General Surgery Small Group Activity (Facilitator Notes)

Curriculum for Antimicrobial Stewardship

Facilitator instructions:

- Read through the facilitator notes and make note of discussion points for each scenario
- Locate and familiarize yourself with your local treatment guidelines for sepsis, if available at your institution

Objectives:

At the completion of this small group activity, the learner should be able to:

1. Describe the appropriate duration of antibiotic prophylaxis in surgical patients
2. Distinguish colonization and/or culture contamination from infection
3. Locate treatment guidelines for sepsis and apply the guidelines to specific cases
4. Describe when and how antimicrobial de-escalation should occur
5. Describe the role of procalcitonin levels in antimicrobial stewardship

Case Scenario #1: You are in the pre-operative assessment clinic seeing Ms. Williams, a 40-year-old female who is scheduled to undergo a laparascopic cholecystectomy. She has a history of morbid obesity, hypertension, and diabetes mellitus. She has no known drug allergies. The anesthesia resident, Dr. Ana, asks you what antibiotics you would like Ms. Williams to have in the operating room for antimicrobial prophylaxis. You prescribe cefoxitin. Dr. Ana then asks if you would like cefoxitin written on the post-operative orders as well. What is your reply?

The majority of published evidence demonstrates that antimicrobial prophylaxis after wound closure is unnecessary, and most studies comparing single-dose prophylaxis with multiple-dose prophylaxis have not shown benefit of additional doses. Prolonged use of prophylactic antimicrobials is associated with emergence of resistant bacterial strains. For the majority of operations being evaluated in the Surgical Infection Prevention project, the guidelines cited in this article recommend that prophylaxis end within 24 h after the operation. The single guideline exception is the preferred regimen of antimicrobial prophylaxis for cardiothoracic surgery recommended by the American Society of Health-System Pharmacists (ASHP), which recommends continuing prophylaxis for up to 72 h after the operation. This ASHP recommendation was based on expert opinion, and its authors suggest that prophylaxis for 24 h may be appropriate. On the basis of published evidence, the workgroup endorsed the national performance measure that prophylactic antimicrobials should be discontinued within 24 h after the end of surgery.

Case Scenario #2: You are seeing Mr. Swanson in the plastic surgery hospital follow-up clinic. Mr. Swanson is a 48-year-old quadriplegic male who has a stage 3 sacral decubitus ulcer. The patient has undergone two incision and drainage procedures in the past year, but still has difficulty with wound healing. The patient states that his dressings are changed every other

day and that he is often left on his back for 12 hours at a time in his nursing home and is rarely turned or repositioned. The patient notes a foul odor when his dressings are changed, but denies any fevers or chills. You see that during his last clinic visit, a wound culture was obtained. You see that the culture was positive for alpha-hemolytic Streptococci, *Proteus mirabilis*, and *Enterococcus faecalis*. On physical exam, he is afebrile. His ulcer site shows purulent material when the dressing is removed. There is minimal surrounding erythema. What treatment would you recommend for this patient?

This patient has polymicrobial wound colonization. The patient does not have evidence of surrounding cellulitis or systemic infection and therefore does not warrant antibiotic therapy. Local wound therapy should be optimized and the frequency of his dressings should be changed. The patient will also need to be turned every 2 hours and pressure directly on his sacrum should be avoided.

<u>Case Scenario #3:</u> You are called to see Mr. Crest, a 72-year-old male, who is being admitted to the General Surgery service with fevers and severe left lower quadrant abdominal pain. A CT scan performed in the Emergency Department revealed diverticulitis with a 5-cm pericolonic abscess. Shortly thereafter, the patient becomes hypotensive and tachycardic. Physical examination reveals a temperature of 102.5°F, blood pressure of 80/46 mmHg, pulse of 133 and a rigid abdomen. In addition to immediate IV fluid resuscitation, what should be done for this patient?

This patient has sepsis due to perforated diverticulitis with secondary peritonitis. In addition to antibiotics, the patient will require primary source control with either surgical drainage of the abscess or percutaneous catheter drainage. It should be stressed that antibiotics alone would not be appropriate and patients with sepsis should always be evaluated for a possible primary focus that may require source control. This patient should receive broad-spectrum antibiotic therapy targeted at the most likely pathogens (in this case Enterobacteriaecae and anaerobic organisms). Piperacillin-tazobactam would be an appropriate initial choice in this patient. This patient should have at least 2 sets of blood cultures obtained and cultures of the abscess drainage should be obtained as well. At 72-hours the patient's antibiotic regimen should be re-evaluated and antibiotic de-escalation or streamlining should occur based on his clinical condition and culture results at that time.

If your institution has local sepsis guidelines, review the guidelines with your group and discuss how this patient would fit into those guidelines.

<u>Case Scenario #4:</u> You are in the General Surgery outpatient clinic seeing Ms. Anderson, a 42-year-old female. She underwent small bowel resection for severe Crohn's disease and now has short bowel syndrome. She was recently started on Total Parenteral Nutrition (TPN) through a Port-a-cath. In addition to a basic metabolic panel, two blood cultures were obtained from the Port-a-cath during a recent home health visit. One of the two blood cultures is growing gram-positive cocci. Ms. Anderson is concerned that her catheter will need to be removed. What additional information would you like to know in order to address her concerns?

The gram-positive cocci from one of two blood cultures may represent blood culture contamination with bacteria such as coagulase-negative staphylococci, which is frequently found on skin. Routine blood cultures for "surveillance" should not be drawn from intravascular catheters. It would be important to ascertain whether this patient has had symptoms of a catheter-related bloodstream infection such as fever, erythema or purulence at the catheter site. In the absence of such signs and symptoms, empiric antibiotic therapy directed towards the gram-positive cocci are not necessary. Empiric antibiotic therapy should be initiated if the patient has signs and symptoms of a catheter-related bloodstream infection. Immediate catheter removal should be performed in patients with suspected bloodstream infection and sepsis.

Of note, certain organisms such as Staphylococcus aureus and Candida spp. should never be considered a contaminant, even if they only grow from one of several blood cultures.

<u>Case Scenario #5:</u> Mr. Woods is a 52-year-old male who was admitted to the trauma surgery service 3 days ago after a motor vehicle accident where he was the restrained driver in a T-bone collision. He sustained multiple rib fractures of his left chest, a pneumothorax and pulmonary contusion. On admission, he was febrile to 101.5°F and hypotensive. Broad-spectrum antibiotic therapy was started with piperacillin-tazobactam and vancomycin due to concern of pneumonia and septic shock. The patient was intubated, mechanically ventilated and a chest tube was placed. His blood pressure has stabilized and his fever curve is improved, although he has intermittent low-grade fevers. His oxygen requirements are stable and blood culture and respiratory cultures are negative. Your senior resident notifies you that his serum procalcitonin level is normal and asks you what you want to do with his antibiotics.

In critically ill patients, if clinicians have a suspicion of bacterial infectious diseases, broad-spectrum antimicrobial therapy should be initiated. However, at 72 hours, de-escalation or discontinuation of antibiotics should be performed. De-escalation or discontinuation of antibiotics can be performed based on culture results. Another tool that can be used to discontinue antibiotics at 72 hours is a biomarker, the serum procalcitonin level. Serum procalcitonin levels increase dramatically within 2-4 hours after onset of systemic inflammation, persist as long as the inflammatory process continues, and normalize with recovery. Levels are increased in moderate-to-severe bacterial infections but remain at comparatively low levels in viral infections and nonspecific inflammatory diseases. Procalcitonin levels can guide antibiotic

discontinuation after clinical stabilization in critically ill patients. The safety of procalcitonin-guided antibiotic discontinuation in critically ill patients has been demonstrated in several randomized-controlled trials. Procalcitonin-guided antibiotic discontinuation is an effective method to discontinue antibiotics in critically ill patients, thereby decreasing antibiotic exposure.

Resources:

- Bratzler DW and Houck PM for the Surgical Infection Prevention Guidelines Writers Workgroup. Antimicrobial Prophylaxis for Surgery: An Advisory Statement from the National Surgical Infection Prevention Project. *Clinical Infectious Diseases* 2004; 38:1706–15.
- Mermel LA, Allon M, Bouza E, Craven DE, Flynn P, O'Grady NP, Raad II, Rijnders BJA, Sherertz RJ, Warren DK. Clinical Practice Guidelines for the Diagnosis and Management of Intravascular Catheter-Related Infection: 2009 Update by the Infectious Diseases Society of America. *Clinical Infectious Diseases*. (2009) 49 (1): 1-45. Also available at: www.idsociety.org
- Hayashi Y and Paterson DL. Strategies for Reduction in Duration of Antibiotic Use in Hospitalized Patients. *Clinical Infectious Diseases.* 2011;52(10):1232-40.
- Dellinger RP, Levy MM, Carlet JM, et. al: Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock. *Critical Care Medicine* 2008; 36:296-327. [published correction appears in *Critical Care Medicine* 2008; 36:1394-1396].