

Antimicrobial Stewardship in Ambulatory Care

Do Bugs *NEED* Drugs?



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Conflicts of Interest



Objectives

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1. Summarize the importance of antimicrobial stewardship in ambulatory care.
2. Summarize key areas for antimicrobial stewardship implementation in the physician assistant daily practice.
3. Outline current treatment recommendations and pharmacology for antimicrobials and infections commonly encountered in primary care.

What is antimicrobial
stewardship anyways?!

Antimicrobial Stewardship (ASP)

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A *[multi-disciplinary healthcare initiative]* whose primary goal is to:

- optimize clinical outcomes *while*
- minimizing unintended consequences of antimicrobial use,
 - including toxicity,
 - the selection of pathogenic organisms, *and*
 - the emergence of resistance.



Core Members: ID physician, ID pharmacist, clinical microbiologist, information system specialist, infection control professional, hospital epidemiologist *with engagement from all clinicians.*

National Infection & Death Estimates for Antimicrobial Resistance

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An illustration of a large iceberg floating in water. The tip of the iceberg, which is above the water line, is relatively small and jagged. The much larger portion of the iceberg is submerged below the water line, representing a hidden or underestimated threat. The water is a light blue color.

Urgent global public health threat

5 million AMR-associated deaths worldwide

2.8 million infections in the US each year

\$4.6 billion to treat 6 top MDR infections

AMR: Antimicrobial Resistance; MDR: multi-drug resistant

Antibiotic Misuse: Yes, it's an Inpatient thing...

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Antibiotic overuse

20-50% of U.S. Acute care hospital antibiotics are unnecessary/inappropriate

Antibiotic overuse → Resistant organisms

Resistant organism → Resistant infections

Resistant infections → Patient deaths



“The CDC Says...”

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SURVEY SAYS...

Concerned for **emergence** and **spread** of new forms of resistance and **rising** resistant infections IN THE COMMUNITY

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Community infections:

- Can put **more** people at risk
- Make spread more **difficult** to *identify and contain*
- **Threaten** the progress made to protect patients in the hospital

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CDC

Antibiotic Consequences: Also an Ambulatory Thing!

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Shehab, et al. – aka the CDC

- An estimated **142,505** annual ER visits from systemic antibiotic adverse events
- Antibiotics were implicated in **19.3%** of all ED visits for drug-related adverse events

Bates, et al.

- ~4,000 hospital admissions studied
- **24%** of ADE's were due to antibiotics
- **10% preventable**



A large, stylized graphic of an iceberg. The tip of the iceberg is a small, light blue shape at the top left. The main body of the iceberg is a large, light blue shape that tapers downwards, representing the submerged portion. The background is white.

AMBULATORY ANTIMICROBIAL USE

AND DATA FROM THE CDC ANTIBIOTIC RESISTANCE & PATIENT SAFETY PORTAL

Prescribing Patterns: All Antibiotic Classes

2021

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CDC Antibiotic Resistance & Patient Safety Portal.

636

National
Outpatient

antibiotic
prescription rate
per 1,000 population

South

US Census Region

**HIGHEST
Outpatient**

antibiotic
prescription rate

211 M

TOTAL

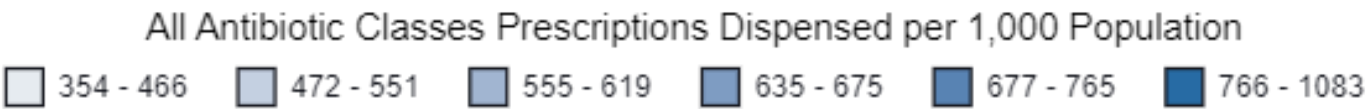
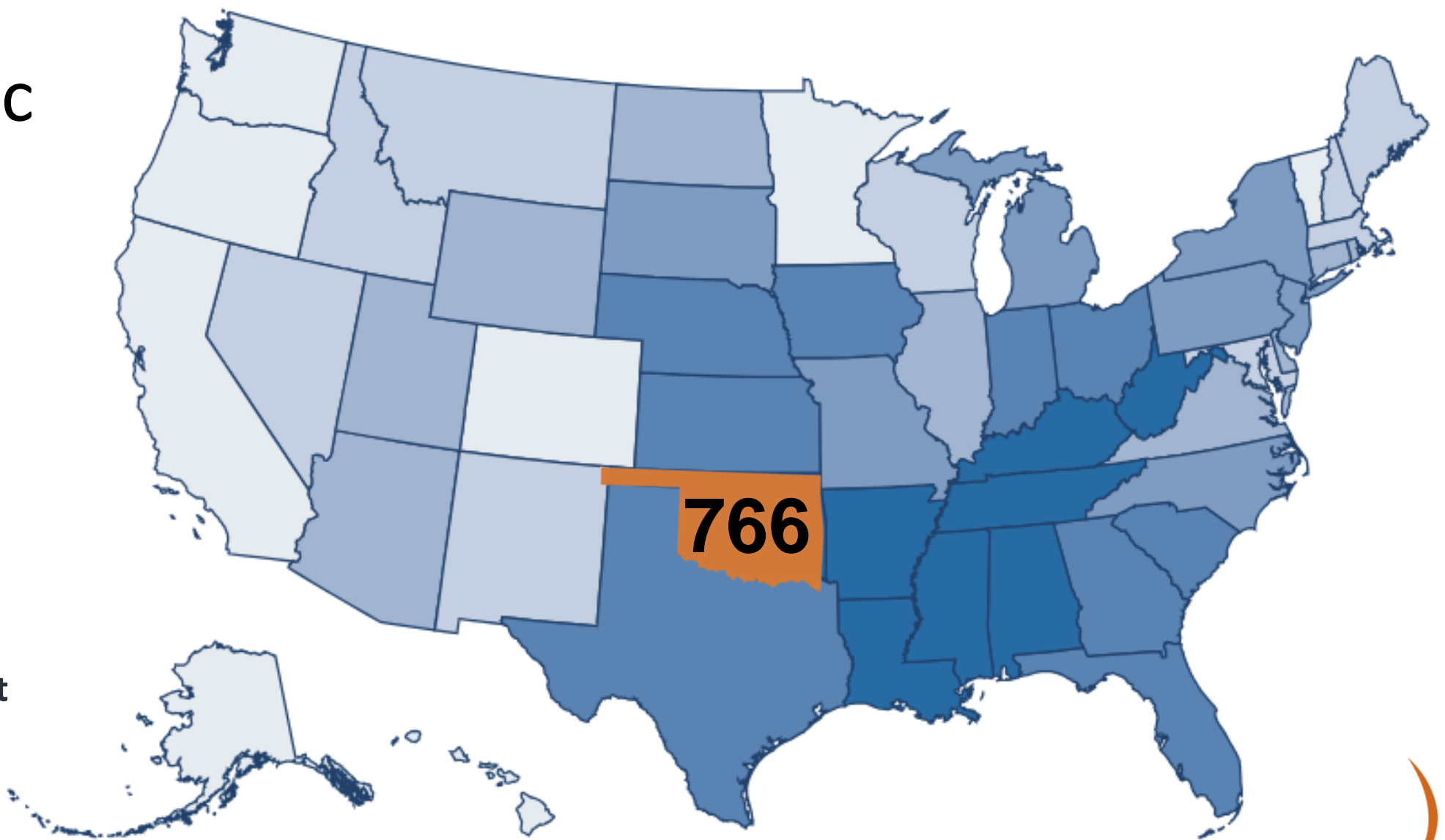
Outpatient

antibiotic
prescriptions
dispensed annually

All Antibiotic Classes

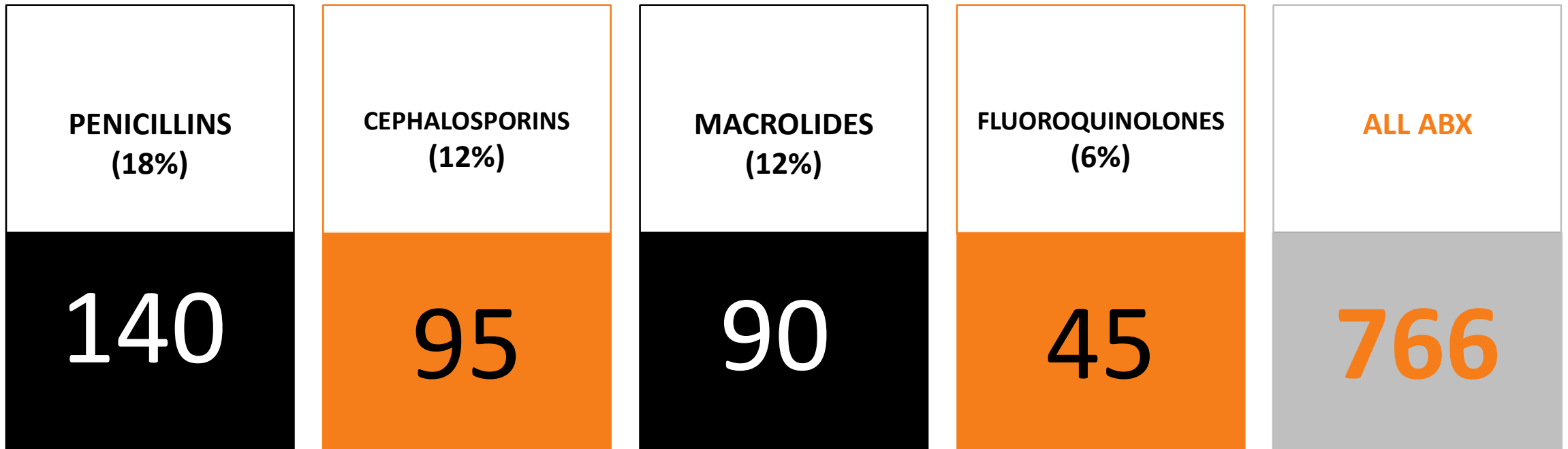
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“for highest overall prescription rates of all antibiotic classes per 1,000 population dispensed in **outpatient** pharmacies across the U.S. in 2021.”



Outpatient Antibiotic Use

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*per 1,000 population dispensed in **outpatient** pharmacies*

Antibiotic Resistance Threats

2019 – US Report

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URGENT

- Carbapenem-resistant Acinetobacter
- Candida auris
- **Clostridioides difficile**
- Carbapenem-resistant enterobacterales
- Drug-resistant Neisseria gonorrhoeae

SERIOUS

- Drug-resistant Campylobacter
- Drug-resistant Candida
- ESBL-producing Enterobacterales
- Vancomycin-resistant Enterococci (VRE)
- Multidrug-resistant Pseudomonas aeruginosa
- Drug-resistant nontyphoidal Salmonella
- Drug-resistant Salmonella serotype Typhi
- Drug-resistant Shigella
- **MRSA**
- Drug-resistant Strep pneumoniae
- Drug-resistant Tuberculosis

CONCERNING

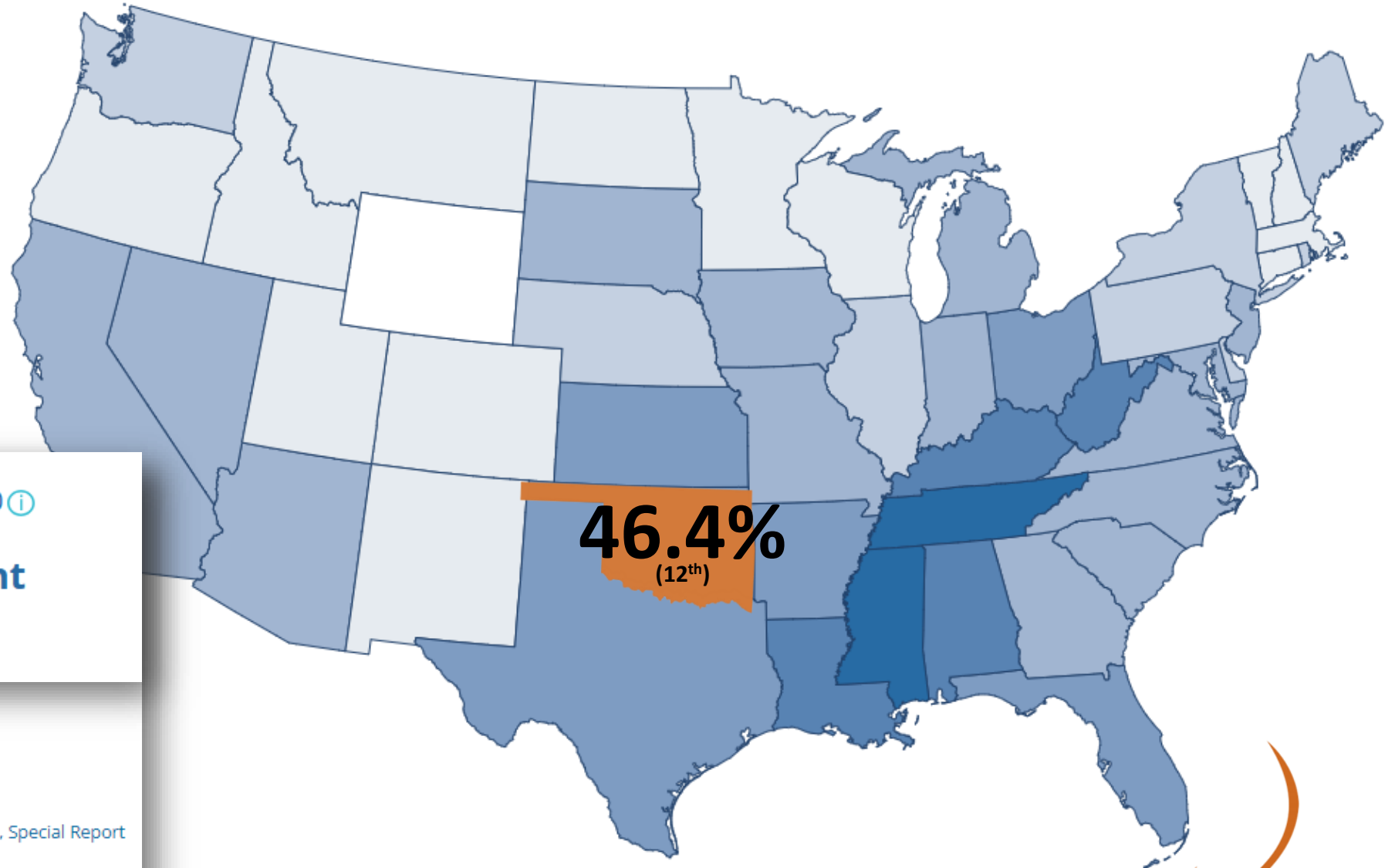
- Erythromycin-resistant Group A Streptococcus
- Clindamycin-resistant Group B Streptococcus

WATCH LIST

- Azole-resistant Aspergillus fumigatus
- Drug-resistant Mycoplasma genitalium
- Drug-resistant Bordetella pertussis

MRSA

National Average
40.6%



% RESISTANT BY PATIENT AGE IN 2020 ⓘ

Pediatric: 23.1% Resistant

Adult: 41.8% Resistant

ESTIMATED DEATHS 10,600

HEALTHCARE COSTS (USD) \$1.7 B

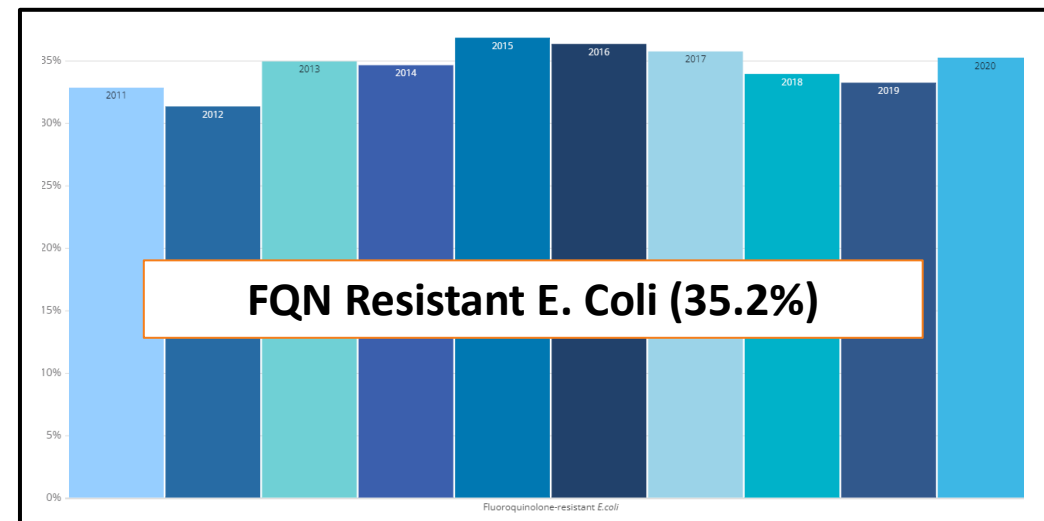
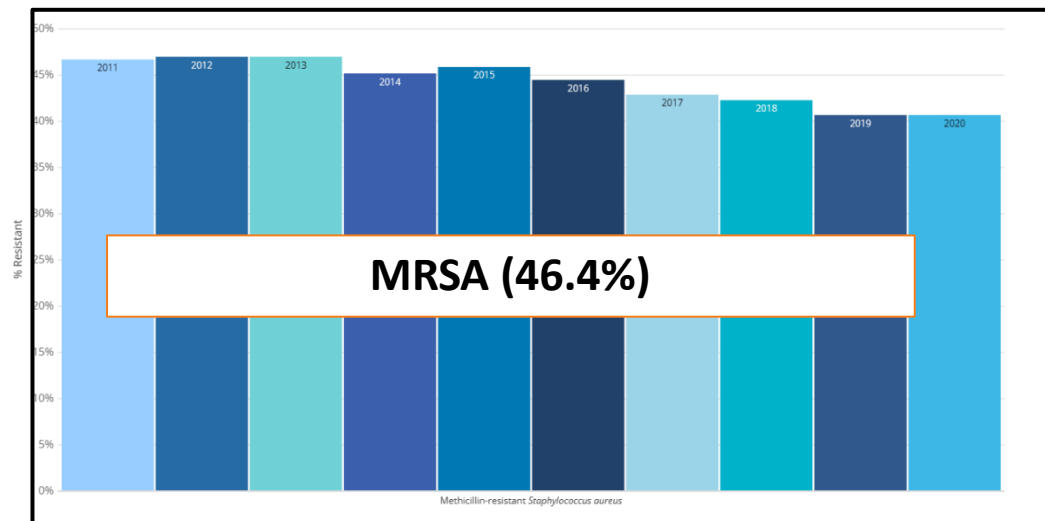
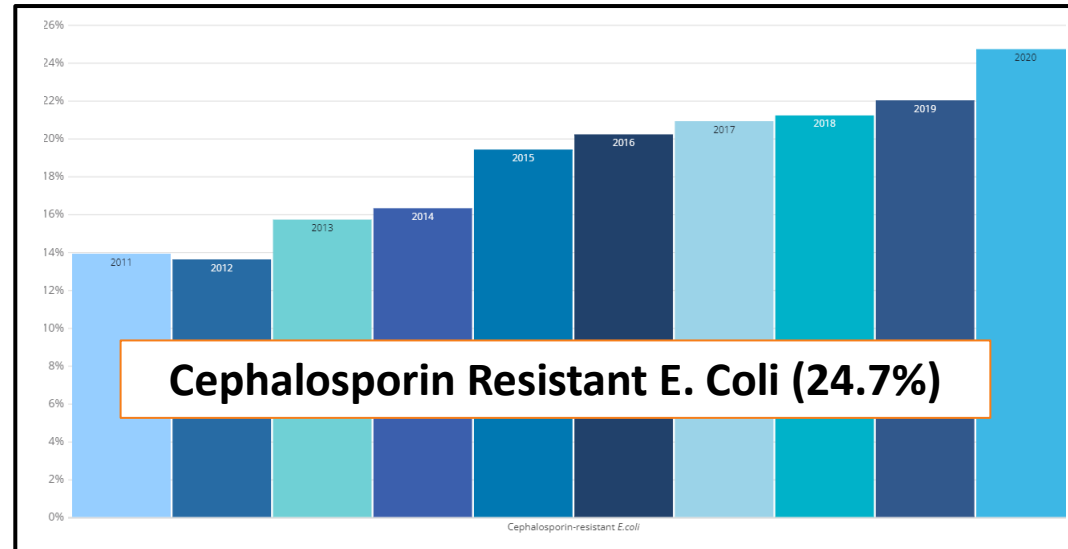
Source: COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report
2022

Percent Antibiotic Resistant

11.5 - 30.6% 30.7 - 38.8% 38.9 - 45.6% 45.7 - 52.7% 52.8 - 61.7% 61.8%+

Changes over Time

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Key areas for antimicrobial stewardship implementation

Key areas for
antimicrobial stewardship
implementation



AHRQ Safety Program *(funded by HHS)*

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“Is a National Stewardship program for **AMBULATORY CARE** associated with a **DECREASE** in antibiotic prescribing?”

- 389 Ambulatory Clinics
 - Primary care, pediatrics, urgent care, IHS, FQHC, and student health
- Utilized core concepts from:
 - Comprehensive Unit-based Safety Program (*CUSP*)
 - Four Moments of Antibiotic Decision Making

CUSP The Comprehensive Unit-based Safety Program

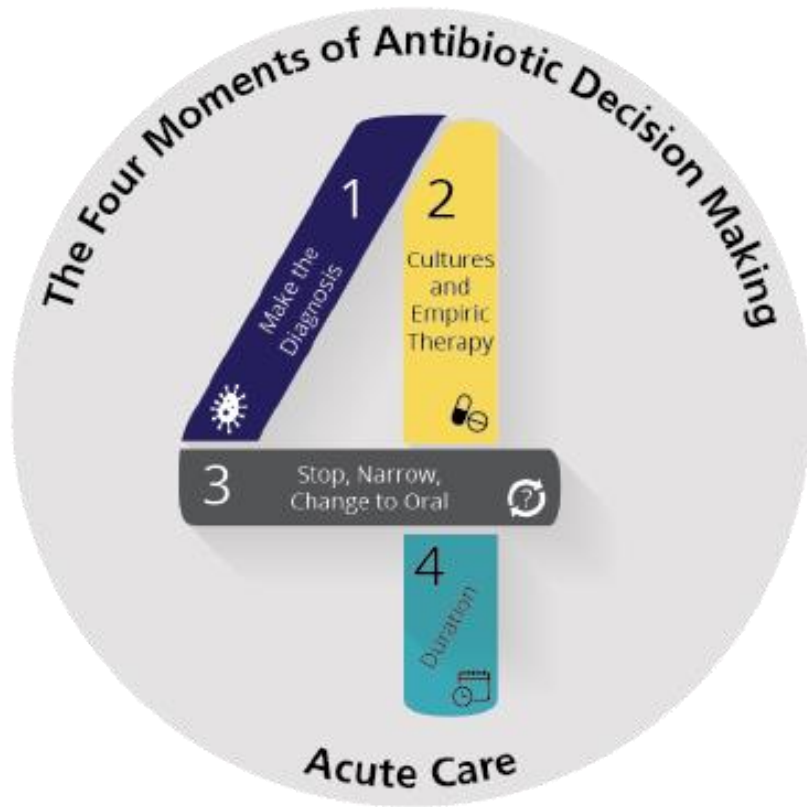
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- Goal is to create a safer clinical environment by combining:
 - ▣ improved teamwork
 - ▣ clinical best practices
 - ▣ science of safety

- Shown to prevent healthcare-associated infections (HAIs)



Module-based toolkit available on ahrq.gov



Moment 1: *Make the diagnosis*

Moment 2: *Cultures & empiric therapy*

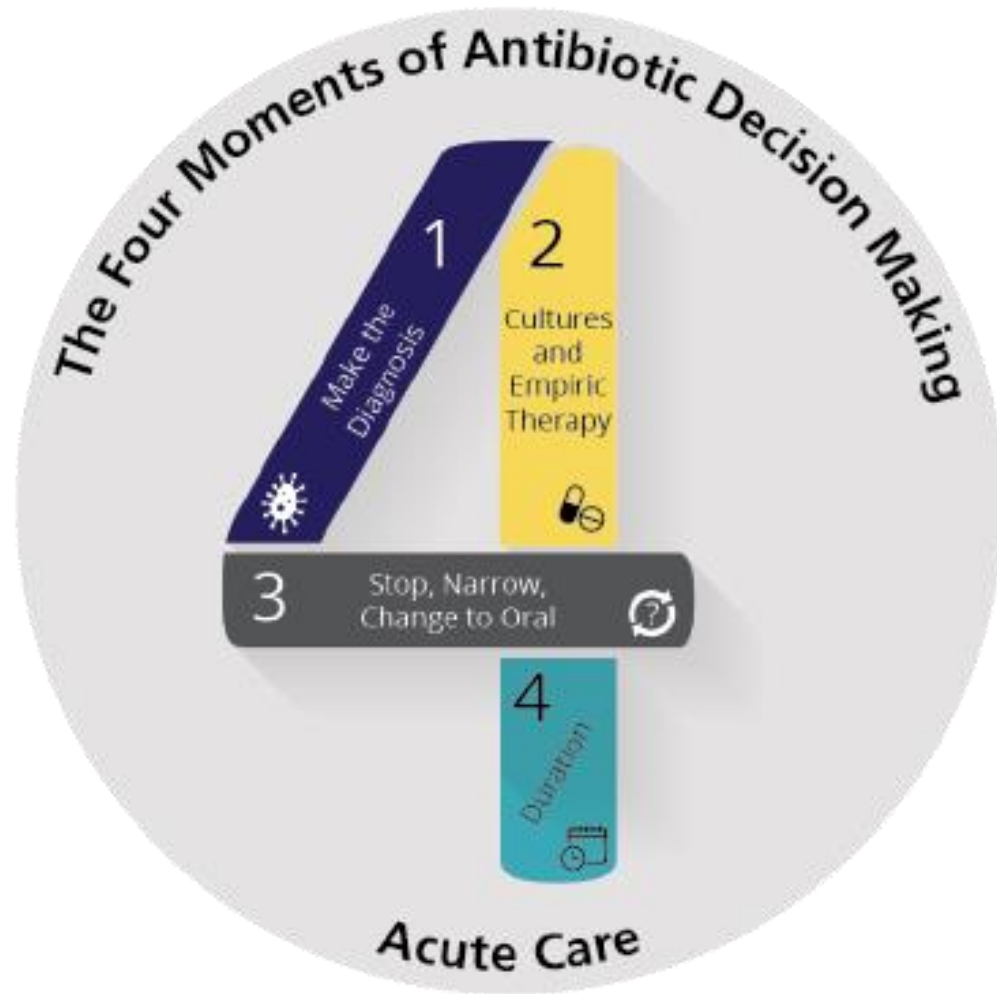
Moment 3: *Stop, narrow, change to oral*

Moment 4: *Duration*

FOUR MOMENTS OF ANTIBIOTIC DECISION MAKING

Moment 1: Make the Diagnosis

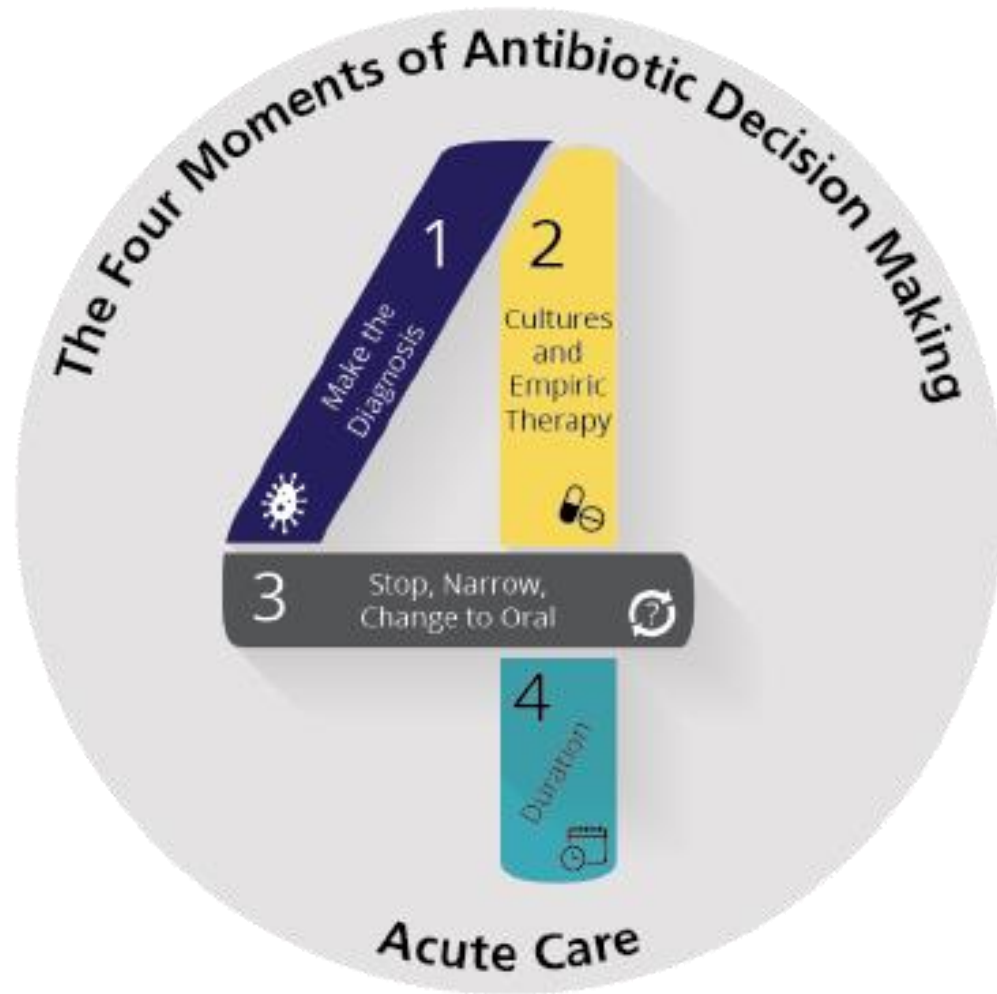
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“Does my patient have an infection that requires antibiotics?”

Moment 2: Cultures and empiric therapy

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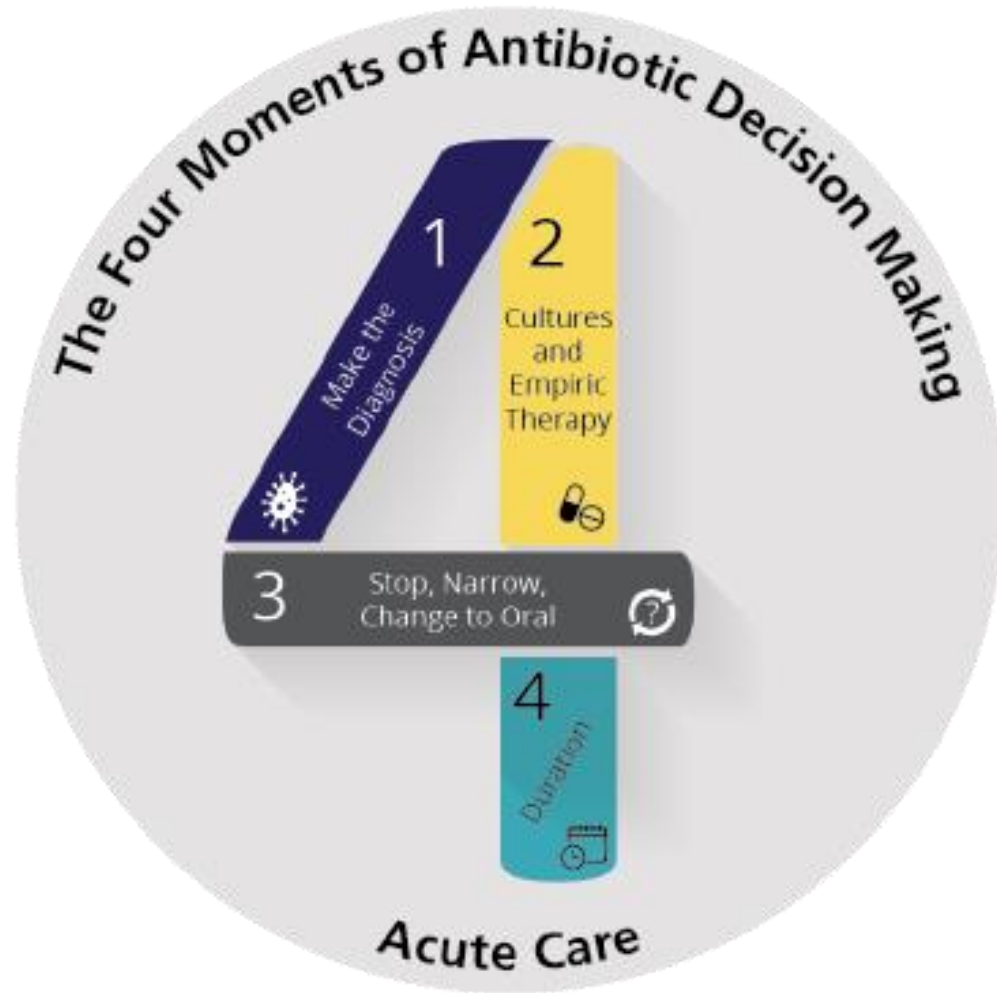


“Have I ordered appropriate cultures before starting antibiotics?”

What empiric therapy should I initiate?”

Moment 3: Stop, narrow, change to oral

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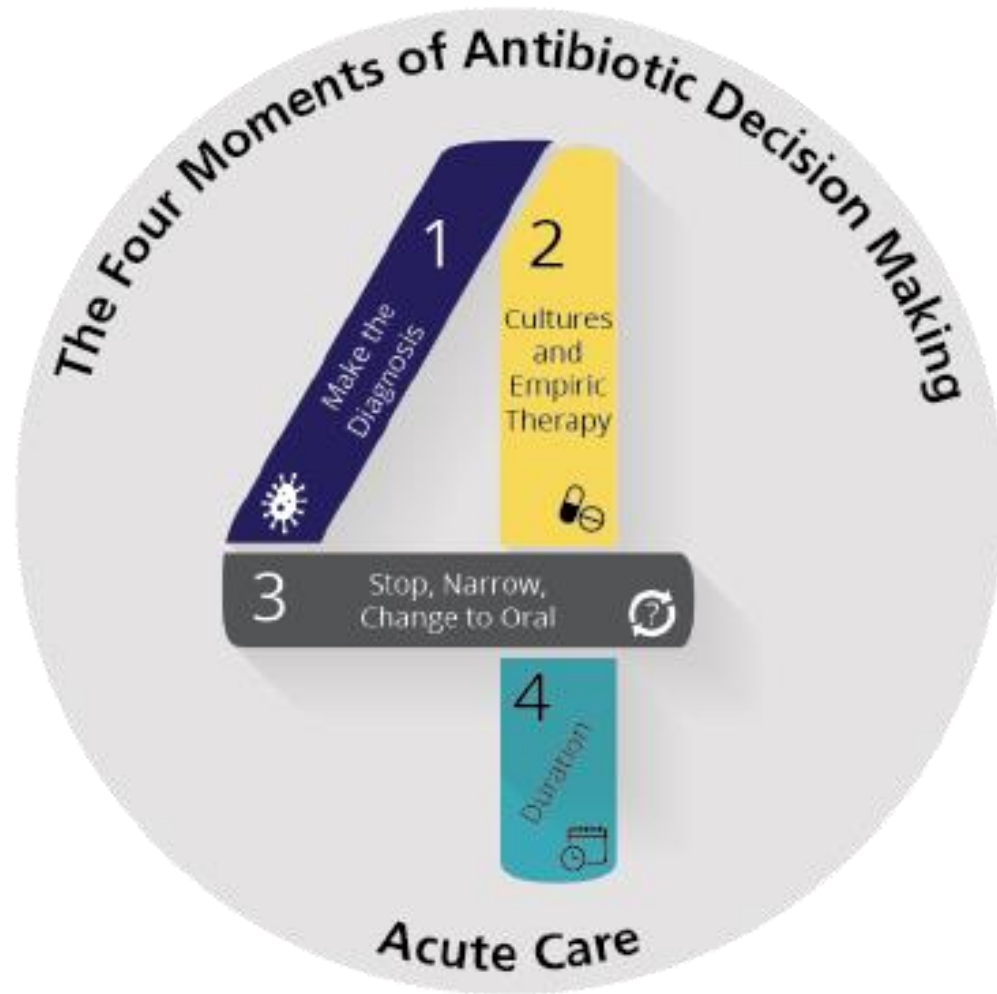
“Can I stop antibiotics?

Can I narrow therapy?

Can I change from IV to oral therapy?”

Moment 4: Duration

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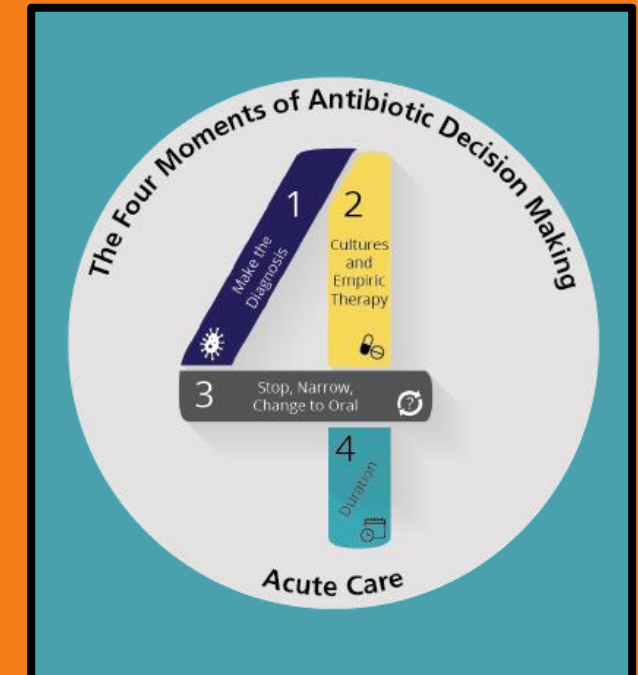
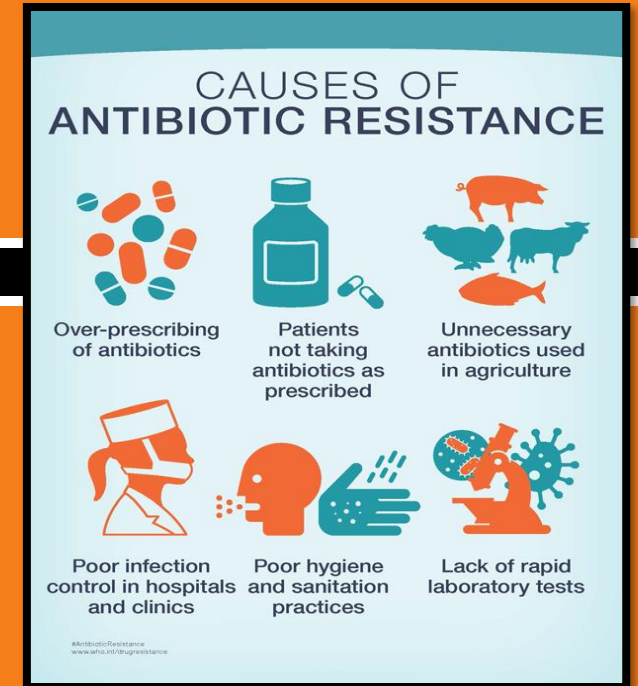
“What duration of antibiotic therapy is needed for my patient’s diagnosis?”

Results

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	Total Visits <i>Per practice per month</i>	Total Antibiotic Prescribing	Acute Respiratory Infection (ARI) Visits	ARI Antibiotic Prescribing
Baseline	1624	18.2%	321	32.9%
End of Program	1979	9.5%	239	24.7%

Key areas for antimicrobial stewardship implementation



Updated Guidelines and Pharmacology



Pharmacology Is Fun!

Updated Guidelines

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Clostridioides difficile

Sexually transmitted infections (STI)

Asymptomatic bacteriuria

Community acquired pneumonia (CAP)

Updated Guidelines

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Clostridioides difficile

Clinical Practice Guideline by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA): 2021



Clostridioides Difficile

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	Treatment Regimen
Initial episode	Fidaxomicin 200 mg PO BID for 10 days Alt: vancomycin 125 mg <u>PO</u> QID for 10 days Alt (non-severe): metronidazole 500 mg PO BID for 10-14 days
Fulminant	Vancomycin 500 mg PO/NG QID X 10 days PLUS Metronidazole 500 mg <u>IV</u> Q8H *If Ileus: Consider adding rectal vancomycin
First recurrence	Fidaxomicin 200 mg PO BID X 10 days OR Fidaxomicin 200 mg PO BID X 5 days then once every other day for 20 days OR PO Vancomycin taper

Clostridioides Difficile

□ Fidaxomicin

- ▣ Drug Class: Macrolide Antibiotic
- ▣ MOA: Binds to 50S subunit (transcription)
- ▣ Cost: Expensive (\$\$\$)

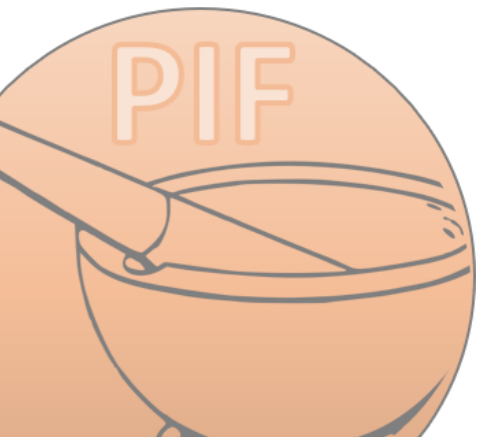
□ Vancomycin

- ▣ Drug Class: Glycopeptide
- ▣ MOA: Inhibits cell wall synthesis (D-ala-D-ala)
- ▣ Cost: More costly orally than IV (\$\$)

□ Metronidazole

- ▣ Drug Class: Nitroimidazole
- ▣ MOA: Free-Radical Damager to DNA
- ▣ Cost: Less Expensive (\$)

	Treatment Regimen
Initial episode	Fidaxomicin 200 mg PO BID for 10 days Alt: vancomycin 125 mg <u>PO</u> QID for 10 days Alt (non-severe): metronidazole 500 mg PO BID for 10-14 days
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Updated Guidelines

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Sexually transmitted infections (STI)

CDC - Treatment Guidelines
Morbidity and Mortality Weekly Report-2021



CHLAMYDIA *Chlamydia trachomatis* (Gram Negative Diplococci)

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□ Most common STI reported.

□ Treatments:

Recommend Azithromycin 1 g PO x 1 dose if

- Urogenital infection only
- Compliance is a concern
- If rectal infection treated with azithromycin, test after treatment to ensure eradication
- Pregnant patients

Recommend Doxycycline 100 mg PO BID x 7 days if

- Infection is urogenital, rectal, oropharyngeal

Alternative: Levofloxacin 500 mg PO BID x 7 days

GONORRHEA *Neisseria gonorrhoeae*

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- 2nd most common STI reported.

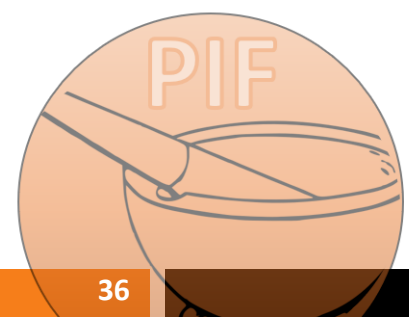
- Treatments:

Known Gonorrhea: Ceftriaxone IM x 1 dose (**≤150 kg: 500mg, >150kg: 1,000mg**)

Alternative Gonorrhea: Gentamycin 240mg IM *plus* azithromycin 2g PO x 1 dose

- Urogenital gonorrhea

Partner Therapy*: Cefixime 800 mg PO +/- doxycycline 100 mg po BID x 7 days



Antibiotic Pearls

Ceftriaxone & Cefiximine *(Cephalosporins: Inhibits cell wall production)*

- ❑ Safer in pregnancy
- ❑ Higher rates in failure associated with reinfection
- ❑ For cephalosporin MIC elevation or allergy use: Gentamicin 240 mg IM + azithromycin 2 g

Gentamycin *(Aminoglycoside: inhibition of bacterial protein synthesis by binding to 30S ribosomes)*

- ❑ Ototoxicity & Nephrotoxicity
- ❑ Avoid in Pregnancy

Doxycycline *(Tetracycline: Inhibits protein synthesis by binding to 30S ribosomal subunit)*

- ❑ Photosensitive rash
- ❑ Avoid in pregnancy (*bone/tooth formation abnormalities*)
- ❑ Interactions: Cations (*e.g. multi-vitamins, calcium, iron -Separate administration by several hrs*)

Azithromycin *(Macrolide: Inhibits bacterial protein synthesis by binding to 50S ribosomal subunit)*

- ❑ QTc prolongation
- ❑ Safer in pregnancy

SYPHILIS *Treponema pallidum*

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□ Disease divided in stages based on clinical findings - Guides treatment & follow-up

Primary, Secondary or EARLY latent: Benzathine PCN G 2.4 million units IM x1

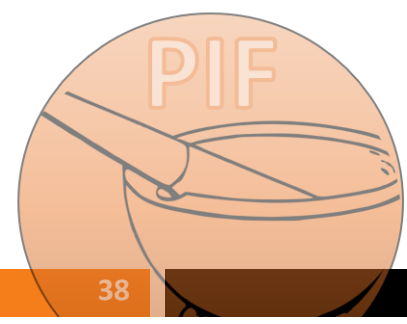
Alternative: Doxycycline 100 mg PO BID x14 days

Tertiary or LATE latent: Benzathine PCN G 2.4 million units IM once weekly x3 wks

Alternative: Doxycycline 100 mg PO BID x 4weeks

Neurosyphilis: Aqueous PCN G 3-4 million units IV Q4H or 18-24 million units continuous infusion IV x 10-14 days

If PCN allergy: consider desensitization



Syphilis Antibiotic Pearls

Penicillin G (*Penicillins: Inhibits cell wall production*)

- ❑ Preferred pregnancy, neurosyphilis & ALL disease stages
- ❑ Preparation [i.e., benzathine (IM), aqueous crystalline (IV)], dosage, and duration of treatment depend on the stage and clinical manifestations

Repository penicillins:

- Provide tissue depots from which the drug is absorbed
- IM use only
- Benzathine PCN G absorbed over days
 - Procaine PCN G absorbed over hours

Ensure correct formulation is used

Antibiotic Related Adverse Events: Syphilis Specific

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□ Jarisch-Herxheimer Reaction

- ▣ Acute febrile reaction
- ▣ Frequently accompanied by headache, myalgia, and fever
- ▣ Can occur within the first 24 hours after the initiation of any syphilis therapy
- ▣ **It is a reaction to treatment and NOT an allergic reaction**

Updated Guidelines

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Asymptomatic bacteriuria

Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America



Asymptomatic Bacteriuria (ASB)

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Screen

Pregnant women

- *Positives: Treat for 4-7 days*

Endoscopic urologic procedures
associated with mucosal trauma

- *Obtain culture prior to the procedure
and target organism*
- *1 to 2 doses started 30-60 min before
procedure*

DO NOT Screen

Infants & Children

Nonpregnant women

Functionally impaired community-dwelling persons

Older residents in long-term care facilities

Patients with diabetes

Renal transplant >1 month ago

Nonrenal solid organ transplant

Impaired voiding following spinal cord injury

Short- and long-term indwelling catheter

Elective nonurologic surgery

Implantation of or living with urologic devices

No Recommendations

Patients with high-risk neutropenia

Indwelling catheter (>30 days)

Indwelling catheters at time of
removal

Functionally or cognitively impaired patients

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No benefit to screening or treating, including:

- ❑ Bacteriuria and **delirium** but **no** local genitourinary symptoms or other systemic signs of infection
- ❑ Bacteriuria but no local genitourinary symptoms or other systemic signs of infection who experience a **fall**



Assess for **other** causes and careful **observation of UTI s/sx *rather than*** initiation of antimicrobial treatment

Updated Guidelines

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Community Acquired Pneumonia (CAP)

Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America



Initial Treatment of Outpatient CAP

Patient Characteristics	Treatment Regimen		
Age < 65 years No comorbidities No recent antibiotics No risk factors for MRSA or Pseudomonas Likely Organisms: <i>S. pneumoniae</i> , <i>H. influenzae</i> , and atypical pathogens (ie, <i>M. pneumoniae</i> , <i>L. pneumophila</i> , and <i>C. pneumoniae</i>)	Amoxicillin (High dose: 1 gram PO TID)		
	Doxycycline		
	Macrolide (if local resistance is <25%)		
Age 65+ years With comorbidities Recent antibiotics Likely Organisms: Beta-lactamase-producing <i>H. influenzae</i> , <i>M. catarrhalis</i> , and methicillin-susceptible <i>S. aureus</i> in addition to <i>S. pneumoniae</i> and atypical pathogens. Structural lung disease: Enterobacteriaceae (eg, <i>E. coli</i> , <i>Klebsiella</i> spp)	amoxicillin/clavulanate <u>OR</u> cefpodoxime <u>OR</u> cefuroxime	<u>AND</u>	azithromycin <u>OR</u> clarithromycin <u>OR</u> doxycycline
	Levofloxacin OR moxifloxacin		

MRSA or Pseudomonas Risk factors: history of respiratory MRSA or *P. aeruginosa*, Recent hospitalization with IV antibiotics (within 90 days)

Comorbidities: chronic heart, lung, liver or renal disease, diabetes mellitus, alcoholism, malignancy, asplenia

Legionella: *First-Line therapy is always a Respiratory Fluoroquinolone*



Parting Thoughts

We have discussed...

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1. The importance of antimicrobial stewardship in ambulatory care.
2. The key areas for antimicrobial stewardship implementation in the physician assistant daily practice.
3. The current trends in antimicrobial pharmacology for antimicrobials and infections common in ambulatory care.



Commitment Action Tracking & Reporting Education & Expertise



CDC Core Elements Outpatient Antibiotic Stewardship

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Commitment Action Tracking & Reporting Education & Expertise

Facility Checklist for Core Elements of Outpatient Antibiotic Stewardship

CDC recommends that outpatient care facilities take steps to implement antibiotic stewardship activities. Use this checklist as a baseline assessment of policies and practices that are in place. Then use the checklist to review progress in expanding stewardship activities on a regular basis (e.g., annually).

COMMITMENT

1. Can your facility demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety related to antibiotics? ☐ Yes ☐ No
- If yes, indicate which of the following are in place. (Select all that apply.)
- ☐ Identify a single leader to direct antibiotic stewardship activities within a facility.
 - ☐ Include antibiotic stewardship-related duties in position descriptions or job evaluation criteria.
 - ☐ Communicate with all clinic staff members to set patient expectations.

ACTION

2. Has your facility implemented at least one policy or practice to improve antibiotic prescribing? ☐ Yes ☐ No
- If yes, indicate which interventions are in place. (Select all that apply.)
- ☐ Provide communications skills training for clinicians.
 - ☐ Require explicit written justification in the medical record for nonrecommended antibiotic prescribing.
 - ☐ Provide support for clinical decisions.
 - ☐ Use call centers, nurse hotlines, or pharmacist consultations as triage systems to prevent unnecessary visits.

TRACKING AND REPORTING

3. Does your facility monitor at least one aspect of antibiotic prescribing? ☐ Yes ☐ No
- If yes, indicate which of the following are being tracked. (Select all that apply.)
- ☐ Track and report antibiotic prescribing for one or more high-priority conditions.
 - ☐ Track and report the percentage of all visits leading to antibiotic prescriptions.
 - ☐ (If already tracking and reporting one of the above) Track and report, at the level of a health care system, complications of antibiotic use and antibiotic resistance trends among common outpatient bacterial pathogens.
 - ☐ Assess and share performance on quality measures and established reduction goals addressing appropriate antibiotic prescribing from health care plans and payers.

EDUCATION AND EXPERTISE

4. Does your facility provide resources to clinicians and patients on evidence-based antibiotic prescribing? ☐ Yes ☐ No
- If yes, indicate how your facility provides antibiotic stewardship education. (Select all that apply.)
- ☐ Provide face-to-face educational training (academic detailing).
 - ☐ Provide continuing education activities for clinicians.
 - ☐ Ensure timely access to persons with expertise.

CDC Core Elements Outpatient Antibiotic Stewardship

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- ✓ Combination of interventions are more effective than single interventions
- ✓ Interventions targeting decreases in overall antibiotic prescriptions were more often effective than interventions targeting improvements in antibiotic selection
- ✓ Using EHR clinical decision support systems improves antibiotic selection – develop the process around the user and educate providers on how to use it
- ✓ Educate parents on antibiotic use including possible adverse effects
- ✓ No single intervention is recommended for all settings
- ✓ Clinician education should be interactive not passive and include communication skills

Antimicrobial Stewardship in Ambulatory Care

Do Bugs *NEED* Drugs?



Sometimes, NO!

..and it's our responsibility
to be good Stewards and
know when, which, how
much and how often!

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September 2023

**Go forth and
make awesomeness.**

Rinse. Repeat.