Chapter 1

State laws impact on prescriptive authority

- Whether state requires APRN practice in collaboration with or under supervision of a physician.

Full Practice Authority

- The legal right to prescribe independently and without limitations

Role: Prescriptive Authority

- Safe and competent practice of prescribing and managing medication. Requires understanding of drugs and the condition that they are used to manage.

Chapter 2

Assessing drug interactions

- Monitor for polypharmacy and ask pt about all current meds, OTC, and herbal meds.

Prescriptions

- Telephone, written, e-prescribing, and refills

Role of Formularies

- This formulary is selected by a panel of pharmacists and providers and may be subject to following guidelines created by regulatory agencies, such as the Centers for Medicare and Medicaid Services (CMS). The formulary may also depend on regional and national drug supplies, drug costs and available rebates, and the presence of generic medications on the market.

- **Impact of drug selectivity on side effects**

Chapter 3

Generic vs Brand Name: Value of Knowing

- Pts should know generic and trade name of medications. Knowing the generic name empowers the pt to catch medication errors in the event two different providers prescribe the same generic drug under different brand names.

Duration of Therapy

- Educating the pt on if medication therapy will be short term or long term. Failure to recognize the need for prolonged therapy is a common reason pts stop medication prematurely when prescription runs out.

Chapter 4

Excretion Process

- Movement of drug and their metabolites out of the body

Metabolism Process

- Body chemically alters drugs for therapeutic use and forms into components that can be easily excreted.

Distribution Process

- Drug must be distributed to sites of action throughout the body via vascular system. To enter target tissue, it must exit vascular system. Blood flow and drug ability to exit vascular system and enter cells and the degree of plasma protein binding.

Passage Across Membranes

- Drug needs to pass through cells rather than between them to cross the membrane. Passage through channels or pores, passage with the aid of a transport system, and direct penetration of the membrane.

Absorption Process

- Process which the drug moves from its administration site into the bloodstream. It starts where the drug is administered and ends when it enters systemic circulation.

Rate of Dissolution

- Helps determine the rate of absorption. Drugs in formulations that allow rapid dissolution to have a faster onset than drugs for slow dissolution.

Surface Area and Absorption

- Major determinants of the rate of absorption. The larger the surface area the faster the absorption. Ex: small intines have larger surface area than the stomach.

Blood Flow Impact on Absorption

- Drugs are absorbed rapidly from sites where blood flow is high. The greater the concentration gradient, the more rapid absorption will be.

Multiple drugs on metabolic pathways

- Drugs may compete with each other for metabolism which may decrease the rate at which one or both agents are metabolized. If metabolized is depressed enough drugs can accumulate to dangerous levels.

Therapeutic Consequences

- Accelerated renal excretion of drugs, drug inactivation, increased therapeutic action, activation of prodrugs, increased toxicity, decreased toxicity.

Receptors and Selectivity of Drug Action

- Selectivity is having only the response in which the drug is given. The more selective the drug the less side effects it will produce. If a drug interacts with only one receptor the effects of the drug will be limited. If a drug interacts with several receptor types the drug could have a wide variety of responses.

Noncompetitive Antagonists

- Bind irreversibly to receptors and reduce the maximal response of an agonist.

Noncompetitive Antagonists Action

- The effect of irreversible binding is equivalent to reducing the total number of receptors available for activation by an agonist.

Chapter 5

FDA & QT Interval Drugs

- Prolong the QT interval and serious risk for dysrhythmias. Torsade’s de pontes.

- FDA requires all new drugs be tested for ability to cause QT prolongation

Boxed Warnings
- Strongest safety warning a drug can carry while still on the market. Text inside box with black border, FDA requires on drugs with serious or life-threatening risks

Boxed Warnings: Drug Examples
- Promethazine is contradicted in pt less than 2 d/t respiratory depression

Identifying Adverse Drug Reactions
- • Did symptoms appear shortly after the drug was first used?
- • Did symptoms abate when the drug was discontinued?
- • Did symptoms reappear when the drug was reinstituted?
- • Is the illness itself sufficient to explain the event?
- • Are other drugs in the regimen sufficient to explain the event?

*More than half of all adverse drug reactions (ADRs) are caused by drug metabolism and CYP450 enzymes

Chapter 6

Metabolic influence on drug administration
- Age (infants and older adults), body surface area and weight, kidney and liver function, acid-base imbalances, tolerance, variability in absorption, gender, race

Renal Disease Impact on Pharmacodynamics
- Kidney disease can reduce drug excretion, leading to drug accumulation in the body

Bioavailability and Variable Drug Responses
- Bioavailability refers to the amount of active drug that reaches the systemic circulation from its administration site. Differences in dissolution time, enteric coatings, and sustained-release formulations can alter bioavailability.

Chapter 7

Drug Metabolism & Therapeutic Index
- For drugs that have a high therapeutic index, altered rates of metabolism may have little effect on clinical outcomes. However, if the therapeutic index is low or narrow, then small increases in drug levels can lead to toxicity and small decreases in drug levels can lead to therapeutic failure

Genetic Variants and Drug Metabolism
- Altering drug metabolism which can either accelerate or slow the metabolism of drugs.
- CYP2C19 can greatly reduce the benefits of Plavix
- CYP2D6 unable to convert codeine into morphine
- CYP2C9 can increase risks for toxicity from warfarin

Genetic Variants and Drug Responses

- Carbamazepine is used for epilepsy and bipolar disorder can cause life-threatening skin reactions in patients specifically Asian ancestry who carry genes human leukocyte antigen (HLA)
- Abacavir is use for HIV can cause fatal hypersensitivity reaction in patients who have gene HLA

Genetic Variants That Alter Drug Metabolism
- CYP2D6- Tamoxifen (Nolvadex) reduced therapeutic effect
- CYP2C19- Clopidogrel (Plavix) reduced therapeutic effect
- CYP2C9- Warfarin (Coumadin) increased toxicity
- TMPT- Thiopurines increased toxicity

Chapter 8

Drug Therapy During Pregnancy
- Drug use during pregnancy is common: about two-thirds of pregnant patients take at least one medication, and the majority take more. Some drugs are used to treat pregnancy-related conditions, such as nausea, constipation, and preeclampsia. Some are used to treat chronic disorders, such as hypertension, diabetes, and epilepsy. Still others are used for the management of invasive conditions, such as infectious diseases or cancer. In pregnant patients, as in all other patients, the benefits of treatment must balance the risks.

Drug Therapy During Pregnancy w/ Maternal Asthma
- Uncontrolled maternal asthma is far more dangerous to the fetus than the drugs used to treat it. The incidence of stillbirth is doubled among pregnant patients who do not take medications for asthma control.

Placental Drug Transfer
- Drugs that are lipid soluble cross the placenta easily, whereas drugs that are ionized, highly polar, or protein bound cross with difficulty. Providers should assume that any drug taken during pregnancy will reach the fetus.

Identification of Teratogens
- Proof of teratogenicity does not mean that every exposure will result in a congenital anomaly
- The incidence of congenital anomalies is generally low.
- • Animal tests may not be applicable to humans.
- • Prolonged drug exposure may be required.
- • Teratogenic effects may be delayed.
- • Behavioral effects are difficult to document.
- • Controlled experiments cannot be done in humans.

* Pregnancy drug categories, ranging from A to X, guide the safety of medication use during pregnancy

Chapter 9

Pharmacokinetics: Children 1 Year and Older

- By age 1 year, most pharmacokinetic parameters in children are similar to those in adults. Therefore drug sensitivity in children older than 1 year is more like that of adults than that of the very young. Although pharmacokinetically similar to adults, children do differ in one important way: they metabolize drugs faster than adults. Drug-metabolizing capacity is markedly elevated until age 2 years and then gradually declines. A further sharp decline takes place at puberty, when adult values are reached. Because of enhanced drug metabolism in children, an increase in dosage or a reduction in dosing interval may be needed for drugs that are eliminated by hepatic metabolism.

Pharmacokinetic Parameters: Children 1 Year and Older

- Childs body surface area x adults dosage divided by 1.73m= pediatric dosage

Chapter 10

Pharmacodynamic Changes in Older Adults

- Alterations in receptor properties may underlie altered sensitivity to some drugs. However, information on such pharmacodynamic changes is limited.
- Other drugs (warfarin, certain central nervous system depressants) produce effects that are more intense in older adults, suggesting a possible increase in receptor number, receptor affinity, or both. Unfortunately, our knowledge of pharmacodynamic changes in older adults is restricted to a few families of drugs.

Pharmacodynamic Changes in Older Adults: beta-adrenergic blocking agents

- In support of the possibility of altered pharmacodynamics is the observation that beta-adrenergic blocking agents (drugs used primarily for cardiac disorders) are less effective in older adults than in younger adults, even when present in the same concentrations. Possible explanations for this observation include (1) a reduction in the number of beta receptors and (2) a reduction in the affinity of beta receptors for beta-receptor blocking agents.

Week 2

Chapter 37

Loop Diuretic: Adverse Effects

- Most effective diuretic
- Site of action: Loop of Henle
- Block reabsorption of sodium and chloride and prevents passive reabsorption of water.
- Diuresis begins in 60 minutes and persists for 8 hours for oral dose.
- Hyponatremia, hypochloremia and dehydration
- Hypotension: loss of volume and relaxation of venous smooth muscle, which reduces venous return to the heart
- Hypokalemia: potassium is lost through increase secretion in the distal nephron. Fatal dysrhythmias may result.
- Ototoxicity: hearing impairment
- Patients should monitor blood pressure