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Antibiotic Stewardship: The "Real World" When Resources Are Limited

To the Editor—Infections caused by multidrug-resistant bacteria continue to challenge physicians in daily practice.[1] In this context, controlling antibiotic use and bacterial resistance through antibiotic stewardship programs are of major importance to all professionals involved in infectious diseases.[1]

Although it has been well established that an appropriate antibiotic stewardship program must include optimum selection, dose, and duration of treatment and control of antibiotic use,[2] other additional factors in the implementation of infection control policies may contribute to reduce amplification and dissemination of bacterial resistance in the hospital (eg, hand hygiene and isolation precautions).[3] On the basis of these data, the antibiotic stewardship program team should include professionals from different specialities (eg, infectious diseases physicians, clinical microbiologists, information system specialists, and clinical pharmacists) and the commitment of the hospital administrative director.[4] However, in developing countries, this infrastructure is uncommon in most hospitals, and the antibiotic stewardship programs are based on individual efforts of infectious diseases physicians who are willing to develop these programs as part of their activities as attending physicians.

The Infectious Diseases Society of America–Society for Healthcare Epidemiology of America guidelines identify 2 core proactive evidence-based strategies and several supplemental strategies for promoting antimicrobial stewardship.[4] The first proactive strategy is a formulary restriction and/or a requirement for preapproval for administration of specific drugs, and the second is a prospective audit with intervention and feedback to the prescriber. Restriction of antimicrobial use may be obtained either by limited access to available antimicrobials through restriction of the hospital formulary or implementation of a requirement for preapproval and a justification for prescribing drugs on the restricted list. Both methods have been shown to be effective in reducing the use and costs of restricted antimicrobials.[5] However, the major disadvantage of this strategy is that prescribers can have a perceived loss of autonomy when making clinical decisions, which may cause conflict and be controversial among the different specialties and the infectious diseases physician[6]; in addition, physicians perceive the preapproval system as stressful and time consuming.[7]

I have coauthored 2 studies[8,9] of prospective audits, with intervention and feedback to the prescriber, that focused on shifting the leadership of antibiotic use to an infectious diseases physician consultant. In both studies, we reduced use of vancomycin and third-generation cephalosporins significantly.

The logistics of auditing should be adapted to local needs and resources, because, as with formulary restriction, this strategy is time consuming. The supplemental strategies used in antibiotic stewardship programs include education of prescribers, implementation of guidelines, use of antimicrobial order forms, de-escalation, combination therapy, dose optimization, and intravenous-to-oral route switch, therapeutic substitution, cycling, mixing, and use of computer decision support.

In general, several of these strategies are implemented in the daily practice simultaneously with some of the 2 core strategies. The most important point is that all of these strategies require the evaluation of the patient at "bedside" (ie, before the approval or refusal of use of an antibiotic in a formulary-restriction strategy). This issue has been identified as a barrier to antibiotic stewardship programs because of the time and effort required and the lack of economic compensation. These could be the reasons why the authorization of an antibiotic and the feedback to the prescriber by telephone or through informal ("curbside") consultations are very common in developing countries.[10]

To avoid these difficulties, it is essential to select the core strategy (ie, formulary restriction or prospective audit of prescription) and the forms to implement it on the basis of the institution's resources (eg, control of all the antibiotic prescriptions versus control only of the prescription of "restricted" antibiotics; hospital-wide control versus control only in the intensive care unit, and control every day versus control 3 times per week). The characteristics of the antibiotic stewardship program would have to be selected such that the infectious diseases physician has the time necessary to evaluate patients and to discuss treatment with the attending physicians. With these considerations taken into account, in the Table, I discuss the "real world" of antibiotic stewardship program implementation in 2 different hospitals that selected the strategy of prospective audit of the prescription plus feedback to the prescriber.

In both hospitals, the duration of an infectious diseases consultation (which included review of the clinical chart, examination of patients, and feedback to the attending physician during the writing of the clinical chart) was 20–25 minutes. As you can see in the Table, if institution A, which has 2 infectious diseases physicians who are available for 8 hours per day, decided to audit all antibiotic prescriptions, it would be technically impossible. However, these hospitals implemented an antibiotic stewardship program to audit only the hospital-wide prescriptions of restricted ("key") antibi-

TABLE. Characteristics of the Prospective Audit of Prescriptions in 2 Hospitals and the Impact on the Infectious Diseases Physicians' (IDPs') Workload

Variable	Institution A	Institution B
Period of study, months	12	9
Complexity[a]	Medium	High
University-based study	No	Yes
Total no. of hospital beds	150	30
No. of ICU beds	18	10
No. of IDPs	2	1
IDP workload, hours/day	8	4
IDP activities		
Assistance of hospitalized patients	Yes	Yes
Assistance of ambulatory patients	Yes	No
Infection control	Yes	Yes
Mean no. of patients admitted per day (range)	113 (80–150)	28 (21–30)
Mean no. of patients who receive antibiotics per day for the entire hospital (range)	81 (68–93)	15 (12–18)
Mean no. of patients who have received restricted antibiotics per day (range)		
Entire hospital	28 (23–34)	12 (8–13)
ICU	12 (9–13)	10 (9–12)
Duration of the IDP consultation, mean minutes (range)		
Entire hospital	20 (18–35)	21 (13–30)
ICU	25 (21–45)	23 (20–38)
Required time per day to evaluate all patients who receive antibiotics, mean minutes (hours)		
All antibiotics in the entire hospital	1620 (27)	315 (5.2)
Restricted antibiotics in the entire hospital	560 (9)	252 (4.2)
Restricted antibiotics in the ICU	300 (5)	230 (3.8)
Use of prospective audit as antibiotic stewardship program strategy	Yes	Yes
Area of the hospital	Hospital-wide	ICU
No. of hours per day required by the IDP to apply the antibiotic stewardship program strategy	4.5	3.8
Percentage of the IDP's daily workload	56	95
Frequency	Monday to Friday	Monday to Friday

NOTE. Institution A, Sanatorio San José (Buenos Aires, Argentina); Institution B, Instituto Sacre Cour (Buenos Aires). ICU, intensive care unit.
[a] High complexity, institution with cardiovascular surgery; low complexity, institution without cardiac surgery.

otics (ie, third-generation cephalosporins, fluoroquinolones, carbapenems, vancomycin, colistin, and new antibiotics, such as linezolid, tigecycline, and daptomycin). This strategy allowed the infectious diseases physician to examine and discuss the patients at bedside, face-to-face with the attending physician, in real time.

At institution B, where there is only 1 infectious diseases physician, who works 4 hours per day, the best antibiotic stewardship program for that setting was the audit of the restricted antibiotics prescriptions only in the intensive care unit, where the infectious diseases physician spent 95% of the time.

Among the diverse elements of antibiotic stewardship programs that can be implemented, a proactive core strategy and supplemental strategies adapted to the institution (this is my key point) appear to be the most effective. In conclusion, I believe that most publications about antibiotic stewardship programs offer only evidence in structured and theoretical forms, with no attention to practical details. I propose a practical approach to implementing antibiotic stewardship programs in which strategies are adapted on the basis of the resources of the institution, prioritizing the bedside evaluation of the patient and interaction between colleagues.

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