Antimicrobial Stewardship in US Hospitals: Is the Cup Half-full Yet?

David N. Schwartz1,2
1John H. Stroger, Jr. Hospital of Cook County, and 2Rush Medical College, Chicago, Illinois

(See the Major Article by Pollack et al on pages 443–9.)

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While participating in a recent multihospital collaborative project sponsored by the Illinois Department of Public Health, a hospital administrator pointedly requested basic clarification:

1. What is antimicrobial stewardship (AS)?
2. How is it done?
3. Why is it important?

In “the first comprehensive national assessment of antibiotic stewardship practices in the United States,” Lori A Pollack and colleagues from the Centers for Disease Control and Prevention (CDC) chart the progress US hospitals have made in sorting out the first 2 of these questions [1]. Of 4184 acute care hospitals responding to 15 AS-related questions embedded in the 2014 Annual Hospital Survey administered by the National Healthcare Safety Network (in which hospital participation is required for reimbursement by the Center for Medicare and Medicaid Services [CMS]), more than one half reported the presence of substantial AS infrastructure or implementation elements, respectively, and 39% “met” (ie, responded affirmatively to at least one question) each of the seven “core elements” of hospital AS programs as defined previously by the CDC [2, 3]. Meeting each of the 7 core AS elements was statistically associated with larger hospital size, facility type (children’s and general acute care more than surgical specialty or critical access hospitals), teaching hospital status, and salary support for AS; less intuitive was the finding that a written statement of support from hospital administration was the strongest predictor on multivariate analysis.

Viewed optimistically, these data suggest that the seeds of effective hospital AS are sufficiently widespread to yield substantial future hospital AS program growth, with improvements in hospital antimicrobial use and decelerated antimicrobial resistance and Clostridium difficile infection to follow. However, Pollack and colleagues caution against this view and prescribe an ambitious agenda of augmented implementation guidance and regulatory strictures to achieve these goals, paralleling in both form and logic the successful dissemination and implementation of hospital infection control policies and procedures in which the CDC has played such a pivotal role. Success in this enterprise will require clearer definitions of essential AS program components, greater emphasis on their interdependence and, as with infection control, greater focus on improved patient outcomes as the central rationale.

Pollack and colleagues forthrightly acknowledge that inferences from their data are tenuous: respondents to the AS-related questions in the survey likely had varying understandings of the concepts involved, both in general and within their own hospitals; neither the scope nor the effectiveness of the reported interventions or other AS program components could be independently verified; administrative support beyond a written statement and the presence of salary support was unclear; and the qualifications of dedicated AS staff were unknown. Also, they rightly question the effectiveness of specific AS interventions implemented in the absence of one or more complementary core elements, as reported by many hospitals (see their Figure 1), cautioning that a comprehensive approach to hospital AS is necessary for success.

This latter point warrants emphasis. If clinician adherence to recommended changes in practice requires awareness of and familiarity with recommended procedures, agreement with relevant goals, perceived self-efficacy (ability to carry out new practices competently), removal of internal (inertia of previous practice) and external barriers (eg, time constraints) [4] and the support of opinion leaders [5], then the core elements of hospital AS programs as presented by Pollack and colleagues can be seen to be interdependent and mutually reinforcing (Table 1). Treatment recommendations that fail to reference facility-specific epidemiology (eg, uniform pneumonia antibiotic selection as mandated by CMS’s Core Measures [6]); audit and feedback
programs without clear treatment goals and regimen change criteria; prior approval programs lacking a clear rationale for restriction of targeted drugs and criteria for their approval; requirements for documenting antibiotic indications or recommendations for antibiotic time outs without clear rationales and easy-to-follow procedures; and AS programs led by staff who are poorly trained and/or lack the respect of their peers can all be expected to perform poorly; all require careful planning and considerable support to achieve measurable success. Pollack and colleagues’ finding on multivariable analysis that a statement of support from hospital leadership was most strongly associated with meeting all 7 core AS elements is less surprising in this context as strong administrative support is clearly necessary for successful stewardship.

In short, successful hospital AS programs, like their infection control analogs, are complex, resource-intensive and require constructive engagement with a broad spectrum of hospital personnel [7]. These characteristics present formidable obstacles to effective AS program development and implementation, especially amid competing regulatory demands and constrained resources.

If the study by Pollack and colleagues isn’t sufficiently compelling to justify our pronouncing the hospital AS cup being half-full, how can we get there and move beyond? The authors appropriately recommend providing hospital outreach and implementation guidance by the CDC, state health departments, and relevant stakeholder organizations, and they voice support for regulatory mandates, citing the impact of California’s statute requiring hospitals to implement AS (California led the US with 58% of hospitals reporting the presence of at least 1 component in each of the 7 core AS elements) and the Joint Commission’s proposed accreditation standards for hospital AS programs. In addition, given that 18 of 28 AS intervention guideline recommendations published recently by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America were characterized as weak and having only poor- or moderate-quality supporting evidence.
The need for innovative AS-related research is self-evident, for example, the development of antimicrobial use and clinical outcome measures based on electronic data that permit inferences about antibiotic use quality [9].

Beyond this, we need to recalibrate our response to the hospital administrator’s last question: why is stewardship important? Despite its urgency, emphasizing worsening antimicrobial resistance may be a failing strategy: physicians accept resistance as a reality to which their prescribing may contribute, yet they tend to minimize its importance in their own practices [10, 11]; they may choose broader-spectrum drugs as a hedge against it; and they must navigate the unintended but direct harms that affect antimicrobial recipients (CDI, subsequent antibiotic-resistant infections, adverse drug effects and reactions, IV catheter complications).

Strategies:
1. Educating clinicians and coordinating pharmacy, infection control, nursing, microbiology and information technology services toward these goals.
2. Ensuring that the antimicrobial formulary contains the drugs needed to treat the full range of pathogens encountered in each institution and ensuring the availability of appropriate alternatives when drug shortages occur
3. Providing evidence-based recommendations on the management of common infection syndromes and diseases that are adapted to each institution’s unique epidemiologic circumstances and antimicrobial formulary
4. Providing impromptu or formal infection management advice as needed
5. Where feasible, performing surveillance for and, when necessary, intervening to ensure optimal treatment of patients with severe infections (eg, those with noncontaminant bacteremias)
6. Performing case-based audits of recipients of general or targeted antimicrobials prospectively (with immediate provider feedback) and/or retrospectively (with delayed and often aggregate feedback)
7. Performing surveillance for error-prone prescribing practices (eg, regimens of excessive duration or with excessive or redundant antimicrobial spectra) and guiding remediation as appropriate
8. Administering prior authorization programs that ensure optimal use of unusually toxic or broad-spectrum drugs
9. Guiding implementation of effective computerized decision support services for infection management when feasible
10. Guiding implementation of programs that indicator documentation, duration selection, antibiotic time outs

Abbreviations: AS, antimicrobial stewardship; CDI, Clostridium difficile infection; IV, intravenous.

Table 2. Goals and Operational Strategies of Antimicrobial Stewardship

1. To ensure the timely administration of effective antimicrobial therapy to patients with syndromes, diseases and planned procedures for which this treatment is beneficial
2. To minimize the intensity and duration of patients’ antimicrobial exposure to the extent consistent with effective care as the most effective way of mitigating the unintended but direct harms that affect antimicrobial recipients (CDI, subsequent antibiotic-resistant infections, adverse drug effects and reactions, IV catheter complications).

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