Antibiotic stewardship in a paediatric hospital

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Infectious diseases comprise a major percentage of paediatric illnesses as infections in out-patients, illnesses requiring hospitalization for treatment and nosocomially acquired infections. Although a significant percentage of infectious diseases are of viral etiology, initial empirical therapy for febrile undiagnosed illnesses and for presumed or proven bacterial infections results in widespread use of antimicrobials. In contrast to the beneficial effects of antibiotics are their expense,

their adverse effects and their contribution to the emergence of increasingly drug-resistant organisms. Strategies to enhance the appropriate use of antimicrobials are most evident in hospitals such as The Hospital for Sick Children – a tertiary care paediatric hospital whose infrastructure supports and encourages proper use. The use of many of the following strategies (1) has been shown to reduce drug expenditures and overall hospital costs by improving patient care.

TABLE 1
Antibiotic stewardship at The Hospital for Sick Children

Stewardship strategies	Description
Pharmacy & Therapeutics Committee	Has broad representation Approves The Hospital for Sick Children formulary Incorporates recommendations from The Antibiotic Subcommittee, Drug Information Service and The Drug Use Evaluation Committee
The Hospital for Sick Children Formulary	Includes antimicrobials that have been approved by the Pharmacy & Therapeutics Committee with dosing guidelines, specific administration recommendations and precautions for use Includes list of restricted drugs; use permitted according to predetermined clinical indications, other indications limited to approval by Division of Infectious Diseases Published yearly
Drug Information Service	Performs independent literature-based, comprehensive review of all antibiotics being considered for formulary inclusion Publishes and edits formulary
Antimicrobial use guidelines	Included in the formulary; new guidelines published as pocketcards until a new formulary is published Initial empirical antimicrobial therapy for hospitalized children (23 disease indications) Prophylaxis: cardiovascular surgery, general surgery, orthopedic surgery, plastic surgery, endocarditis prophylaxis Management of presumed meningitis Management of neutropenic patients with fever

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TABLE 1 continued

Stewardship strategies	Description
Drug Use Evaluation Committee	Reviews targeted drug, eg, evaluation of appropriate utilization, administration and monitoring Develops audit criteria Analyses use against approved criteria Provides feedback to prescribers Promotes evidence-based practice Encourages clinical outcomes research where paediatric data are lacking Informs and educates through the Drug Use Evaluation Bulletin Makes presentations to groups within the hospital
Antibiotic Order Form	Includes indication (treatment or prophylaxis), site of infection, likely pathogen Provides health professionals with accessible information regarding antibiotic use for analysis of utilization patterns Available as a paper-based form or incorporated into computerized order entry (KIDCOM)
Automatic Stop Order	Assigns a four-day automatic stop date for all antimicrobials unless ordered for a specific length of time Allows for re-evaluation after microbiology results are available
Therapeutic Interchange	Automatic drug substitution, eg, piperacillin for ticarcillin, amoxicillin for pivampicillin, cefaclor suspension for cefuroxime axetil tablets in young children
Cost awareness	Cost comparisons for intravenous and oral antibiotics (5-day course for 20 kg child) included in the formulary Costs for restricted antimicrobials displayed along with costs of possible alternative therapies in restricted drug guidelines Microbiology culture and sensitivity reports indicate relative costs of antimicrobials (\$ – \$\$\$\$)
Microbiology Laboratory	Current hospital susceptibility patterns included yearly in the formulary; updated every six months Selective reporting of susceptibility results based on spectrum of activity, suitability for site of infection and cost Interpretive comments regarding clinical significance of isolate, therapeutic ranges of drugs, suggested treatment regimens, resistant patterns requiring infection control procedures, contaminated or improper specimens
Antibiotic Subcommittee	Targets individual antimicrobial agents or disease states in which antimicrobial use requires careful scrutiny and evaluation Develops guidelines and makes recommendations to Pharmacy & Therapeutics Committee, eg, Meropenem Usage Guidelines in paediatrics, empirical antimicrobial therapy for fever in asplenic patients
Infection Control Service	Provides nosocomial infection surveillance, consultation, education Investigates nosocomial outbreaks of antimicrobial-resistant organisms such as methicillin-resistant <i>Staphylococcus aureus</i> , vancomycin-resistant enterocci, resistant Gram-negative bacteria

The core of the stewardship program is the Pharmacy and Therapeutics Committee (P&T), which has broad representation from all clinical areas and reports to the Medical Advisory Committee via the Patient Care Committee. Reporting to the P&T are the Drug Use Evaluation Committee (DUE), the Antibiotic Subcommittee and the Drug Information Service. The Department of Pharmacy, the Divisions of Infectious Diseases and Microbiology and the Infection Control Service play key roles in these core committees to produce the array of continuously operating strategies (Table 1). Examples of DUE audits that have had significant effects on curbing inappropriate use of antimicrobials are targeted reviews of acyclovir, cefuroxime, ceftazidime, clindamycin, vancomycin and liposomal amphotericin B. Other audits that have significantly decreased costs are guidelines for reduced monitoring of gentamicin and

vancomycin serum concentrations, standardized drug dosage and frequency guidelines (within defined weight ranges), and drug wastage studies (ie, antimicrobials).

These initiatives cumulatively produce significant financial savings and unmeasured but critical benefits to patient care and more than support the salary of a part-time DUE pharmacist. The process of evaluation and re-evaluation also permits the consideration of newer, more effective, but usually more expensive antimicrobials for the formulary. Continuing the cyclical process and maintaining a core of committed individuals are key to the success of such a program.

REFERENCES

1. Diamond SA, Hales BJ. Strategies for controlling antibiotic use in a tertiary-care paediatric hospital. *Paediatr Child Health* 1997;2:181-6.