Antibiotic therapy: principles of treatment and general strategies (Papich, MG).

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Antibiotic therapy has made many advances that has given veterinary medicine a large number of effective drugs and provided pharmacokinetic and pharmacodynamic information to guide dosing. Improved techniques for bacterial identification and susceptibility testing have helped to provide information for the most appropriate drug selection. Initiating antibiotic therapy often must be done before diagnostic microbiology information is available. Subsequently, treatment is often empirical – based on the clinician's best judgment and experience. To provide the patient with the best chance for a successful outcome, some knowledge is needed about the most likely pathogen, the susceptibility of the pathogen, and what drugs are the most practical for each type of infection. The considerations for drug choice include the bacterial susceptibility, site of infection, and pharmacokinetic-pharmacodynamic properties of the drug. There are several approved drugs to meet our needs in small animal medicine and surgery. When an ideal animal drug is not available, we have sufficient information on many important human drugs that can be used to initiate antibiotic therapy for animals. Several studies of bacterial identification and susceptibility testing have helped to provide information for the most appropriate drug selection. There is usually not just a single choice that meets the criteria in most cases, but several good ones. Clinician preference, patient factors, and clinical presentation may determine which drug is the most appropriate. The ability to comply with the prescribed dosing regimen also is important, especially if the patient will be medicated at home by the pet owner. The most common infections treated with antibiotics in small animal medicine are skin-soft tissue and ear infections, urinary tract infections, and respiratory infections. For example, treatment of skin and soft-tissue infections can often be successful with cephalosporins, amoxicillin-clavulanate, trimethoprim-sulfonamides, or clindamycin. Treatment of urinary tract infections often can be treated with similar agents because in uncomplicated cases the urine concentrations are high and contribute to successful therapy. Respiratory infections are more complicated and often dependent on the site of infection (upper respiratory tract, lower respiratory tract, pyothorax, etc.). These infections often require broad-spectrum treatment to account for the variety of pathogens that may be encountered.

The pharmacokinetic-pharmacodynamic (PK-PD) targets are also important principles for antibiotic administration. To achieve a cure, the drug concentration in plasma, serum, or tissue fluid should be maintained above the minimum inhibitory concentration (MIC), or some multiple of the MIC, for at least a portion of the dose interval. PK-PD relationships of antibiotics explain how these factors can correlate with clinical outcome. The parameters that define antibacterial activity are taken from the shape of the plasma concentration vs time profile. Rather than bacteriostatic or bactericidal, drugs are now more frequently grouped as either concentration-dependent or time-dependent in its action. If concentration-dependent, one should administer a high enough dose to maximize the C_{MAX}: MIC ratio or AUC:MIC ratio. If time-dependent, the drug should be administered frequently enough to maximize the T > MIC.