

Antibiotic Stewardship Priorities: Follow the Evidence

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An Assessment of Antibiotic Stewardship Interventions

There is a consensus that antibiotic resistance has reached a crisis status requiring substantial response through two mechanisms: new antibiotic development and smart antibiotic use.

Physicians have minimal control over the development of new antibiotics, but near absolute control over how they are used. (A major exception is antibiotic use in agriculture.) There is general agreement that contemporary prescribing practice includes substantial misuse of antibiotics. It has been estimated that about 50% of antibiotic use is unnecessary.

This crisis requires substantial change, by implementing antibiotic stewardship programs that reduce overall use of antibiotics and prevent misuse of broad-spectrum agents. To address this issue, the new Centers for Disease Control and Prevention (CDC)/Centers for Medicare & Medicaid Services (CMS) plan that applies to all health facilities that receive CMS funding will be evaluated by comparing antibiotic use with benchmark data. Many different stewardship approaches have been proposed, but their relative impact based on scientific assessment seems critical.

A recent document from the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America^[1] examines 23 antibiotic stewardship interventions to determine the strength of each recommendation and the quality of the evidence to support it. Of the 23 interventions reviewed, only five survived this scrutiny and can be considered endorsed recommendations with adequate supporting evidence:

- Preauthorization and/or prospective audit with feedback;
- Implementation of interventions designed to reduce the use of antibiotics with a high risk for *Clostridium difficile* infection;
- Interventions to reduce antibiotic therapy to the shortest effective duration;
- Implementation of pharmacokinetic monitoring with dose adjustment for aminoglycosides; and
- Promotion of switching from intravenous to oral administration when clinically feasible.

Strategies with weak recommendation and low-quality supporting evidence included the following:

- Didactic education;
- Facility-specific clinical practice guidelines for common infectious disease syndromes;
- Interventions to improve antibiotics that target specific infections;
- Use of computerized clinical decision support systems that are integrated into the electronic health record (EHR) at the time of prescribing;
- Strategies using "cycling" in antibiotic selection, advocating alternative agents;
- Implementation of allergy assessment in patients with a history of beta-lactam allergy to improve use of first-line antibiotics;
- Laboratory development of facility-specific antibiograms, including location and patient age;
- Use of rapid viral testing for respiratory pathogens;
- Use of rapid pathogen diagnostic testing of positive blood cultures;

- Use of procalcitonin to guide antibiotic decisions for adults in intensive care; and
- Improvement in use and outcomes of antifungal therapy in immunocompromised patients.

This review indicates that despite the high priority for stewardship to guide better use of antibiotics, supporting evidence that such programs actually work is substantially lacking.

Evidence-Based Guidance

A few exceptions related to these findings deserve attention. First, the work was restricted to inpatient antibiotic use, but we also know that antibiotic misuse in outpatient clinics is a major problem. Most hospitals also have outpatient services, and many high-quality stewardship studies support effective interventions in that setting. Avoidance or delayed use of antibiotics in the following clinical circumstances is supported by the evidence:

- Sinusitis: no antibiotics until at least 7 days of symptoms^[2];
- Pharyngitis: antibiotics only with a positive group A Streptococcus test^[3];
- Acute bronchitis: no sputum culture and no antibiotics unless chest x-ray shows pneumonia^[3];
- Asymptomatic urinary tract infection (UTI): no antibiotics^[4]; and
- Upper respiratory infection (URI): no antibiotics, ever.^[3]

Another concern is the lack of incorporation of recent IDSA guidance that addresses the resistance issue and makes recommendations for selection of agents and duration of therapy. Representative guidelines are available for the following conditions:

- [Skin and soft-tissue infections](#)^[5];
- [UTI](#)^[6];
- [Community-acquired pneumonia](#)^[7];
- [Hospital-acquired and ventilator-associated pneumonia](#)^[8];
- [Intra-abdominal sepsis](#)^[9] (currently under revision); and
- [Diverticulitis](#),^[10] based on recent American Gastroenterological Association recommendations for limited antibiotic use in [diverticulitis](#).

Recommendations to improve outpatient antibiotic abuse include reframing the issue to emphasize potential patient harm resulting from adverse reactions rather than public health concerns; EHR order entry requirements to justify antibiotic use; the use of "report cards"^[11]; and discouraging patient outpatient visits for URIs, sinusitis, or bronchitis.^[12] Data to evaluate antibiotic stewardship activities are evolving rapidly. The 2016 guidelines have 225 references, but only nine citations are dated after 2014, calling attention to the need for timely recommendation updates.

It is disappointing that stewardship guidelines demonstrate a lack of substantial supporting evidence for the practices that many people advocate as key elements of the "stewardship bundle." Most experts agree that more work needs to be done to further validate many of the recommendations as well as their relative value. It is unfortunate that there is no network of healthcare centers to do this evaluation, analogous to the AIDS Clinical Trials Group that has been so successful in defining HIV care standards.

Current data provide convincing evidence that we can substantially reduce unnecessary use of antibiotics through a multitude of actions, but the utility of these interventions will vary by institution, population served, resources, and administrative support. The recent [Medscape review](#) of the CDC/CMS plan to improve antibiotic use defines the plan to compare antibiotic use by peer health facilities, although incentives for improvement are quite vague.

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