Pharmacokinetics Class Preparation

Nursing 101

Yana Quel

GI SYSTEM: The oral medication reaches the systemic circulation through the GI system. As a result, numerous factors can affect the absorption of the pill.

Questions:

1. A client is experiencing diarrhea. How could this affect absorption of an oral drug?
    a. Diarrhea stimulates the GI system to work faster to move out of the body. This would decrease drug absorption because it will have increased renal excretion.

2. How could the presence of food in the stomach affect the rate of absorption?
    a. It could decrease the amount of space and time the drug has to absorb into the stomach lining if food is blocking it and taking up too much space.

CARDIOVASCULAR SYSTEM: Once the pill is absorbed into the bloodstream, it is carried or delivered to the sites of pharmacologic action where the drug produces its effects.

Question:

3. How do you think the distribution of the oral medication is affected if a client has less than normal cardiac output?
    a. The oral medication is first absorbed into the GI tract and then the bloodstream. If the client has less cardiac output, there is less blood flow. There will be decreased distribution of oral medication because it cannot travel as quickly through the bloodstream.

LIVER: Most biotransformation takes place in the liver. Any decrease in the ability of the liver to metabolize medication could lead to an accumulation of the active drug in the bloodstream. This could put the client at risk for toxic effects and adverse reactions.

Questions:

4. How might nutritional status affect metabolism?
    a. A patient with decreased nutritional status is considered malnourished. This means they are unable to create certain enzymes to properly metabolize medications, leading to less breakdown, and toxic accumulation in rest of body.

5. What factors influence the rate of medication metabolism?
    a. Age: infants and elderly have a harder time metabolizing medications, requiring smaller amounts to decrease toxic accumulation.
    b. Nutritional status: (see above question 4).
    c. Increase in metabolization of medication enzymes: can require increased dosages of drug and other concurrent usage of drugs.
    d. First-pass effect: the liver metabolizes medications so well that some are completely limited and require other routes to work effectively.
    e. Similar metabolic pathways: if 2+ medications are metabolized in the same pathway, 1 or both/more can be altered and lead to medication accumulation.

KIDNEYS: Drug excretion/elimination occurs mainly through the kidneys into the urine. If there is any impairment in kidney function, medications may not be excreted at the anticipated speed. Subsequent medication administration may lead to accumulation and potential toxicity.

Questions:

6. Why would very young and very old clients need to be closely monitored by nurse for signs and symptoms of drug toxicity?
    a. Infants have a limited capacity for metabolizing medications. They need to be monitored closely because 1) they need a low amount to decrease toxicity, but 2) need a high enough amount for the medication to work properly. They are monitoring closely because the dosage can be a fine line.
    b. Elderly patients have a decreased liver medication-metabolism. For similar reasons to infants, they need to be monitored closely to not administer too high of a dosage that is toxic, but too low of a dosage that it is ineffective.

7. How can the nurse assess kidney function?
    a. They can monitor BUN (blood urea nitrogen) and creatinine levels or watch for steady blood-concentration levels of the medication.