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THE JUDICIOUS USE OF ANTIMICROBIAL THERAPY: JUST BECAUSE YOU CAN DOESN'T MEAN YOU SHOULD

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Antimicrobial therapy is arguably the most important therapeutic advancement in modern medicine. Most clinicians feel comfortable in the everyday use of antimicrobials, in large part due to their favorable safety profile. As an infectious diseases consultant, initiating and modifying antimicrobial therapy is the mainstay of patient care. However, it is my experience and opinion that an increasingly important part of appropriate care is to reduce and eliminate antimicrobial therapy.

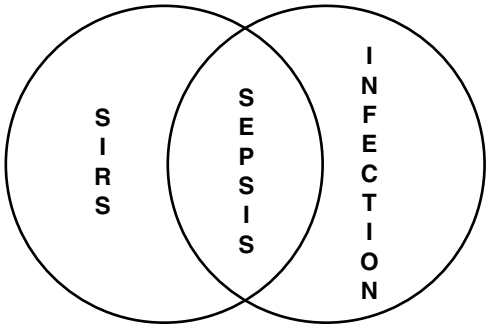
There are several situations in which antimicrobial therapy at first blush may seem indicated, but after careful analysis the thoughtful physician will realize that antibiotics are either unnecessary or needed only briefly. The following are seven points to remember when considering the use of antimicrobial agents:

1. Systemic inflammatory response syndrome (SIRS) with or without infection. An important distinction:
   - **SIRS + infection = sepsis.** When a patient has any combination of fever or hypothermia, leukocytosis or leukopenia, tachycardia, and tachypnea due to infection, sepsis is present and should be treated with antimicrobials.
   - **SIRS without infection.** When the preponderance of data fails to suggest an infection in the presence of SIRS, there is great reticence to stop antimicrobial therapy even with negative cultures, negative radiographic studies, and the absence of physical findings to suggest infection.

It is important to remember the concept of SIRS for two reasons. First, these patients may not be infected, so antimicrobial therapy will be of no benefit. Second, the physician should consider other etiologies such as pancreatitis, deep venous thrombosis and/or pulmonary embolism, drug reactions, postpericardiotomy syndrome, myocardial injury, and many other noninfectious causes of SIRS that need other forms of treatment.

2. In the postoperative period, a patient with SIRS who has no clinical evidence of infection may have clues that suggest the absence of infection, including immediate and persistent postoperative fever, a "flat-line" temperature curve that varies little, eosinophilia (>5%) and, perhaps most compelling, clinical improvement despite fever and/or leukocytosis.

3. One of the most overtreated "noninfections" is asymptomatic bacteriuria, which is often suspected in the following situations:
   - **Urinary catheter**. If the patient has an indwelling bladder catheter but is afebrile and stable, trying to eradicate urinary bacterial colonization will not benefit the patient but, rather, will lead to antimicrobial resistance and drug side effects (such as *Clostridium difficile* colitis), ultimately adding to the unnecessary cost of health care.
   - **Voided urine.** If the patient does not have a urinary catheter and voids without symptoms (mainly of dysuria), studies show therapy does not decrease the incidence of urosepsis but again leads to resistance, side effects, and increased costs. The only situations in which treating asymptomatic bacteriuria are indicated is during pregnancy, before genitourinary instrumentation that will injure the mucosa, and in cases of granulocytopenia; there is not even definite evidence that treating patients with renal transplants is beneficial. Candiduria is almost invariably benign, and the best approach to treatment is to remove the urinary catheter, if present.



Systemic inflammatory response syndrome (SIRS) consists of two or more of the following:

Temperature	<36 °C (96.8 °F) or >38 °C (100.4 °F)
Heart rate	>90/min
Respiratory rate	>20/min or PaCO2<32 mmHg
White blood cell	<4000/mm³ or >12,000/mm³

4. Separating true bacteremia from false-positive blood (contaminated) cultures can be difficult.

These are some clues that the blood culture may in fact just be a contaminant from skin flora at the venipuncture site: only one blood culture bottle with growth; positivity occurring >48 hours after blood was obtained; and the identification of one normal skin flora organism such as coagulase-negative *Staphylococcus*, diphtheroids, *Bacillus* species, or alpha-hemolytic *Streptococcus*. If the patient is doing well and only one blood culture bottle grows one of the above organisms, especially after 48 hours, it is very likely that antimicrobial therapy is not indicated.

5. Patients with chronic leg edema often develop stocking distribution erythema. The two main causes of this are beta-hemolytic streptococcal cellulitis and stasis dermatitis. Most of these patients will rightly or wrongly be treated with oral or parenteral antibiotics.

   - **Cellulitis**. If a patient has fever and/or leukocytosis, leg pain, and rapidly spreading erythema, streptococcal cellulitis is likely and should be treated with antibiotics.

   - **Stasis dermatitis.** Some clues that the erythema may be due to stasis dermatitis (which is the skin and soft tissue reaction to pressure from the marked distention caused by edema) include pruritus, thickened skin, lack of fever and leukocytosis, and failure to respond to gram-positive therapy. Stasis dermatitis will benefit from edema control and topical steroids such as triamcinolone, not antibiotics.

6. The most important time for adequate serum levels of prophylactic antibiotics perioperatively is while the wound is open. Most studies show that one dose may be all that is needed, and it is appropriate to stop prophylactic therapy no later than 24 hours postoperatively.

7. The majority of infections can be cured in 7 days or less; longer duration of therapy is not beneficial to the patient. Some exceptions to this guideline are endocarditis, osteomyelitis, septic arthritis, and *Staphylococcus aureus* bacteremia, all of which require at least 10 to 14 days of therapy).

While a "cookbook" or computer algorithm to guide the use of antimicrobial therapy is impractical, physicians need to review all of the available data and strongly consider discontinuation of antimicrobial therapy if there is no cultural or clinical evidence of infection in a patient with SIRS, especially if the patient is clinically improving. Although antimicrobials are among the most important and safest tools in our therapeutic armamentarium, their overuse is undeniable and will ultimately lead to increased resistance and decreased effectiveness.

Editor's note: When I was in medical school at Northwestern University, my roommate and I used to tack notes up all around our desks and walls to remind us of certain important facts (at least those we thought might be important). I have used that technique ever since.

Not long ago, Dr. Juan J. Olivero, a distinguished nephrologist at Houston Methodist (until recently, The Methodist Hospital) and a contributor to the *Methodist DeBakey Cardiovascular Journal*, suggested we devote a page to "Points to Remember"—a modern facsimile of my notes on the wall. I was so taken by his idea that I have established a column starting with this issue, and Dr. Olivero will be the corresponding editor responsible for content. I hope you find it worthwhile. (Don't hesitate to let me know your reaction.)

Dr. Olivero is a fellow of the American College of Physicians and the American Society of Nephrology and a clinical professor of medicine at Baylor College of Medicine and the University of Texas Health Science Center at Houston. He's a native of Guatemala whose training in internal medicine and nephrology occurred at the Baylor College of Medicine affiliated hospitals. He has been a member of the Houston Methodist Hospital medical staff since 1972 and has been elected to the Baylor College of Medicine Hall of Fame for Excellence in Teaching. At the Houston Methodist Hospital, Dr. Olivero received the first John W. Overstreet Award for physician excellence and has been recognized by its nursing department with the Nursing Champion Award.

— William L. Winters Jr., M.D.