Bugs and Drugs: Antimicrobial Stewardship in Ambulatory Care

MT Academy of Family Physicians
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Shannon Puckett May, PharmD, BCACP, CPP
Clinical Pharmacist Supervisor
Riverstone Health Clinic, Billings, MT

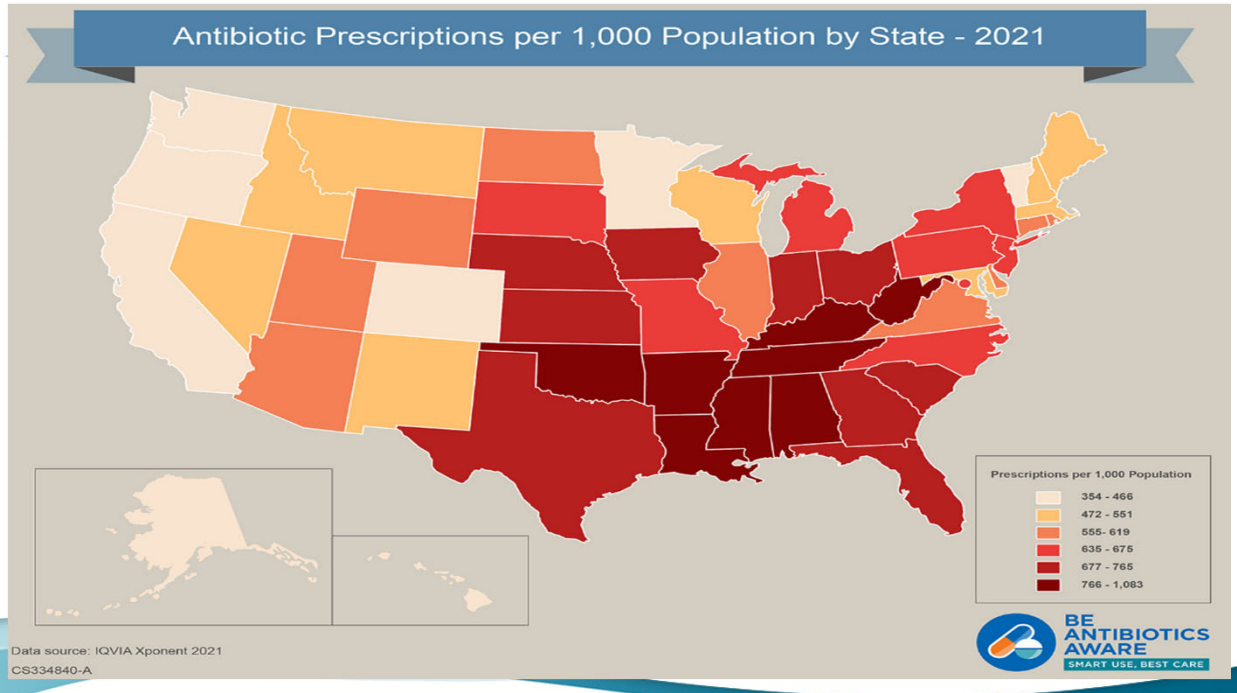
Objectives

1. Review the CDC and Joint Commission Standards for Ambulatory Antimicrobial Stewardship
2. Identify Common Disease States that may benefit from Ambulatory Antimicrobial Stewardship Program
3. Design an antibiotic regimen that follows outpatient antimicrobial stewardship principles

Background

- CDC estimates 2.8 million illnesses and 35,000 deaths/year due to antibiotic-resistant bacteria in the US
- 10% of adult and 20% of peds outpatient visits result in an antibiotic prescription
- 269 million antibiotic RXs dispensed from outpatient pharmacies each year
- Estimates show approx. 30% of outpatient antibiotics prescribed are unnecessary

Rivera, Infectious Dis Amb Care, 2022



https://www.cdc.gov/antibiotic-use/data/report-2021.html

CDC Statistics ABX RX'ing 2021

SPECIALTY	NUMBER OF ANTIBIOTIC PRESCRIPTIONS (MILLIONS)	ANTIBIOTIC PRESCRIPTIONS PER HEALTHCARE PROFESSIONAL, RATE
Primary Care Physicians	61.2	258
Physician Assistants and Nurse Practitioners	69.8	403
Surgical Specialties	10.3	183
Dentistry	25.5	208
Emergency Medicine	10.7	332
Dermatology	5.7	505
Obstetrics/Gynecology	4.6	122
Other	17.1	82
All Healthcare Professionals	211.1	231

62% of Total Prescriptions

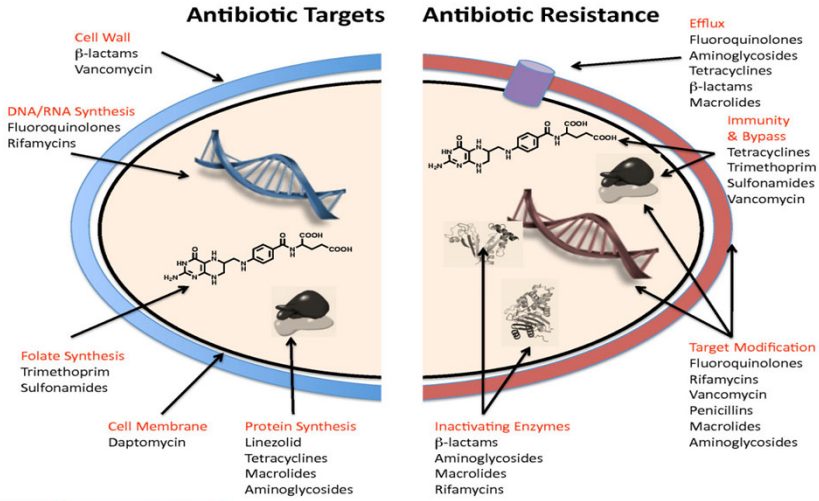
https://www.cdc.gov/antibiotic-use/data/report-2021.html

Top oral antibiotic classes and agents—United States, 2021

ANTIBIOTIC AGENT	NUMBER OF ANTIBIOTIC PRESCRIPTIONS (MILLIONS)	ANTIBIOTIC PRESCRIPTIONS PER 1,000 PERSONS, RATE
Amoxicillin	42.9	129
Azithromycin	28.7	86
Amoxicillin clavulanic acid	22.6	68
Doxycycline	21.7	65
Cephalexin	20.5	62

https://www.cdc.gov/antibiotic-use/data/report-2021.html

Mechanisms of Antimicrobial Resistance



https://commons.wikimedia.org/wiki/File:Antibiotic_resistance_mechanisms.jpg

Antimicrobial Stewardship (AS)

- Antimicrobial resistance threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi

"The Right Drug at the Right Time at the Right Dose for the Right Duration"

- AS describes a range of concepts including institutional programs, best clinical practices, targeted initiatives, clinical roles, and general philosophy of the safe and effective use of antimicrobial agents.

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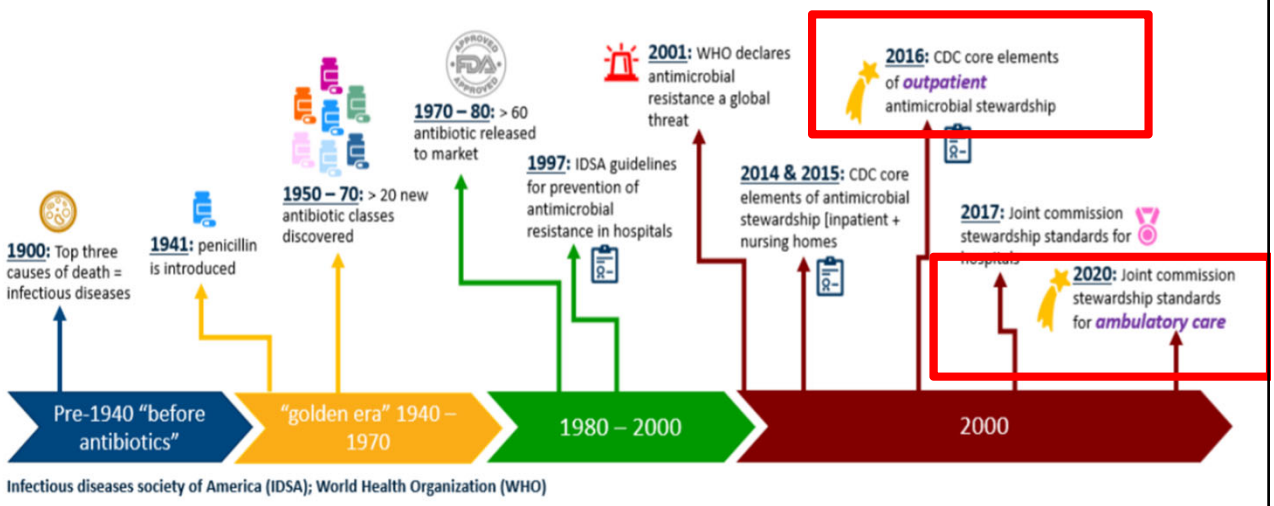
Timeline – Antibiotics + Resistance + Stewardship



Infectious diseases society of America (IDSA); World Health Organization (WHO)

Int. J. Mol. Sci. 2020, 21, 7047; doi:10.3390/ijms21197047; Clin Antimicrobi Rev. 2021, doi:10.1128/CMR.00003-20; FDA image: FDA-Approved - IACT Health

Joint Commission Standards 2020

Core Element	Ambulatory Setting
Element 1	Identifies an antimicrobial stewardship leader
Element 2	Establishes an annual antimicrobial stewardship goal
Element 3	Implements evidence-based practice guidelines related to the antimicrobial stewardship goal
Element 4	Provides clinical staff with educational resources related to the antimicrobial stewardship goal
Element 5	Collects, analyzes, and reports data related to the antimicrobial stewardship goal

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CDC OpAS 2016 and 2021

- OpAS = Outpatient Antimicrobial Stewardship
- Core elements: Commitment, Action, Tracking/Reporting, Education and Expertise
- Targets: Primary Care Clinics, Dental Clinics, Mid-Level Providers, Outpatient specialty clinics, Retail Health Clinics, Outpatient Health Systems

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COMMITMENT: CDC Core Element1/TJC 1/2

- ✓ Write and display public commitments in support of antimicrobial stewardship
- ✓ Identify a leader to direct AS activities
- ✓ Include antibiotic stewardship-related duties in position descriptions/job evaluations
- ✓ Set expectations with clinic staff and patients

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ACTION: CDC2, TJC 2/3

- EMR Evaluation and Dx Criteria for common infections
- Algorithm-based order sets
- Local Antibiograms (FirstLine/Spectrum) Access
- Clinician Decision Support Tools and Training
- Watchful Waiting
- Viral illness prescription for symptom management

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TRACKING/REPORTING: CDC 3, TJC 5

- Choose at least 1 annual goal for antibiotic tracking and prescribing/reporting
  - Ie reduce abx prescribing for viral dx by x%
  - X number of C/S followups within 24 hours
- Share clinician performance on goals and quality measures set
- Audit and Feedback:
  - Real Time Dashboards with stewardship metrics, peer comparison, group prescribing trends

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EDUCATION/EXPERTISE: CDC 4, TJC 4

Patients

Clear communication when abx are needed and when they are not

Educate about potential harms of treatment

Provide written materials

Providers

Face to Face Education (Or Teams)

Continuing Educations

Access to expertise (ID and Clinical Pharmacists)

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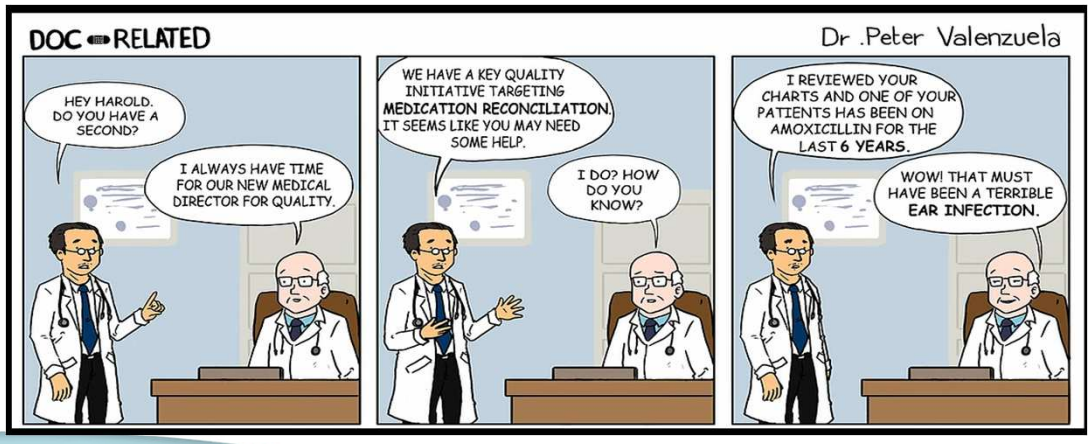
OpAS Core Element 4: Education and CE



Ambulatory Antimicrobial Stewardship Targets

- ✓ Condition Targets: Overprescribed, Over-diagnosed
- ✓ Culture and Sensitivity F/U (Wrong Drug/Duration)
- ✓ Watchful Waiting/ Delayed Prescribing Practices

- ✓ Examples of AS Primary Care Targets: Upper Respiratory Tract Infections (URTIs), Urinary Tract Infections/Asymptomatic Bacteruria, Skin and Soft Tissue Infections

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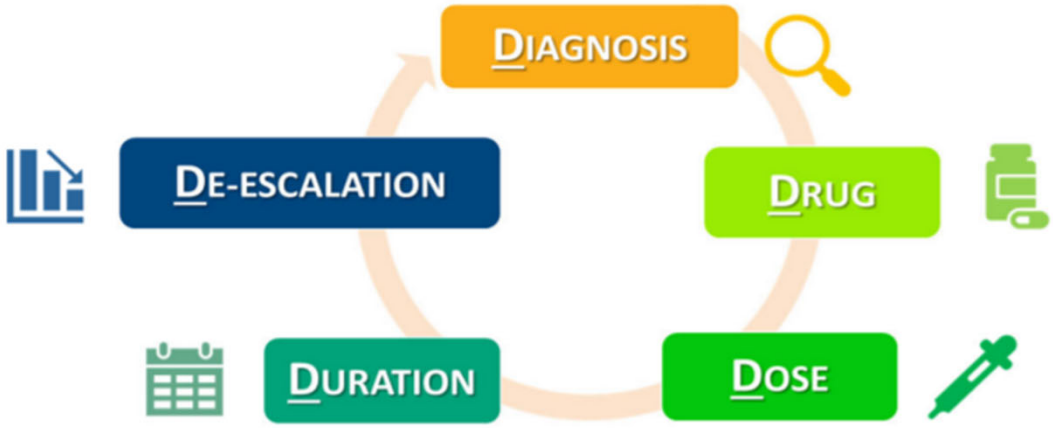
CDC Antibiotic THREATS Report 2019

URGENT THREATS	SERIOUS THREATS**	CONCERNING THREATS
Carbapenem-resistant *Acinetobacter*	ESBL-producing Enterobacterales	Erythromycin-Resistant Group A *Streptococcus*
Candida auris	Vancomycin-resistant *Enterococci* (VRE)	Clindamycin-resistant Group B *Streptococcus*
Clostridioides difficile	Multidrug-resistant *Pseudomonas aeruginosa*	**Watch List**
Carbapenem-resistant Enterobacterales	Methicillin-resistant *Staphylococcus aureus* (MRSA)	Azole-resistant *Aspergillus fumigatus*
Drug-resistant *Neisseria gonorrhoeae*	Drug-resistant *Streptococcus pneumoniae*	Drug-resistant *Mycoplasma genitalium*
	Drug-resistant Tuberculosis	Drug-resistant *Bordetella pertussis*

https://www.cdc.gov/drugresistance/biggest-threats.html

**Other organisms: Campylobacter, Candida, Salmonella (both non and typhi, Shigella

The 5 Ds of Antimicrobial Stewardship



Gobel MC, Trautner BW, Grigoryan L. 2021. The five Ds of outpatient antibiotic stewardship for urinary tract infections. Clin Microbiol Rev 34:e00003-20.https//doi.org/10.1128/CMR.00003-20.

Asymptomatic Bacteruria (ASB) vs UTI

Criteria	UTI	ASB	Not a Symptom of UTI
+ urine culture	+	+/-	• Cloudy Urine • Foul Smelling Urine • Sediment in Urine • Dirty Urinalysis • + UA or culture lacking symptoms • Confusion w/out ruling out other cause • Family insisting it's a UTI
Dysuria, urgency, frequency	+	--	
Flank/suprapubic pain	+/-	--	
Fever	+/-	+/-	
Hypotension	+/-	+/-	
Leukocytosis	+/-	+/-	
Pyuria > 50	+/-	+/-	

https://www.uwhealth.org/cckm/cpg/infection-and-isolation/name-97539-en.html .

Firstline E. Coli Resistance (Urine Isolates Only) BC 2021*

Antimicrobial	Number of Urine Isolates	% Susceptibility
Cefazolin	4298	97%
Cefepime	4298	97%
Ceftriaxone	4298	96%
Tobramycin	4298	96%
Nitrofurantoin	4298	96%
Gentamicin	4298	95%
Piperacillin-Tazobactam	4298	95%
Levofloxacin	4298	84%
Trimethoprim-Sulfamethoxazole	4298	83%
Ampicillin-Sulbactam	4298	71%

5 D's for prescribing for UTIs

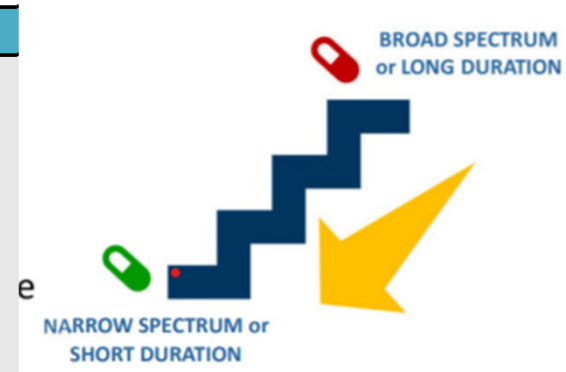
Diagnosis: Appropriate urine collection, reflex cultures, clinical decision aids, clear approach for patients "in the middle", text with help in culture results

Drug: Choose the right drug, take into consideration local resistance patterns, side effects, patient specific factors. Start as narrow as possible with local antibiograms

Dose: Appropriate dose/duration KEY. Underdosing + Excessive Duration= **INCREASED RESISTANCE**

Duration: shorter duration as efficacious in uncomplicated cystitis , no difference between 3 days vs extended > 5 days and increased risk for ADRS such as C dif

De-Escalation: Based on culture results



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Upper Respiratory Tract Infections

- The most common indications for inappropriate outpatient antimicrobial prescriptions in adults and children are sinusitis, otitis media, and pharyngitis (Fleming-Dutra 2016)
- AS Interventions have shown reductions in antibiotic prescribing with provider education, communication training, delayed prescribing, and audit/feedback (Dutcher 2022; Stuart 2021).

Upper Respiratory Tract Infections (URTIs)

Condition	Diagnosis	Management
Acute Rhinosinusitis	Viral – 98% Bacterial- severe symptoms > 3-4 days, fever, purulent drainage, facial pain. Persistent > 10 days w/out improvement or worsening	Watchful waiting Oral beta-lactams 1st Line Doxycycline (PCN allergic) Macrolides not rec due to high Strep PNA resistance
Acute bronchitis	Cough most common s/s R/O pneumonia- RR >24;HR > 100 bpm; T > 100F + abnormal lung findings	Routine tx with abx is not recommended, regardless of cough duration. Symptomatic Tx: Cough suppressants (benzonatate, dextromethorphan); Antihistamines, decongestants
Non-Spec URTI	"Common Cold" Prominent cold symptoms include fever, cough, rhinorrhea, nasal congestion, postnasal drip, sore throat, headache, and myalgias.	Decongestants PLUS antihistamines, NSAIDs See viral management prescription (next slide)
Pharyngitis	Group A beta-hemolytic streptococcal (GAS) infection Only 5–10% of adult sore throat cases are caused by GAS. Rapid antigen detection test (RADT) is necessary to establish a GAS pharyngitis vs viral pharyngitis.	Antibiotic treatment is NOT recommended for patients with negative RADT results. Amoxicillin and penicillin V remain first-line therapy GAS antibiotic resistance to azithromycin and clindamycin are increasingly common. Recommended treatment course for all oral beta lactams is 10 days

URTI: Viral Symptom Prescription

Antibiotics do NOT work in treating viral infections.

Antibiotics only help to treat bacterial infections. **Taking antibiotics when you do not need them is strongly discouraged.** They can lead to serious and harmful side effects such as allergic reactions, rashes, C. difficile infections, diarrhea, and yeast infections.

There is no cure for the common cold, but there are things you can do to help you feel better. You should:

- **Drink plenty of fluids**. Water, juice, clear broth, or warm lemon water with honey helps loosen congestion and it prevents dehydration. Avoid caffeinated drinks. They can make dehydration worse.
- **Sleep**. Adequate sleep is necessary to support your immune system so that you can recover.
- **Get good nutrition**. Eat well while you recover.
- **Wash your hands often**.
- **Add moisture to the air**. Use a humidifier or take a steamy bath. This may help loosen congestion.
- **Avoid smoking** or exposure to second hand smoke.

Fever, headache, pain or sore throat

- ☐ **Acetaminophen (Tylenol®) 500–1000 mg every 4 hours as needed**
  Maximum dose: 3000 mg of acetaminophen in 24 hours
- ☐ **Ibuprofen (Advil®, Motrin®) 400 mg every 4 hours as needed**
  Avoid if you have kidney disease, coronary heart disease, heart failure or history of gastric ulcer or gastric surgery.
  Maximum dose: 2400 mg of ibuprofen in 24 hours

Additional options for sore throat

- ☐ Lozenges or throat spray with benzocaine as needed
- ☐ Gargle with salt water several times per day.
  Mix ¼ teaspoon of table salt in 8 ounces of warm water.

Sinus drainage, sinus/nose/ear congestion

- ☐ Saline nasal spray or saline rinse (Simply Saline™, Ocean Nasal Spray, Neilmed®) as needed
- ☐ Steroid nasal spray (Flonase®, Nasacort®, fluticasone) as directed on package instructions
- ☐ Pseudoephedrine capsules (Sudafed®) as directed on package instructions
  Avoid if you have high blood pressure, heart disease or take beta-blockers (atenolol, metoprolol, etc.). Do not exceed 240 mg per day.
- ☐ Oxymetazoline nasal spray (Afrin®, Sinex™) as directed on package instructions. Do not use longer than 5 days.

Skin and Soft Tissue Infections

- Several algorithms for management – purulent (Staph coverage) vs non-purulent (Strep coverage) based on severity , recent abx use etc.
- Duration: Use a 5-day course of antibiotics active against streptococci or staph, use local antibiogram data, particularly for patients able to self-monitor and who have close follow-up with primary care.

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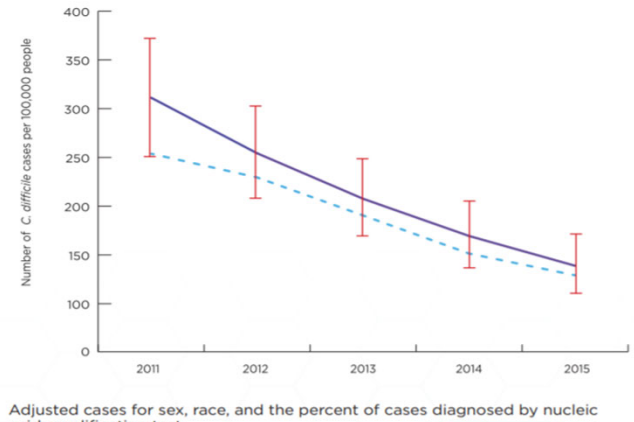
Antibiogram Data 2022 Strep and Staph Isolates Billings Clinic

Isolate	PCNs	Cephalosporins	Vancomycin	Macrolides	Clinda	FQs	Tetracycline	Trimeth/Sul
Group A Strep	S	S	S	**R**	**R**	NR	NR	NR
Group B Strep	S	S	S	**R**	53% (NR)	NR	NR	NR
Strep Pneumoniae N=53	100% (PCN G IV)	100% (Rocephin)	100%	74% (Erythro)	NR	100% (Levo)	95%	NR
MSSA N=1018	100% (Nafcil/ Oxacilin	100 % (Ancef)	100%	70% (erythro)	82%	NR	95%	99%
MRSA N=447	R	R	100%	13%	76%	NR	89%	96%

C Difficile ; An AS Story



C. difficile Ambulatory Treatment:

1. Infection Control: Reduce Spread w/ hand hygiene
2. Discontinue inciting abx
    1. FQ's, clindamycin
3. Management of fluids, nutrition, diarrhea
4. Fidaxomicin 200 mg BID x10 days
   Vancomycin 125 mg PO QID x10 days;
   Metronidazole 500 TID x10-14 days**

only if above are unavailable

Johnson, Clin Infect Dis 2021

Is it a Penicillin Allergy?

- **Approximately 10% of all U.S. patients report having an allergic reaction to a penicillin class antibiotic in their past**
- **< 1% of the population are truly allergic to penicillins (do not have true IgE-mediated reactions)**
- **80% of patients with IgE-mediated penicillin allergy lose their sensitivity after 10 years**
- **Broad-spectrum antibiotics are often used as an alternative to PCNs when not necessary**
- **The use of broad-spectrum antibiotics in patients labeled "penicillin-allergic" is associated with higher healthcare costs, increased risk for antibiotic resistance, and suboptimal antibiotic therapy**

1. Joint Task Force on Practice Parameters representing the American Academy of Allergy, Asthma and Immunology; American College of Allergy, Asthma and Immunology; Joint Council of Allergy, Asthma and Immunology. Drug allergy: an updated practice parameter. Ann Allergy Asthma Immunol. 2010 Oct;105(4):259-273.

- **Conduct a Thorough H&P**
- What medication were you taking when the reaction occurred?
- What kind of reaction occurred?
- How long ago did the reaction occur? – How was the reaction managed?
- What was the outcome?

- **Characteristics of an IgE-mediated (Type 1) reaction:**
- Reactions occur immediately or within one hour
- Hives
- Angioedema
- Wheezing and shortness of breath
- Anaphylaxis

Patient Case: Altered Mental Status

83 yof patient seen in SDC for daughter call that patient has UTI s/s. PMH: HTN, hypothyroidism, DM II. Patient is somewhat confused, does not report urgency, urinary pain, abdominal pain, hematuria, fevers/chills . Family reports patient has AMS and her urine is "dark" and this is how she gets when she has a UTI .

Allergies: PCN (teenager-stomach upset), HCTZ- anaphylaxis
Vitals: BP 144/89, HR 62, O2 95%, T 98.6F
Meds: losartan 50 mg daily, ibuprofen 400 mg q6H prn, metformin 1000 mg BID, Jardiance 25 mg daily, levothyroxine 88 mcg daily
Physical Exam: abdominal/costovertebral tenderness absent.
Urinalysis: 14 WBCs, nitrite+, 7 squamous epithelial cells, moderate bacteria, negative leukocyte esterase
Relevant CMP- SCr 1.4, eGFR 34 mL/min, K+ 5.0, BUN 44, Na+ 142

Patient Case:

What is the best course of action for this patient using the CDC/TJC Ambulatory Care Core Elements for AS?

A. Educate caregiver this is asymptomatic bacteruria and encourage fluids and rest . Have RN call in 24 hours to evaluate symptoms
B. HOLD SGLT2, NSAID due to dehydration/AKI
C. Start empiric sulfamethoxazole-trimethoprim 1 DS tablet BID x3 days
D. A and B
E. Send her to the ER for further evaluation of AMS

Element 4: Educational Resources

1. CDC Core Elements of Antibiotic Stewardship 2021. Available at www.cdc.gov/antibiotic-use/core-elements/index.html

2. The Joint Commission 2020: Available at www. idsociety.org/practice-guideline/implementingan-ASP/

3. Barlam TF, Cosgrove SE, Abbo LM, et al. Implementing an antibiotic stewardship program: guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. Available at www. idsociety.org/practice-guideline/implementingan-ASP/

Patient Campaigns

CDC Campaign

www.cdc.gov/antibiotic-use

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

https://www.cdc.gov/antibiotic-use/

Review Question 1

All of the following **EXCEPT** what is a CDC Core Elements for Outpatient Antimicrobial Stewardship?

A. Empiric Abx selection based on local Antibiogram Data
B. Tracking/Reporting of AS Goals
C. Providing Educational Materials for Patients on Antibiotic Prescribing
D. Ordering Urinalysis on all patients presenting to clinic complaining of foul-smelling urine

Review Question 2

The 5 “D’s” of Outpatient Antimicrobial Stewardship are:

A. Diagnosis, Drug, Dose, Duration, De-escalation
B. Drug, Dose, Decontaminate, Debride, Duration
C. Diagnosis, De-escalate, Disassociate, Drug, Deprescribe
D. Dodge, Duck, Dip, Dive, Dodge

References

1. Rivera, C. Antmicrobial Stewardship in Ambulatory Care. In: Irons BK, Meredith AH, eds. Ambulatory Care Self-Assessment Program, 2022 Book 2. Infectious Diseases in Ambulatory Care. Lenexa, KS: American College of Clinical Pharmacy, 2022:page range. Pgs 125-145

Centers for Disease Control and Prevention. 2021. Core Elements of Antibiotic Stewardship. Available at www.cdc.gov/antibiotic-use/core-elements/index.html

2. Barlam TF, Cosgrove SE, Abbo LM, et al. Implementing an antibiotic stewardship program: guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. 2020. Available at www.idsociety.org/practice-guideline/implementingan-ASP/

3. The Joint Commission (TJC). 2016. R3 Report: Requirement, Rationale, Reference: New antimicrobial stewardship standard. Available at www.jointcommission.org/-/media/tjc/documents/standards/r3-reports/r3_antimicrobial_stewardship.pdf

4. The Joint Commission (TJC). 2019. R3 Report: Requirement, Rationale, Reference: Antimicrobial Stewardship in Ambulatory Health Care. Available at www.jointcommission.org/-/media/tjc/documents/standards/r3-reports/r3_23_antimicrobial_stewardship_amb_6_14_19_final2.pdf.

5. Fleming-Dutra KE, et al. Prevalence of inappropriate antibiotic prescriptions among U.S. ambulatory care visits, 2010 – 2011. JAMA 2016;315:1864 – 73

6. Int J Mol Sci. 2020 Oct; 21(19): 7047. Published online 2020 Sep 24. doi: 10.3390/ijms21197047

References

7. Dobson EL, Klepser ME, Pogue JM, et al. Outpatient antibiotic stewardship: Interventions and opportunities. J Am Pharm Assoc 2017;57:464-73.

8. Nicolle LE, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America. Clin Infect Dis. 2019 Hooton et al

9. International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the IDSA and the European Society for Microbiology and Infectious Diseases, Clinical Infectious Diseases, Volume 52, Issue 5, 1 March 2011, Pages e103–e120

10. Johnson S, Lavergne V, Skinner AM, et al. Clinical Practice Guideline by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA): 2021 Focused Update Guidelines on Management of Clostridioides difficile Infection in Adults. Clin Infect Dis 2021; 24:ciab549. Available at: https://www.idsociety.org/practice-guideline/clostridioides-difficile-2021-focused-update/.

11. Joint Task Force on Practice Parameters representing the American Academy of Allergy, Asthma and Immunology; American College of Allergy, Asthma and Immunology; Joint Council of Allergy, Asthma and Immunology. Drug allergy: an updated practice parameter. Ann Allergy Asthma Immunol. 2010 Oct;105(4):259-273.

Questions?

Shannon.puc@riverstonehealth.org