

Antimicrobial Use Metrics and Benchmarking to Improve Stewardship Outcomes

Methodology, Opportunities, and Challenges

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KEYWORDS

- Antibiotic use • Antibiotic metrics • Antibiotic resistance • Benchmarking
- Antibiotic stewardship • Antibiotic epidemiology

KEY POINTS

- Professional organizations recommend that antimicrobial stewardship programs measure their antimicrobial drug use and the clinical outcomes of interventions that change drug use.
- The recommended metric to quantify inpatient antimicrobial drug use in the United States is days of therapy per 1000 patient-days. Additional metrics are being evaluated.
- Benchmarking risk adjusted antibiotic use across multiple hospitals is possible; research is needed to determine if stewardship programs will use the information to develop interventions resulting in improved antibiotic use.
- Stewardship interventions have historically focused on process measures and economic savings; research of the effectiveness of stewardship on clinical outcomes, including bacterial resistance, is needed to justify long-term viability.

INTRODUCTION: NATURE OF THE PROBLEM

All antimicrobial stewardship programs (ASPs) have a common goal: to improve the quality of antibiotic prescribing. It follows that a successful ASP must be able to accomplish 2 tasks: (1) measure antimicrobial usage to know if an intervention was effective in changing antimicrobial use and (2) measure an outcome related to the

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change in use. Nearly all position papers from professional organizations and expert commentaries support these 2 tasks (Box 1).

Outcomes of ASPs historically focused on reducing costs of antimicrobial therapy,¹¹ and this focus continues for many programs.^{12–14} Recent attempts to refocus stewardship outcomes have stressed clinical measures, including reductions in rates of bacterial resistance and *Clostridium difficile* infection (CDI) (see Box 1). Two recent reviews discussed the importance of linking ASP activities to clinical outcomes, including bacterial resistance.^{15,16} As John McGowan, a stewardship pioneer, emphasized, “Measurements of the success of these programs have focused primarily on process measures. However, evaluation of outcome measures will be needed to ensure sustainability of these efforts.”¹⁶ In this review, measurement of aggregate

Box 1

Recommendations to measure antimicrobial use and the consequences of an intervention

- ASPs “must establish process and outcome measures to determine the impact of antimicrobial stewardship on antimicrobial use and resistance patterns.”¹
- “Research on Antimicrobial Stewardship Is Needed. Two primary issues of equal importance must be considered: (1) the benchmarking of antimicrobial use within and between institutions, and the most effective and efficient interventions to optimize these measures; and (2) the development of clear, well-defined, and validated process and outcome measures that may be utilized to assess the clinical impact of stewardship efforts.”²
- “Intervention-specific outcome data should be collected after the intervention is implemented to demonstrate the continued benefit of the program. Outcomes can include costs, days on antibiotics, changes in prescription practices of a specific antibiotic, trends in MDROs or *Clostridium difficile*.”³
- “Although the aim of [ASPs] has traditionally been to guide antimicrobial usage, the guidelines emphasize that this is a proxy (process variable) for the ultimate goal of controlling antimicrobial resistance and improving patient outcomes (outcome variables). Proper measurement of these variables is essential to ascertain the effectiveness of an antimicrobial stewardship program.”⁴
- “C.2.a. [The] Facility has a multidisciplinary process in place to review antimicrobial utilization, local susceptibility patterns, and antimicrobial agents in the formulary and there is evidence that the process is followed.”⁵
- “When asked to rank the most important final indicators with respect to both quality improvement and public reporting purposes...all respondents ranked [antibiotic] days of therapy and readmission rates among the most important areas on which to focus, irrespective of feasibility.”⁶
- “The change in antimicrobial usage is the most common outcome measured in studies of stewardship programs. Common outcome variables related to antimicrobial usage include quantity of total antimicrobial use, quantity of targeted antimicrobial use, duration of therapy, percentage of oral versus intravenous drug administration, and antimicrobial drug expenditures.”⁷
- “Stewardship metrics: Measuring outcomes. Documentation of fiscal and clinical outcomes is required for sustainability of most antimicrobial stewardship programs.”⁸
- “Use of antibiotics as quality metrics often measures process instead of outcome, but remain important benchmarks for hospitals to use in national benchmarks. Antibiotic stewardship programs must monitor all aspects of antibiotic use, not just total consumption or costs”⁹
- “...antibiotic use data will have to be linked with an intervention strategy to reduce overuse and misuse of antibiotics.”¹⁰

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