MEDICAL PHARMACIES TABLET

Drug information and news for health care providers

June 2014

ANTIMICROBIALS: APPRECIATING THE BASICS OF DOSING AND ADMINISTRATION

In the February 2014 issue of the *Tablet*, we discussed antimicrobial stewardship, which was defined as "coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy and route of administration."[1] In this issue, we are going to focus on important considerations in antibiotic dosing and administration, especially as they relate to seniors.

WHY DO ANTIMICROBIALS POSE ADDITIONAL RISKS IN THE SENIOR POPULATION?

When administered antibiotics, seniors are at increased risk for adverse drug events, drug interactions, and unpredictable effectiveness of therapy compared with younger individuals.[2]

Issues that contribute to these additional risks are physiological in nature and include the following:

Drug Absorption: Age-related changes in drug absorption due to reduced gastric acid secretion:[2]

- Antimicrobials that may be absorbed less efficiently than normal, providing lower than expected concentrations and the potential for lower efficacy, include itraconazole, ketoconazole, sulfonamides, and dapsone.
- Antimicrobials that may be absorbed more effectively, providing higher than expected concentrations and are associated with higher risk for adverse effects include erythromycins and penicillins.

Drug Distribution: The ability of antimicrobials to be distributed to the tissues where they are needed is affected by the amount of lean and adipose (fat) tissues, the total body water, and the body's protein-binding capacity. In seniors, the percentage of adipose tissue increases and the total body water decreases. In addition, kidney function and liver clearance of drugs slow down. These all contribute to a potential for higher or lower (depending on the antimicrobial) than expected concentrations of drug at the site of action.[2] This speaks to the importance of ongoing monitoring of the patient during periods of antimicrobial use (see below).

Drug Interactions: As healthcare workers, we need to be aware that polypharmacy can increase the risk of a harmful drug interaction. Table 1 lists some important drug interactions to consider when patients are using oral antimicrobials.

Table 1
Some Common Antimicrobial-Drug Interactions[3]

Antimicrobial	Interacting Drugs	Concern
Aminoglycosides (e.g., amikacin, gentamicin, tobramycin)	Amphotericin B Cyclosporine Vancomycin NSAIDs (e.g., ibuprofen)	Nephrotoxicity
Doxycycline (tetracycline)	Antacids Iron salts Cimetidine	Decreased absorption of doxycycline (tetracycline)
	Phenytoin Carbamazepine	Enhanced hepatic metabolism
	Digoxin	Digoxin toxicity
Trimethoprim-Sulfamethoxazole	Warfarin	Increased anticoagulation
	Cyclosporine	Nephrotoxicity
	Phenytoin	Phenytoin toxicity
	Methotrexate	Bone marrow suppression
	Glipizide	Hypoglycemia
Fluoroquinolones (e.g., ciprofloxacin, levofloxacin, moxifloxacin, norfloxacin, ofloxacin)	Antacids Iron salts Zinc Sucralfate	Decreased fluoroquinolone absorption
Ciprofloxacin only	Theophylline	Theophylline toxicity

Oral Antibiotic Administration: Depending on the properties of an antibiotic, it may be better given with food (i.e., when acid improves the absorption of the drug) or given on an empty stomach (i.e., when acid prevents optimal absorption of the drug). There are some antibiotics that should not be crushed and some that warrant being given at separate times from other drugs that may affect their absorption. (See this month's QI for a list of some of these antibiotics.)

ANTIBIOTIC ADMINISTRATION GUIDELINES FOR LONG-TERM CARE NURSES

Following are some general guidelines for antibiotic administration in the long-term care setting:[4]

- If antibiotics are ordered 4 times a day, when possible try to give them every 6 hours as opposed to an every 4 hour daytime schedule.
- Avoid skips; make sure treatment is provided for the entire duration of the prescription.
- Update the patient's care plan to reflect change in condition and monitoring required.
- For documentation, instead of charting only "No side effects noted to antibiotics," provide observations with respect to the condition for which the resident is receiving antibiotics.
- In circumstances such as wound and urinary tract infections, the physician may order a repeat culture and sensitivity test after the antibiotics are finished. If the physician does not order a repeat culture, inquire if repeat laboratory testing is needed. If it is, the test should be obtained five to seven days after the last antibiotic is given, unless otherwise ordered.
- Continue monitoring the resident for at least 72 hours after completion of antibiotic therapy to ensure that the signs and symptoms of infection are resolved.
- Any unresolved infection has the potential to cause sepsis, which can be serious and sometimes fatal in elderly residents. Early recognition and treatment of signs and symptoms of infection are the best prevention.
- Document the results of follow-up monitoring, observations, nursing interventions, and the resident's response in the nurses' notes. Document positive and negative findings.
- Monitor vital signs every four to eight hours or as ordered by the prescriber. Repeat vital signs and schedule more frequently if one or more of the values are abnormal or the resident's condition warrants. **MPT**

1. Infectious Diseases Society of America. Promoting Antimicrobial Stewardship in Human Medicine. Online at http://www.idsociety.org/stewardship_policy/. Accessed on May 27, 2014.
2. Faulkner CM, Cox HL, Williamson JC. Aging Infect Dis 2005;40:997-1004.
3. Antibiotic Side Effects. Semin Resp Crit Care Med 2000;21(1).
4. Medication Administration. In: Long-Term Care Nursing Desk Reference. HCPro Inc. 2005.

Onreltea™ (brimonidine) Subcutaneous Formulation

Onreltea™ Gel 0.33% is indicated for the topical treatment of facial erythema of rosacea in adults 18 years of age or older. Brimonidine is a highly selective alpha-2 adrenergic receptor agonist that has a subcutaneous vasoconstrictive effect. This action is believed to be the basis of clinical efficacy for once daily cutaneous treatment of facial erythema of rosacea.

Dose & Administration

A small pea-size amount of Onreltea™ should be applied once daily to each of the five areas of the face (i.e., forehead, chin, nose, each cheek), avoiding the eyes and eyelids, lips, mouth, and membrane of the inner nose. Gloves should be worn and hands should be washed immediately after applying Onreltea™. Cosmetics may be applied after application.

Adverse Effects

The most common adverse effects associated with Onreltea™ in clinical trials were erythema, pruritus, flushing, and skin burning sensation. These occurred in 1.2% to 3.3% of patients. Adverse effects were usually temporary, mild to moderate in severity, and usually did not require discontinuation of treatment.

Precautions

Alpha-2 adrenergic agonists should be used with caution in patients with depression, cerebral or coronary insufficiency, Raynaud's phenomenon, orthostatic hypotension, thromboangiitis obliterans, scleroderma, or Sjögren's syndrome. They should also be used with caution in patients with severe or unstable or uncontrolled cardiovascular disease. **DN**

Please refer to Onreltea™ product monograph for more comprehensive information.