

Impact of Antimicrobial Stewardship Program

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Objectives

- Provide an overview on antimicrobial stewardship programs (ASP)
- Describe the antimicrobial stewardship program at Tampa General Hospital (TGH) and its progression
- List the potential barriers that may impact ASP
- Discuss the regulatory standards related to ASP

Antimicrobial Stewardship Program

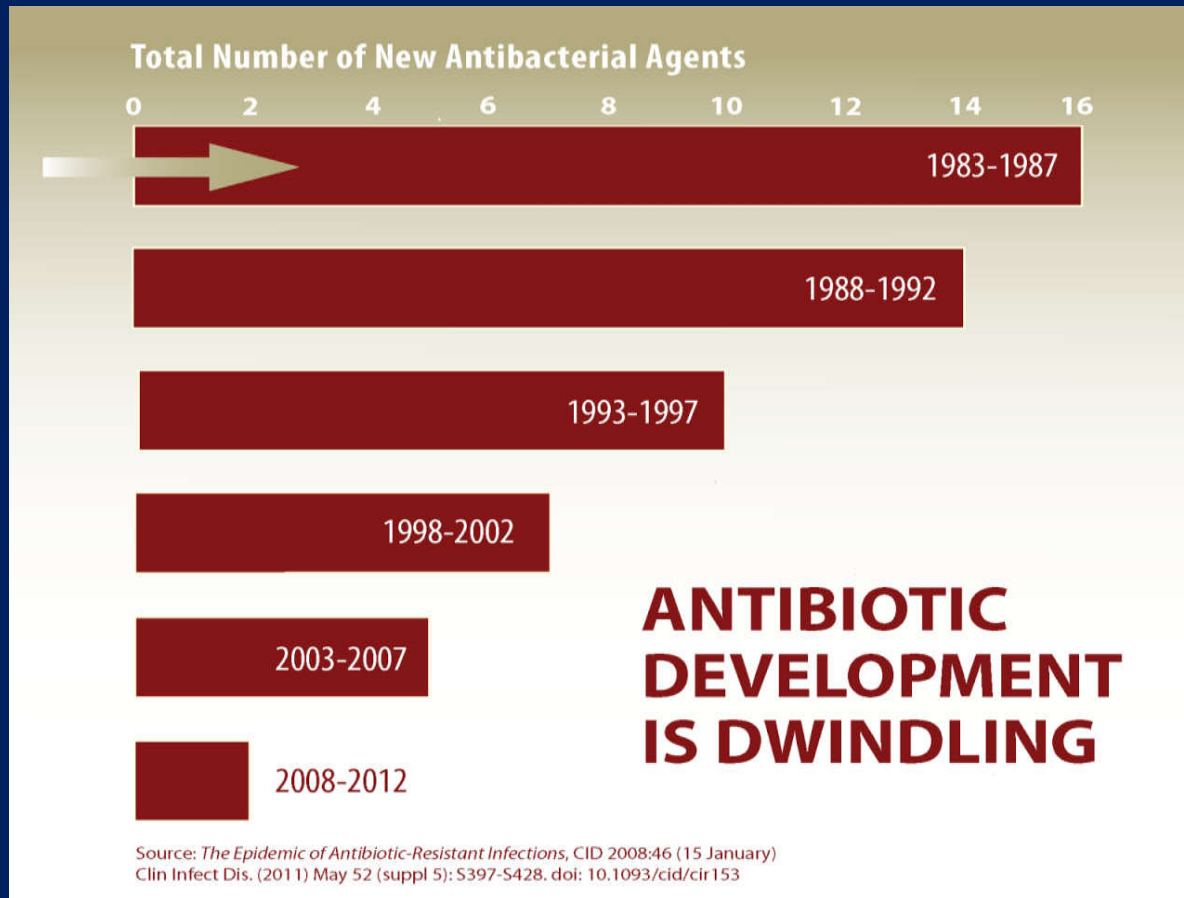
- Program to change and direct antimicrobial use at a health care institution
- Utilize a multidisciplinary team
- Goals:
 - Appropriate antimicrobial treatment
 - Optimize drug dosing and duration
 - Improve patient safety
 - Reduce antimicrobial resistance

Background

- Significant number of hospitalized patients receive anti-infective agents
- Decrease in anti-infective agent production
- Increase in antimicrobial resistance
 - MRSA
 - VRE
- Health care costs



Antibiotic Development: Dry Pipeline



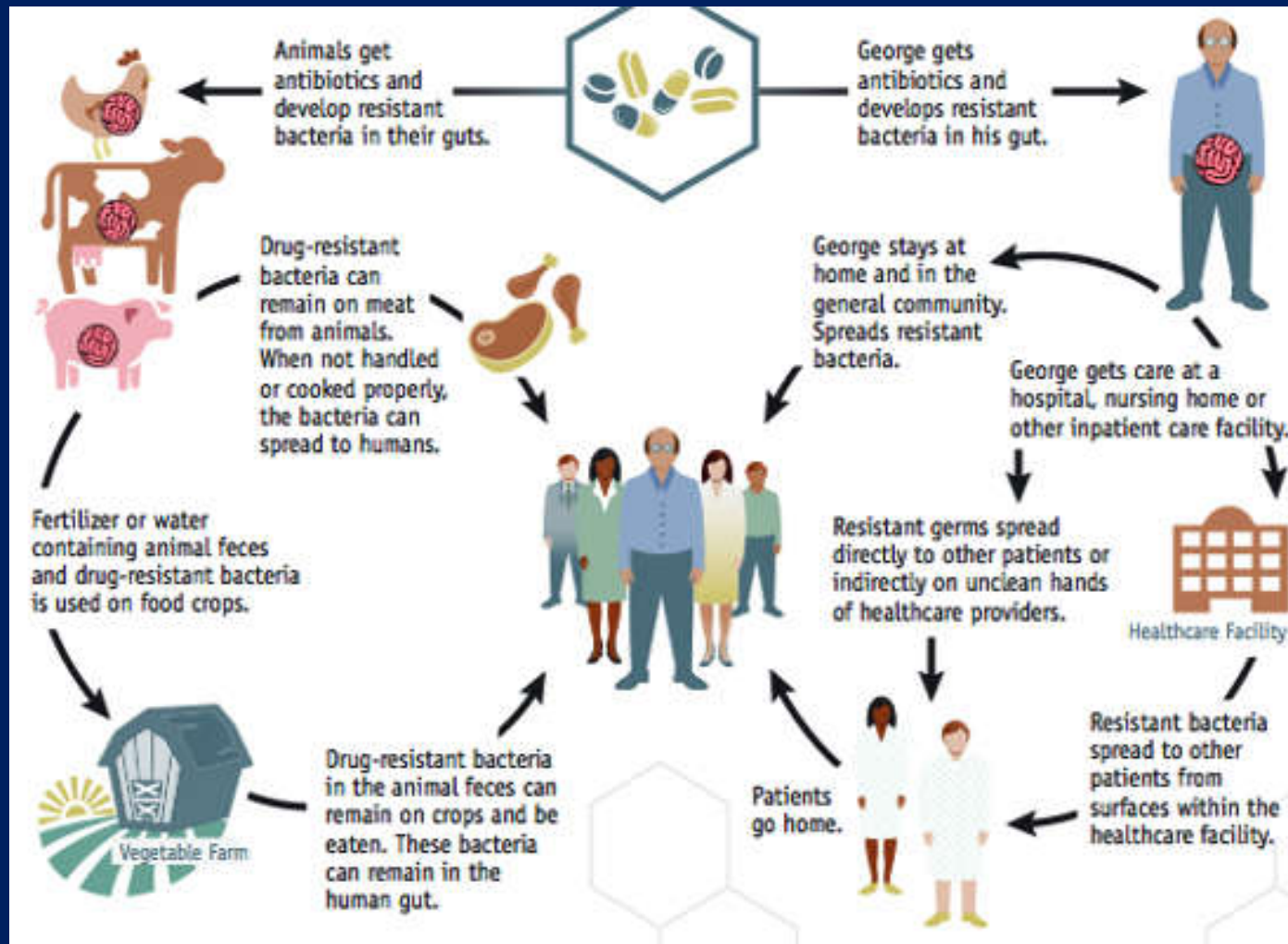


Image: <http://www.cdc.gov/media/dpk/2013/dpk-untreatable.html>

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

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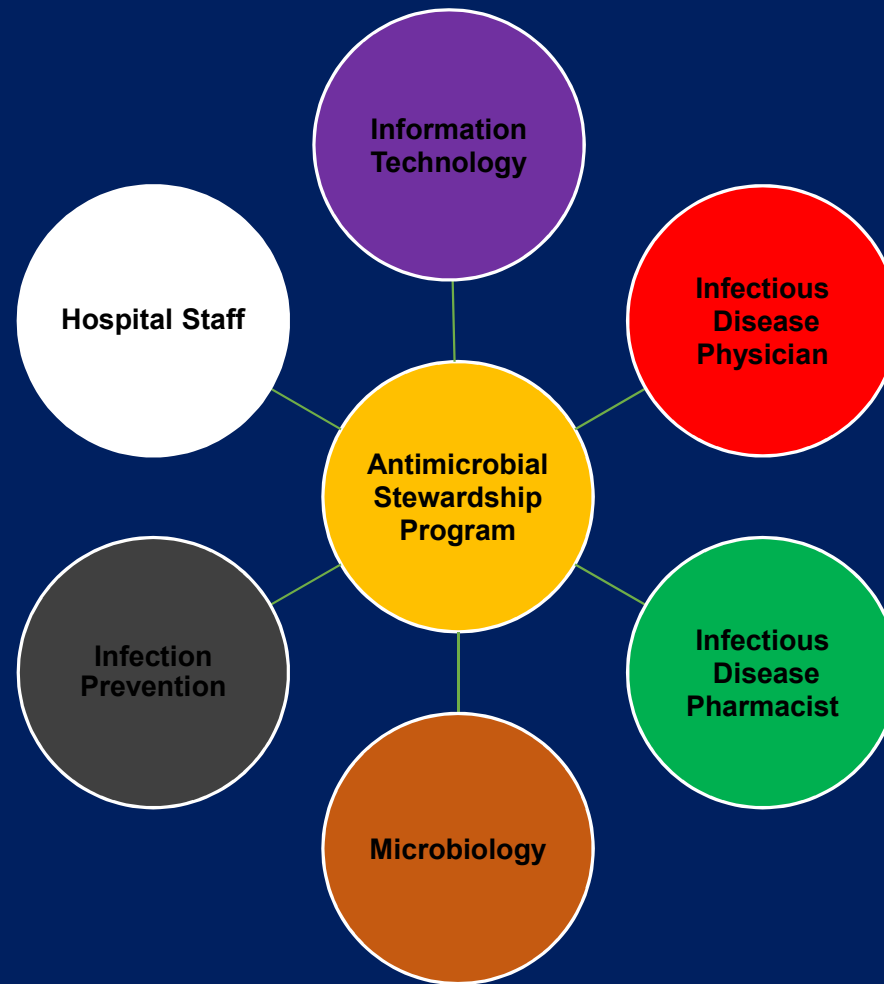
Benefits of Antimicrobial Stewardship Program

- Improve patient care
- Impact antimicrobial resistance patterns
- Decrease the use of antimicrobial agents
 - \$200,000 - \$900,000 annual savings in smaller community hospitals and larger academic hospitals

Basics of ASPs

- Front end approach
 - Focus on the start of empirical therapy
- Back end approach
 - Focus on intervention after 2 or 3 days
- Supplemental interventions
 - Evaluate resistance patterns for local guidelines
 - Education programs

Multidisciplinary Team



Tampa General Hospital

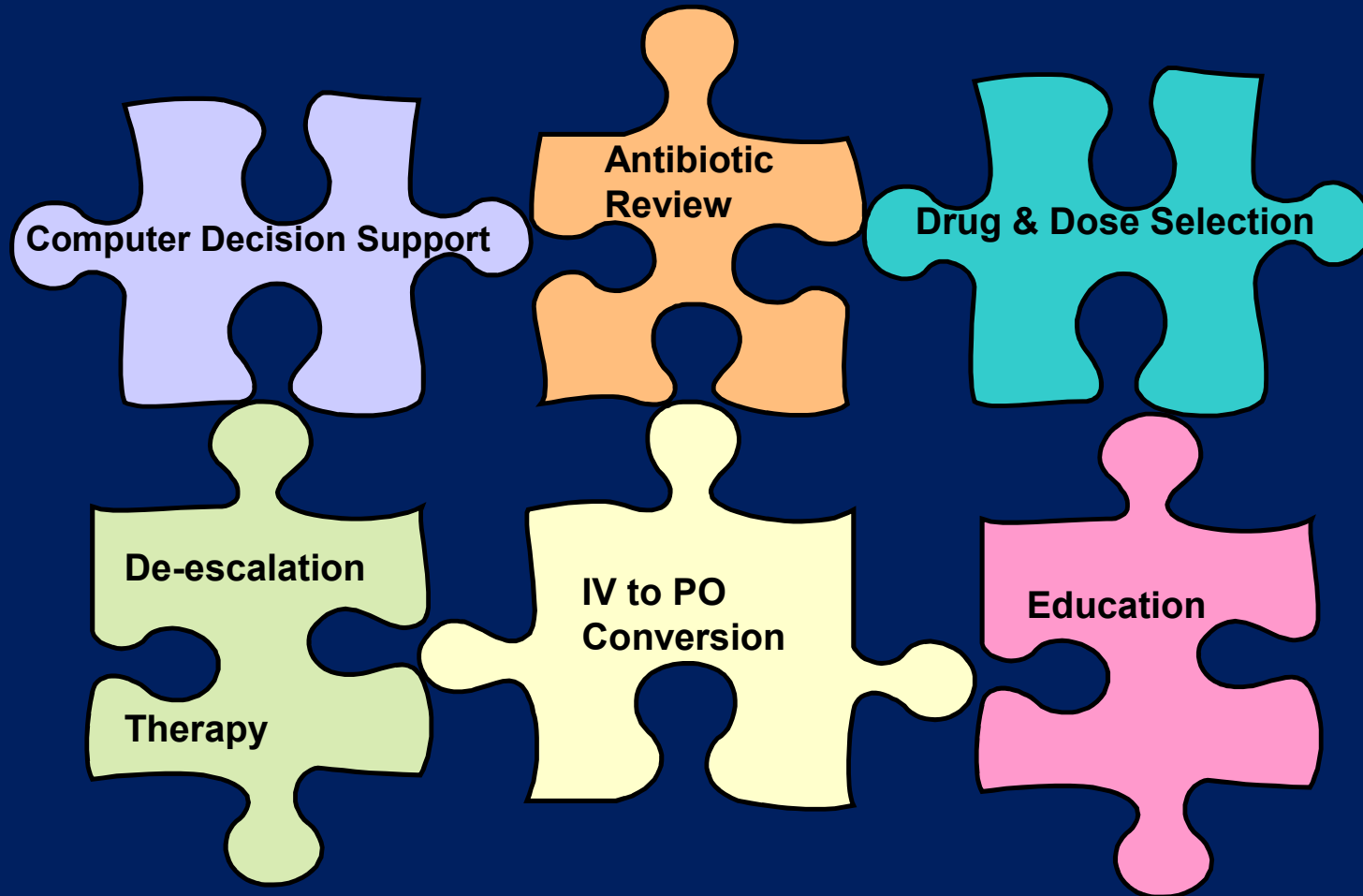
- 1018 bed hospital
- Level I trauma center
- Anti-infective agents are commonly prescribed
- Multiple Infectious Disease (ID) teams



Antimicrobial Stewardship Program (ASP)

- Initiated in 2010
- 1 ID physician and 1 ID pharmacist
- No restrictions of anti-infective agents
- Duplicate agents on formulary
- Approximately 60% of hospital received at least one anti-infective
- Paper chart system

Strategies



Year One

- Build relationships between providers and ASP team members
- Implement policies to optimize anti-infective therapy
 - IV to PO
 - Assist with OB/GYN with Group B Strep
 - Update order sets
- Utilize electronic clinical intervention surveillance system to create clinical alerts, blood culture lists, and vancomycin therapeutic drug monitoring lists

Year One

- Created the Antimicrobial Subcommittee
 - Comprised of various physicians, pharmacists, and other areas
 - Help to make decisions on formulary and policies related to anti-infective agents
 - Functions as a subcommittee to Pharmacy and Therapeutics committee

Year Two

- Transition to an electronic medical record (EMR) system
- Educate pharmacy residents and ID fellows through lectures, clinical interventions, and clinical rotations for pharmacy residents
- Develop business proposal to expand ID pharmacist staff

Year Two

- Utilize EMR to support the Surgical Care Improvement Project (SCIP)
- Update EMR order sets
- Create ASP webpage
- Educate medical residents via grand rounds and presentations
- Build and strengthen relationships with the IT support to support EMR

Year Three

- Increase ID pharmacist staff from 1 to 2 to support goals of ASP
- Include a requirement for an indication to be selected for targeted anti-infective agents upon EMR order entry
- Adjust EMR report to display the selected indication for each anti-infective to support optimal dosing

Year Three

- Provide education to pharmacists regarding SCIP measures related to anti-infective agents for inpatient
- Use electronic survey to gauge pharmacists' interest in various ID topics and determine topics of focus for the ASP
 - Development of clinical pathways
 - Education on antibiotic resistance
 - Overview of available antibiotics
 - HIV education
 - Developing a policy to standardize anti-infective dosing
 - Allowing pharmacists to make renal dose adjustments without contacting the ordering provider

Year Four

- Develop an ID lecture series
- Adjust ASP strategy from utilizing medication lists to reviewing each patient receiving an anti-infective
- Add anti-infective columns in the EMR patient list view to show the antibiotic, anti-viral, and anti-fungal agents
- Implement weekly standing huddle with various pharmacists who round with medical teams

Year Five to Current

- Integrating day time pharmacy staff into certain stewardship activities
- Introduce fecal microbiota transplantation (FMT) for certain *C. difficile* infected patients
- Restriction of certain agents by Infectious Diseases and/or ASP
- Updating metrics and developing an ASP/EMR workflow
- Collaborating with Intervention Radiology and Orthopedic Trauma

Elements for Success

- Individualizing ASP to our institution's needs
- Effective communication
- Providing positive feedback to pharmacy staff members
- Respecting those who want to practice autonomy in their respective area

ASP and Microbiology

- Antibigram development and resistance trends
- Assist in evaluating certain patients to ensure optimal therapy
- Developing selective reporting
- Microbiology part of Antimicrobial Subcommittee
- Evaluating rapid diagnostics and how its use can impact patient care
 - MALDI-TOF

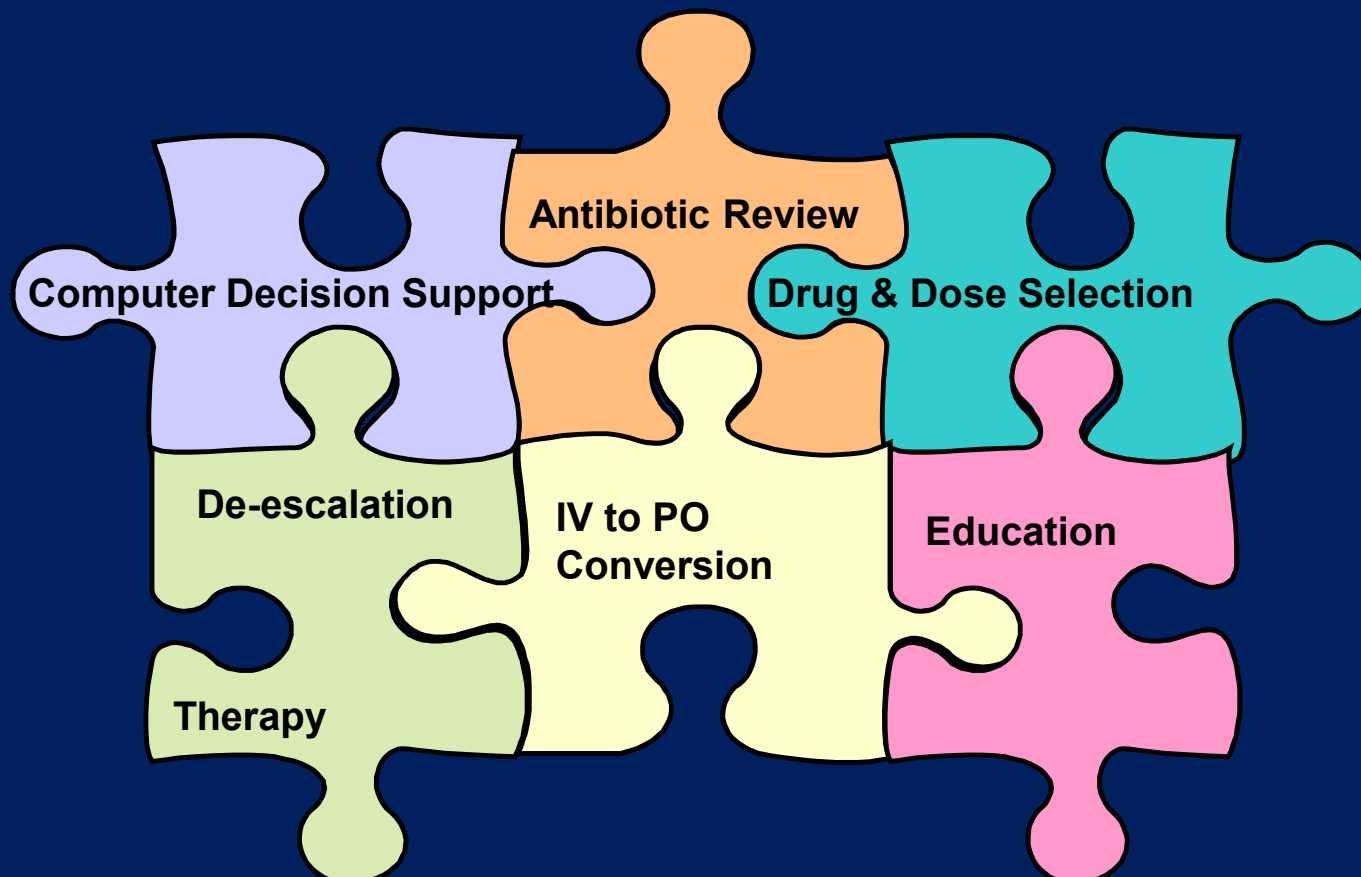
ASP and Infection Prevention

- Work closely to review certain patient cases to identify where anti-infective agents could have been optimized
- Assist in identifying patients that may need the attention of an Infection Prevention Specialist
- Communicate anti-infective shortages
- Part of Infection Prevention meetings

ASP and Information Technology

- Collaborate with different services to update order sets
- Update default dosing in EMR with various anti-infectives
- Add required indications to certain agents
- Develop and maintain restriction pathways with certain agents (i.e. daptomycin, ceftazidime/avibactam, etc.)

Impact of Antimicrobial Stewardship Program



Results

- Decrease anti-infective expenditure significantly
- Developed relationships with a variety of the hospital staff
- Decrease anti-infective percentage from 60% to 55% despite increasing census per year
- Improved utilization with various agents such as daptomycin, linezolid, meropenem, micafungin, etc.

Barriers

- Changing the institution's culture with anti-infectives takes time
- Various types of providers at TGH
 - Academic
 - Private
- Need full time support from IT to assist with ASP and EMR endeavors
- Indicating the value of the ASP besides financial impact

Evaluating ASPs

- Measuring the efficacy of an ASP is where a lot of programs struggle
- Limited literature on evaluating ASPs
- Financial
 - Opportunity to improve
 - Need to account for all costs
- Microbiological
 - Resistance trends can be measured
- Clinical outcomes

Metrics

Metric	Definition
Defined daily dose (DDD)	Total grams antibiotics use divided by WHO approved DDD values
Days of therapy (DOT)	Total grams used from administered, dispensed, or purchased data sources/reports
Length of therapy (LOT)	Number of days that the patient receives therapy regardless of number of drugs or doses received
Expenditure	Dollars spent

Metrics

Metric	Advantages	Disadvantages
Defined daily dose (DDD)	<ul style="list-style-type: none">• Easy to calculate• Can be used as a benchmark and compare to other similar institutions• Landmark studies included this metric	<ul style="list-style-type: none">• Renally impaired patients can contribute to bias• Excludes pediatric patients• Bias towards combination therapy
Days of therapy (DOT)	<ul style="list-style-type: none">• Can be clinically relevant to the health care provider• Can indicate that the patient received the anti-infective	<ul style="list-style-type: none">• Renally impaired patients can contribute to bias• Drug with long half-lives• May not be able to obtain data easily

Metrics

Metric	Advantages	Disadvantages
Length of therapy (LOT)	<ul style="list-style-type: none">• Reflect duration of therapy• Accounts for dosed adjusted intervals	<ul style="list-style-type: none">• Cannot compare specific drugs
Expenditure	<ul style="list-style-type: none">• Easy metric to measure• Easy for individuals to understand	<ul style="list-style-type: none">• Affected by cost variations• Affected by formulary changes• Law of diminishing returns

Metrics

Metric	Definition
Health Care Associated	<ul style="list-style-type: none">• Rate of disease-specific infections (i.e. <i>C. difficile</i>)• ASP Intervention rates• ASP Intervention Acceptance rates
Resistant Organisms	<ul style="list-style-type: none">• Percentage of patients with resistant organism(s)• Antibigram data• Percentage of isolates of a pathogen with antibiotic resistance

Metrics

Metric	Advantages	Disadvantages
Health care Associated	<ul style="list-style-type: none">• Can trend out the changes over time	<ul style="list-style-type: none">• Focusing on certain organisms and may affect other organisms• Not much available literature
Resistant Organisms	<ul style="list-style-type: none">• Could utilize antibiogram over the years to identify trends	<ul style="list-style-type: none">• Unclear if the resistant organism is related to the anti-infective agent alone

Metrics

Metric	Advantages	Disadvantages
Mortality	<ul style="list-style-type: none">• Can focus on a certain disease state	<ul style="list-style-type: none">• Confounding variables can affect mortality besides anti-infective prescribing
Length of stay	<ul style="list-style-type: none">• May be a surrogate marker	<ul style="list-style-type: none">• Confounding variables can affect length of stay besides anti-infective prescribing

2017 Joint Commission Standards

- Hospital administration commitment to antimicrobial stewardship
 - Supported by policy and documentation
- Hospital educates antimicrobial ordering, dispensing, administration, and monitoring about antimicrobial resistance and antimicrobial stewardship practices
 - Annual Update includes ASP information
 - Institution providing medical staff education upon hire
 - EPIC has required indication question on certain anti-infectives

2017 Joint Commission Standards

- The hospital educates patients, and their families as needed, regarding the appropriate use of antimicrobial medications, including antibiotics
 - Providing document on viruses and bacteria from the Centers for Disease Control and Prevention to patients in different patient care areas (i.e. inpatient, ED, clinics, etc)
 - Biggest change to the institution
- The hospital has an antimicrobial stewardship multidisciplinary team that includes:
 - Infectious diseases physician
 - Infection preventionist(s)
 - Pharmacist(s)
 - Practitioner(s)

Joint Commission Standards

- The hospital's antimicrobial stewardship program has the following core elements:
 - Leadership commitment
 - Dedicating necessary human, financial, and information technology resources
 - Accountability
 - Dr. Montero provides oversight to the program
 - Drug expertise
 - Ripal Jariwala and Kristen Zeitler
 - Action
 - Tracking
 - Reporting
 - Education

Joint Commission Standards

- The hospital's antimicrobial stewardship program uses organization-approved multidisciplinary protocols
 - Examples: fecal microbiota transplant protocol, *C. difficile* guidelines
- The hospital collects, analyzes, and reports data on its antimicrobial stewardship program
 - Feedback on resistance patterns and developing strategies to counter resistance
- The hospital takes action on improvement opportunities identified in its antimicrobial stewardship program

Joint Commission Activities

- List of patients receiving antimicrobials as follows:
 - Emergency department patients who are prescribed antimicrobials.
 - Ambulatory and clinic patients surveyed under the hospital program who are prescribed antimicrobials
 - Hospitalized patients who will be discharged on antimicrobials

CMS Guidelines

- The hospital has written policies and procedures whose purpose is to improve antibiotic use (antibiotic stewardship)
- The hospital has designated a leader (e.g., physician, pharmacist, etc.) responsible for program outcomes of antibiotic stewardship activities at the hospital
- The hospital's antibiotic stewardship policy and procedures requires practitioners to document in the medical record or during order entry an indication for all antibiotics, in addition to other required elements such as dose and duration

CMS Guidelines

- The hospital has a formal procedure for all practitioners to review the appropriateness of any antibiotics prescribed after 48 hours from the initial orders (e.g., antibiotic time out)
- The hospital monitors antibiotic use (consumption) at the unit and/or hospital level

<https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-15-12-Attachment-1.pdf>

CMS Standards

- Adding antimicrobial stewardship standards for acute care and critical access
- May be going into effect June 2019 but under review

CDC Core Elements

ACTIONS TO SUPPORT OPTIMAL ANTIBIOTIC USE	
POLICIES	POLICY ESTABLISHED
A. Does your facility have a policy that requires prescribers to document in the medical record or during order entry a dose, duration, and indication for all antibiotic prescriptions?	<input type="checkbox"/> Yes <input type="checkbox"/> No
B. Does your facility have facility-specific treatment recommendations, based on national guidelines and local susceptibility, to assist with antibiotic selection for common clinical conditions?	<input type="checkbox"/> Yes <input type="checkbox"/> No
SPECIFIC INTERVENTIONS TO IMPROVE ANTIBIOTIC USE <i>Are the following actions to improve antibiotic prescribing conducted in your facility?</i>	
BROAD INTERVENTIONS	ACTION PERFORMED
C. Is there a formal procedure for all clinicians to review the appropriateness of all antibiotics 48 hours after the initial orders (e.g., antibiotic time out)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
D. Do specified antibiotic agents need to be approved by a physician or pharmacist prior to dispensing (i.e., pre-authorization) at your facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No
E. Does a physician or pharmacist review courses of therapy for specified antibiotic agents (i.e., prospective audit with feedback) at your facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No
PHARMACY-DRIVEN INTERVENTIONS <i>Are the following actions implemented in your facility?</i>	ACTION PERFORMED
F. Automatic changes from intravenous to oral antibiotic therapy in appropriate situations?	<input type="checkbox"/> Yes <input type="checkbox"/> No
G. Dose adjustments in cases of organ dysfunction?	<input type="checkbox"/> Yes <input type="checkbox"/> No
H. Dose optimization (pharmacokinetics/pharmacodynamics) to optimize the treatment of organisms with reduced susceptibility?	<input type="checkbox"/> Yes <input type="checkbox"/> No
I. Automatic alerts in situations where therapy might be unnecessarily duplicative?	<input type="checkbox"/> Yes <input type="checkbox"/> No
J. Time-sensitive automatic stop orders for specified antibiotic prescriptions?	<input type="checkbox"/> Yes <input type="checkbox"/> No
DIAGNOSIS AND INFECTIONS SPECIFIC INTERVENTIONS <i>Does your facility have specific interventions in place to ensure optimal use of antibiotics to treat the following common infections?</i>	ACTION PERFORMED
K. Community-acquired pneumonia	<input type="checkbox"/> Yes <input type="checkbox"/> No
L. Urinary tract infection	<input type="checkbox"/> Yes <input type="checkbox"/> No
M. Skin and soft tissue infections	<input type="checkbox"/> Yes <input type="checkbox"/> No
N. Surgical prophylaxis	<input type="checkbox"/> Yes <input type="checkbox"/> No
O. Empiric treatment of Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	<input type="checkbox"/> Yes <input type="checkbox"/> No

CDC Patient Education

Viruses or Bacteria What's got you sick?

Antibiotics only treat bacterial infections. Viral illnesses cannot be treated with antibiotics. When an antibiotic is not prescribed, ask your healthcare professional for tips on how to relieve symptoms and feel better.

Common Condition: What's got you sick?	Common Cause			Are antibiotics needed?
	Bacteria	Bacteria or Virus	Virus	
Strep throat	✓			Yes
Whooping cough	✓			Yes
Urinary tract infection	✓			Yes
Sinus infection		✓		Maybe
Middle ear infection		✓		Maybe
Bronchitis/chest cold (in otherwise healthy children and adults)*		✓		No
Common cold/runny nose			✓	No
Sore throat (except strep)			✓	No
Flu			✓	No

* In some cases, acute bronchitis is caused by bacteria, but even in these cases antibiotics still do not help.

Antibiotics Aren't Always the Answer



www.cdc.gov/getsmart



services

Nov 14, 2014
000220796

<https://www.cdc.gov/getsmart/community/materials-references/print-materials/everyone/viruses-bacteria-chart.pdf>

Outpatient Stewardship

- Core Elements of Outpatient Stewardship published December 2016
- Provides some guidance on how to address anti-infective prescribing in the outpatient arena
- Highlights include:
 - Delayed prescribing practice when appropriate
 - Improved written justification for use of agents
 - Triaging unnecessary visits with call centers
- Anticipate that this will become a CMS standard as well

Summary

- Customize ASP based upon your institution
 - Each institution may have different issues
- Involve key players that can help your stewardship program
- Metrics is an evolving area for ASPs
- Regulatory standards are helping to support and sustain ASPs



Questions ?