

The Role of Nursing in Antimicrobial Stewardship



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Objectives

- Define antibiotic stewardship and discuss historical approaches to managing antibiotics
- Highlight landmark initiatives currently (and likely to) affect antimicrobial stewardship in the US
- Differentiate outcome vs. process measures utilized in current programs, and provide examples
- List opportunities for nurses to participate in antimicrobial stewardship

Global Consumption of Antibiotics



- From 2000-2010, total global antibiotic consumption grew by >30%
 - ~50 billion to ~70 billion standard units (SU)
 - Penicillins and cephalosporins ~60%
 - Significant increase last resort antibiotics → carbapenems and polymyxins

Leaders in Antibiotic Consumption 2010



13 billion SU



10 billion SU



7 billion SU

Adjusted per capita → US leader
22 SU per person

US Consumption of Antibiotics

United States accounts for 10% of global consumption



*Number of doses sold, identified as pill, capsule, or ampule

Enforces need for GLOBAL Stewardship Efforts

Inpatient Use 20% of Human

Outpatient Use 80% of Human

**Estimated based on use of carbapenems and polymyxins. Center for Disease Dynamics, Economics & Policy. 2015. State of the World's Antibiotics, 2015. CDDEP: Washington, D.C. Van Boeckel, TP, et al. Lancet Infect Dis 2014;14:742-50. Van Boeckel TP, et al. PNAS Early Edition 18 Feb 2015.

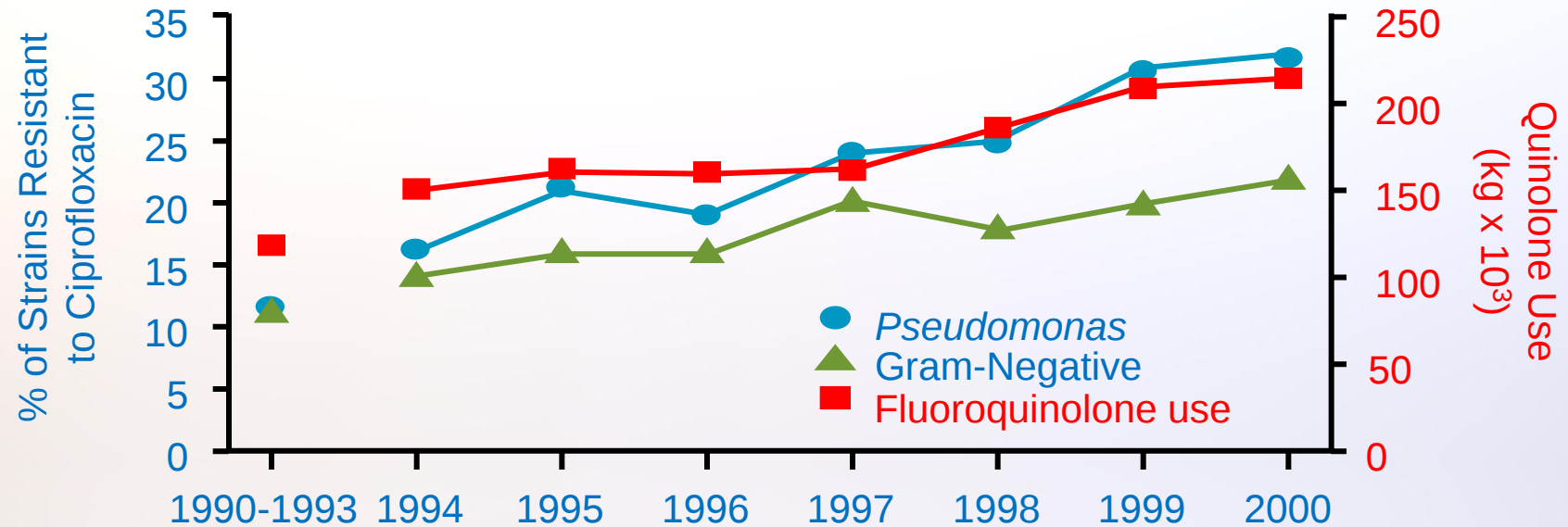
Inappropriate Use of Antibiotics

- Surveys suggest that half of all antimicrobial use is inappropriate
 - non-bacterial infections
 - wrong antibiotic to begin with
 - unnecessary antibiotic continued longer than it needs to be



"Don't forget to take a handful of our complimentary antibiotics on your way out."

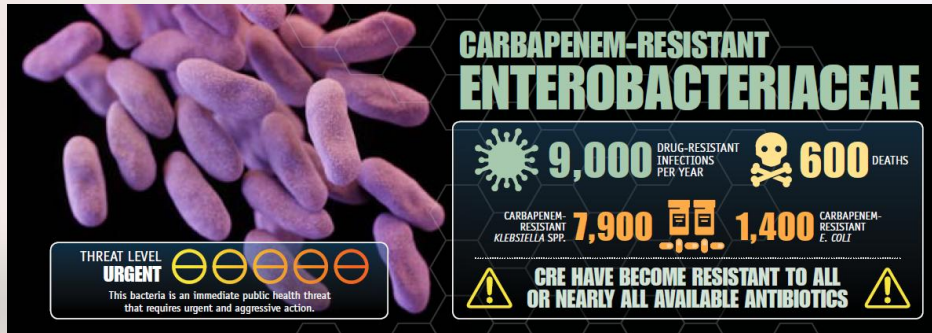
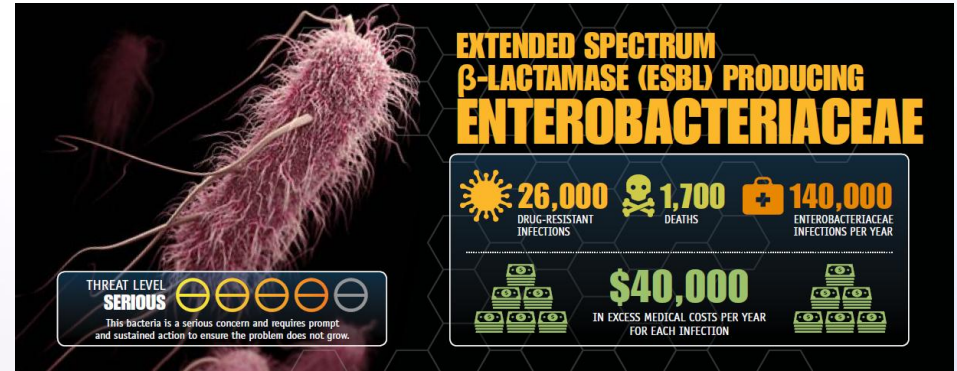
Increased Antibiotic Use Drives Resistance



Increasing fluoroquinolone resistance in Gram-negative bacilli correlates with increased fluoroquinolone use in patients from 43 states (numbers of isolates from 1994-2000=35,790). The 1990 to 1993 data points represent composite susceptibility and quinolone use for those 4 years.

Multi-Drug Resistant Enterobacteriaceae

- *Escherichia coli* and *Klebsiella pneumoniae* are common causes of respiratory tract, blood, urine, and tissue infections
- They are typically susceptible to many antibiotics
- Extended-spectrum beta-lactamases (ESBLs) have now emerged in 10-15% of clinical isolates
- Carbapenems are widely considered the antibiotics of choice for ESBLs



- The rise in carbapenem use has been associated with emergence of carbapenem resistant strains
- Predominantly due to presence of bla_{KPC} carbapenemase enzymes
- Few available antibiotics remain with activity against these multidrug resistant Enterobacteriaceae
- New treatments needed

Consequences of Antimicrobial Resistance

Clinical and Financial Burdens

Sample of 1391 high-risk hospitalized adult patients from Chicago hospitals

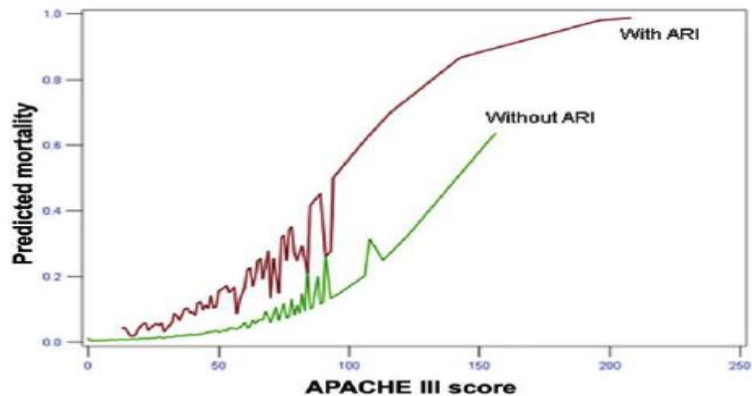


Figure 1. Predicted mortality for patients with and without antimicrobial-resistant infection (ARI). APACHE, Acute Physiology and Chronic Health Evaluation.

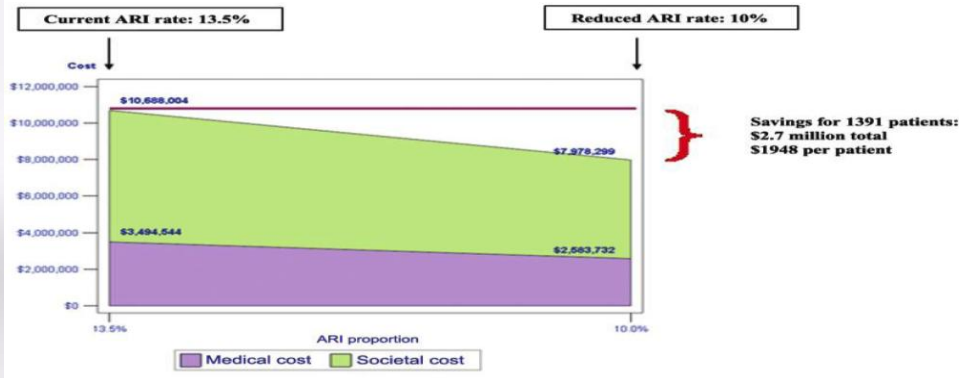
Table 5. Mean Cost and Length of Stay for Patients with Antimicrobial-Resistant Infection (ARI), Compared with Matched Control Subjects

Propensity score	Patients with ARI	Patients without ARI	Mean difference	P
Propensity score 2^a				
No. of patients	169	169	...	
Total cost, US\$	53,863 ± 60,720	24,794 ± 23,231	29,069	<.001
Total length of stay, days	23.8 ± 20.3	12.8 ± 10.2	11.0	<.001
Propensity score 3^b				
No. of patients	138	138	...	
Total cost, US\$	52,211 ± 59,456	31,003 ± 26,325	21,208	<.001
Total length of stay, days	22.5 ± 20.1	15.9 ± 11.3	6.7	<.001

NOTE. Data are mean ± standard deviation, unless otherwise indicated.

^a Comorbidities, surgery, and intensive care unit stay.

^b Comorbidities, surgery, intensive care unit stay, and health care-acquired infection.



Antibiotic Use – Striking the Balance

Getting it Right Up Front
Increasing Response
Decreasing Mortality



Appropriate Use
Collateral Damage

What is Antibiotic Stewardship?

- Coordinated interventions designed to improve and measure the appropriate use of antibiotic agents by promoting the selection of the optimal drug regimen including dosing, duration of therapy, and route of administration.

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,¹ Robert C. Owens,² John E. McGowan, Jr.,³ Dale N. Gerding,⁴ Robert A. Weinstein,⁵ John P. Burke,⁶ W. Charles Huskins,⁷ David L. Paterson,⁸ Neil O. Fishman,⁹ Christopher F. Carpenter,¹⁰ P. J. Brennan,⁹ Marianne Billeter,¹¹ and Thomas M. Hooton¹²

- **Primary goal**
 - Optimize clinical outcomes while minimizing unintended consequences of antibiotic use
 - Toxicity
 - Selection of pathogenic bacteria (e.g., *Clostridium difficile*)
 - Emerging resistance
- **Secondary goal**
 - Reduce health care cost without compromising quality of care

Stewardship is Not a New Concept

- Many references from the 80's on antibiotic restriction programs
- More contemporary stewardship (i.e., **Antibiotic Management**) included de-escalation recommendations and involved an antibiotic management team
- Described 3 phases of infection where the team could interact:
 - **Stage 1** – Empiric antibiotic therapy; uncertainty about cause of infection
 - **Stage 2** – Days 3-5; availability of culture and susceptibility data to help guide antibiotic therapy
 - **Stage 3** – Day 7 and later; completion of antibiotic therapy, discharge from hospital; dependent on type of infection and patient response to therapy from Stages 1 and 2

Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America

Tamar F. Barlam,¹ Sara E. Cosgrove,² Lilian M. Abbo,³ Conan MacDougall,⁴ Audrey N. Schuetz,⁵ Edward J. Septimus,⁶ Arjun Srinivasan,⁷ Timothy H. Dellit,⁸ Yngve T. Falck-Ytter,⁹ Neil O. Fishman,¹⁰ Cindy W. Hamilton,¹¹ Timothy C. Jenkins,¹² Pamela A. Lipsett,¹³ Preeti N. Malani,¹⁴ Larissa S. May,¹⁵ Gregory J. Moran,¹⁶ Melinda M. Neuhauser,¹⁷ Jason G. Newland,¹⁸ Christopher A. Ohl,¹⁹ Matthew H. Samore,²⁰ Susan K. Seo,²¹ and Kavita K. Trivedi²²

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- **Primary goal**
 - Expanded on previous guidelines with recommendations on specific interventions and implementation

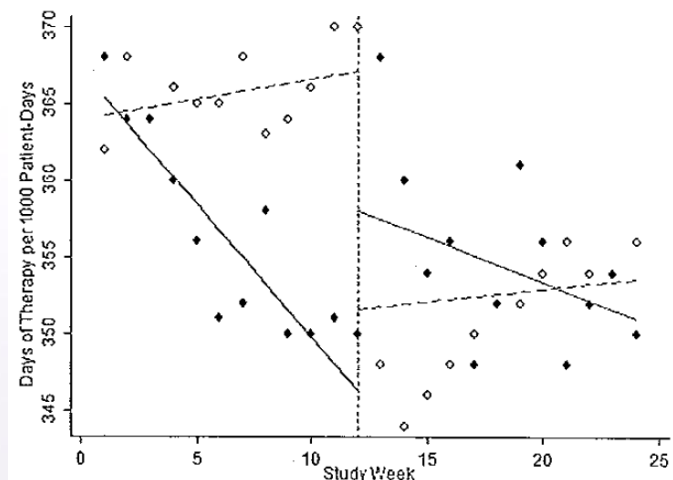
Strategies For Antimicrobial Stewardship from the Guidelines

- Core Strategies
 - Prospective Audit with Intervention and Feedback
 - Formulary Restriction/Prior Authorization
- Supplemental strategies
 - Clinical pathways and guidelines
 - Streamlining/de-escalation
 - Dose (PK/PD) optimization
 - Combination therapy
 - Switch from parenteral to oral therapy
 - Antibiotic Time-Outs
 - Antimicrobial order forms
 - Antibiotic cycling/switch
 - Working closely with microbiologists
 - Physician order entry

Table 1. Comparison of Preauthorization and Prospective Audit and Feedback Strategies for Antibiotic Stewardship

Preauthorization	Prospective Audit and Feedback
Advantages	
- Reduces initiation of unnecessary/ inappropriate antibiotics - Optimizes empiric choices and influences downstream use - Prompts review of clinical data/ prior cultures at the time of initiation of therapy - Decreases antibiotic costs, including those due to high-cost agents - Provides mechanism for rapid response to antibiotic shortages - Direct control over antibiotic use	- Can increase visibility of antimicrobial stewardship program and build collegial relationships - More clinical data available for recommendations, enhancing uptake by prescribers - Greater flexibility in timing of recommendations - Can be done on less than daily basis if resources are limited - Provides educational benefit to clinicians - Prescriber autonomy maintained - Can address de-escalation of antibiotics and duration of therapy
Disadvantages	
- Impacts use of restricted agents only - Addresses empiric use to a much greater degree than downstream use - Loss of prescriber autonomy - May delay therapy - Effectiveness depends on skill of approver - Real-time resource intensive - Potential for manipulation of system (eg, presenting request in a biased manner to gain approval) - May simply shift to other antibiotic agents and select for different antibiotic-resistance patterns	- Compliance voluntary - Typically labor-intensive - Success depends on delivery method of feedback to prescribers - Prescribers may be reluctant to change therapy if patient is doing well - Identification of interventions may require information technology support and/or purchase of computerized surveillance systems - May take longer to achieve reductions in targeted antibiotic use

Preauthorization (PPA) versus Post Prescription Review with Feedback (PPRF)



Solid Line is DOT during PPRF; Dashed line is DOT during PPA.

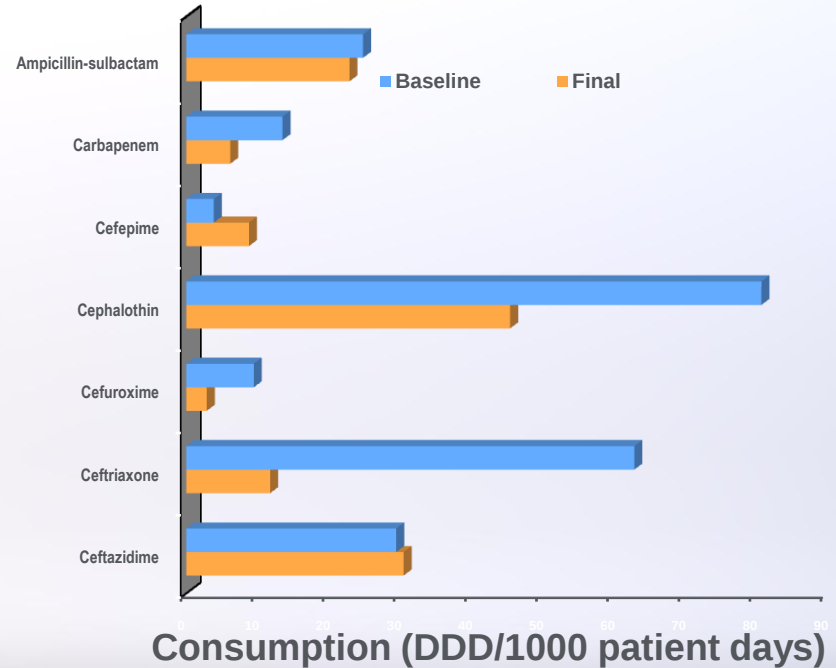
- PPRF was more effective than PPA at reducing antibiotic DOT and Length of Therapy
- No Differences in CDI, length of hospital stay, or in-hospital mortality

Barlam TF et al. *Clin Infect Dis* 2016;62:1197-202.

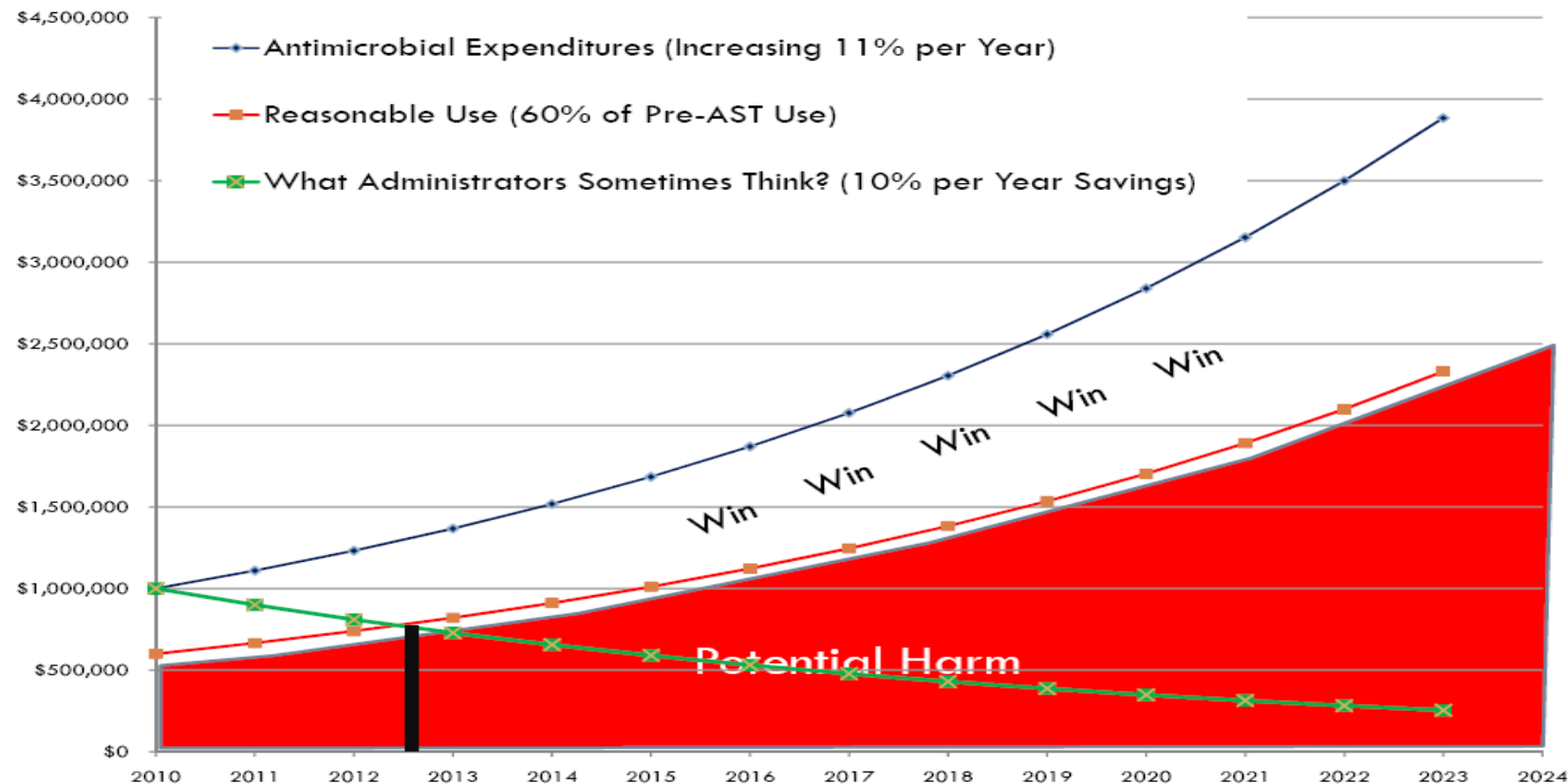
Tamma P et al. *Clin Infect Dis* 2017;64:537-43.

Hospital-wide Program to Optimize Antibiotic Use

- Antimicrobial Treatment Committee
 - ID, Microbiologists, Pharmacists, IM, IT
- Hospital-wide Program
 - No restrictions on antibiotic use
 - Antibiotic Order Form
 - Feedback and education to prescribers
 - Recommended substitutions
 - 3rd-generation cephalosporins → cefepime
 - Carbapenems → aminopenicillin/sulbactam
- Decreased antibiotic use
- Decreased resistance
- Cost reduction: total savings of \$913,236 over 18 months



The Low Hanging Fruit – Controlling Antibiotic Costs



Effect of a national 4C antibiotic stewardship intervention on the clinical and molecular epidemiology of *Clostridium difficile* infections in a region of Scotland: a non-linear time-series analysis

Timothy Lawes, José-María Lopez-Lozano, Cesar A Nebot, Gillian Macartney, Rashmi Subbarao-Sharma, Karen DWares, Carolyn Sinclair, Ian M Gould

Summary

Background Whereas many antibiotics increase risk of *Clostridium difficile* infection through dysbiosis, epidemic *C difficile* ribotypes characterised by multidrug resistance might depend on antibiotic selection pressures arising from population use of specific drugs. We examined the effect of a national antibiotic stewardship intervention limiting the use of 4C antibiotics (fluoroquinolones, clindamycin, co-amoxiclav, and cephalosporins) and other infection prevention and control strategies on the clinical and molecular epidemiology of *C difficile* infections in northeast Scotland.



Persuasive/Restrictive ASP on 4C antibiotics:

- Cephalosporins
- Ciprofloxacin/fluoroquinolones
- Clindamycin
- Co-amoxicillin

Reduced hospital *C.difficile* by 68% in hospitals and 45% in community settings

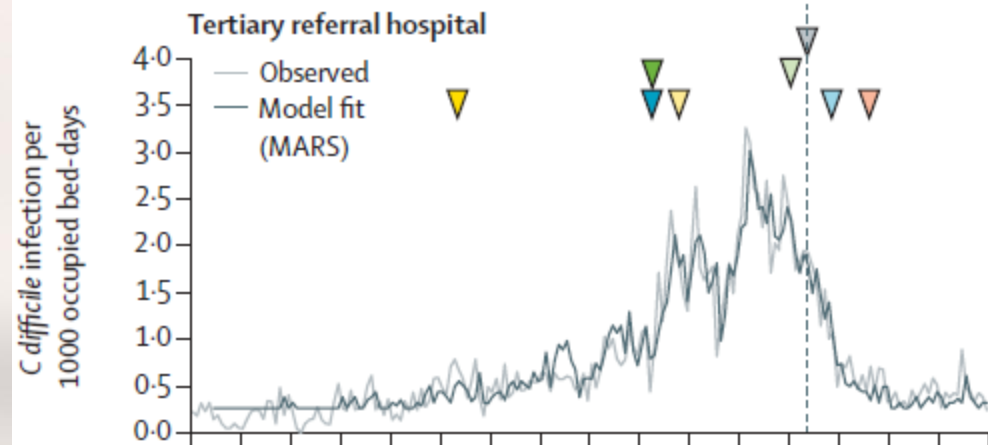
Lancet Infect Dis 2016

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[http://dx.doi.org/10.1016/S1473-3099\(16\)30397-8](http://dx.doi.org/10.1016/S1473-3099(16)30397-8)

See Online/Comment



- 1 Mandatory surveillance in hospitals >65 y.o.
- 3 All patients, all settings
- 4 Alcohol-based hand sanitizers
- 5 National hand hygiene campaign
- 6 Auditing of environmental cleaning standards
- 7 Hospital Environmental Inspections
- 8 Antibiotic Stewardship – 4C's (dashed line)
- 9 Reductions of Proton Pump Inhibitors

Opportunities for Stewardship: Influenza

- 65% of patients admitted with influenza received antibiotics empirically
- 35% of these patients received therapy inappropriately (no evidence of bacterial infection)
- Respiratory cultures ordered in only 15% of patients

Outcome	Total cohort (N = 322)	No Antibiotics on Admission (N = 111; 34.4%)	Appropriate Antibiotic Duration (N = 138; 42.8%)	Inappropriate Antibiotic Duration (N = 73; 22.7%)	P Value
Mortality	11 (3.4)	2 (1.8)	6 (4.3)	3 (4.1)	.510
Time to temperature normalization, median d (IQR)	1 (1–2)	1 (1–2)	1 (1–2)	1 (1–2)	.373
Time to WBC normalization, median d (IQR)	2 (1–3)	1 (1–1.5)	2 (1–4.25)	2 (1–3.75)	.050
LOS, median d (IQR)	5 (3–7)	4 (3–6)	5 (3–8)	6 (4–9)	<.001 ^a
Discharge status					
Home	218 (70.1)	83 (74.7)	91 (65.9)	44 (60.2)	.154
Health care	93 (29.9)	26 (23.4)	41 (24.7)	26 (35.6)	
30-day readmission	40 (12.4)	11 (9.9)	21 (15.2)	9 (12.3)	.455
Total hospital cost, median \$ (IQR)	7,553 (5,002–13,077)	5,961 (4,711– 9,575)	7,479 (4,866–12,922)	10,645 (6,485–18,035)	<.001 ^a
Hospital net revenue, median \$ (IQR) ^b	2,214 (–2,091–4,623)	2,202 (–507–4,342)	2,957 (–1,616–6,439)	881 (–4,892–3,196)	<.001 ^a

NOTE. All data are presented as number (%), unless otherwise indicated.

LOS, length of stay; IQR, inter-quartile range (25th–75th percentile); SNF, skilled nursing facility; WBC, white blood cell count.

^aInappropriate antibiotic duration (IAD) group was significantly different from the other groups.

^bHospital net revenue = gross payments received – total hospital cost.

Justifying an Antimicrobial Stewardship Program

- **Poor Outcomes/Resistance Already Present** –
New therapies/interventions needed to reduce multidrug resistant bacteria
- **Poor Outcomes/Resistance Prevalence Low** –
Optimizing infection-control/stewardship activities could delay/prevent emergence of multi-drug resistance

No two institutions have precisely the same issues...

USE YOUR OWN DATA!

"Measurement is the first step that leads to control and eventually to improvement..."

- Dr. H. James Harrington
Harrington Institute Inc.

"An ASP is not an ASP without measurement..."

- anonymous

When to Measure in an Antimicrobial Stewardship Program (ASP)?

- Pre-intervention

- What and where is the ASP problem at your institution?
 - high resistance, abusive use of certain antibiotics, poor outcomes for a certain infectious process
- What data are needed to assist in correctly identifying a path to problem solution?

- Post-intervention

- How compliant were providers with the ASP intervention?
- Did the intervention achieve intended results?
- Are new modifications needed?
- Help support/justify ASP resources?

Don't Stop... Continuous Monitoring is Required

- When resources are shifted elsewhere and compliance declines, a reduction in successful outcomes will be observed.
- Compliance of VAP treatment program reduced from 100% to 44%
- Percentage of patients receiving appropriate antibiotic therapy fell from 70.8% to 56.3% (36.1% in patients not receiving care by protocol, $p < 0.001$).
- Triple antibiotic therapy decreased from 79.2% to 32.8% ($p < 0.001$)
- Time to appropriate therapy increased by one day
- Death during hospitalization increased from 32% to 42% ($p = 0.603$)

Process versus Outcome Measures

Outcome Measures

- Based on the primary goal of ASP
- May not always measure quality of care
- Often affected by multiple variables
- Examples:
 - Mortality
 - Clinical success/failure
 - Resistance
 - Superinfections (*C. difficile*)
 - Healthcare costs
 - Length of Stay

Process Measures

- Useful only if have a link to the outcome
- Easier to measure
- Examples:
 - Compliance
 - Reductions in antibiotic utilization
 - Antibiotic cost
 - Frequency/time to appropriate antibiotic therapy
 - Acceptance of ASP recommendations

Evaluating Antibiotic Consumption: Defined Daily Doses (DDD)

- Promoted by World Health Organization
- Assumed average maintenance dose per day for a drug used for its main indication in adults.
- Total grams are summed during period of interest and divided by WHO-assigned DDD (grams/day).
- Often expressed in DDDs per 1000 patient days for benchmarking with other hospitals.
- Limitations:
 - Will underestimate antibiotic exposure in patients with impaired renal function
 - Aggregate use may include pediatric prescriptions, which is not accounted for in assigned DDD
 - If administered daily dose differs from WHO DDD, then no accurate assessment of number of days of therapy

Evaluating Antibiotic Consumption:

Days of Therapy (DOT) – Now Favored by Guidelines

- Direct measure of the number of days of therapy
- Represents the administration of a single agent on a given day regardless of number of doses or dosage
- Often expressed in DOT per 1000 patient days for benchmarking with other hospitals.
- Can be used to compare relative use between drug classes and among children
- Limitations:
 - Will overestimate use for drugs given in multiple doses per day
 - Often more difficult to measure without computerized pharmacy records

NHSN Antimicrobial Utilization Measure (NQF #2720)

- Developed by CDC
- Goal: Hospital benchmarking of antibiotic use
- Standardized Antimicrobial Administration Ratio (SAAR)
 - Antimicrobial use collected electronically at point of care
 - Data separated by medical/surgical, ward/ICU, adult/pediatric
 - Numerator: Antimicrobial DOT's by patient care location
 - Denominator: Days present for each patient care location (i.e., number of patients who were present for any portion of each day of a calendar month for each location)
- Currently being evaluated as a Center for Medicare and Medicaid Services (CMS) performance measure requirement

California Antibiotic Stewardship Program Initiative

Making ASP Mandatory

- Part of California Department of Public Health
- First and only (so far) state to enact ASP legislation
- California Senate Bill 739 mandated that by Jan 1, 2008, all general acute hospitals must monitor and evaluate the utilization of antibiotics and charge a quality improvement committee responsible for oversight of antibiotics
- September 2014: California Senate Bill 1311 – ASP programs must follow recommendations by federal government or professional organizations (includes physician or pharmacist trained specifically in stewardship)

National Action Plan for Combating Antibiotic-Resistant Bacteria (CARB)

- Issued by the White House in March 2015
- Based on the September 2014 *Report to the President on Combating Antibiotic Resistance*, released by PCAST
- Set's forth goals to slow the emergence of resistance and spread of resistant bacteria
 - Strengthening Antimicrobial Stewardship in inpatient, outpatient, and long-term care settings
- All acute care hospitals and long term care facilities should have a stewardship program in place by 2020



NATIONAL QUALITY FORUM

Antibiotic Stewardship in Acute Care: A Practical Playbook

NQP Antibiotic Stewardship Action Team, 2016

- Based on CDC developed, The Core Elements of Hospital Antibiotic Stewardship Programs
- Goal is to assist inpatient acute care hospitals developing an ASP by offering suggestions for framework, support, and tools
- Launched May 25, 2016
- A playbook for Stewardship in Long Term Care Facilities is in the works
- http://www.qualityforum.org/Publications/2016/05/Antibiotic_Stewardship_Playbook.aspx

CDC 7 Core Elements

- **Leadership Commitment**: dedicate necessary human, financial, and information technology resources
- **Accountability**: appoint a leader responsible for program outcomes (usually an ID trained physician or pharmacist)
- **Drug Expertise**: appoint a single pharmacist leader
- **Action**: implement at least one recommended ASP action
- **Tracking**: monitor process and outcome measures
- **Reporting**: report the above information regularly to doctors, nurses, and relevant staff
- **Education**: educate clinicians about disease state management, resistance, and optimal prescribing

Current and Future National ASP Metrics

- CMS Sepsis Treatment Measure
 - Launched in October 2015
 - Stressed early goal directed therapy and recommends specific antibiotics for patients presenting with sepsis
- CMS SAAR Measure as Condition of Participation (CoP)
 - On hold after public comment
- The Joint Commission: Antimicrobial Stewardship Measure
 - Implemented in January 2017
 - Requires all hospitals to have programs in place that meet the CDC Core Elements
- IDSA/SHEA Provider Level ASP Measurements
 - Bolt-on to CMS Sepsis: Antibiotic Time Out at 72 hours
 - Minimizing Inappropriate anti-MRSA Antibiotic Use

Accreditation Survey Activity Guide For Health Care Organizations 2017

What's New for 2017

New or revised content for 2017 is identified by underlined text.

Changes effective January 1, 2017

All Programs

Opening Conference, Organization Exit Conference – Updated to include discussion topic related to the changes in the Clarification process, and the revised accreditation report content related to the SAFER™ matrix

Preparing for Surveyor Arrival, Document Lists – The Customer Value Assessment tool has been retired and tool references removed from this Guide; removed references to Statement of Conditions (eSOC) and Plans for Improvement (PFIs), as these are no longer required

Emergency Management and Environment of Care and Emergency Management – Added an IT Representative, when available, to the list of recommended participants

Hospital and Critical Access Hospital

Antimicrobial stewardship standard and survey process related material has been added to the following sections: Document List, Individual Tracer Activity, Competence Assessment, Medical Staff Credentialing and Privileging, System Tracer - Data Management, System Tracer - Medication Management, Leadership Session

Nursing Care Centers

Antimicrobial stewardship standard and survey process related material has been added to the following sections: Document List, Individual Tracer Activity, Competence Assessment and Credentialing/Privileging, Leadership and Data Use

Laboratory

Document List updated to include the Surveyor Checklist to Unique Requirements of California Department of Public Health

Joint Commission Hospital & Critical Access Hospital Accreditation Document List

- List of patients receiving antimicrobials
 - Emergency department patients prescribed antibiotics
 - Ambulatory and clinic patients (under hospital program) who are prescribed antibiotics
 - Hospitalized patients who will be discharged on antibiotics
- Documents demonstrating leadership support for the organization antimicrobial stewardship program (e.g., accountability document, budget plans)
- Document describing how the organization is using the CDC's Core Elements of Stewardship
- Organization approved antimicrobial stewardship protocols (e.g., policies, procedures, order sets)
- Antimicrobial stewardship data (e.g., days of therapy)
- Stewardship reports documenting improvements

The Role of Nursing in Antibiotic Stewardship

- Limited data in the literature (exception is role in nursing homes/long term care facilities)
 - Mesh terms: APRN, antibiotic, stewardship revealed zero matches
- BUT OF COURSE THERE IS A ROLE!
- Can be broken by the following areas:
 - Practice
 - Education
 - Research
 - Policy

Practice

- Could be applied to both nursing staff as well as advanced practice nurses
- Adopt antibiotic stewardship as a patient safety imperative
- Provide robust educational offerings on topics related to resistance and stewardship
- Promote antibiotic time-outs
- Partner and collaborate with antibiotics stewardship teams
 - We collaborate with our Infection Control Nurses
 - Two nurses sit on our Stewardship Committee (they are based in Quality)
 - We bring Nurse Educators on board when implementing a new dosing strategy or policy that effects administration or monitoring of antibiotics
- Raise nursing awareness
- Participate in CDC Get Smart About Antibiotics Week

Symptom-Free Pee: LET IT BE

A national initiative to stop inappropriate antibiotic use for asymptomatic bacteriuria in long-term care residents.

Asymptomatic bacteriuria (bacteria in the urine with no symptoms) is colonization of the bladder that occurs frequently in the elderly, especially those with diabetes, immobility, fecal incontinence, prostatic enlargement, or post-menopausal changes.

ANTIBIOTICS NOT INDICATED!

Asymptomatic bacteriuria is not an infection

- Do not test urine even if foul-smelling, dark, or cloudy

For hemodynamically stable residents with cognitive changes, seek other causes: drug interactions / side effects, dehydration, sleep disturbances, sensory deprivation, hypoxia, hypoglycemia, constipation, etc.

Note: Falls, decreased appetite, verbal aggression, wandering, confusion, and disorientation alone are not indications for urine testing.

HOLD URINE TESTING:

- Monitor frequently
- Rehydrate / push fluids for 24 hours if not contraindicated

Possible urinary tract infection if at least **TWO** are present:

- ☐ Fever / rigors
- ☐ Flank pain / suprapubic pain
- ☐ Pain on urination
- ☐ New frequency
- ☐ Hematuria
- ☐ New incontinence

Dipsticks are not recommended due to poor predictive value. Urine culture ideally should be submitted in preservative.

- Send urine for urinalysis and urine culture

IT IS HARD TO IGNORE A POSITIVE URINE TEST...

Unnecessary testing in colonized residents results in unnecessary antibiotics, which lead to adverse events (antibiotic resistance / failure, C. difficile infection, GI upset, etc.)

For more directions and guidance:
www.ammi.ca
#SymptomFreeLetItBe



Initiatives to Reduce Antibiotic Use for Asymptomatic Bacteruria

Nursing program to hold urine testing and monitor

Education

- Applied to American Association of Colleges of Nursing, nursing faculty and curriculum committees
- Assure that basic and graduate level nursing curriculum includes benefits, risks, and management of antibiotic use, appropriate antibiotic use and administration, and role of nurses
- Develop education materials to support nurses in prescribing antibiotics appropriately (APRNs)
- Deploy infection preventionists as staff educators and members of stewardship team

Research & Policy

- All nursing degrees, organizations, and constituencies
- Assess the impact of nursing involvement in antibiotic stewardship on use patterns (DOTs)
- Examine antibiotic prescribing patterns among nurse practitioners
- Examine the impact of infection preventionist involvement in antibiotic stewardship on use patterns
- Support and disseminate information on the NCARB, Joint Commission Standard, and CDC Elements
- We need your ideas for future support and involvement

Summary

- Since the early development of antibiotics, the successful utilization of these agents has been challenged by the develop of antibiotic resistance
- Some form of managing antimicrobial use has been in practice for decades
 - Early recommendations focused around managing drug budget
- Only in the last decade has a focus re-emerged on Antimicrobial Stewardship as a quality improvement program
 - IDSA/SHEA Antimicrobial Stewardship Guidelines released
 - Process and Outcomes Metrics defined
 - Stewardship now mandatory in Acute Care Hospitals (by 2020) with Joint Commission Standards in place
- Role of Nurses
 - Still undefined but clearly many opportunities for involvement including Practice, Education, Research, and Policy