Antibiotic Stewardship in a Community Hospital: Building a Program from the Ground Up

Comprehensive Antimicrobial Management Program
Texas Health Presbyterian Dallas
September 4, 2014

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Clinical Professor, UT Southwestern
What is the problem for which Antibiotic Stewardship is the answer?

- Increasing antibiotic misuse
- Antibiotic use correlates with resistance
- Increasing antibiotic resistance
- No new drugs are in the pipeline
Antibiotic Misuse

• Published surveys reveal that:
  – 25 - 33% of hospitalized patients receive antibiotics *(Arch Intern Med 1997;157:1689-1694)*
  – At THD 1999 -2001, 50-60% of patients received antibiotics
  – 22 - 65% of antibiotic use in hospitalized patients is inappropriate *(Infection Control 1985;6:226-230)*
Regulatory Agencies have “Wised Up”

- Centers for Disease Control (CDC)
- Centers for Medicare and Medicaid Services (CMS)
- The Joint Commission (TJC)
- Infectious Disease Society of America (IDSA)
Making Health Care Safer
Antibiotic Rx in Hospitals: Proceed with Caution

Antibiotics save lives, but poor prescribing practices are putting patients at unnecessary risk for preventable allergic reactions, super-resistant infections, and deadly diarrhea. Errors in prescribing decisions also contribute to antibiotic resistance, making these drugs less likely to work in the future.

To protect patients and preserve the power of antibiotics, hospital CEOs/medical officers can:

- Adopt an antibiotic stewardship program that includes, at a minimum, this checklist:
  1. Leadership commitment: Dedicate necessary human, financial, and IT resources.
  2. Accountability: Appoint a single leader responsible for program outcomes. Physicians have proven successful in this role.
  3. Drug expertise: Appoint a single pharmacist leader to support improved prescribing.
  4. Act: Take at least one prescribing improvement action, such as requiring reassessment within 48 hours, to check drug choice, dose, and duration.
  5. Track: Monitor prescribing and antibiotic resistance patterns.
  6. Report: Regularly report to staff prescribing and resistance patterns, and steps to improve.
  7. Educate: Offer education about antibiotic resistance and improving prescribing practices.
- Work with other health care facilities to prevent infections, transmission, and resistance.
What Can Be Done

**The Federal government can**
- Expanding the National Healthcare Safety Network to help hospitals track antibiotic use and resistance.
- Sharing prescribing improvement recommendations and tools with clinicians and administrators. [www.cdc.gov/gis捻ant/healthcare](http://www.cdc.gov/gis捻ant/healthcare)
- Supporting networks testing new prescribing improvement strategies.
- Helping hospitals and health departments create regional programs to improve antibiotic prescribing.
- Improving health care for veterans by launching antibiotic stewardship programs in Veteran's Health Administration hospitals.
- Providing incentives for development of new antibiotics.

**State and local health departments can**
- Gain an understanding of antibiotic stewardship activities in the state or area.
- Facilitate efforts to improve antibiotic prescribing and prevent antibiotic resistance.
- Provide educational tools to facilities to help prescribers improve practices.

**Hospital CEOs/medical officers can**
- Adopt an antibiotic stewardship program that includes, at a minimum, this checklist:
  1. **Leadership commitment**: Dedicate necessary human, financial, and IT resources.
  2. **Accountability**: Appoint a single leader responsible for program outcomes. Physicians have proven successful in this role.
  3. **Drug expertise**: Appoint a single pharmacist leader to support improved prescribing.
  4. **Act**: Take at least one prescribing improvement action, such as requiring reassessment within 48 hours, to check drug choice, dose, and duration.
  5. **Track**: Monitor prescribing and antibiotic resistance patterns.
  6. **Report**: Regularly report to staff prescribing and resistance patterns, and steps to improve.
  7. **Educate**: Offer education about antibiotic resistance and improving prescribing practices.
- Work with other health care facilities to prevent infections, transmission, and resistance.

**Doctors and other hospital staff can**
- Prescribe antibiotics correctly – get cultures, start the right drug promptly at the right dose for the right duration. Reassess the prescription within 48 hours based on tests and patient exam.
- Document the dose, duration and indication for every antibiotic prescription.
- Stay aware of antibiotic resistance patterns in your facility.
- Participate in and lead efforts within your hospital to improve prescribing practices.
- Follow hand hygiene and other infection control measures with every patient.

**Hospital patients can**
- Ask if tests will be done to make sure the right antibiotic is prescribed.
- Be sure everyone cleans their hands before touching you. If you have a catheter, ask each day if it is necessary.

For more information, please contact

**Telephone**: 1-800-CDC-INFO (232-4636)

**TTY**: 1-888-232-6348

**Web**: www.cdc.gov/CDC/Health/Epidemiology/CommunicableDisease/InfectiousDisease/DrugResist

**Publications date**: 4/6/2014

**www.cdc.gov/vitalsigns**

**www.cdc.gov/mmwr**
Poor antibiotic prescribing harms patients

Antibiotic prescribing practices vary widely and errors are common.
- About half of patients receive an antibiotic for at least one day during the course of an average hospital stay.
- The most common types of infections for which hospital clinicians wrote antibiotic prescriptions were lung infections (22%), urinary tract infections (14%), and suspected infections caused by drug-resistant Staphylococcus bacteria, such as MRSA (17%).
- About 1 out of 3 times, prescribing practices to treat urinary tract infections and prescriptions for the critical and common drug vancomycin included a potential error – given without proper testing or evaluation, or given for too long.
- Doctors in some hospitals prescribed up to 3 times as many antibiotics as doctors in similar areas of other hospitals. This difference suggests the need to improve prescribing practices.

Poor prescribing puts patients at risk.
- Although antibiotics save lives (for example, in the prompt treatment of sepsis, a life-threatening infection throughout the body), they can also put patients at risk for a Clostridium difficile infection, deadly diarrhea that causes at least 250,000 infections and 14,000 deaths each year in hospitalized patients.
- Decreasing the use of antibiotics that most often lead to C. difficile infection by 30% (this is 5% of overall antibiotic use) could lead to 26% fewer of these deadly diarrheal infections. These antibiotics include fluoroquinolones, β-lactams with β-lactamase inhibitors, and extended-spectrum cephalosporins.
- Patients getting powerful antibiotics that treat a broad range of infections are up to 3 times more likely to get another infection from an even more resistant germ.

Every time antibiotics are prescribed:

1. Order recommended cultures before antibiotics are given and start drugs promptly.
2. Make sure indication, dose, and expected duration are specified in the patient record.
3. Reassess within 48 hours and adjust Rx if necessary or stop Rx if indicated.

Specific recommendations for common prescribing situations:

- **Rx for urinary tract infections**
  - Make sure that culture results represent true infection and not just colonization.
  - Assess patient for signs and symptoms of UTI.
  - Make sure that urinalysis obtained with every urine culture.
  - Treat for recommended length of time and ensure that planned post-discharge treatment takes into account the antibiotics given in the hospital.

- **Rx for pneumonia**
  - Make sure that symptoms truly represent pneumonia and not an alternate, non-infectious diagnosis.
  - Treat for the recommended length of time and ensure that planned post-discharge treatment takes into account the antibiotics given in the hospital.

- **Rx for MRSA infections**
  - Verify that MRSA is growing in clinically relevant cultures. Do not use vancomycin to treat infections caused by methicillin-resistant staph (and not MRSA).

SOURCE: CDC Vital Signs, 2014
MDROs & Antibiotic Stewardship

- Policies and procedures to minimize the risk of transmission and development of multidrug-resistant organisms (MDROs).
- Multidisciplinary process in place to review antimicrobial utilization, local susceptibility patterns, and antimicrobial agents.
- Antibiotic orders include an indication for use.
- There is a mechanism in place to prompt clinicians to review antibiotic courses of therapy after 72 hours of treatment.
CMS Requirements

MDROs & Antibiotic Stewardship

- Systems are in place to prompt clinicians to use appropriate antimicrobial agents (e.g., computerized physician order entry, comments in microbiology susceptibility reports, notifications from clinical pharmacist, formulary restrictions, evidence based guidelines and recommendations).
- The facility has a system in place to identify patients currently receiving intravenous antibiotics who might be eligible to receive oral antibiotic treatment.
Don’t Forget TJC!

### Elements of an Effective Control Plan

- MDRO risk assessment
- MDRO performance assessment
- Antimicrobial stewardship
- Transmission control
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,9 P. J. Brennan,9 Marianne Billeter,11 and Thomas M. Hooton12

1Harborview Medical Center and the University of Washington, Seattle; 2Maine Medical Center, Portland; 3Emory University, Atlanta, Georgia; 4Hines Veterans Affairs Hospital and Loyola University Stritch School of Medicine, Hines; and 5Stroger (Cook County) Hospital and Rush University Medical Center, Chicago, Illinois; 6University of Utah, Salt Lake City; 7Mayo Clinic College of Medicine, Rochester, Minnesota; 8University of Pittsburgh Medical Center, Pittsburgh, and 9University of Pennsylvania, Philadelphia, Pennsylvania; 10William Beaumont Hospital, Royal Oak, Michigan; 11Ochsner Health System, New Orleans, Louisiana; and 12University of Miami, Miami, Florida

Support
American Academy of Pediatrics
American Society of Health-System Pharmacists
Infectious Diseases Society for Obstetrics and Gynecology
Pediatric Infectious Diseases Society
Society for Hospital Medicine
Society of Infectious Diseases Pharmacists
Society for Healthcare Epidemiology of America
Infectious Diseases Society of America
Antibiotic Stewardship Programs (ASP) alone cannot prevent transmission of organisms from patient to patient. Infection Prevention/Control is essential to maximize any benefits achieved from ASP.

Ideally, they should be integrated under one Medical Director along with:

- Infection Preventionist
  To share information uncovered by each discipline
- Microbiologist
  To provide updated susceptibility information
- IT Specialist
  To provide data mining and interface with EMR
There is no “cookie cutter” approach to starting an ASP

<table>
<thead>
<tr>
<th>Academic Hospitals</th>
<th>Private Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ID trained PharmD</td>
<td>• Limited pharmacy support</td>
</tr>
<tr>
<td>• ID Fellows</td>
<td>• ID physicians not always available</td>
</tr>
<tr>
<td>• Eager ID Faculty looking for a niche!</td>
<td>• Limited incentive for ID physicians</td>
</tr>
<tr>
<td>• Employed physicians</td>
<td>– Can harm their practice!</td>
</tr>
<tr>
<td>– Can be influenced</td>
<td>• Self- employed physicians</td>
</tr>
<tr>
<td>• Research grants to fund</td>
<td>– Not easy to influence</td>
</tr>
<tr>
<td></td>
<td>– Easier to “herd cats”</td>
</tr>
<tr>
<td></td>
<td>• No outside funding sources</td>
</tr>
</tbody>
</table>
What Did We Do?

- 2001 Creation of a Comprehensive Antibiotic Management Program (CAMP) at Texas Health Presbyterian Hospital of Dallas
  - Literature reviewed
  - Attended “Quintilianni/Nightengale course” at Hartford Hospital
  - Presented to Medical Board twice 2000
  - Incremental introduction April 2001
  - Full implementation July 2001

- Published first three year experience of CAMP in ICHE March 2006
Controlling Use of Antimicrobials in a Community Teaching Hospital

Carla Philmon, PharmD; Terri Smith, PharmD; Sharon Williamson, BSMT, SM; Edward Goodman, MD

OBJECTIVE. To test the hypothesis that antibiotic use could be controlled or improved in a community teaching hospital, with improvement defined as reductions in overall use, overall cost, and antimicrobial resistance.

DESIGN. Interventional study with historical comparison.

SETTING. A not-for-profit, 900-bed community general hospital with residents in medicine, surgery, obstetrics-gynecology, and psychiatry.

PARTICIPANTS. Physicians who requested any of the targeted antibiotics.

INTERVENTIONS. Three categories of inpatient antibiotic orders were monitored beginning in April 2001: conversion from intravenous to oral administration for selected highly bioavailable antimicrobials, cessation of perioperative prophylaxis within 24 hours for patients undergoing clean and clean-contaminated surgery, and consultation with an infectious diseases physician before continuing administration of selected drugs beyond 48 hours. Data were analyzed after the first 33 months. Patient outcomes were reviewed during the hospital stay and at readmission if it occurred within 30 days after discharge.

RESULTS. From April 2001 through December 2003, a total of 1426 requests for antimicrobial therapy met criteria for intervention. Overall physician compliance with the program was 76%, ranging from 57% for perioperative prophylaxis to 92% for intravenous to oral conversion. Antimicrobial costs per patient-day decreased by 31%, from $13.67 in 2000 (before program implementation) to $9.41 in 2003. Total savings in acquisition costs were $1,841,203 for the 3-year period. Resistance to numerous drugs among Klebsiella pneumoniae isolates was also significantly reduced.

CONCLUSIONS. A program to improve the use of antibiotics in a community hospital was successful in reducing overall use, overall cost, and antimicrobial resistance.

Infect Control Hosp Epidemiol 2006; 27:239-244
Figure 2. Cefepime mean daily defined dose (DDD) per 1,000 patient-days. *P ≤ .05 versus 2000 by Student’s t test. #P ≤ .05 versus 2001 by Student’s t test. Bars = 95% confidence intervals.
<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Drug-Susceptible Isolates by Year, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>Cefepime</td>
<td>94</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>85</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>85</td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>78</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>88</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>82</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>90</td>
</tr>
<tr>
<td>TMP-SMZ</td>
<td>86</td>
</tr>
</tbody>
</table>

**NOTE.** TMP-SMZ = trimethoprim-sulfamethoxazole.

* Statistically significant difference between data from 2000 (*P* < .05).
**Cost/Census Day**

Cost Savings for 2001 = $399,238  
Cost Savings for 2002 = $659,812  
Cost Savings for 2003 = $782,153  
Total Cost Savings = $1,841,203  

**Figure 7.** Antimicrobial cost per patient-day
Re-assessment of CAMP

- Flawed Premises -
  - If ID consultants approve or use a drug, it must be appropriate!
  - Retrospective data collection and analysis can result in change in behavior.
  - Behavior of physicians can be changed if no authority resides in Stewardship Group.
  - The advent of EMR will automatically make data collection, analysis and change in behavior easy!
  - Restricting certain drugs will limit antibiotic abuse!
    - Restricting ceftaz, cefepime and carbapenems led to pip/tazo abuse!
Steps in (re)Developing ASP

- Analyze antibiotic usage in your institution using standardized metrics
  - Daily Defined Dosage (WHO)
  - Length of treatment (CDC)
- Focus on
  - High use drugs – e.g., piperacillin/tazobactam, vancomycin
  - High risk
    - Of toxicity or adverse effects (e.g. selecting C diff)
    - Of selecting resistance
  - High cost
  - Drugs of “last resort”
    - Carbapenems
    - Daptomycin/Linezolid
    - Colistin
    - Tigecycline
Steps: continued

• Coordinate with Microbiology Department
  – Suppress reports of susceptibility for drugs that should be restricted
    • If urine culture has E coli that is sensitive to ampicillin and TMP/SMX, don’t report quinolones
    • For invasive isolates, don’t report inappropriate drugs
      – Do not report furadantoin for blood stream isolates

• Coordinate drugs tested with formulary
  – If doctors don’t see a drug on susceptibility panel, they likely won’t use it!
Steps: What Assets Do You Have?

• An ID Physician
  – Interested and motivated
  – Experienced and respected
  – Good communication skills
  – Willing to take some flak!

• An ID PharmD
  – If not, consider sending someone to a training program for certification
  – We are happy to be mentors for others
Assets: continued

- In addition to an ID Pharmacist
  - Infection Prevention input
  - Microbiology Support
  - IT support
- Support of Administration and Medical Board
  - FTE for PharmD
  - Partial FTE for Micro, ICP
  - Reasonable $ support for ID physician
    - To supplant lost income from angry doctors and potentially fewer consults
    - Better yet, give ID physician full time employment!
  - Liability protection
  - Authority from Medical Board
If No ID Physician Available or Willing

• Go after the “low hanging fruit”
  – IV to oral conversion for highly bioavailable drugs in patients on oral feeding and other oral meds
  – Automatic stop orders for prophylactic antibiotics for clean surgery
    • Using SCIP criteria
  – Practice Guidelines from IDSA to educate physicians
    • www.idsociety.org/practiceguidelines
With ID Physician Involved

- Follow IDSA Practice Guidelines
- Use *data mining* for real time surveillance
- Active real time feedback to physicians
- Trending and tracking physician behavior
  - Report to leadership and Quality
  - Consequences for outliers
    - Credentialing File
    - Peer Review
Data Mining Programs

• Examples:
  – TheraDoc®
  – Sentri 7®
  – Med Mined®
  – Safety Surveillor®

• EMR ≠ data mining

• Must have functionality to allow flexible “rule making”
Surveillance: (thanks to Kavita P. Bhavan, MD)
Monitor ADT, Lab and Pharmacy Orders Continuously (Sentri-7)
Daily Alerts for “inappropriate antimicrobial utilization”

• Medication Based
  – Therapy duration
  – Multiple antibiotics
  – IV to PO switch opportunities
  – Targeted Drug Alerts

• Lab Based
  – Infection not treated
  – Contaminant being treated
  – Susceptibility mismatch
  – Overly broad or redundant treatment
Physician Feedback: not so simple

• Via EMR
  – “Sticky Notes”
    • Visible to physician only when they are accessing that patient’s chart
    • Also, visible to all health care professionals on the case = embarrassment!
  – “In Basket”
    • Available whenever on EMR
    • Cluttered with enormous amount of noise (other unrelated data)

• Via phone calls
  – Disruptive of their practice
  – Can generate hostility

• Emails/fax
  – Can be missed or delayed in being seen
  – Lost in noise from advertisements

– Text Messaging
  – Not normally HIPAA compliant
  – There are some vendors with HIPAA compliant smart phone Apps ($$$)
Track and Trend

- Must have metrics for comparison
- Need longitudinal data
  - Benchmark to national standards (NHSN?)
  - Benchmark to other physicians of same specialty
- Must have recipient of data willing to act
  - Quality Department
  - Medical Staff Office
  - Peer Review Committee
    - Consequences to outliers
      - Credentialing file?
If ID consultants approve or use a drug, it must be appropriate!
FIGURE 1. Quarterly costs of all antimicrobials, beginning with the first quarter of fiscal year 1998 (July 1997) and continuing through the 4th quarter of fiscal year (FY) 2010 (June 1, 2010). The solid horizontal lines represent the average cost for each fiscal year. The beginning and end of the antimicrobial stewardship program in the 3rd quarter of fiscal year 2001 and ending in the 4th quarter of fiscal year 2008, respectively, are indicated with arrows.
Reinventing CAMP

- Transition from reporting to Pharmacy to reporting to Quality Department
- Real time “data mining”
- FTE ID Pharmacist
- Physician Champion became hospital employee
- No pre-approval of targeted drugs
  - Any misuse acted upon when discovered
  - Continued 48 hour restriction of same drugs as initial project
Reinvented CAMP

• Initiated 9/1/11
• Data Mining with Sentri-7®
  – Flexible rule creation
  – Integrated with EPIC/Care Connect
• “Targets” flagged by Sentri-7
  – PharmD reviews dashboard of 25-30 daily
  – Matched against evidence based literature
    • IDSA Clinical Practice Guidelines
    • Up to Date®
Reinvented CAMP

• “Fall outs” filtered by PharmD reviewed with ID physician/Epidemiologist (3-7 daily)
• Notification of attending physicians
  – “Sticky notes”
  – Increasingly, phone calls directly to physicians
• Daily review of previous day’s recommended interventions for compliance
• Finance department provided raw utilization data
  – Conversion to DDD
Results of “Reinvented CAMP”

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Hospital Pharmacy

Manuscript Number: HP835R1

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**Article Type:** Review Article

**Keywords:** antimicrobial stewardship, data-mining tool, recommendations, patient outcomes metrics, process metrics

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Edward L Goodman, MD
<table>
<thead>
<tr>
<th>Definition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antibiotic De-escalation</strong></td>
<td>Streamline to a narrower spectrum antibiotic based on culture and susceptibility data</td>
</tr>
<tr>
<td><strong>Antibiotic Dose Optimization</strong></td>
<td>Optimize antimicrobial dose based on pharmacokinetic/pharmacodynamic parameters, causative organisms and site of infection</td>
</tr>
<tr>
<td><strong>Antibiotic Double Coverage</strong></td>
<td>Inappropriate double gram-positive, gram-negative or anaerobic coverage</td>
</tr>
<tr>
<td><strong>Antibiotic Duration</strong></td>
<td>Prolonged surgical prophylaxis or therapy that exceeds the recommended evidence-based duration of treatment</td>
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<tr>
<td><strong>Antibiotic Recommendation</strong></td>
<td>Recommendation to start antibiotic, based on documented diagnostic or clinical signs and symptoms of infection, and culture reports</td>
</tr>
<tr>
<td><strong>Bug-Drug Mismatch</strong></td>
<td>Organism isolated is resistant to antibiotic prescribed</td>
</tr>
<tr>
<td><strong>Inappropriate Therapy</strong></td>
<td>Empiric or directed antibiotic therapy started in the absence of documented diagnostic or clinical signs and symptoms of infection, and culture reports</td>
</tr>
<tr>
<td><strong>Restricted Antimicrobial</strong></td>
<td>Requires consultation by an Infectious Diseases physician to facilitate appropriate utilization</td>
</tr>
<tr>
<td>Intervention</td>
<td>No. of Accepted Recommendations/Suggestions (%)</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------------------------------</td>
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<tr>
<td>Bug-Drug Mismatch</td>
<td>21/21 (100)</td>
</tr>
<tr>
<td>Antibiotic Recommendation</td>
<td>209/220 (95)</td>
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<tr>
<td>Antibiotic De-escalation</td>
<td>297/313 (94.9)</td>
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<tr>
<td>Antibiotic Dose Optimization</td>
<td>204/215 (94.9)</td>
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<tr>
<td>Antibiotic Double Coverage</td>
<td>87/95 (91.6)</td>
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<tr>
<td>Antibiotic Duration</td>
<td>350/382 (91.6)</td>
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<tr>
<td>Inappropriate Empiric Therapy</td>
<td>66/74 (89.2)</td>
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<tr>
<td>Restricted Antimicrobial</td>
<td>521/612 (85.1)</td>
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<td>Inappropriate Directed Therapy</td>
<td>56/71 (78.9)</td>
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<tr>
<td><strong>Total</strong></td>
<td>1811/2003 (90.4)</td>
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<tr>
<td>Antimicrobial</td>
<td>Pre-implementation</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Daptomycin</td>
<td>24.3</td>
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<tr>
<td>Quinolones</td>
<td>87.3</td>
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<tr>
<td>Carbapenems</td>
<td>34.2</td>
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<tr>
<td>Linezolid</td>
<td>13.9</td>
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<tr>
<td>Tigecycline</td>
<td>6.2</td>
</tr>
<tr>
<td>Piperacillin/tazobactam</td>
<td>44.6</td>
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<tr>
<td>Vancomycin</td>
<td>72.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>282.8</strong></td>
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</tbody>
</table>

* Determined by student t-test. (p < 0.05 statistically significant)
15% Overall Reduction of Use of Carbapenems, Quinolones and Anti-Staphs

Cost-Savings of $1,621,730
<table>
<thead>
<tr>
<th>Drug</th>
<th>Pre-implementation</th>
<th>Post-implementation</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>Daptomycin</td>
<td>1,213,798</td>
<td>273,996</td>
<td>939,802</td>
</tr>
<tr>
<td>Carbapenems</td>
<td>502,053</td>
<td>234,643</td>
<td>267,410</td>
</tr>
<tr>
<td>Linezolid</td>
<td>480,413</td>
<td>250,327</td>
<td>230,086</td>
</tr>
<tr>
<td><em>Tigecycline</em></td>
<td>163,159</td>
<td>34,655</td>
<td>128,504</td>
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<tr>
<td>Quinolones</td>
<td>142,462</td>
<td>95,075</td>
<td>47,387</td>
</tr>
<tr>
<td><em>Piperacillin/tazobactam</em></td>
<td>186,306</td>
<td>173,941</td>
<td>12,365</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>101,799</td>
<td>105,623</td>
<td>-3,824</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,789,990</strong></td>
<td><strong>1,168,260</strong></td>
<td><strong>1,621,730</strong></td>
</tr>
</tbody>
</table>
Any Adverse Effects?

- No change in Antibiogram after first year
- No increase in mortality, same cause readmissions, length of stay
Some Final Philosophic Comments

• Physician Autonomy is in direct conflict with ASP
• General Internal Medicine is already under siege:
  – Internists not allowed to manage AMI
    – Must consult invasive cardiologist
  – Internists not allowed to manage a GI bleed
    – Must consult gastroenterologist for endoscopy
  – Internists not allowed to manage a vent patient
    – Must have critical care/pulmonologist manage
• Now we are saying that no physician can prescribe antibiotics without some oversight!
• However, the greater good is served by Antibiotic Stewardship
  – It is very labor intensive!
Thanks to

• Terri Smith, PharmD without whom this program would never have occurred
• The Leadership of Texas Health Dallas who encouraged and supported this program