**Antibiotic stewardship**

**What is antibiotic stewardship?**

Antibiotic stewardship refers to coordinated interventions to promote appropriate antibiotic use. The goals of antibiotic stewardship include: (1) improving health outcomes related to the treatment of infections, (2) preventing adverse effects, (3) reducing antibiotic resistance, and (4) decreasing the spread of multi-drug resistant bacteria.

**Why is antibiotic stewardship important?**

Although antibiotics can help to cure infections, their overuse can also have associated harms such as: (1) toxic side effects; (2) selection of pathogenic organisms – for example, antibiotics can destroy the normal bacteria in the gut and allow other bacteria to flourish and cause infections such as Clostridium difficile; and (3) emergence of multi-drug resistant organisms where there may be few antibiotics available to treat related infections.

**What is the Surgical Infection Society (SIS) and why is antibiotic stewardship important to the SIS?**

The SIS is a multi-disciplinary professional organization whose mission is to educate health care providers and the public about infection in surgical patients and promote research in the understanding, prevention and management of surgical infections. Antibiotic stewardship is part of that mission – the SIS seeks to optimize antibiotic use to adequately treat infections without inducing harms. Furthermore, the SIS aims to preserve antibiotic effectiveness against as many bacteria for as long as possible.

**How does the SIS promote antibiotic stewardship?**

(1) **Guidelines** – The SIS develops and disseminates evidence-based guidelines that promote appropriate and judicious use of antibiotics (<http://www.sisna.org/guidelines>). For example, the SIS published guidelines guiding the use of prophylactic antibiotics (designed to prevent infections before they occur) in open fractures where the bone penetrates the skin. The guidelines advocate against using prolonged antibiotics, repeated courses of antibiotics, and extended-spectrum antibiotics.

(2) **Clinical trials** – Members of the SIS design, conduct, and participate in clinical trials to determine the optimal length of antibiotic treatment after surgery for infectious diseases such as complicated appendicitis or severe soft tissue infections. Length of antibiotic treatment should balance the risks of infectious complications after surgery with those of promotion of antibiotic resistance. For example, SIS past president, Dr. Rob Sawyer, conducted a multi-center trial showing that a shorter, ~4-day course of antibiotics had similar outcomes to longer (~8-day) courses after surgery for complicated intra-abdominal infections. (<https://www.ncbi.nlm.nih.gov/pubmed/25992746>)

(3) **Collaborations with other societies** – Members of the SIS recently collaborated with the World Society of Emergency Surgery (WSES) to write a call to action to all surgeons to engage in antibiotic stewardship. (<https://www.ncbi.nlm.nih.gov/pubmed/27828764>) The SIS also collaborates with other societies such as the American College of Surgeons (ACS) and the Infectious Diseases Society of America (IDSA) to develop evidence-based guidelines regarding antibiotic use and infection prevention.

**What are examples of how individual surgeons can promote antibiotic stewardship?**

Surgeons can follow evidence-based guidelines relating to antibiotic prescription, such as those promoted by SIS and other professional organizations. Surgeons should:

(1) **Avoid prolonged courses of antibiotics** where they are administered beyond the point of additional therapeutic benefit. For example, routine antibiotic administration beyond a single preoperative dose for an elective (non-emergent) operation is usually not indicated.

2) **Utilize the most narrow spectrum antibiotics** that have activity against the bacteria causing the infection. Extended spectrum or broad spectrum antibiotics (that have activity against a wide range of bacteria) may be initiated or indicated prior to the availability of culture results; however, these should be discontinued if possible after bacterial identification and sensitivities are obtained.

**What are examples of how surgical patients can promote antibiotic stewardship?**

(1) Ask your surgeon about plans for antibiotic administration around the time of surgery. Most elective operations only require a single dose of antibiotics prior to incision; preoperative antibiotics have been demonstrated to reduce the risk of wound or surgical site infections. Nonetheless, antibiotics may not be indicated for every operation (such as those with a very low risk of wound infections).

(2) Follow your surgeon’s instructions regarding preparation before and after surgery to decrease risk of infection. These instructions may include a special wash the night and/or morning before surgery (chlorhexidine), close monitoring of your blood sugars if you are diabetic, etc.

**Frequently asked questions (FAQs)**

**What is the difference between antibiotics and antimicrobials?** Antibiotics are a type of antimicrobial. Antibiotics refer to drugs that have activity against bacteria while antimicrobials are drugs that have activity against the spectrum of organisms such as bacteria, viruses, and fungi.

**What do the terms prophylactic, empiric, and therapeutic antibiotics mean?**

(1) Prophylactic antibiotics are administered before an infection exists with the intent to prevent a subsequent infection – for example, a single dose of preoperative antibiotics is often administered to prevent a post-operative wound or surgical site infection.

(2) Empiric antibiotics are administered when an infection is suspected and confirmatory data (such as cultures that can identify the causative organism) is not yet available.

(3) Therapeutic antibiotics are administered when an infection has been diagnosed. Therapeutic antibiotics should not be administered indefinitely – increasing evidence exists to support shorter courses of antibiotics.

**What is Clostridium difficile and how is it related to antibiotic stewardship?**

*Clostridium difficile* (a.k.a. *C. diff*) is a bacterium that causes infectious diarrhea. Infection with *C. diff* is often associated with antibiotic administration. Antibiotics can destroy the normal bacteria that live in the gut, allowing *C. diff* to flourish. *C. diff* produces toxins that cause diarrhea. Initial treatment of *C. diff* is with antibiotics. However, severe cases of *C. diff* infection can be life threatening and can require surgical intervention.

**What are examples of multi-drug resistant organisms (MDROs) and what types of infections can they cause?**

*MRSA=Methicillin resistant Staphylococcus aureus* – These bacteria are resistant to the penicillins (methicillin, nafcilin, oxacillin) and cephalosporins. MRSA infections can be acquired in hospitals and from the community. MRSA can cause urinary tract infections, bloodstream infections, wound infections, and pneumonia.

*VRE=Vancomycin resistant Enterococcus* – These bacteria are resistant to vancomycin (an antibiotic that is commonly used to treat MRSA) and can cause urinary tract infections, bloodstream infections, and wound infections.

*CRE=Carbopenem resistant Enterobacteriaceae* -- These bacteria can be resistant to carbapenems or extended spectrum cephalosporins (broad-spectrum antibiotics) and can include *Escherichia coli*, *Enterobacter aerogenes*, and *Klebsiella pneumoniae* or *oxytoca*. They can cause urinary tract infections, bloodstream infections, wound infections, and pneumonia.

**Where can I learn more about antibiotic stewardship?**

Association for Professionals in Infection Control and Epidemiology (<http://www.apic.org/Professional-Practice/Practice-Resources/Antimicrobial-Stewardship>)

Centers for Disease Control and Prevention Get Smart for Healthcare Campaign (<http://www.cdc.gov/getsmart/healthcare/inpatient-stewardship.html>)

Infectious Diseases Society of America (<http://www.idsociety.org/Stewardship_Policy/>)

World Health Organizations (<http://www.who.int/mediacentre/factsheets/antibiotic-resistance/en/>)