or consumer. Such events may be related to professional practice, healthcare products, procedures, and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use."

Medical errors (which include medication errors) have been tapped as the third leading cause of death in the US. Fortunately, medication errors are preventable and healthcare is in a constant state of evolution to improve patient safety.

How do medication errors happen?

You might be surprised to find out that medication errors are generally not considered to be the "fault" of individuals, or to occur because a person was negligent or unintelligent. Experts say that medication errors usually happen because of "system failures." This means that multiple people (e.g., prescribers, nurses, pharmacists, pharmacy technicians) might miss opportunities to catch an error. Or the error might even go undetected by technology, such as computer software and barcode scanners.

Medication errors are often the result of the "system" failing in multiple places. This is sometimes called the "Swiss cheese model." Picture the holes in several pieces of Swiss cheese lining up, so the error can slip right through multiple layers of protection.

Because system failures are often to blame for errors, it's important for pharmacy technicians to let a pharmacist or administrator know if a system-based process isn't working as it should be. That way, the process can be examined and changed, hopefully before an error occurs.

Say, for example, there's a new drug on the market. It's getting a lot of hype and you've already filled several prescriptions for it. You notice that when you reached for it on the shelf, you picked the wrong product, one that has very similar packaging. This "near miss" that was caught before reaching the patient is a scenario that should be discussed with a pharmacist or other appropriate person (e.g., manager, medication safety officer) to figure out how to prevent this potential error from happening. If it happened to you, other technicians and pharmacists are probably running into the same problem.

On the other hand, if an error has already occurred, processes must be examined and corrected, so the same error doesn't happen again. Don't ever feel like you are "tattling" if you report an error. Reporting errors and near-misses is an essential part of improving patient safety.

How can I help prevent medication errors?

The Institute for Safe Medication Practices (ISMP), an organization devoted to improving medication safety, emphasizes different points where pharmacy technicians have the opportunity to prevent errors.

Prescription drop-off. Good communication is key. The more information you have, the better positioned you are to catch an error. Of course, **date of birth and current allergy information** should always be obtained from every patient.

Date of birth gives you another identifier, besides name, to help avoid mix-ups between patients with the same or similar names. In the hospital setting, a medical record number (e.g., MRN) or date of birth can be used as a second identifier to prevent mix-ups with the same or similar names. Things that are subject to change, such as a hospital room number, are not dependable ways to identify patients.

Current allergy information is important because a patient may have experienced a reaction since the last time they had a prescription filled. This should include both the cause of the reaction and the specific reaction that the patient had, plus the date of the reaction, if possible. For example, if a patient reports an allergy to amoxicillin, ask them when it happened and what happened (i.e., whether they had stomach upset, hives, or trouble breathing), and document those details.

You'll also want to get information about a patient's food and other allergies (e.g., dyes, latex) because some meds shouldn't be used in patients with certain nondrug allergies. If your computer system doesn't allow food and other allergies to be entered in the same way as drug allergies, try to make a note in the patient's profile about the nondrug allergy.

No medication should be dispensed before allergy information is obtained. An exception to this might be for a patient with a life-threatening condition, who is unable to communicate. However, any allergies should be recorded as soon as the information is available.

Ask patients for **basic information about medical conditions**, and record these in their profiles. Having this info can be very important. For example, if a patient is pregnant, certain medications should NOT be used, and the pharmacist can determine this. Also, knowing a patient's medical conditions can help the pharmacist double-check the appropriateness of prescriptions.

For babies and children, it's important to ask parents or caregivers for a current weight with every new prescription. This is necessary so the pharmacist can check that doses are appropriate, since pediatric doses

are usually based on both age and weight, and a child's weight can change significantly over a short period of time.

You make sure to ask your patient about her allergies. She verifies that she has no drug or nondrug allergies. You also ask about her medical conditions, and she says that she is completely fine, except for high blood pressure that's controlled with medicine, occasional hot flashes, and a pesky nail fungus.

Order entry. When you're processing prescriptions, it's best to **minimize distractions**. Keep personal business, like conversations, phone calls, and text messages, to a minimum. Focus on the task at hand. It's easy to get caught up in the "buzz" of things. But when an error happens, reality can quickly set in. Stay present and keep your mind on your work. Encourage others to do the same.

At order entry, familiarity with med names, especially **names of new meds**, is very important. We have a list of new products hitting the market in the US and in Canada. The lists have a short description of each product. It's a good thing to stay on top of what's new, so you know to expect prescriptions for these.

Look-alike/sound-alike med names, also referred to as "LASA," or "SALAD" for "sound-alike/look-alike drugs," can be problematic when you're entering orders. Some examples of **look-alike/sound-alike med names** are atomoxetine and atorvastatin; methadone and methylphenidate; methotrexate and metolazone; risperidone and ropinirole; *Topamax*, *Toprol-XL* (US), *Tegretol*, *Tegretol-XR* (US), and *Tegretol-CR* (Canada); and *Ultram* and lithium. Another example is *Celebrex*, *Celexa*, and *Cerebyx* (US). And the list goes on. It's easy to see how these med names could be confused with each other. To add to the confusion, some of the available strengths of these meds overlap.

Ten-fold dosing errors can come up, especially with meds that come in similar-looking strengths, such as *Abilify* 2 and 20 mg, heparin 1,000 and 10,000 units/mL, and prednisone 5 and 50 mg. Plus, med names that end in the letter "L" can fool the eyes, where the "L" is seen as a "1" in front of the dose, leading to errors such as misreading lisinopril 2.5 mg as lisinopril 12.5 mg. These situations really drive home why it's important to carefully read orders and Rxs, and to clarify anything that's confusing, hard to read, etc.

Drug name suffixes, like CD, SR, or XL, can also lead to errors. There's not a uniform meaning for most **suffixes**. Common errors with med names with suffixes include incorrect dosing interval and mistakenly omitting a suffix. For example, a prescription for the immediate-release metoprolol tartrate given once daily (which should normally be given twice daily), or a prescription for the long-acting metoprolol succinate (US only) given twice daily (which should normally be given just once daily) should be questioned. These meds may sometimes be dosed in this manner, but it's always a good idea to double-check. Another common mix-up is with the long-acting bupropion products, *Wellbutrin XL* and *Wellbutrin SR* (US only), and their respective generics.

Also keep in mind that sometimes prefixes can cause confusion. For example, the prefix "Depo-" can lead to errors. These long-acting injectable versions can get mixed up with the regular versions, such as with *Depo-Medrol* and *Medrol*.

Meds that come in **different salt forms** are also prone to errors. For example, oral doxycycline comes as both a hyclate salt and a monohydrate salt. Nasal fluticasone comes as either furoate or propionate. Different salts of meds might have different dosing or side effects. If you have questions about which salt form of a med to choose, double-check with the pharmacist.

In addition to mix-ups between med names, mix-ups due to abbreviations can be problematic. There's a **long list of abbreviations** that should NOT be used in healthcare. They are known to increase the risk for errors, often because they can be misread. The following list gives a few examples of dangerous abbreviations:

Abbreviation	Intended Meaning	Common Error
U	Units	Mistaken as a zero or as a "4" Can also be mistaken for "cc"
µg	Micrograms	Mistaken for "mg"
Q.D.	Every day	The period after "Q" can be mistaken for an "I," so that the abbreviation is misread as "QID" or four times daily
Q.O.D.	Every other day	Mistaken for "QD" or "QID"
SQ or SC	Subcutaneous	Mistaken as "SL"
TIW	Three times a week	Misinterpreted as "three times a day" or "twice a week"
HS	Half-strength	Misinterpreted to mean "at bedtime"
cc	Cubic centimeters (same as mL)	Mistaken as "U" for units
AU, AS, AD	Both ears; left ear; right ear	Misinterpreted as "OU" (both eyes), "OS" (left eye), or "OD" (right eye)
IU	International unit	Mistaken as "IV" or "10"
MS, MSO4, MgSO4	MS and MSO4 = Morphine sulfate MgSO4 = Magnesium sulfate	Can be confused for one another
APAP	Acetaminophen	May not be recognized as meaning acetaminophen

If you run into an ambiguous abbreviation (for example, is it a "U" or is it a "0"?), always alert the pharmacist so they can clarify the prescription with the prescriber if needed. And avoid using abbreviations for med names, such as "levo" for levofloxacin, which could be mistaken for levothyroxine, or "nitro" for nitroprusside (in the hospital setting) which could be mistaken for nitroglycerin.

Be alert for instructions requiring a patient to **split or crush a tablet** (or open a capsule or crush its contents). Many tablets and capsules must be taken without any kind of alteration. Some reasons for this include:

- extended-release dosage form. Splitting or crushing a tablet or opening a capsule would destroy an extended-release mechanism. If an extended-release mechanism is destroyed, a large dose can be "dumped" all at once, which could result in an overdose.
- bad taste.
- irritating to the gastrointestinal (GI) tract. Destroying a coating that is meant to protect the gastrointestinal tract can result in GI irritation.
- potential harm to the person administering them if they are not administered intact.

Most of the time, single-ingredient tablets, that aren't coated and aren't extended-release, can be split or crushed. If a tablet is scored, then you know it can be split. Some capsules can be opened, and the contents administered with a beverage or mixed with a food such as applesauce. Examples of these include *Depakote Sprinkle* (US only) and *Adderall XR*.

It's not always possible to determine if a tablet can be split or crushed, or if a capsule can be opened, by simply looking at it. This information may be found in the product labeling. Alert the pharmacist if you have a concern.

It's important to be extra cautious when processing and dispensing prescriptions for **"high-alert" medications**. The reason certain meds are designated as high-alert isn't because they're more likely to be involved in errors. It's because patients are more likely to have serious harm if these meds are used incorrectly and patients get too much or too little of the medication. For example, errors with oral hypoglycemics for

diabetes (e.g., glimepiride, glyburide) or insulin can be deadly because hypoglycemia, or low blood sugar, can cause patients to lose consciousness. Be vigilant with high-alert meds and question any part of an order or prescription that seems inappropriate or ambiguous.

Here's a list of some "high-alert" medications:

- chemotherapy (e.g., capecitabine [*Xeloda*], cyclophosphamide, methotrexate).
- oral hypoglycemics for diabetes (e.g., glimepiride, glyburide).
- insulin (e.g., *Humulin*, *Lantus*, *Novolin*).
- methotrexate (for noncancer conditions, such as rheumatoid arthritis).
- opioids (e.g., codeine, fentanyl, hydrocodone, methadone, morphine, oxycodone).
- opium tincture.
- anticoagulants or "blood thinners" (e.g., warfarin, heparin, enoxaparin [*Lovenox*], dabigatran [*Pradaxa*], rivaroxaban [*Xarelto*]).
- injectable electrolytes (i.e., concentrated potassium chloride, potassium phosphate, hypertonic sodium chloride, magnesium sulfate).
- sedative agents (e.g., chloral hydrate, dexmedetomidine [*Precedex*], midazolam).
- paralyzing agents (e.g., cisatracurium, rocuronium, succinylcholine).
- injectable vasopressin.

If you perform a calculation when entering an order or prescription, have a colleague double-check your math independently. This can help reduce the risk of dosing errors, errors with days' supply, etc.

A good rule of thumb is to **question any dose that requires more than three or four dosing units**. For example, if four tablets are needed to make up one dose, alert the pharmacist to double-check the dose. If you're in the hospital setting and mixing up an IV medication that requires more than three or four vials, have the pharmacist double-check the dose.

Unclear prescriptions and med orders should **always be clarified**. We know handwritten prescriptions may be especially prone to errors due to poor legibility. But keep in mind that errors can still happen even with electronic prescriptions. Watch out for common problems such as mismatches between med and dosage form (e.g., a med that comes as a tablet ordered as a capsule or liquid), or free text in the "notes" field that could easily be missed. If you encounter an unclear order or prescription, don't ever guess. Let the pharmacist know so they can touch base with the prescriber. Also, clarify "use as directed" sigs to help prevent patient confusion and other problems such as pharmacy audits.

If your computer allows you to use **quick codes**, such as entering "PAX20" for *Paxil* 20 mg, match up the med, strength, and directions on the prescription label to the hard copy of the prescription as a double check. As a general practice, consider typing in at least five letters of a med name plus the intended strength to help limit the number of meds and strengths that appear on the screen and to reduce the risk of picking the wrong one.

You might feel bombarded by **alerts** from your computer system. But don't ignore them. Always notify the pharmacist. Some alerts are very serious, while others may not be a problem. The pharmacist can decide what action needs to be taken to avoid potential issues.

Medication reconciliation or "med rec" is required by regulatory agencies at transitions of care as another way to gather information and identify med errors. During med rec, the patient's entire med list can be examined, and any problems can be sussed out. Pharmacy techs can play a big role in med rec, such as by documenting a patient's med history, an opportunity which is expanding in the hospital setting.

When you're documenting a med history, include all meds a patient takes. Include those that are non-Rx, non-oral, and non-daily, which may have a tendency to slip a patient's mind. Ask open-ended questions to trigger memory, such as by saying, "What meds do you apply to your skin?" or "What meds do you take less often than every day?" Also document how patients actually take their meds, since they may take them differently than prescribed (and it's important for clinicians to be aware of this). Follow your pharmacy's policies on comparing information from the patient to a second source, since patient interviews can be error-prone.

As you start to enter the Rx into the computer, you note that your initial impression was that it read "Lamictal" *with some suffix, at a dose of 50 mg. Because the Rx isn't clear, you ask the pharmacist to take a look. The pharmacist is puzzled as well, but asks "What's new with this patient?" You tell him nothing, except the nail infection. Then, you both realize that the prescription is actually written for* Lamisil*, at a dose of 250 mg once daily. The pharmacist takes a moment to speak with the patient to verify that this new Rx is intended to treat her nail infection.*

Filling/dispensing. Choosing the wrong product can happen for a variety of reasons, including **look-alike packaging or labels and the location of a product on the shelf**. It's best to keep look-alike/sound-alike products, such as *Toprol-XL* and *Tegretol-XR* (both US only), physically separated from one another on pharmacy shelves. In the hospital setting, you'll also want to pay extra attention to med vials, prefilled syringes, or IV infusions that look alike due to similar size, labeling, or cap color. Shelf tags are another good error-prevention strategy, as is the use of tall man lettering to help differentiate similar med names.

In some cases, it may be helpful to place a "spacer" or other marker on the correct shelf spot to indicate that a product has been relocated. This will help ensure that products are stocked in the correct location and prevent staff from incorrectly assuming a product isn't in stock if it's not immediately located on the pharmacy shelves. Some pharmacists or techs use an empty Rx bottle with a note on the label, like "*Tegretol-XR* stocked on shelf 12." A small plastic bin can be turned upside down in the refrigerator, in the spot where a med would normally be expected, to indicate relocation of a refrigerated product (e.g., insulin, vaccines).

In the hospital setting, it's important to remember that products with look-alike labels and packaging should be separated not only in the pharmacy, but also when they're stocked on patient care units. Also, avoid storing vials in a position so that only the caps are visible. This may lead to choosing a vial based on cap color alone, which is a dangerous practice.

Another way to help make sure the right products are chosen is to optimize use of **barcode technology**. Barcode technology works to improve patient safety if you use it correctly, without shortcuts and workarounds. If scanning is problematic, troubleshoot before you resort to using manual override. If multiple doses, bottles, vials, etc, need to be scanned, make sure and scan each one if possible. Don't scan the same package multiple times.

Also avoid using shortcuts and workarounds with **automated dispensing devices** (e.g., *AcuDose*, *Parata*, *Pyxis*, *ScriptPro*). Bypassing necessary steps can increase the risk for med errors and inventory issues. Make sure you fill these with the correct meds. Use barcode scanning as a double check if possible. If there are issues with barcodes, such as a missing or unreadable barcode, try to resolve them so barcode scanning doesn't get skipped. And scan the barcode on each package, not just one package multiple times. Don't forget to double-check expiration dates of meds before filling these devices.

As you go to the shelf to pull the Lamisil *250 mg tablets, you're aware that the* Lamictal *tablets are in such close proximity. You alert the pharmacist that these should be physically separated. Unfortunately, you have limited space in your pharmacy, so there's really no way to move the* Lamictal *tablets. Instead, you place a look-alike/sound-alike sticker on the shelf for both drugs.*

Distributing meds to patients. Errors can also occur when a patient picks up their prescription from the pharmacy. One example of an error at point-of-sale is handing a filled and bagged prescription to the **wrong patient**. To prevent this from happening, always ask the person picking up the prescription for a second identifier such as an address or date of birth to avoid mix-ups with same or similar patient names. And consider verifying how many prescriptions they're picking up. You can also use barcode technology to prevent these types of errors. Either way, pay close attention, even if you personally know the patient.

Be extra careful when combining **multiple meds** into one bag. Match the name and address for all the meds. Also, take extra steps to make sure nothing is missing from a patient's order by matching up the number of receipts and filled prescriptions.

Another example of an error at point-of-sale is handing out **an oral suspension that hasn't been reconstituted**. This error has been reported multiple times in pediatric patients for products like amoxicillin. In some cases, parents have administered the prescribed amount of *powder* instead of the *reconstituted liquid*, resulting in a trip to the emergency room. Consider the current system in your pharmacy for dispensing drug products that require reconstitution. Is there a double check before the drug is handed to the patient to be sure that it got mixed?

Be sure to include an **appropriate calibrated measuring device** when you dispense oral liquids in the outpatient setting. Patients should not use household spoons to measure out doses because they can be very inaccurate. Try to choose a measuring device that's a correct size for the patient to measure the total dose. For example, if a dose is 15 mL, dispense a measuring device that holds at least 15 mL. If you dispense one that holds only 5 mL, the patient will need to pull up doses three separate times for each 15 mL dose. Or the patient could mistakenly think that the 5 mL device holds the full dose of 15 mL, which could lead to underdosing and less effective treatment. In the hospital, follow your pharmacy's policies for drawing up individual doses of liquid meds into oral syringes rather than dispensing bulk bottles.

To be safe, pharmacists should personally hand patients their prescriptions for high-alert medications, if possible. This way, they can help clear up any confusion or answer any questions patients may have about these meds. Note on the outside of the prescription bag that there's a high-alert medication inside. In the hospital setting, you may be required to attach "high-alert" auxiliary labels to these orders, to let pharmacy and nursing colleagues know to take any required precautions. But don't cover up any important info such as a med's beyond-use date with auxiliary labels. Other things that might be noted on the outside of a prescription bag to prompt referral of the patient to the pharmacist include new patient or major changes in doses or meds.

Finally, keep the **will-call bin** tidy. If it's overflowing, avoid stacking bags on top of bags. Instead, alert the pharmacist and look for solutions, like removing discontinued or unclaimed meds.

In the hospital you should also watch for similar or duplicate patient names when delivering meds to patient care units. Double-check date of birth or MRN to make sure you're delivering to the right patient. As previously mentioned, don't depend on room numbers as a double check since these can change and aren't foolproof. Also, be sure to remove meds from patient care units if they've been discontinued or if the patient has been discharged or transferred, according to your pharmacy's policies and procedures.

Encourage patients to ask questions. If there are questions, don't hesitate to alert the pharmacist. There's movement toward empowering patients to share in the responsibility for their care, sometimes referred to as "Speak Up" campaigns. Plus, with availability of medical information on the internet, patients have access to more information than ever before. Also help facilitate routine counseling of patients. This is the last chance the pharmacist will have to check a patient's prescription and make sure the patient understands any special techniques required such as using an inhaler or injecting a med. Look for any notes the pharmacist may have attached to the Rx receipt or bag in case the pharmacist uses this strategy to let you know they'd like to speak with a patient.

Pay attention to anything that seems odd or off. For example, in the hospital setting, if you notice that a particular item is being used up unusually quickly from floor stock, or from an automated dispensing cabinet, let the pharmacist know. The use could be legitimate, but it could also indicate that there's a problem somewhere. For example, a nurse called the pharmacy twice in one shift to ask for more IV magnesium for floor stock. The pharmacist asked why the magnesium had been used up twice during one shift. The nurse responded that they were using a dose every hour for one patient. It turned out that the order for magnesium supplementation had been entered into the computer incorrectly. The patient should have received two doses but had instead received eight doses and counting! Too much magnesium could cause the patient to have very serious heart problems. The nurse stopped giving magnesium, the prescriber was called, blood levels of magnesium were checked, and the patient's heart rhythm was monitored to watch for problems.

Report errors and near-misses appropriately. It's likely that your pharmacy or institution has an internal reporting system for these. If you aren't familiar with the reporting system, ask your pharmacist or admin or check pharmacy policies and procedures. One of the main benefits of reporting errors and near-misses is that staff can learn from them, to prevent the same problem from happening again. To close this loop, there also has to be feedback to staff on what errors and near-misses have occurred.

There's also a big push for healthcare professionals to stay on top of errors and near-misses that are happening in other pharmacies and hospitals. This provides an even greater opportunity to implement safeguards proactively.

What's the bottom line?

Pharmacy technicians are an integral part of the team providing medication therapy to patients. Establishing an awareness of factors that can increase the risk for medication errors is important. Be on the lookout for areas that can use improvement and help strategize to minimize the risk for errors. Always question anything that looks "fishy." And remember that guessing or cutting corners to save time is ALWAYS a bad idea.

To learn more strategies on how to promote patient safety, search our library of medication safety CEs in the CE & Training portal.

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--Continue to the next section for a "Cheat Sheet" for Preventing Med Errors—

"Cheat Sheet" for Preventing Med Errors

Why do med errors happen?

Med errors often happen because of system failures. This means that multiple safety checks fail, not that a single person "drops the ball."

How can med errors be prevented?

Be vigilant and look for opportunities for errors to happen, and report these to a pharmacist or administrator so safeguards can be put into place. Also report errors or near-misses that happen. Putting safety checks into place even after the fact helps prevent errors from being repeated in the future.

What practices can I incorporate into my routine to help prevent med errors?

- Ensure you have all the patient information you need:
  - a second identifier other than name such as date of birth or medical record number.
  - current allergy information (e.g., meds, food).
  - basic medical info (e.g., medical conditions, pregnancy status).
  - current weight (especially for babies and children).

- Watch for problems at order entry, especially with:
  - look-alike/sound-alike drug names.
  - meds that come in multiple strengths.
  - med name suffixes or prefixes.
  - meds that come in different salt forms.
  - dangerous abbreviations.
  - meds with special instructions such as to crush a tab or open a cap
  - high-alert meds

- Watch for problems when dispensing or stocking meds, especially those with any of the above attributes, or meds with look-alike packaging.

- Avoid technology workarounds, such as manually overriding barcode technology.

- Ensure safety when meds are distributed to patients, such as by:
  - checking a second identifier other than name.
  - ensuring a calibrated measuring device is included with oral liquids.
  - flagging patients getting high-alert meds to receive counseling from the pharmacist.
  - encouraging patients to get their questions answered.

- Stay alert for situations that seem odd or off, since these can be red flags for actual problems.

- Always clarify anything that's questionable. Don't guess.

- Report errors and near-misses to prevent future problems.

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