

Idaho Society of Health-System Pharmacists

The Pharmacy Technician's Role in Preventing Harmful Drug Interactions

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Disclosures

- We have no actual or potential conflicts of interest in relation to the material covered in this presentation.

Learning Objectives

- Define terms: drug-drug interaction, drug-allergy interaction, drug-food interaction, and drug-disease interaction
- Identify medications that commonly interact with other agents
- Understand the technician's responsibilities for managing drug interactions
- Determine when a drug interaction requires intervention from a pharmacist

Abbreviations

- ADE: Adverse drug event
- ADR: Adverse drug reaction
- DDI: Drug- drug interaction

What are drug interactions?

- Drug interaction:
 - An interaction between a drug and another substance that causes the drug to perform other than expected
- Drugs have many different actions on our bodies whether internal, external, intracellular, or extracellular
- May lead to:
 - ADE: an injury resulting from medical intervention related to a drug
 - ADR: harm directly caused by the drug at normal doses, during normal use

Health Care Quality and Patient Safety: Prevent Adverse Drug Events (ADEs). Available at: <https://health.gov/hcq/ade.asp>

Why do we care about drug interactions?

- Patient may not get the full benefit of a drug
- Patient may experience an adverse drug event that causes harm and/or death
- Economic Burden:
 - \$30.1 billion/annually due to ADR's
- Prevalence:
 - With patients taking a large number of medications, the opportunity for an ADE from a drug interaction increases
- Roughly 40% of ADEs are preventable

Sultana J, Cutrono P, Trifiro G. Clinical and economic burden of adverse drug reactions. *Journal of Pharmacology & Pharmacotherapeutics*. 2013;4(Suppl1):573-577. doi:10.4103/0976-500X.120957.

4 types of drug interactions

- **Drug-drug:**
 - When a drug interacts with another drug
 - Prescription, OTC, herbals
- **Drug-allergy:**
 - When a drug causes an undesired immune response resulting in an allergic reaction
- **Drug-food:**
 - A change in a drug's effects due to food or beverage the patient consumes while taking
- **Drug-condition:**
 - When a drug worsens or exacerbates a patient's medical condition or disease

Drug-Drug Interactions (DDI)

- If a drug interacts with another drug, it is called a drug-drug interaction:
 - There are good drug-drug interactions which are intended
 - There are harmful drug-drug interactions which are unintended
- Types of Interactions:
 - Additive effects of same/similar classes
 - CYP interactions
 - Acid/Base interactions

"Good" DDI's

- Drugs used together to induce an interaction for an intended outcome:
 - Help prevent an ADE from occurring
 - Enhance effects of drugs for optimal benefit
- Examples:
 - Naloxone and opioids
 - Warfarin and Vitamin K (phytonadione)
 - Other reversal agents
 - N-acetylcysteine, flumazenil, glucagon, dextrose, etc.
 - Antibiotic combinations:
 - SMX/TMP, AMP/SULB, AMOX/CLAV
 - Lidocaine with epinephrine
 - Epinephrine acts as a vasoconstrictor which clamps down or constricts local blood vessels. This acts to keep the lidocaine anesthetic local and not systemic.

Additive DDI's

- Some drugs enhance effects of other drugs when used in combination
 - Increased side effects
 - Potentially fatal ADE's
- Duplication in therapy can also cause an additive DDI
- Examples:
 - Benzodiazepines + opioids → increases side effects such as drowsiness, dizziness and confusion and increases risk of respiratory depression.
 - Aspirin + warfarin → increases risk of bleed
 - Sertraline (Zoloft) + citalopram (Celexa) → increased risk of toxicity
 - Sildenafil (Viagra) + nitroglycerin (Nitrostat) → increased hypotension

CYP Enzyme DDI's

- CYP enzymes help break down drugs in the liver
- Some drugs inhibit or enhance these enzymes, altering drug effects in the body:
- Drug Classifications:
 - CYP substrate: metabolized by enzyme
 - CYP inhibitor: blocks enzyme
 - Increased risk of side effects and toxicity for CYP substrates
 - CYP inducer: increases enzyme activity
 - Increases metabolism and decreases effectiveness of CYP substrates
- Examples:
 - Omeprazole (Prilosec) + clopidogrel (Plavix)
 - Carbamazepine (Tegretol) + amlodipine (Norvasc)

Acid-Base DDI's

- Some drugs require a certain pH to absorb appropriately
- Taking medications that alter the pH of the stomach may decrease effectiveness of some drugs
- Examples:
 - Antacids → decrease effectiveness of drugs that need acidic pH to absorb

Common Rx DDI's

- Watch out for these common medications and class of medications that have many potential interactions:
 - Warfarin
 - SSRIs (sertraline, citalopram, escitalopram, fluoxetine)
 - Fluconazole
 - Opioids
 - Birth Control
 - Antibiotics
 - Proton Pump Inhibitors (omeprazole, pantoprazole)
 - Nitrates (nitroglycerin)
 - Antiarrhythmic (amiodarone, sotalol)

Common OTC DDI's

- Acetaminophen (Tylenol)
 - Hydrocodone-APAP (Norco), oxycodone-acetaminophen (Percocet)
- NSAIDS: ibuprofen, naproxen
 - These drugs can decrease excretion by the kidneys and enhance bleeding
 - Example:
 - Ibuprofen + Methotrexate → decreases methotrexate clearance
 - Ibuprofen + warfarin → increases bleed risk
- Tums, Antacids, Minerals
 - These can cause chelation with certain other drugs → decrease drug effectiveness
 - Examples:
 - Fluoroquinolones: Ciprofloxacin (Cipro), levofloxacin (Levaquin)
 - Levothyroxine (Synthroid)

Drug-Allergy Interactions

- If a drug interacts with the individual who uses it and causes harm or discomfort to a patient, it is called a drug-allergy interaction
- Sulfa:
 - Sulfamethoxazole-trimethoprim (Bactrim)
 - Sulfasalazine (Azulfidine)
- Penicillin
 - Penicillin allergies can have cross-reactivity with many other antibiotics in different classes
 - Examples:
 - Aminopenicillins: Amoxicillin (Amoxil), amoxicillin + clavulanate (Augmentin)
 - Cephalosporins: Cephalexin (Keflex), cefdinir (Omnicef), ceftriaxone (Rocephin)
 - Carbapenems: meropenem (Merrem), ertapenem (Invanz)
- Tetracycline
 - Doxycycline
 - Minocycline (Minocin)

Drug-Food Interactions

- When a drug cannot perform its action because of something an individual eats or drinks, it is called a drug-food interaction.
- Alcohol:
 - Combination with metronidazole (Flagyl): vomiting, nausea, flushing
 - Enhances the hypoglycemic effect of anti-diabetic medication
 - Enhances hypotensive effect of many blood pressure drugs
 - Enhances drowsiness/dizziness in sedating medications
- Tobacco in cigarettes:
 - Increases metabolism of certain drugs so that they don't work as well or as long
- Vitamin K:
 - Must be consistent intake while on warfarin (Coumadin)
- Grapefruit juice:
 - CYP inhibitor → increases the effect of some drugs including statins
- Dairy:
 - Reduces the absorption of bisphosphonates, iron, levothyroxine, and some antibiotics (ciprofloxacin and tetracycline).

Drug-Condition Interactions

- Certain drugs do not work well with conditions or diseases and result in drug-disease interactions.
 - Drugs can worsen or exacerbate existing medical conditions.
- Examples:
 - Pseudoephedrine (SudaFed): increases blood pressure
 - Ibuprofen can cause airway constriction and should be used with caution in severely asthmatic patients
 - Diseases that place patients at high risk for interactions include:
 - Kidney Disease
 - Liver Disease
 - Diabetes
 - Hypertension
 - Asthma
 - Pregnancy

Technician's Responsibility

- Be aware of drug interaction prevalence and where they can occur
- Understand the importance of catching drug interactions before it reaches the patient
- Always verify drug allergies with patients when they drop off prescriptions
- Consult with pharmacist if you suspect a potential interaction
- Be cognizant of computer drug interaction alerts
- Make sure appropriate cautionary stickers are placed on the prescription bottle when filling
- When you are helping a patient who is picking up a new prescription or OTC medication, make sure the pharmacist is aware and counsels the patient to avoid any potential interactions

When to utilize a pharmacist

- If you suspect concern regarding any medication
- If you see a drug-drug, allergy, or food mismatch
- If you notice a therapeutic duplication

How you can help

- Take drug interactions seriously
- Make sure complete medical history is obtained for each patient as part of medication reconciliation
- Discuss any concerns you have with the pharmacist
- Remember that OTCs can have interactions too
- Be aware of common OTC interactions
- Read drug labels and adhere to warnings and recommendations
- Teach patients how to read Drug Facts label

Assessment Question

Which one of the following is a drug-drug interaction that you would let the pharmacist know about?

- A) Patient on simvastatin with a new order for atorvastatin
- B) Patient buying OTC ibuprofen and acetaminophen together
- C) Patient on warfarin buying OTC aspirin
- D) A and C
- E) All of the above

Assessment Question

What do you do if a new patient dropping off a prescription for cephalexin (Keflex) tells you that he thinks he is allergic to penicillin but doesn't remember what the reaction was?

- A) Document the allergy and fill the prescription
- B) Don't document it in his drug allergies since it probably wasn't bad if he doesn't remember it
- C) Tell him that you can't fill his prescription because of the possible cross-reaction
- D) Document the allergy and notify the pharmacist

Assessment Question

What sticker should you make sure the patient is aware of when picking up a prescription for metronidazole?

Patient Case

A patient comes to pick up his monthly medications which include lisinopril, hydrochlorothiazide, and amlodipine. He also asks for some behind-the-counter pseudoephedrine for his cold he caught from his niece over the weekend.

What potential interaction do you see?

What do you do in this situation?

Patient Case

Ms. White is a well-known patient at your retail pharmacy. She is picking up a refill of her prescription for warfarin that she has been taking for a few months. She also has a bottle of ibuprofen to buy because she recently injured her wrist while gardening and needs some help with the pain. She goes on to tell you excitedly that her garden has been growing so much spinach and kale that she is going to start a new diet that includes all of her own vegetables since she normally never eats them.

What potential drug interactions do you see with Ms. White?

How should you handle this situation?

What could have happened if you did not notice these drug interactions?

QUESTIONS?
