


## Successes of Illinois Antimicrobial Stewardship Initiatives

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Bug Off, Prevention is Game On!  
Co-sponsored by  
Association for Professionals in Infection Control and Epidemiology  
& Hawaii State Department of Health



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## Disclosure Statement

We have no commercial or financial conflict of interest

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## Objectives

- Illustrate the importance of an antibiotic stewardship program
- Demonstrate one of the stewardship initiatives that have been successfully implemented in Illinois.

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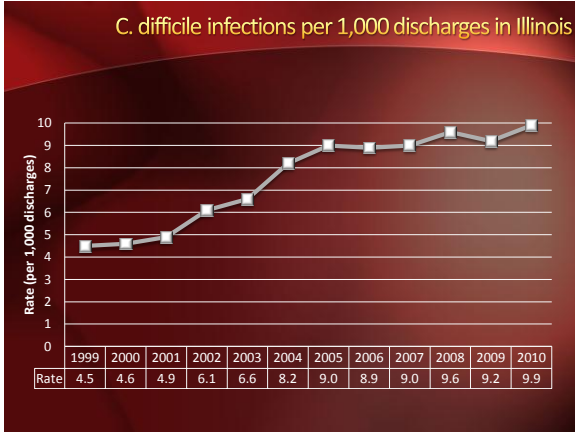
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## IDPH HAI Prevention Program

*Clostridium difficile*

**CDI Prevention Collaborative (2010-2011)**

- 20 acute care hospitals
- focused on bundle of CDI prevention interventions

**Illinois Campaign to Eliminate *Clostridium difficile* "ICE C. diff" (2011-2012)**

- 120 acute care hospital
- 134 long term care facilities
- 23 sponsor organizations
- [http://www.idph.state.il.us/patientsafety/ice\\_home.htm](http://www.idph.state.il.us/patientsafety/ice_home.htm)

**CDI Prevention Across the Continuum of Care "PACC" Collaborative (2013-2014)**

- 4 acute care hospitals
- 11 long term care facilities
- Address issues specific to Long Term Care setting & transitions of care between acute & LTC

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## IDPH HAI Prevention Program

*Antimicrobial Stewardship (AMS)*

**AMS Collaborative (2011-2012)**

- 5 acute care hospitals

**Illinois Summit on AMS (June 2013)**

- Hospitals, Long Term Care facilities, and other stakeholders
- 250 participants
- 2<sup>nd</sup> Summit on Stewardship coming in March 2015!

**AMS Webinars (co-hosted with Telligen)**

**Assessment of AMS in LTC**

- web-based survey & site interviews (2013-2014)

**Illinois Collaborative for Antimicrobial Stewardship Enhancement "ICHASE" (2013-2014)**

- Acute care hospitals reporting antibiotic use to NHSN
- Focus on evaluating the implementation of guidelines

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### Illinois Antimicrobial Stewardship Collaborative

- Pre-collaborative surveys 
  - “What” elements are in place?
- Qualitative on-site assessment to elicit input from multidisciplinary team members
  - More than “What” are you doing?
  - “How” does it work?
  - “Why” does it work (or not work)?
  - “What” do you need?
  - “Who” needs to be involved?
  - “Where” do you want to go?




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### Illinois Antimicrobial Stewardship Collaborative

- Large group meeting:
  - hospital administration, pharmacy, infectious disease, infection control, quality improvement, microbiology, information technology, nursing, and others
- Small focus groups:
  - Front line prescribers (n=28)
  - Pharmacists
  - AMS leadership (ID MDs & pharmacy leadership)
  - Various disciplines (micro, IT, nursing)
- Review of technical documents (e.g., antibiogram)

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### The Illinois AMS Collaborative

#### ASSESSMENT TOOL EXCERPTS

- Please tell me a word, phrase, or sentence that comes to your mind when you hear the term “antimicrobial stewardship.”




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Illinois Antimicrobial Stewardship Collaborative  
SUMMARY FINDINGS

Antimicrobial Stewardship is associated with:

- "Appropriate antimicrobial use"
- "Accountability, helping people understand that the decisions that they make impact more than just the patient in front of them."
- "Critical to the survival of the antibiotic class."
- "Necessity. It's become incumbent on us to act."
- "3 words: Monitoring, timing, and collaboration"



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Illinois Antimicrobial Stewardship Collaborative  
SUMMARY FINDINGS

Antimicrobial Stewardship is associated with:

- "Balancing priorities."
- "Money. I think about money."
- "I think antibiotic stewardship is difficult"
- "Complicated and politically charged."
- "Policing misuse... here come the cops!"



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Precious Drugs & Scary Bugs:  
The 5 D's of Antimicrobial Stewardship



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## Precious Drugs: We ♥ Antibiotics!

### • Why are antimicrobials prescribed so frequently?

- Customer service?
- Physician anxiety?
- ...do something!



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## Illinois Antimicrobial Stewardship Collaborative SUMMARY FINDINGS

### Greatest Challenges:

- Timely communication to all prescribers
- Prescribers' "fear to de-escalate therapies" when patients are improving
- Authoritative program that supports front-line pharmacists and other personnel interacting with prescribing clinicians
- Balance between autonomy of clinicians and implementing standard quality improvement measures

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## Illinois Antimicrobial Stewardship Collaborative SUMMARY FINDINGS

### Greatest Challenges:

- "Data. Data. Data." (lack of)
- Competing IT priorities
- No clear metrics by which to evaluate success of antimicrobial stewardship programs
- Lack of benchmarking with other institutions
- Finding a common denominator
- Need for Guidelines that are clear and readily available

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## Conceptual Framework

RATIONAL FOR STEWARDSHIP

### Mitigate the unintended consequences of antimicrobial use

- **Direct harms**
  - *C. difficile* & MDROs
  - Treatment failures
  - Adverse drug events, phlebitis
- **Indirect harms**
  - Increasing antimicrobial resistance
  - Increased colonization with MDROs
  - Excess costs
- **Regulatory burden**
  - Mandatory public reporting to CMS & IDPH




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## The Public Health Imperative

**Problem** Poor antibiotic prescribing harms patients

Antibiotic prescribing practices vary widely and across all specialties. It is a lack of uniform practice on antibiotics, for at least 100 years, that is the cause of an average hospital stay of 7 to 10 days. The most common types of infections for which hospital admission rates are highest are urinary tract infections (UTIs), lower respiratory tract infections (LRTIs), and pneumonia. In 2010, 1.5 million people were hospitalized for UTIs, 1.5 million for LRTIs, and 1.5 million for pneumonia. In 2010, 1.5 million people were hospitalized for UTIs, 1.5 million for LRTIs, and 1.5 million for pneumonia.

Specific recommendations for optimal prescribing situations:

- Do for urinary tract infections:
  - Use nitrofurantoin for uncomplicated UTIs.
  - Use trimethoprim-sulfamethoxazole for complicated UTIs.
  - Avoid fluoroquinolones for UTIs.
- Do for pneumonia:
  - Use amoxicillin for community-acquired pneumonia.
  - Use levofloxacin for hospital-acquired pneumonia.
  - Avoid broad-spectrum beta-lactams for pneumonia.
- Do for skin infections:
  - Use topical antibiotics for minor skin infections.
  - Avoid oral antibiotics for skin infections.

**Vitalsigns**

### Making Health Care Safer

Antibiotic Rx in Hospitals: Proceed with Caution

1 in 2 patients receive an antibiotic

3x more antibiotic prescriptions in hospitals than in ambulatory care

30% of antibiotic prescriptions are unnecessary

Antibiotics are used, but poor prescribing practices are putting patients at increased risk for potentially drug-resistant superbug infections, and *Clostridium difficile* (C. diff) infections. Errors in prescribing include unnecessary antibiotic use, resistance, and drug-drug interactions that can lead to death.

To protect patients and preserve the power of antibiotics, hospitals should consider all of the following:

- Adopt an antibiotic stewardship program that includes:
  - Leadership commitment. Dedicate necessary human, financial, and IT resources.
  - Accountability. Appoint a single leader responsible for program direction. Others have primary oversight in their role.
  - Drug expertise. Appoint a single pharmacist leader to support regional prescribing.
  - Audit. Take at least one prescribing report every 30 days, with ongoing surveillance every 60 days, to track drug trends, dose, and duration.
- Track. Monitor prescribing and antibiotic resistance patterns.
- Report. Regularly report and monitor antibiotic resistance patterns and drug expenses.
- Educate. Offer education about antibiotic resistance and stewardship prescribing practices.
- Work with other health care facilities to prevent antibiotic resistance, and antibiotic use.

Go to page 4 for more information

<http://www.cdc.gov/vitalsigns/antibiotic-prescribing-practices/>

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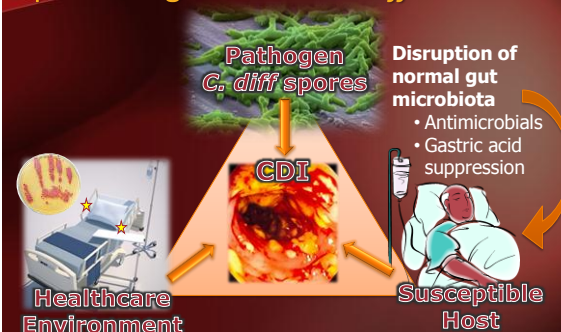
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## DIRECT HARM

### Epidemiological Triad of *C. diff* Infection



**Pathogen**  
*C. diff* spores

**Disruption of normal gut microbiota**

- Antimicrobials
- Gastric acid suppression

**Healthcare Environment**

**Susceptible Host**

**CDI**

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## The Public Health Imperative

### SCARY BUGS

**HAZARD LEVEL**  
**URGENT**  


These are high-consequence antibiotic-resistant threats because of significant risks identified across several criteria. These threats may not be currently widespread but have the potential to become so and require urgent public health attention to identify infections and to limit transmission.

*Clostridium difficile* (*C. difficile*), Carbapenem-resistant Enterobacteriaceae (CRE), Drug-resistant *Neisseria gonorrhoeae* (cephalosporin resistance)

**CRE “ Nightmare bacteria”**

- ❖ Few treatment options (if any)
- ❖ High mortality rate
- ❖ Spreading quickly



**ANTIBIOTIC RESISTANCE THREATS**  
 In the United States, 2013

http://www.cdc.gov/drugresistance/threat-report-2013/

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## Enterobacteriaceae

- **Family of bacteria that include:**
  - *Escherichia coli*
  - *Klebsiella* species
  - *Enterobacter* species
  - *Citrobacter* species
- **Cause healthcare and community-associated infections**
  - Example: urinary tract infections



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### Geographical Distribution of *Klebsiella pneumoniae* carbapenemase (KPC) Infections



**2001**

States with KPC producing organisms

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Geographical Distribution of *Klebsiella pneumoniae* carbapenemase (KPC) Infections




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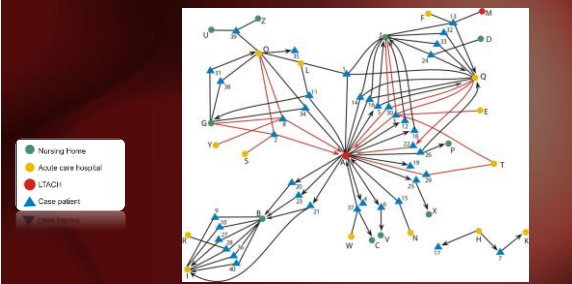
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Emergence and Rapid Regional Spread of KPC Social Network of Resistant Pathogens



Won, Munoz-Price, Lolans, Hota, Weinstein, Hayden (2011). Emergence and Rapid Regional Spread of KPC Producing enterobacteriaceae. *Clinical Infectious Diseases*, 53(6), 532-540.

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Emergence and Rapid Regional Spread of KPC Social Network of Resistant Pathogens

- KPC Outbreak Investigation**
- 42 patients
    - 14 acute care hospitals
      - 4 cases acquired in acute care hospitals
    - 2 LTACHs
      - 24 cases linked to "LTACH A"
    - 10 nursing homes
      - 12 cases linked to 3 nursing homes
  - 11 patients died or were discharged to hospice

Won, Munoz-Price, Lolans, Hota, Weinstein, Hayden (2011). Emergence and Rapid Regional Spread of KPC Producing enterobacteriaceae. *Clinical Infectious Diseases*, 53(6), 532-540.

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## Illinois Situation Update

### Chicago area facilities (REALM project), 2010-2011

Facility type	CRE colonization prevalence
Short stay acute care hospitals (adult ICUs)	3%
Long term acute care hospitals (LTACHs)	30%

Lin MY et al. CID, 2013

- CRE are relatively common in some Chicago healthcare facilities, particularly LTACHs
- Few prevalence data exist for hospital non-ICU wards, nursing homes, and regions outside of Chicago

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## The Public Health Imperative

### SCARY BUGS

#### New-Delhi Metallo- $\beta$ -Lactamase (NDM)

Year	US Patients with NDM
2009-2012	27
2013	67 (44 pts from Illinois)

MMWR 2014; 62(51): 1051

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### SCARY BUGS

#### CREs are emerging in Hawaii

- 2013 – 1 case
- 2014 – 1 case

- Both cases
  - confirmed to produce KPC
  - had complex medical histories
  - prolonged healthcare exposures, including care on the mainland.




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## Illinois CRE Detect & Protect Campaign

[www.xdra.org](http://www.xdra.org)

### DETECT AND PROTECT

**Stop Deadly Drug Resistant Infections**

Emerging healthcare-associated infection pathogens, especially highly drug resistant pathogens, pose a significant public health threat. CDC must detect highly drug resistant "superbugs" such as carbapenem-resistant Enterobacteriaceae (CRE) and prevent patients from their spread.

**Threat:**  
Drug resistant infections are on the rise

Some of these infections are virtually untreatable with currently available drugs

In the past decade, one type of drug resistant infection, CRE has increased from 1% to 4%

### CRE Detect and Protect

**Solution:**  
Implementing "detect and protect" strategies that identify pathogens and stop transmission and between facilities in a region.

**DETECT if Patients Have Drug Resistant Infections**

1. Use electronic data sources like CDC's National Healthcare Safety Network to detect outbreaks
2. Request alerts every time the lab identifies a patient infected with a superbug
3. When treating or transferring patients, find out if the patient has a drug resistant infection

**PROTECT Patients from Drug Resistant Infections**

1. Follow contact and other infection control practices with drug resistant infections
2. Dedicate rooms, equipment, and staff with highly drug resistant infections
3. Take out temperature sensitive devices like computers or monitors
4. Prescribe antibiotics carefully, consider alternatives with less risk and CDC's National Healthcare Safety Network's Antimicrobial Use modules

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## CRE

carbapenem-resistant Enterobacteriaceae

### Mandatory reporting to the

**E**Xtensively

**D**rug

**R**esistant

**O**rganism

registry

began November 1, 2013

Amendment to the Control of Communicable Diseases Code (77 Ill. Adm. Code 690) Rules

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## The Public Health Imperative

### PRECIOUS DRUGS

**Why we must act now**

- Antibiotics are a shared resource: The way antibiotics are used in one patient directly impacts how effective they are for another patient, or even for that same patient in the future.
- The more antibiotics are used, the more resistance proliferates; As antibiotic resistance increases, the effectiveness of the antibiotics we have decreases
- Development of new antibiotics has not kept pace with need for new agents.

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Conceptual Framework  
OPERATIONAL GOALS

the 5 Ds

- *right* Diagnosis
- *right* Drug selection
- *right* Dose
- *right* Duration
- *right* De-escalation

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Conceptual Framework  
OPERATIONAL GOALS

the 5 Ds

- Succinct way to market AMS aims
- Addresses frontline clinician's focus
  - What is the best way to treat infections that are common in my practice?
- Provides further justification/rationale when requesting additional support/resources from leadership





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Conceptual Framework  
OPERATIONAL GOALS

*right* Diagnosis

the 5 Ds

- Does this patient have an infection or something else?
  - Empiric treatment for what? And for how long?
- Appropriate indication for antimicrobial therapy
  - Current treating physician may not have been the one to initiate therapy/lack of ownership for revising the drug regimen
- Diagnostic testing issues
  - Were cultures obtained appropriately?

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*right* **Diagnosis** the 5 **Ds**

**Does this patient have an infection or something else?**

- **Nurses' role**
  - The "rights" of medication administration
    - Right patient, Right medication, Right dose, Right route, Right time, Right documentation
    - Right reason
      - Why is antimicrobial therapy indicated?
    - Right response
      - Monitor for adverse side effects, signs of CDI (diarrhea), and improvement or worsening of clinical symptoms, review & communicate lab results

Elliott, M., & Liu, Y. (2010). The nine rights of medication administration: an overview. *British Journal of Nursing*, 19(5), 300-305.

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*right* **Diagnosis** the 5 **Ds**

**Does this patient have an infection or something else?**

- **Something has changed... could it be a UTI?**

**Seek an answer and you will find one, but it may not be the correct one**



- **Asymptomatic bacteriuria is prevalent in**
  - 25-50% of elderly women in LTC
  - 15-40% of elderly men in LTC

Nicolle, Lindsay E., et al. "Infectious Diseases Society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults." *Clinical Infectious Diseases* (2005): 643-654.

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**Conceptual Framework**  
OPERATIONAL GOALS

*right* **Drug** the 5 **Ds**

- For the diagnosis, the institution, AND for the patient
- Demonstrated effective per local epidemiology
- Safest
- Least "resistance-ogenic" – narrowest spectrum
- Least expensive

*right* **Dose**

- Adjusted for size & renal function
- Pharmacy dosing programs (generally greater acceptance)

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Conceptual Framework  
OPERATIONAL GOALS  
the 5 Ds

*right* **Duration**

- Harms minimized by shortest effective duration
- Minimal duration undefined for many indications
- For most: resolution of systemic and improvement in local manifestations

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Conceptual Framework  
OPERATIONAL GOALS  
the 5 Ds

*right* **De-escalation**

- Change to narrowest-spectrum, least invasive, safest, lowest cost regimen when:
  - Justified by culture results (positive or negative)
  - Clinical improvement (e.g., IV to PO switch)
- Implement systematic way to ensure de-escalation is regularly evaluated & re-evaluated

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Conceptual Framework  
OPERATIONAL GOALS  
**Antimicrobial Mindfulness**

- Umbrella concept for various methods employed to systematically assess and reassess the appropriateness of antimicrobial therapy
- Implement processes to review the 5 D's of Stewardship (Diagnosis, Drug, Dose, Duration, De-escalation)



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## Conceptual Framework

### ESSENTIALS FOR SUCCESS

- **Compelling rationale** & clear communication of purpose & goals: the 5 D's
- **Authority:** Leadership support & clinician buy-in
- **Financial impact:** AMS interventions are revenue neutral or cost saving
- **Feasibility:** Availability of resources & practicality of implementation – impact on workflow
- **Feedback:** Monitor progress toward goals by reporting measures back (clinical outcomes, process measure, abx use)

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## Conceptual Framework

### MEASURES OF IMPACT

- **Clinical outcomes**
  - Treatment success
  - Rates of *C. difficile*, MDROs, SSIs, & adverse reactions
- **Process measures (monitor the 5 Ds)**
  - Rates of misdiagnosis
  - Pharmacist/AMS reviews & intervention outcomes
  - Inappropriate therapy (complex, redundant, or inadequate drugs/doses)
  - Excessive duration or failure to de-escalate
- **Antimicrobial utilization & costs**
- **Antimicrobial susceptibility prevalence trends**
  - Hospital wide & targeted patient care areas
  - Key bug-drug susceptibilities emphasized

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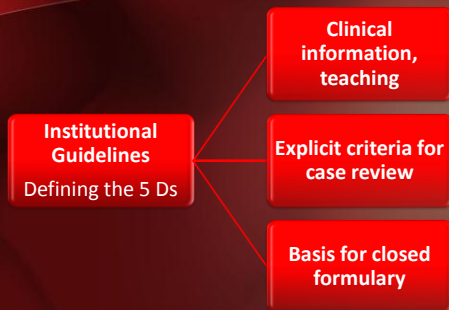
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## The Heart of the Matter




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### Antimicrobial Stewardship What you can do

- Prescribe antibiotics correctly & practice antimicrobial mindfulness
- Document the dose, duration, indication for every antibiotic prescription
- Stay aware of antimicrobial resistance patterns in your practice & community
- Participate in and lead efforts in your practice to improve prescribing practices
- Follow hand hygiene and other infection control measures with every patient
- Educate patients and families about appropriate antibiotic use

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### How do we start the process of improvement?

- **Build on past successes**
  - HAI prevention efforts often “grow” as an extension of previous prevention efforts
    - Expansion from acute to long term care settings
    - C. diff → antimicrobial stewardship → CRE
- **Do what’s feasible**
  - Many small steps still get you closer to achieving your goals
- **Sustainability**
  - Build changes into the workflow
  - Engagement of partners & coordination of efforts

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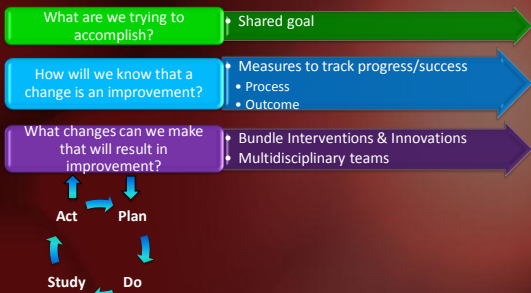
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### The Institute for Healthcare Improvement (IHI) Model for Improvement



The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement; 2003. (Available on [www.ihi.org](http://www.ihi.org))

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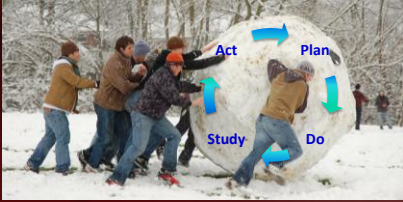
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The Institute for Healthcare Improvement (IHI)  
Model for Improvement

Start with a small test of change...  
Then, build on and expand your efforts.



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Objectives

1. State the primary goal of antimicrobial stewardship.
2. List alternate personnel who may be recruited to fulfill the roles of Infectious Diseases (ID)-trained physicians and pharmacists to spearhead antimicrobial stewardship initiatives.
3. State how application of each of the 5Ds is relevant to meeting the primary goal of antimicrobial stewardship.

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

**Primary goal:**

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.

Dellit. *Clin Infect Dis* 2007; 44:159.

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## Multidisciplinary effort...

How can you (or colleagues) help to advance the goal of antimicrobial stewardship at your practice site?

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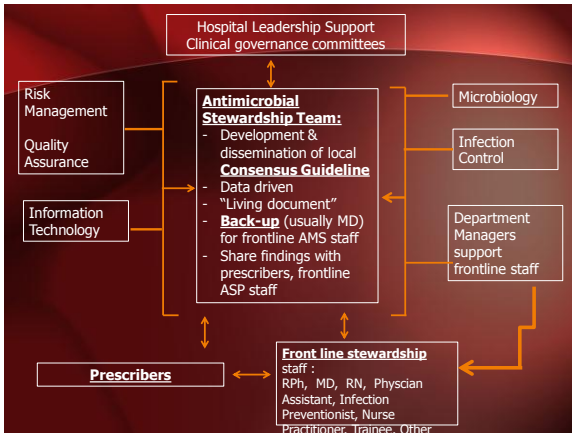
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## Objectives

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**Table 1.** Practical considerations for potential antimicrobial stewardship team resources

Ideal resources	Potential alternative resources
Infectious diseases (ID) physician	Other "physician champion" <ul style="list-style-type: none"> <li>• Staff physician with ID interest</li> <li>• P&amp;T chair or committee member</li> <li>• Local thought/practice leader</li> <li>• Physician groups who frequently prescribe antimicrobials</li> </ul> Residents/fellows
ID pharmacist	Non-ID-trained clinical pharmacist Staff pharmacists Residents/students Working director of pharmacy
Clinical microbiologist	Microbiology laboratory technician Pathologist
Infection control coordinator	Nursing staff Patient safety representative
Information systems specialist	Information systems staff Commercial data-mining programs

Note: P&T = Pharmacy & Therapeutics.

0. Dellit

*Clin Infect Dis* 2007; 44:135.

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Physician champions... Hospitalists

Commitment to quality and process improvement

- Many (52-61%) lead initiatives in practice guidelines and quality improvement
- 83% of hospitals with ≥200 Beds have hospital medicine programs\*

\* 2007 American Hospital Association . Rosenberg. *J Hosp Med* 2012; 7: (supp 1):S34.

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Non-ID trained pharmacists and successful stewardship programs in community hospitals

Beds	ID – physician	Measures
100 <sup>1</sup>	Yes  1 hour, twice weekly chart audit	<ul style="list-style-type: none"> <li>• 16 months (n= 313 interventions)</li> <li>• 75% overall acceptance rate                             <ul style="list-style-type: none"> <li>- 36% interventions to <b>stop antibiotics</b> (74% accepted)</li> </ul> </li> <li>• 16% reduction in monthly antibiotic use per 1000 days</li> </ul>
141 <sup>2</sup>	Yes  0.5 hours/week with remote ID-MD	<ul style="list-style-type: none"> <li>• Antibiotic streamlining increased from 44% to 96%</li> <li>• <i>C. difficile</i> infection reduced from average of 5.5 to 1.6 cases/ 10,000 patient days</li> </ul>

<sup>1</sup>Storey. *Antimicrob Resist Infect Cont* 2012; 1:32. <sup>2</sup>Yam. *Am J Health-Syst pharm* 2012; 69:1142.

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# How to Make Antimicrobial Stewardship Work: Practical Considerations for Hospitals of All Sizes

Dimple Patel, PharmD, BCPS; and Conan MacDougall, PharmD, MAS

- Don't be afraid to start a "less than perfect" stewardship program
- Start small, build upon successes
- Adapt stewardship initiatives to available resources

Hosp Pharm 2010; 45(suppl 1):S10.

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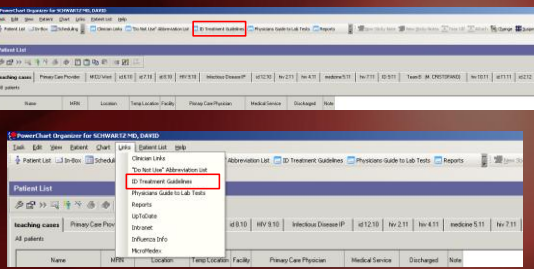
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## Empower others...Easy access to guidelines Stroger Hospital ID Treatment Guidelines




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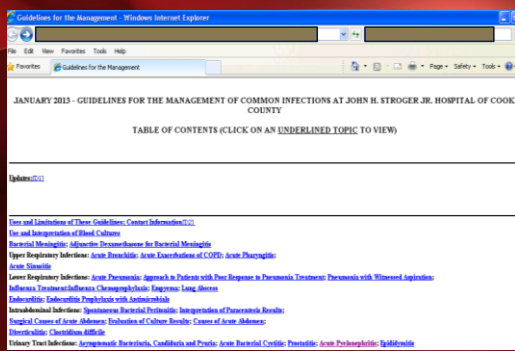
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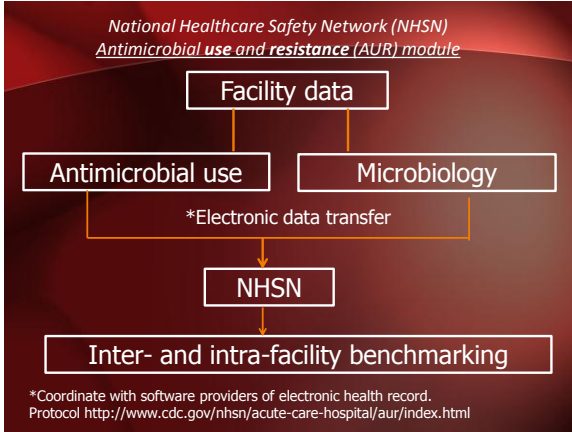
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Prospective Audit & Feedback (RPh / MD)  
Critically ill patients, over 1 year...

247 suggestions (34%)  
of 717 cases reviewed

Suggestion	Acceptance
Stop abx (56%)	81%
Change abx (26%)	84%
Other (18%)	84%

Outcomes	
Antibiotic days	↓ 22%
<i>C. difficile</i> infection	
Intervention	↓ 31%
Control	↑ 33%
Abx expenditures (\$95,000)	↓ 24%
Crude mortality	↔
Length of stay	↔

Elligsen. *Infect Control Hosp Epidemiol* 2012; 33:354.

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- Success!**  
Securing support after 1 year...
- 1 FTE stewardship pharmacist
  - 0.5 FTE pharmacy fellow
  - 0.5 FTE ID physician
  - 0.1FTE database analyst
  - Expanding stewardship initiatives to medical and surgical units
- Elligsen. *JCPH* 2012; 65:31

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### Objectives

1. State the primary goal of antimicrobial stewardship.
2. List alternate personnel who may be recruited to fulfill the roles of infectious Diseases (ID)-trained physicians and pharmacists to spearhead antimicrobial stewardship initiatives.
3. State how application of each of the 5Ds is relevant to meeting the goal of antimicrobial stewardship.

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### Right Diagnosis

- Infrequently addressed outcome in the literature ...but,
- 28-43% of ASP interventions are to stop antibiotics in response to negative cultures, or an alternate diagnosis<sup>1</sup>

Masterson. *Crit Care Clin* 2011; 27:149. Dellit. *Clin Infect Dis* 2007; 44:159. Niederman. *Semin Respir Crit Care Med* 2006; 1:45. <sup>1</sup> Cosgrove 2012; 33:374. Laible. *J Pharm practice* 2010; 23:531. Teo. *Eur J Clin Microbiol Infect Dis* 2012; 31:947.

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### Diagnostic uncertainties

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|---|--|--|
| <ul style="list-style-type: none"> <li>• Pneumonia</li> <li>• Skin &amp; soft tissue infection</li> <li>• Asymptomatic bacteriuria</li> </ul> |  | <ul style="list-style-type: none"> <li>- Oftentimes associated with unnecessary use of antimicrobials</li> <li>- Unnecessarily broad-spectrum therapy</li> <li>- Prolonged treatment duration</li> </ul> |
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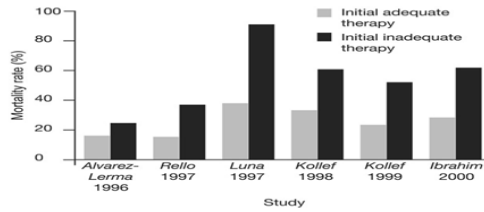
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Right Drug ...the *first* time (empiric therapy)

Lower mortality with *adequate initial* (empiric – best guess) regimen



Niederman. *Clin Infect Dis* 2006; 42(sup):S72.

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Right Dose (dose optimization)

Piperacillin-Tazobactam for *Pseudomonas aeruginosa* Infection: Clinical Implications of an Extended-Infusion Dosing Strategy

Thomas P. Lodise, Jr.,<sup>1,2</sup> Ben Lomax,<sup>2</sup> and George L. Drusano<sup>1</sup>  
<sup>1</sup>Department of Infectious Diseases, Albany College of Pharmacy, <sup>2</sup>Oriskany Research Institute, and <sup>3</sup>Department of Pharmacy, Albany Medical Center Hospital, Albany, New York

APACHE II score ≥17*	(2000- 2002) <i>Intermittent</i> 3.375 Q4-6h	(2002 - 2004) <i>Extended infusion</i> (3.375 over 4 h, q8)	
14 day mortality	32%	12%	P=.04
Length of stay, (median) days	38	21	P=.02

\*No difference in less critically ill patients APACHE II score <17.

*Clin Infect Dis* 2007; 44:357.

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Right De-escalation

Broader Spectrum = Greater "Collateral Damage"

- *Clostridium difficile* risk highest from 3<sup>rd</sup>-generation cephalosporins, fluoroquinolones, clindamycin<sup>1,2,3</sup>

<sup>1</sup> *J Hosp Infect* 1998;40:1-15 <sup>2</sup> *Antimicrob Chemother* 2003;51:1339-1350 <sup>3</sup> *Antimicrob Agents Chemother* 2013;57:2326-2332

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Summary

**Making stewardship happen**

- Growing evidence that stewardship improves patient outcomes
  - More data needed to sustain/justify programs
- Empower front-line staff with the tools to change prescribing practices to advance the goal of antimicrobial stewardship

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**Why Stewardship: Provider Perspective**

- **Triple Aim Approach:**
  - Patient satisfaction including quality of care and outcomes
  - Decrease costs
  - Improve population health
- Antibiotic misuse adversely impacts the patient directly and eventually society as a whole
  - Antibiotic use increases risk for resistant bacteria
  - Fewer antibiotic choices for the community as a whole



Figure taken from: <http://www.ihl.org/engage/initiatives/TripleAim/Pages/default.aspx>

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**Why Stewardship: Provider Perspective**

- Stewardship aims to improve antibiotic use
  - Improve patient satisfaction and outcomes
  - Improve quality of patient care
  - Decrease costs
  - Improve the health of the community
- **Bonus:**
  - Educational Opportunities
    - Antibiotics are used by a wide variety of medical professionals
    - Education for patient and patient's family

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## Antibiotic Use Begets Resistance in the Population and the Person

- Adjusted hazard ratios for development of specific resistance pattern after prior use:
  - Fluoroquinolones: 4.0
  - 3<sup>rd</sup>-generation cephalosporins: 3.5
  - Ampicillin-sulbactam: 2.3
  - Imipenem: 5.7

Harbarth et al. Clin Infect Dis 2001;33:1462-8

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## Role of Clinician

- Does not have to be "ID" physician
  - Hospitalist, Internist, Family Medicine, etc
- Key role in leadership, development and implementation of stewardship team and initiatives
- Back up for Pharmacist and all others on stewardship team

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## Our Stewardship

1. Family Medicine Teaching Service Intervention
  - Family Medicine Service on General Med/Surg Floor
  - Treatment of diabetic foot infections
2. Pharmacist Driven Stewardship Intervention
  - Surgical ICU, Neurosurgical ICU, General Medical/Surgical Floors

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## Our Stewardship

**ONGOING AMS Activities**

3. Institutional Guidelines
4. Antibiotics on 7<sup>th</sup> Hospital Day Review
5. Bacteremia Surveillance
6. Outpatient Antibiotic Treatment Program (OPAT): requires ID Consult for Long Term IV Antibiotics
7. MICU antibiotic educational intervention

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## Our Stewardship: Family Medicine Teaching Service (FMS)

- **Pre-Intervention Phase:**
  - Retrospective chart review of FMS antibiotic recipients to evaluate for antibiotic appropriateness
    - Opportunities for Antibiotic Improvement
      - Based on clinical judgment & ID Tx guidelines (Local)
    - Characterize these opportunities
  - Survey on antibiotic prescriber comfort for attendings, residents and pharmacists rounding with FMS

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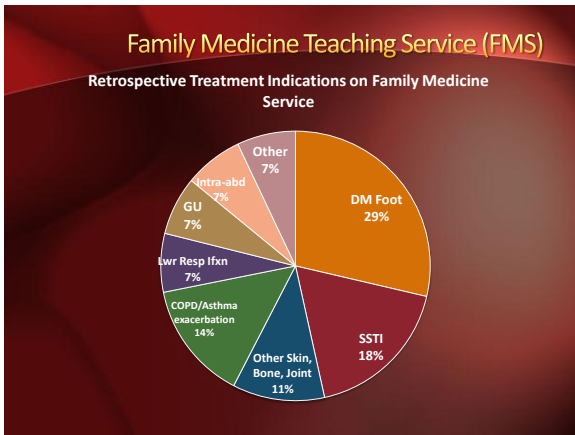
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### Our Stewardship Family Medicine Teaching Service (FMS)

- **Intervention:**
  - Presented data gathered on Retrospective reviews
  - Diabetic foot infection (DFI) treatment picked as area of focus based on retrospective review
  - Teaching session on the treatment of DFI
    - Based on Stroger Infectious Disease Treatment Guidelines and culture based data collected during previous projects

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### Our Stewardship: Family Medicine Teaching Service (FMS)

- Prospective post-prescriptive reviews of all antibiotic recipients on FMS
- Provide immediate feedback to the treating service on opportunities for improvement

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### Progress: FMS

Recommendation	n(%) Pre	n(%) Post	n(%) Control
<b>DFI</b>	<b>11</b>	<b>29</b>	<b>8</b>
Any AM recommendation	6 (55)	15 (52)	7 (88)
Empiric AM appropriate	3 (27)	22 (76)	3 (38)
Empiric AM too broad	1 (10)	6 (21)	3 (38)
Empiric AM too narrow	1 (9)	1 (3)	2 (25)
Discontinue AM	0	8 (28)	2 (25)
Recommendation accepted	NA	15 (100)	6 (86)
to consult recommended	1	11 (38)	5 (63)
<b>SSTI</b>	<b>9</b>	<b>5</b>	<b>3</b>
Any recommendation	6 (67)	4 (80)	3(100)
Empiric AM appropriate	2 (22)	2 (40)	0
Empiric AM too broad	4 (44)	2 (40)	1(33)
Empiric AM too narrow	2 (22)	1 (20)	2(67)
Recommendation accepted	NA	4 (100)	2(67)
<b>Total Cases</b>	<b>20</b>	<b>34</b>	<b>11</b>

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**Our Stewardship #2:  
Pharmacist Led Intervention**

- **3 Floor Pharmacists**
- **Round with various service teams & flag charts with possible opportunities for antibiotic improvement**
  - **Pharmacist**
    1. Makes recommendations during team rounds
    2. OR Calls Gail or Becca to discuss case and then makes recommendation/s to the appropriate team
  - **Gail Itokazu or Becca Peglow review all flagged chart for appropriateness of recommendations**

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**Our Stewardship #2:  
Pharmacist Led Intervention**

- **SICU/NSICU Pharmacist (intervention start March 2014)**
- **SICU = 14 bed unit; NSICU= 10 bed unit**
  - **52 interventions**
    - Dosing/kinetics (Vanco); Duration of antibiotics; Indication; De-escalation; ID consultation
  - **81% (42/52) acceptance of recommendations**
    - Pharmacist makes recommendations directly to team during rounds
    - Reasons for rejection are usually due to unclear diagnosis/treatment indication and duration
    - MD calls team if Pharmacist recs are appropriate but rejected

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**Our Stewardship #2:  
Pharmacist Led Intervention**

- **Main impact seen in SICU/NSICU where Pharmacist has smaller service**
- **Floor Pharmacists cover multiple busy services**
  - **Less time dedicated, but over time picked up**
- **Important to have a presence in the hospital**
  - **Relationships with various services and administrators cannot be over emphasized**

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## Lessons Learned

- Clinical Pharmacists are ALREADY doing a lot of this, now we are documenting the work
- Barriers are particular services
  - Working with various services to break down barriers and educate about stewardship
- Continued success requires appropriate resources
  - Pharmacists, Physicians, IT support
  - primary services buy in to stewardship
- Won't happen overnight
  - Ongoing efforts, education and intervention

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## Resources on Antimicrobial Stewardship



American Hospital Association Antimicrobial Stewardship Toolkit  
<http://www.ahaphysicianforum.org/resources/appropriate-use/antimicrobial/ASP-Toolkit.pdf>

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