Metrics of Antimicrobial Stewardship Programs

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KEYWORDS

• Antimicrobial stewardship • Antibiotic use • Stewardship metrics • Benchmarking

KEY POINTS

- Appropriate metrics are necessary to measure the quality, clinical, and financial impacts of antimicrobial stewardship programs.
- Antimicrobial stewardship metrics are categorized into antibiotic use measures, process measures, quality measures, costs, and clinical outcome measures.
- Traditionally, antimicrobial stewardship metrics have focused on antibiotic use, antibiotic costs, and process measures.
- With health care reform, practice should shift to focusing on the clinical impact of stewardship programs over financial impact.
- More research is needed to define optimal clinical outcome measures; these metrics should be further developed, standardized, and validated for internal and external benchmarking purposes.
- Outpatient antimicrobial stewardship is a novel area and requires metrics for adequate program evaluation; more research is needed to determine optimal metrics in this setting.

INTRODUCTION

The Infectious Diseases Society of America/Society of Healthcare Epidemiology of America (IDSA/SHEA) Antimicrobial Stewardship (AMS) guidelines and the Centers for Disease Control and Prevention (CDC) Core Elements of Hospital Antibiotic Stewardship Programs (ASP) promote ASPs to enhance patient care by improving appropriate use of antimicrobial therapy, decreasing collateral damage, and improving patient outcomes.[1,2] Traditionally, ASP metrics have centered on "low-hanging fruit," including antimicrobial consumption, antimicrobial costs, and process measures.[3–7] Guidance exists regarding the most important metrics for antimicrobial use and costs[1,2]; but few metrics for measuring quality of antimicrobial use and clinical outcomes have been validated and incorporated into routine program assessments.[8,9]

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With health care reform and the shift from fee-for-service models to quality of care, ASP programs should refocus their energy on higher-level outcomes metrics.[10] Limitations to proposed outcomes metrics include the presence of confounding factors; difficulty in attributing an improvement in outcomes directly to an ASP intervention; and the feasibility of extracting metrics, performing meaningful analyses, and translating results into actionable conclusions.[6,8,10] **Table 1** provides an introduction to potential useful inpatient ASP metrics based on recommendations from the IDSA/SHEA ASP Guidelines and the CDC's Core Elements for Hospital ASP. Although ASP initiatives have historically concentrated on the inpatient setting, the importance of

Table 1
IDSA/SHEA ASP recommendations and CDC's core elements of ASP: potential metrics to consider

Recommendation	Potential Associated Metric(s)
Develop facility-specific clinical practice guidelines for infectious diseases syndromes[2]	• Compliance with guidelines • Clinical outcomes related to the specific infectious disease syndrome
Implement interventions designed to reduce use of antibiotics associated with high risk of CDI[2]	• Use of high-risk antibiotics associated with CDI • Incidence of CDI • Incidence of CDI related to antimicrobial therapy
Implement interventions to increase appropriate use of oral antibiotics for initial therapy and timely transition from IV to PO antibiotics[2]	• Compliance with IV to PO interventions • Use of IV therapy when PO was appropriate • Adverse effects of IV vs PO therapy • Length of hospitalization in relationship to IV vs PO therapy
Implement guidelines and strategies to reduce antibiotic therapy to the shortest effective duration[2]	• Compliance with recommended duration of therapy as stated in guidelines • Duration of therapy • DOT
Use rapid viral testing for respiratory pathogens to reduce the use of inappropriate antibiotics[2]	• Compliance with recommendation to stop antibiotics in setting of viral illness • Number of patients with viral illness receiving unnecessary antibiotics
Monitor antibiotic use as measured by DOT in preference to DDD[2]	• DOT/1000 patient days • DOT/1000 days present
Measure antibiotic costs based on prescriptions or administrations instead of purchasing data[2]	• Antimicrobial costs (based on prescriptions or administrations)
Monitor process measures[1]	• Documentation of treatment indications • Adherence to facility-specific guidelines • Time to initiation or de-escalation of antibiotic therapy • Antibiotic-related adverse events
Monitor antibiotic use[1]	• DOT or DDD/1000 patient days or days present • Measure both overall antibiotic use and focused analyses on specific antibiotics where stewardship interventions are implemented
Monitor outcomes[1]	• Hospital-onset CDI • Antibiotic resistance • Drug cost savings and healthcare savings

Abbreviations: ASP, antimicrobial stewardship program; CDI, *Clostridium difficile* infection; DDD, defined daily dose; DOT, days of therapy; IDSA, Infectious Diseases Society of America; IV, intravenous; PO, oral; SHEA, Society of Healthcare Epidemiology of America.

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