

Antimicrobial Stewardship General Principals

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THE STATE OF THE WORLD'S ANTIBIOTICS 2015

Global Antibiotic Use and Resistance in 'Dire' Situation

Antibiotic resistance rates across the globe are alarming, and the only sustainable solutions are to limit overuse and misuse of antibiotics, according to the Center for Disease Dynamics, Economics & Policy (CDDEP).

CDDEP and the Global Antibiotic Resistance Partnership have coreleased a new report, *The State of the World's Antibiotics, 2015*, on the state of global antibiotic use and antibiotic resistance in humans and livestock.

"We need to focus 80 percent of our global resources on stewardship and no more than 20 percent on drug development," said Laxminarayan. "No matter how many new drugs come out, if we continue to misuse them, they might as well have never been discovered."

ANTIBIOTIC RESISTANCE IN 2015

• KEY MESSAGES

- Antibiotic-resistant bacteria, including methicillin-resistant *Staphylococcus aureus* (MRSA), extended-spectrum beta-lactamase producers, and carbapenem-resistant Enterobacteriaceae, are increasing in prevalence worldwide, resulting in infections that are difficult and expensive to treat.
- A major driver of antibiotic resistance is antibiotic use, which is fueled by the high background burden of infectious disease in low- and middle-income countries and easy access to antibiotics in much of the world, which increases both appropriate and inappropriate use.
- Few low- and middle-income countries have national surveillance systems for antibiotic-resistant infections. Some, such as India, are beginning to establish networks that will inform clinical decision-making and policy development.

HUMAN USE OF ANTIBIOTICS

- **KEY MESSAGES**

- Antibiotic consumption in humans is increasing globally. The greatest increase between 2000 and 2010 was in low- and middle-income countries (LMICs), but in general, high-income countries still use more antibiotics per capita.
- An estimated 80 percent of all antibiotics are used in the community, where prescribing and purchasing of antibiotics without prescription are common, especially in LMICs. In many countries at all economic levels, clinicians have incentives to overuse antibiotics.
- The confluence of patients with serious medical conditions, interconnectedness of hospitals through mobile patient populations, and high density of antibiotic use make hospital antibiotic use disproportionately important.

Untoward Effects of Antibiotics

- Antibiotic resistance
- Adverse drug events (ADEs)
 - Hypersensitivity/allergy
 - Drug side effects
 - *Clostridium difficile* infection
 - Antibiotic associated diarrhea/colitis
- Increased health-care costs

Frequency of ADEs due to Antibiotics in Outpatient Setting

- 142,505 estimated emergency department visits/year due to untoward effects of antibiotics
 - Antibiotics account for 19.3% of drug related adverse events
 - 78.7% for allergic events
 - 19.2% for adverse events (e.g. diarrhea, vomiting)
 - Approximately 50% due to penicillin & cephalosporin classes
 - 6.1% required hospital admission

Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship

Timothy H. Dellit, Robert C. Owens, John E. McGowan, Jr., Dale N. Gerding, Robert A. Weinstein, John P. Burke, W. Charles Huskins, David L. Paterson, Neil O. Fishman, Christopher F. Carpenter, P. J. Brennan, Marianne Billeter, and Thomas M. Hooton

Clinical Infectious Diseases 2007;44:159–77

Antimicrobial Stewardship

- An activity that includes appropriate selection, dosing, route, and duration of antimicrobial therapy.
- The primary goal of antimicrobial stewardship is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms (such as *Clostridium difficile*), and the emergence of resistance.
- A secondary goal of antimicrobial stewardship is to reduce health care costs without adversely impacting quality of care.

Antibiotic Stewardship

- Definition: A system of informatics, data collection, personnel, and policy/procedures which promotes the optimal selection, dosing, and duration of therapy for antimicrobial agents throughout the course of their use
- Purpose:
 - Limit inappropriate and excessive antibiotic use
 - Improve and optimize therapy and clinical outcomes for the individual infected patient

Ohl CA. *Seminar Infect Control* 2001;1:210-21.

Ohl CA, Luther VP. *J. Hosp. Med.* 2011;6:S4

Dellit TH, et. al. *Clin Infect Dis.* 2007;44:159-177

Six Goals of Antibiotic Stewardship Programs

1. Reduce antibiotic consumption and inappropriate use
2. Reduce *Clostridium difficile* infections
3. Improve patient outcomes
4. Increase adherence/utilization of treatment guidelines
5. Reduce adverse drug events
6. Decrease or limit antibiotic resistance
 - Hardest to show
 - Best data for health-care associated gram negative organisms

Antibiotic Stewardship

- Is pertinent to inpatient, outpatient, and long-term care settings
- Is practiced at the
 - Level of the patient
 - Level of a health-care facility or system, or network
- Should be a core function of the medical staff (i.e. doctors and other healthcare providers)
- Utilizes the expertise and experience of clinical pharmacists, microbiologists, infection control practitioners and information technologists

Key Components of an Antimicrobial Stewardship Program

- Multidisciplinary team
- Institutional support
- Ability to monitor antibiotic use and bacterial resistance

- Guidelines
- Educational measures
- Restrictive measures

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Measures for Antimicrobial Stewardship Programs

Structural

- Antibiotic order form
- Availability of expert advice
- Guidelines
- Computerised decision support systems
- Rapid diagnostic tests

Educational

- Education
- Audits and feedback

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Measures for Antimicrobial Stewardship Programs

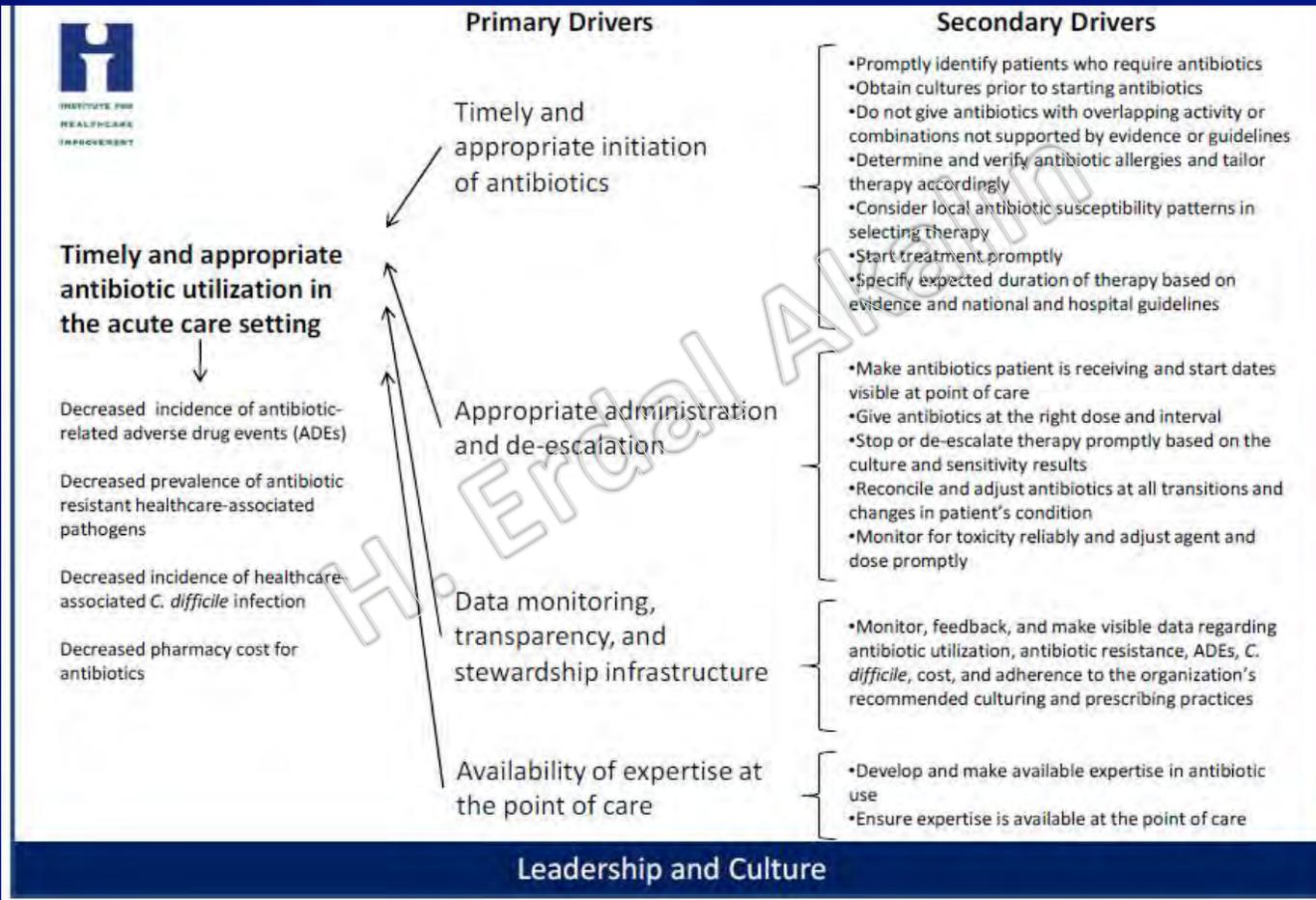
Restrictive measure

- Restrictive prescribing
- Review of prescriptions
- Systematic expert advice in some cases (MDR, blood cultures, reserve antibiotics...)

Monitoring

- Antibiotic use and resistance
- With feedback and benchmarking

Antibiotic Stewardship Driver Diagram



Practical Approach

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Antimicrobial Stewardship: A Definition

- Processes designed to optimize the appropriate use of antimicrobials by ensuring that every patient receives...
 - ...an antibiotic only when one is needed, with
 - The right agent
 - The right dose
 - The right route
 - For the right duration ...
- ... in order to optimize clinical outcomes and minimize unintended consequences of antimicrobial use

Developing an Antimicrobial Stewardship Program

- Develop a culture change which embraces prudent antibiotic use
- Identify and gain solid commitment from members of the ASP
- Administrative support is essential
- ASP operates under auspices of the CMO and QA/Safety
- A commanding Chief Medical Officer, Medical Executive Committee, and Pharmacy and Therapeutics Committee enhance the success of an ASP
- Patient safety is linked to antibiotic resistance – make them believe it

The Core Team and Supporting Stakeholders

- Core Team
 - Infectious disease physician
 - Clinical pharmacist (id trained)
- Support Team
 - Infection control
 - Microbiology
 - Hospital epidemiologist
 - Patient safety
 - Information technology
- Collaborative Team
 - Hospital administration & pharmacy director
 - Medical executive

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Core Strategies

- Education
- Guidelines
- Order sets
- Dose optimization
- IV to PO
- Streamlining (de-escalation)
- Information technology

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Measure Something

- What to measure depends on objectives of the program, data available, and the audience
- Demonstrate effectiveness of the antibiotic stewardship program
 - Improved patient outcomes
 - Improved patient safety
 - Decreased antimicrobial use
- Study your institution's antibiogram – assess the need for a “deeper dive” into patient demographics
- Internal benchmarking and trending
- External benchmarking
 - Multi-hospital systems
 - Quality improvement measures

Tips

- Recruit an ID physician, or physician with interest and passion for antimicrobial stewardship (if no ID physician available)
- Get buy-in from providers before starting the program
- Start small
 - Concentrate on use of 1 drug/drug class or syndrome instead of comprehensive antimicrobial stewardship; start targeted rather than broad-based
 - Don't start with your workhorse antibiotic
- Develop tools for daily ASP activities
 - Guidelines, therapeutic recommendations, and clinical pathways
 - Standard order forms
 - Some activities may need P&T approval, e.g., IV-to-PO automatic switch

Tips (continued...)

- Develop communication tools to communicate messages to prescribers
- Consider antimicrobial stewardship training/certification for clinical pharmacists
- Use available free online resources on stewardship but study primary literature
- Partner with IT for clinical decision support tools in order sets
 - Dosing calculators
 - Pop-up screens/ drop-down menus