

# Building Blocks of Antimicrobial Stewardship



Jonathan Edwards, Pharm.D., BCPS-AQ ID, BCGP  
Antimicrobial Stewardship Pharmacist  
Huntsville Hospital  
Huntsville, AL

# Disclosures



☞ Nothing to disclose for this presentation

# Objectives



- ❧ Define antimicrobial stewardship
- ❧ Discuss the core elements of hospital antimicrobial stewardship programs
- ❧ Discuss the critical role of hospital staff in the practice of antimicrobial stewardship

# Antimicrobial Stewardship



- ❧ Antimicrobial stewardship is defined as coordinated interventions designed to improve and measure the appropriate use of agents by promoting the optimal selection, dosage, duration, and route of administration of antimicrobials that results in:
  - ❧ Improved patient outcomes
  - ❧ Reduced adverse events
  - ❧ Improved rates of antibiotic susceptibilities
  - ❧ Optimization of resource utilization

# Birth of Antimicrobial Stewardship



“Microbes are educated to resist penicillin and a host of penicillin-fast organisms is bred out...in such cases, the thoughtless person playing with penicillin is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism. I hope this evil can be averted.”

- Alexander Fleming

Pssst! Hey kid! Wanna be a Superbug...?  
Stick some of this into your genome...  
Even penicillin won't be able to harm you..!



It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.

# Benefits of Antimicrobial Stewardship Programs



- ∞ Improved efficacy
  - ∞ Increase the utilization of first-line treatment options
  - ∞ Reduce the unnecessary use of broad-spectrum agents
  - ∞ Dose optimization
  - ∞ Reduce bacterial resistance
- ∞ Improved safety
  - ∞ Dose adjustments for organ dysfunction
  - ∞ Dosing of agents with a narrow therapeutic index
  - ∞ Dosing of agents with organ toxicities
- ∞ Cost savings
  - ∞ Appropriate utilization of antimicrobials decreases usage
  - ∞ De-escalation of therapy typically changes therapy to a less expensive agent
  - ∞ IV-to-PO conversions help facilitate discharge from the hospital decreasing antimicrobial cost as well as overall hospital expense
- ∞ Compliance
  - ∞ Centers for Medicare and Medicaid Services (CMS)
  - ∞ The Joint Commission (TJC)

# The Joint Commission Requirements



- ❧ In June 2016 a new Medication Management (MM) standard was published - MM.09.01.01
- ❧ Effective date – January 1, 2017
- ❧ Applies to all hospitals and critical access hospitals
- ❧ Included 8 Elements of Performance (EP)



# CDC

# Core Elements Document



- ❧ Summarizes core elements of successful hospital ASPs
- ❧ Complement existing guidelines
  - ❧ Infectious Diseases Society of America (IDSA)
  - ❧ Society for Healthcare Epidemiology of America (SHEA)
  - ❧ American Society of Health System Pharmacists (ASHP)
  - ❧ The Joint Commission (TJC)
- ❧ Success is dependent on two key factors
  - ❧ Defined Leadership
  - ❧ Coordinated multidisciplinary approach

Dellit TH,, Owens RC, McGowan JE, JR., et al. CID. Dec 2009;28(12):1047-1051.

The Joint Commission. Antimicrobial Stewardship Toolkit. 2013.

American Society of Health-System Pharmacists An Interprofessional Team Approach.2013.

# Summary of Core Elements



- ☞ Leadership Commitment
  - ☞ Human, financial, and information technology resources

- ☞ Accountability
  - ☞ Leader responsible for outcomes

- ☞ Drug Expertise
  - ☞ Pharmacist leader responsible for improved antibiotic use

- ☞ Action
  - ☞ Implementing recommended actions

- ☞ Tracking and Monitoring
  - ☞ Monitoring prescribing and resistance patterns

- ☞ Reporting
  - ☞ Antibiotic use and resistance to physicians, nurses, and relevant staff

- ☞ Education
  - ☞ Clinicians regarding resistance and optimal prescribing
  - ☞ Patients and families regarding antibiotic use and potential side effects

# Leadership Commitment



## Critical component to the success of ASP

- ❧ Formal statement of support
- ❧ Facilitate training and education
- ❧ Adequate staffing
- ❧ Sustained financial support
- ❧ Ensuring ASP team leaders have time to perform the functions of the program
- ❧ Endorse participation from many groups that can support stewardship activities

# Leadership Commitment at Huntsville Hospital (HH)



- ❧ Formal board-approved statement that the facility supports efforts to improve and monitor antibiotic use
- ❧ Created an ASP pharmacist position to dedicate sufficient time to conduct stewardship activities
- ❧ Stewardship-related duties are included in performance reviews of ASP pharmacist
- ❧ Ensures support from other disciplines such as quality management, information technology, laboratory
- ❧ Provides training for staff through Infection Control Conference and allowing pharmacy staff to attend national meetings

# Accountability



- ❧ Stewardship program leader or co-leaders
  - ❧ Held accountable to the hospital leadership for meeting goals and targets
  - ❧ Have expertise in antibiotic use and training in stewardship
    - ❧ Infectious diseases
    - ❧ Hospitalists
    - ❧ Nurse practitioners
  - ❧ Actively engage other groups in stewardship

# Accountability at HH



- ❧ Antimicrobial stewardship program is co-led by physicians and pharmacists
- ❧ Collaboration between the infectious disease physician groups and the pharmacy department
- ❧ Physician leadership are all infectious disease trained
- ❧ ASP pharmacy leadership has specific training in stewardship
  - ❧ Board-certified with added qualifications in infectious diseases
  - ❧ Certification in advanced stewardship training
- ❧ ASP leaders held accountable for outcomes in performance evaluations

# Accountability at HH



☞ Dr. Ali Hassoun

☞ Infection Control  
Committee

☞ Dr. Hafsa Siddiqui

☞ Pharmacy & Therapeutics  
(P&T) Committee

☞ Dr. Richard Spera

☞ Anti-Infective Sub-  
Committee of P&T

☞ Antimicrobial Management  
Team (AMT)

☞ Dr. Sharon Baty

☞ Dr. Jonathan Edwards

☞ Dr. Andres Gutierrez

☞ Dr. Ali Hassoun

☞ Dr. Neha Paranjape

☞ Dr. Scott Parker

☞ Dr. Ingrid Roig

☞ Dr. Peguy Saad

☞ Dr. Adam Sawyer

☞ Dr. Hafsa Siddiqui

☞ Dr. Richard Spera

☞ Dr. Claudia Taramona

# Drug Expertise



## ☞ Pharmacy leader

- ☞ Identify a single pharmacy leader who will co-lead the program
  - ☞ Formal training in infectious diseases is highly preferred
  - ☞ Larger facilities have achieved success by hiring full time staff



# Drug Expertise at HH



## ☞ Pharmacy Leaders

- ☞ Jonathan Edwards,  
Pharm.D., BCPS-AQ  
ID, BCGP
- ☞ Sharon Baty, Pharm.D.,  
BCPS
- ☞ Adam Sawyer,  
Pharm.D., BCPS,  
BCCCP

## ☞ Infectious Diseases Training

- ☞ Board Certification
  - ☞ Added qualifications
  - ☞ Test (2018)
- ☞ Certificate Programs
  - ☞ Making a Difference  
in Infectious Diseases  
(MAD-ID)
  - ☞ Society of Infectious  
Disease Pharmacists  
(SIDP)

# Drug Expertise at HH



- ☞ Pharmacy leaders engage and train other pharmacy staff in AS

- ☞ Initial training
- ☞ Annual competency
- ☞ Staff meeting
- ☞ Staff development
- ☞ Newsletter

- ☞ Ensures a broad pharmacy stewardship workforce

- ☞ Emergency department
- ☞ Intensive care
- ☞ Internal medicine
- ☞ Surgery
- ☞ Unit-based

# Key ASP Staff



- ❧ Clinicians
  - ❧ Antibiotic prescribers
- ❧ Department Heads
  - ❧ Staff resources
- ❧ Infection Preventionists
  - ❧ Monitor and prevent infections
- ❧ Quality Management
  - ❧ Quality and safety issues
- ❧ Laboratory / Microbiology
  - ❧ Proper use of tests and flow of results
- ❧ Information Technology
  - ❧ Integrate stewardship protocols
- ❧ Nurses
  - ❧ Prompt discussions regarding stewardship

# Actions to Support Optimal Antibiotic Use



**Utilize specific interventions that can be divided into three categories**

- ∞ Broad
  - ∞ Antibiotic “Time outs”
  - ∞ Prior authorization
  - ∞ Prospective audit and feedback
- ∞ Pharmacy driven
  - ∞ IV to PO conversions
  - ∞ Dose adjustment
  - ∞ Duplicate therapy alerts
  - ∞ Time-sensitive stop orders
  - ∞ Drug-Drug interaction detection and prevention
- ∞ Infection and syndrome specific
  - ∞ Community-acquired pneumonia
  - ∞ Urinary tract infections
  - ∞ Skin and soft tissue infections
  - ∞ Empiric coverage of methicillin-resistant *Staphylococcus aureus* (MRSA) infections
  - ∞ *Clostridium difficile* infections
  - ∞ Treatment of culture proven invasive infections

# Action at HH



- ❧ Broad
  - ❧ Antibiotic “Time outs”
    - ❧ Senti7<sup>®</sup> identifies duration of therapy for all antibiotics
  - ❧ Prior authorization
    - ❧ Required for the following antibiotics
      - ❧ Daptomycin
      - ❧ Telavancin
      - ❧ Fidaxomicin
      - ❧ Ceftolozane-tazobactam
      - ❧ Ceftazidime-avibactam
- ❧ Prospective audit and feedback
  - ❧ Daily AMT rounds with ID physicians with recommendations left in the medical record for attending physician review

# Action at HH



## Pharmacy driven

- ∞ IV to PO conversions
  - ∞ Conducted daily using Senti7<sup>®</sup>
- ∞ Dose adjustment
  - ∞ Automatic renal dose adjustment approved by P&T
- ∞ Dose optimization
  - ∞ Extended infusion protocol
- ∞ Antibiotic allergy assessment
- ∞ Duplicate therapy alerts
  - ∞ Utilize Senti7<sup>®</sup> to find duplicate  $\beta$ -lactams and atypical coverage
- ∞ Time-sensitive stop orders
  - ∞ Automatic stop times for prophylactic antibiotics
- ∞ Rapid diagnostics
  - ∞ PCR
  - ∞ T2

# Action at HH



## Infection and syndrome specific

- ∞ Community-associated pneumonia
  - ∞ Order set developed for the management of this disease state
- ∞ Urinary tract infections
  - ∞ AMT monitors for asymptomatic bacteriuria
- ∞ Empiric coverage of methicillin-resistant *Staphylococcus aureus* (MRSA) infections
  - ∞ Use of PCR testing to deescalate therapy in patients with pneumonia
- ∞ Skin and soft tissue infections
  - ∞ AMT assesses antibiotic spectrum of activity daily
- ∞ *Clostridium difficile* infections
  - ∞ Assess adequate antibiotic utilization and treatment duration
- ∞ Treatment of culture proven invasive infections
  - ∞ AMT recommends tailoring antimicrobial therapy based on culture results

# Tracking and Monitoring



- ❧ Critical to identifying opportunities for improvement and assess the impact of improvement efforts
- ❧ Allows for assessment, monitoring, and improvement
- ❧ Measurement may involve
  - ❧ Process
  - ❧ Outcomes
  - ❧ Antibiotic Use



# Tracking and Monitoring



## ❧ Process measures

- ❧ Adherence to documentation policies
  - ❧ Indications for antibiotic use
  - ❧ Antibiotic time-outs
- ❧ Adherence to facility-specific treatment guidelines
- ❧ Accurate antibiotic allergy and adverse reaction histories

## ❧ Outcome measures

- ❧ Tracking of antibiotic resistance patterns
- ❧ *C. difficile* infection rates
- ❧ 30-day readmission rates
  - ❧ *C. difficile*
  - ❧ Pneumonia

# Tracking and Monitoring



## Antibiotic Use Measures

- ❧ Defined Daily Doses (DDD)
  - ❧ A standardized metric for drug exposure endorsed by the World Health Organization (WHO)
  - ❧ Assumed average maintenance dose per day for a drug used for its main indication in adults
- ❧ Days of Therapy (DOT)
  - ❧ Adopted by National Healthcare Safety Network (NHSN)
  - ❧ A single day of drug administration regardless of number of doses or strength
- ❧ Antibiotic Use (AU)
  - ❧ Developed by the CDC
  - ❧ Automatically collects and reports monthly DOT data, which can be analyzed in aggregate and by specific agents and patient care locations
- ❧ Standardized antibiotic administration ratio (SAAR)
  - ❧ National Quality Forum (NQF) endorsed
  - ❧ Benchmarking measure for antibiotic use
- ❧ Direct antibiotic expenditures
  - ❧ Easiest to measure
  - ❧ Could be easily misinterpreted

# Tracking and Monitoring at HH



- ❧ Process measures
  - ❧ Adherence to formulary restrictions
  - ❧ Duration of therapy interventions
  - ❧ Acceptance rate of AMT interventions
- ❧ Outcome measures
  - ❧ Annual antibiogram
    - ❧ Gram-negative organisms
    - ❧ Multi-drug resistant organisms (MDRO)
  - ❧ *C. difficile* infection rates
- ❧ Antibiotic use measures
  - ❧ Electronic health record
  - ❧ Physician specific reporting
    - ❧ Individual doses given
    - ❧ Cost per
      - ❧ Dose
      - ❧ Patient
    - ❧ Compared to peers
  - ❧ Direct antibiotic expense
    - ❧ Total spend on selected antibiotics
    - ❧ Cost per adjusted discharge

# Reporting



- ❧ Regular reporting is a key element of a successful ASP
- ❧ Present facility-specific antibiotic use and outcomes
  - ❧ Hospital leadership
  - ❧ Pharmacy leadership
  - ❧ Healthcare providers
  - ❧ Infection control
  - ❧ Quality management

# Reporting



## Basic

- Standing ASP report to key stakeholders
- Report to medical staff committee and hospital board

## Intermediate

- Updates on progress toward ASP goals
- Newsletter articles that focus on antimicrobial use

## Advanced

- Provider-level information
  - Antibiotic use
  - Acceptance of ASP recommendations
  - Audit and feedback
- Facility specific dashboard for ASP metrics for all staff to view

# Reporting at HH



- ❧ Basic
  - ❧ Present regular reports on antimicrobial use and expense to the ID Sub-Committee
  - ❧ Report ASP interventions and projects to P&T
  
- ❧ Intermediate
  - ❧ Present progress toward TJC goals to Infection Control Committee
  - ❧ Newsletter articles
  
- ❧ Advanced
  - ❧ Provide physician specific information to all infectious disease physicians regarding antimicrobial use and expense
  - ❧ Provide audit and feedback through AMT recommendations

# Education



- ASP should provide regular updates regarding

- Antibiotic prescribing
- Antibiotic resistance
- Infectious disease management
  - National issues
  - Local issues

- Can motivate improved prescribing

- Education has been found to be the most effective when paired with
  - Corresponding interventions
  - Measurement of outcomes

- Ways to provide education

- Physicians and Staff

- Didactic presentations
- Posters
- Flyers
- Newsletters
- Electronic communications to the staff

- Patients and family members

- Verbal education
- Written education
- Educational videos
- Support groups
- Post-discharge phone calls

# Education at HH



## ☞ Staff education

- ☞ Infection Control Conference
- ☞ Newsletters
- ☞ Huddles
- ☞ Committee minutes
  - ☞ P&T
  - ☞ ID Sub-Committee
- ☞ Antibiogram
- ☞ Annual competencies
  - ☞ Pharmacy
- ☞ Computer based learning (CBL)

## ☞ Patient and family education

- ☞ Care Notes for new medications
- ☞ HCS printout for new medications at discharge
- ☞ Transitions of care (TOC) pilot
- ☞ Infectious disease pharmacist
- ☞ “Meds to Beds” program
- ☞ Patient education materials included in discharge packet



# Summary



- ❧ Antibiotic overuse and misuse has driven antimicrobial resistance
- ❧ Changes to clinical practice to promote appropriate use are essential to the preservation of these life-saving medications
- ❧ Antimicrobial stewardship programs can optimize the treatment of infections and antibiotic use
- ❧ Stewardship can improve patient outcomes, slow the development of antimicrobial resistance, and reduce healthcare costs
- ❧ Government funding will be increasingly tied to implementing, measuring, improving, educating, and reporting of stewardship activities

# Questions?



Jonathan Edwards, Pharm.D., BCPS-AQ ID, BCGP  
Antimicrobial Stewardship Pharmacist  
Huntsville Hospital  
Huntsville, AL  
[Jonathan.Edwards@hhsys.org](mailto:Jonathan.Edwards@hhsys.org)