





### Thank you

### Virginia HAI Advisory Group;

### **Antimicrobial Stewardship Workgroup**









HAI Advisory Group - HAIAR (virginia.gov)

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To ask questions, click on the **Chat** icon. At the end of the presentation, you will also be able to unmute to ask a question verbally.

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Resources from today's session will be shared after the call.



### Health Quality Innovation Network Today's Presenter



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# Antimicrobial Stewardship: CDC Core Elements



June 30, 2022

### Agenda



Define antimicrobial stewardship (ASP) and why it is important



Summarize components of an effective antimicrobial stewardship program



Describe antimicrobial stewardship strategies in the hospital setting



Highlight specific initiatives recommended by the CDC ASP Core Elements



### Antimicrobial Stewardship Defined

Antimicrobial stewardship is defined as the optimal selection, dosage, and duration of antimicrobials that results in:

- The best clinical outcome for treatment & prevention of infections
- Minimum toxicity to the patient
- Minimum impact on subsequent bacterial resistance



## Background

- 20-50% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or inappropriate.
- Antibiotics have serious side effects, including adverse drug reactions and <u>*Clostridioides difficile* infection (CDI)</u>. Patients who are unnecessarily exposed to antibiotics are placed at risk for serious adverse events with no clinical benefit.



### Background

- The misuse of antibiotics has also contributed to the growing problem of <u>antibiotic resistance</u>, which has become one of the most serious and growing threats to public health.
- The potential for spread of resistant organisms means that the misuse of antibiotics can adversely impact the health of patients who are not even exposed to them!
- The Centers for Disease Control and Prevention (CDC) estimates that more than 2,800,000 people are infected with antibiotic-resistant organisms annually in the USA, resulting in approximately 35,000 deaths.



### Antimicrobial Stewardship Program

The antimicrobial stewardship program (ASP) is established to:

- 1. Optimize the treatment of infections
- 2. Reduce adverse events associated with antibiotic overuse

The methods by which to accomplish these goals are to:

- 1. Increase the frequency of correct prescribing of antimicrobial therapy and prophylaxis
- 2. Employ technology, clinical pharmacy expertise, and medical evidence to decrease antibiotic overuse



### Antimicrobial Stewardship Team

Anyone can play a role in antimicrobial stewardship!

The antimicrobial stewardship subcommittee is composed of:

- Infectious disease physicians and other physicians that prescribe antibiotics regularly (ex. hospitalists)
- Pharmacists- clinical and staff
- Nurses- leadership and bedside
- Microbiology laboratory leadership
- Infection preventionist
- Administration
- Informaticist



### Patient Case

CC: 68 year old female presents to ED with acute productive cough, chest pain, and shortness of breath. <u>PMH:</u> Uncontrolled T2DM, COPD, GERD, neuropathy, constipation. Hospitalized 3 weeks ago for DKA and discharged to rehab. Home meds: Aspirin, docusate/bisacodyl, gabapentin, insulin glargine, insulin lispro, lisinopril, oxycodone/APAP, pantoprazole Allergies: Penicillin (unknown reaction) Vitals: RR 26, Tmax 101.2, HR 88, O2 sat 86% PE: Rales in right lower lung CXR: Right lower lobe infiltrate



Which of the following antibiotic interventions for this patient has the strongest recommendation from the IDSA/SHEA guidelines?

- A. Watch and wait- no need to start antibiotics
- B. Provide education to the hospitalist team on appropriate antibiotics to treat pneumonia
- C. Develop an order set to guide pneumonia treatment
- D. Use prospective audit and feedback on antibiotic therapy



- Implemented to provide guidance for optimizing antibiotic therapy
- Each activity is graded as strong, weak, or good practice

Stewardship Categories	Examples
Antibiotic interventions	Preauthorization
Antibiotic optimization	Pharmacokinetic monitoring
Metrics	Days of therapy
Microbiology and diagnostics	Cascade reporting
Special Populations	NICU specific interventions



Antibiotic Intervention Recommendations	Strength of Recommendation
Preauthorization or prospective audit and feedback	Strong
Reduce use of high-risk <i>C. difficile</i> antibiotics	Strong
Didactic education	Weak
Facility clinical practice guideline	Weak
Syndrome-specific intervention	Weak
Prescriber-led review of antibiotics	Weak
Computerized decision support systems	Weak
Antibiotic cycling	Weak



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- Cefepime 2G IV every 8 hours
- Levofloxacin 750mg IV every 24 hours
- Vancomycin 25mg/kg IV x 1, then pharmacy to dose



Which of the following antibiotic optimization interventions for this patient has the strongest recommendation from the IDSA/SHEA guidelines?

- A. Change Levofloxacin from IV to PO when clinically stable
- B. Perform penicillin skin testing and make recommendations according to the results for streamlining therapy
- C. Change to meropenem
- D. Perform vancomycin therapeutic drug monitoring



Antibiotic Optimization Recommendations	Strength of Recommendation
PK monitoring of aminoglycosides	Strong
IV to PO switch	Strong
Appropriate duration of therapy	Strong
PK monitoring of vancomycin	Weak
Alternative dosing strategies	Weak
Beta-lactam allergy assessment	Weak



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Vitals: RR 26, Tmax 101.2, HR 88, O2 sat 86%

PE: Rales in right lower lung

CXR: Right lower lobe infiltrate

Antibiotics started:

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What microbiologic strategy can be used to optimize this patient's antibiotics?

- A. Utilize the facility antibiogram to choose the most appropriate empiric therapy based on susceptibility data
- B. Implement rapid diagnostic technology to obtain organism identification faster
- C. Work with the lab to develop cascade reporting for susceptibility panels
- D. Draw cultures after the antibiotics are started



Microbiology Recommendations	Strength of Recommendation	
Develop antibiogram	Strong	
Cascade reporting	Weak	
Rapid diagnostic testing	Weak	
Procalcitonin testing in ICU patients	Weak	
Fungal diagnostics	Weak	
Rapid viral testing	Weak	



### CDC Core Elements

- Released for hospitals in 2014
- National Healthcare Safety Network (NHSN) data identified a disparity in small and critical access hospitals
- Specific guidelines for small and critical access hospitals released in 2015:
  - Help with limitations in staffing, infrastructure and resources
  - Offer flexible and tailored approaches

CDC Core Elements of Hospital Antibiotic Stewardship Programs: <u>https://www.cdc.gov/antibiotic-use/core-elements/hospital.html</u>

Implementation of Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals: <u>https://www.cdc.gov/antibiotic-use/core-elements/small-critical.html</u>



### Antimicrobial Stewardship Core Elements





### Leadership Commitment and Accountability





### Leadership Commitment and Accountability

### Strategies for Implementation-

Physician Leadership
Pharmacy Leadership
Team Members

Image: Image:





# Drug Expertise

Physician and pharmacist leaders

Multi-hospital collaboratives

Telemedicine- remote consultation

Training programs- <u>CDC</u>, <u>IDSA</u>, <u>MAD-ID</u>, <u>SIDP</u>, State collaboratives, colleges



Action

Choose interventions that most benefit the hospital and local needs

### Infection-type specific

- Community-acquired pneumonia
- Urinary tract infections
- Skin and soft tissue infections

### Review course of therapy

- Is an antibiotic still needed?
- Is the antibiotic tailored to the culture results?
- Is the narrowest spectrum agent being used?
- How long should the antibiotic be used?



# Action

Infection Type	Diagnostic Interventions	Empiric Therapy Guidance	Duration of Therapy Assessment
Community- Acquired Pneumonia	Review imaging and lab tests at 48 hr to ensure infection MRSA screen	Avoid anti- pseudomonal or MRSA coverage unless indicated	Uncomplicated Pneumonia: 5-7days
Urinary Tract Infection	Ensure symptoms present Only culture when high likelihood of infection	Avoid treatment of asymptomatic bacteruria Fluoroquinolones likely not optimal	Uncomplicated cystitis: 3-5days Pyelonephritis: 7-10 days
Skin and Soft Tissue Infection	Purulent vs non-purulent Assess severity MRSA screen	Avoid anti- pseudomonal or anti- anerobic unless indicated	Uncomplicated: 5 days



### Urine Culture Stewardship

#### Clinical Infectious Diseases

ACCEPTED MANUSCRIPT

Optimal Urine Culture Diagnostic Stewardship Practice – Results from an Expert Modified-Delphi Procedure @

#### Table 3. Reporting Urine Culture: Best Practices for Diagnostic Stewardship of Urine Culture Reporting Included These Recommendations

Appropriate practices

- · For urine culture reports, to:
  - Inform clinicians that even high colony counts (ie, >100 000 CFU/mL) may not represent true infection in the absence of symptoms or signs<sup>a</sup>
  - Nudge clinicians to not treat asymptomatic bacteriuria<sup>a</sup>
  - Nudge clinicians to not treat mixed flora<sup>a</sup>
  - Differentiate typical uropathogens vs contaminants<sup>a</sup>
- Withhold urine culture results (including organism identification and antibiotic susceptibilities) when there are more than 2 unique bacterial strains identified in culture
- Preferentially report only Infectious Disease Society of America-recommended antibiotics if organism is susceptible
- · Withhold fluoroquinolone susceptibilities unless there is resistance to preferred oral antibiotics

Inappropriate practices

- Nudge clinicians to not treat if there are <100 000 CFU/mL of bacteria
- Withhold information about urine culture organism identification or antibiotic susceptibilities unless the clinician contacts the clinical microbiology laboratory

Reference available here: https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciab987/6446183



# Action





# Tracking

#### Measures of success-

- Antibiotic days of therapy
- Adherence to treatment protocols- CAP, UTI, SSTI
- Provider-specific antibiotic use data
- Medication use evaluations
- IV to PO rates
- Unnecessary duplicate therapy
- Adverse event rates- C. difficile
- Antibiotic resistant infections
- Antibiotic expense



### Tracking Examples

IV to PO Targeted Drugs (Goal <u>&gt;</u> 65%)	71.3	79.9	81.6	74.1
Patient De-escalation (Goal <u>&gt;</u> 60%)	52.2	83.3	25	54.5
Vancomycin De-escalation (Goal <u>&gt;</u> 75%)	73.3	77.3	100	77
Fluoroquinolone Use in UTI (Goal < 10%)	7.3	2.3	0	7

IV to PO Ratio by Drug

■ IV ■ PO



Top 10 Antibiotics	DOT/1KAPD
piperacillin/tazobactam	50.80
ceftriaxone	46.16
vancomycin	34.30
cefazolin	24.83
cefepime	16.07
azithromycin	14.88
meropenem	14.68
doxycycline	13.87
metronidazole	7.94
ampicillin	7.89

\* If multiple months are selected, this value represents the average APD



## Reporting

- Reporting needs to be timely, accurate, easy to interpret, and communicated in multiple delivery methods
- Dashboard- reportable to providers, admin, pharmacists, nursing
- Standing report to P&T, ASP, Patient Safety, Hospital Board, Med Exec Committee
- Individual provider reports
- Newsletters and emails

### Education

Audience- Providers, pharmacists, nurses, patients, families Intervention Strategies-

- Regular updates- newsletters, emails, dashboards
- Targeted in-person education
- Staff education- webinars, lunch and learn, online education, orientation and annually
- Patient and family education- admission packet, in-room TV/computer, handout



## CAP Algorithm





### Newsletter

### ASAP Newsletter

Antimicrobial Stewardship Program

#### Utilizing Procalcitonin to Guide Antimicrobial Therapy

Procalcitonin (PCT) is a biomarker that is specific for the detection of bacteria, making it a useful tool in the decision to initiate, continue, or discontinue antimicrobial therapy. PCT can be detected in the blood as early as 3-6 hours post-bacterial immune response and peaks in 24 hours. Its expression correlates well with the severity of infection.

Procalcitonin has primarily been studied for lower respiratory tract infections and sepsis, and its use has been associated with a decrease in antimicrobial usage without negatively affecting patient outcomes.

#### In what situations should I consider using PCT?

- Differentiation of bacterial vs. viral respiratory tract infection
- Determination of antibiotic duration of treatment in respiratory infections
- Diagnosis, risk stratification, and monitoring of sepsis/septic shock
- Monitoring response to antibiotics and evaluating opportunities to discontinue antibiotics



Volume 1, Issue 2 December 2019

DID YOU KNOW?

Cross-reactivity between penicillin and cephalosporin drugs occurs in about 2% of cases!



# Summary

"Every day matters and limiting the duration of antibiotics can reduce the risk of antibioticassociated adverse effects without impacting efficacy."







### Resources

- <u>www.cdc.gov</u>
- IDSA/SHEA guidelines- Dellit TH, Owens RC, McGowan JE, Jr., et al. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. Clinical infectious diseases: an official publication of the Infectious Diseases Society of America. 2007; 44:159–177.
- CDC Core Elements for Small and Critical Access hospitals- Centers for Disease Control and Prevention. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2014 <u>http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html</u>
- CID Urinary Diagnostic Stewardship



### Upcoming Events

#### Join Us for the next sessions of Antimicrobial Stewardship Summer Camp

Friday, July 29 from 11 a.m. to noon ET Antimicrobial Stewardship Program: Using Data

Wednesday, August 31 from noon to 1 p.m. ET

Reducing Hospital Onset CDI Through Diagnostic Stewardship: The University of Virginia Experience

Registration Link: https://hqin-org.zoom.us/meeting/register/tZEvdOCpqTwuGNbDlx-CVQjIG9\_emOcSQfQ1

#### **July Office Hours**

Demystifying Data Date: July 21st (new date!) Time: 12:00 PM Registration Link: https://hqin-org.zoom.us/meeting/register/tJMqdO6sqj0sH9Gqv-umYdfPUQbxD1vyVT6N



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