

Antimicrobial Stewardship (AMS) Essentials: Defining the Role and Responsibility of non-AMS team members

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Faculty Disclosure

Danielle Casaus, PharmD, BCIDP has no relevant financial relationships (in any amount) to disclose during the past 24 months

Educational Need/Practice Gap

Gap= Antibiotic resistance is increasing at a faster rate than new antibiotics are being created

Need = A better understanding of antimicrobial stewardship measures from all healthcare team members to help reduce unnecessary antibiotic use and optimize antibiotic regimens when antibiotics are indicated

Objectives

- Understand Antimicrobial Stewardship principles set by governing bodies and discuss how to incorporate these principles into clinical practice
- Evaluate when antibiotics are appropriate for commonly encountered disease states and develop treatment plans

Expected Outcome

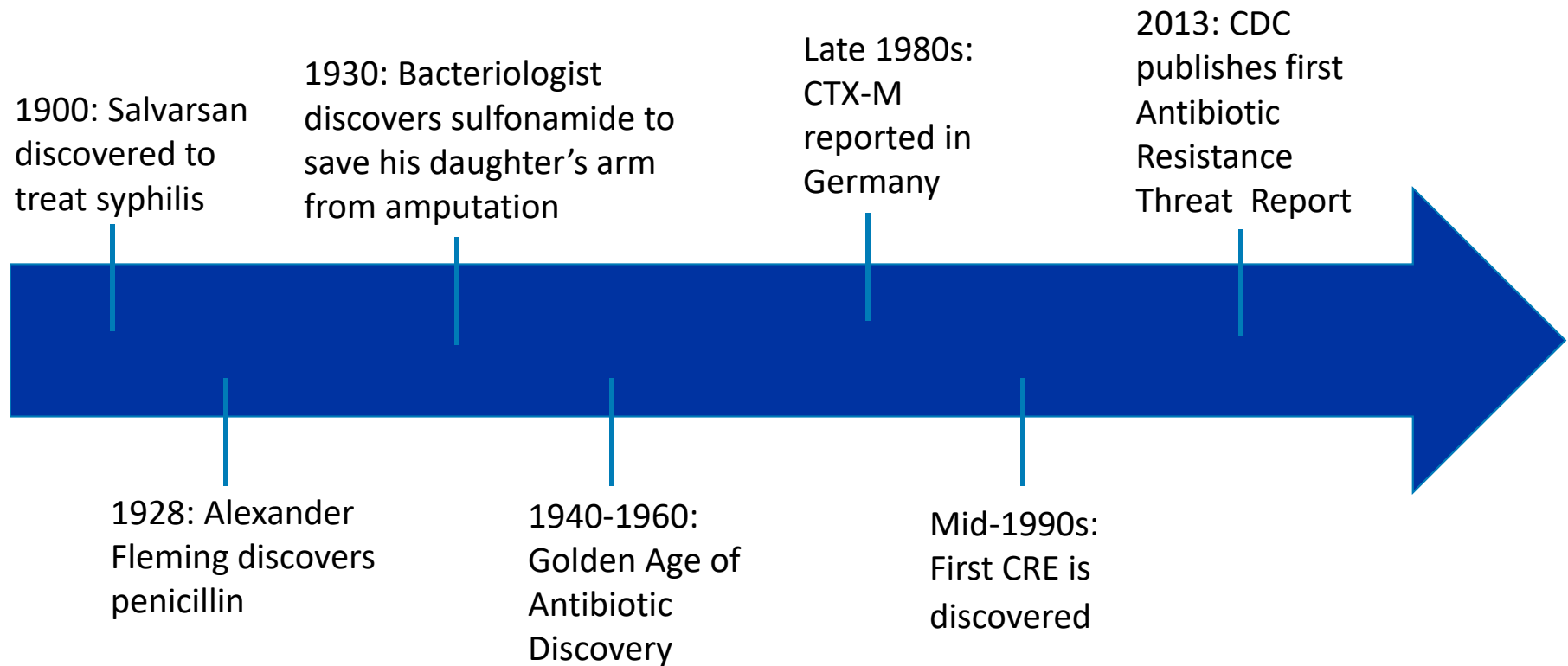
- This educational intervention aims to inform non-infectious diseases trained providers of their role in antimicrobial stewardship and review when antibiotics are appropriate for commonly encountered disease states

“If we use antibiotics when not needed, we may not have them when they are most needed.” –Tom Frieden, MD, former director of the US CDC

“ASP steers the ship but we need all hands on deck to complete the journey”- Debra Goff, PharmD, Professor of Clinical Pharmacy Practice and Science at The Ohio State University of Pharmacy

“Antibiotics are uniquely societal drugs because individual use effects others in the community and environment”-Dr. Stuart Levy, President of the Alliance for the Prudent Use of Antibiotics

Antibiotics and Antibiotic Resistance



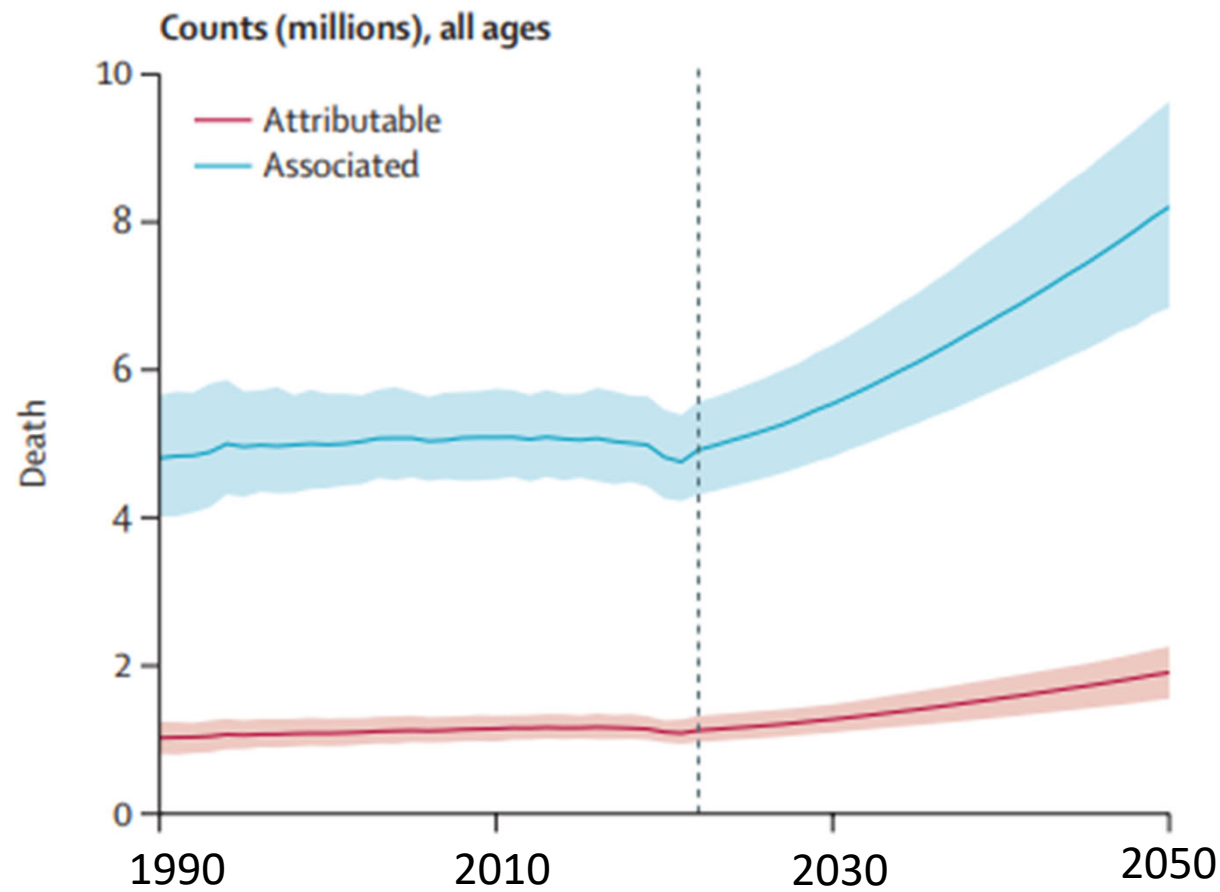
Mortality Rates Associated with Antibiotic Resistance

- 4.71 million deaths (95% UI 4.23-5.19) globally were associated with bacterial antimicrobial resistance in 2021
 - 1.14 million of those deaths were attributable to bacterial antimicrobial resistance

	Associated deaths in 1990	Associated deaths in 2021
Methicillin Resistant <i>Staphylococcus Aureus</i> (MRSA)	261,000	550,000
Gram Negative Bacteria Resistance to Carbapenems	619,000	1.3 million

Where Are We Headed?

- By the year 2050, estimated increase of 8.22 million associated deaths and 1.91 million attributable deaths



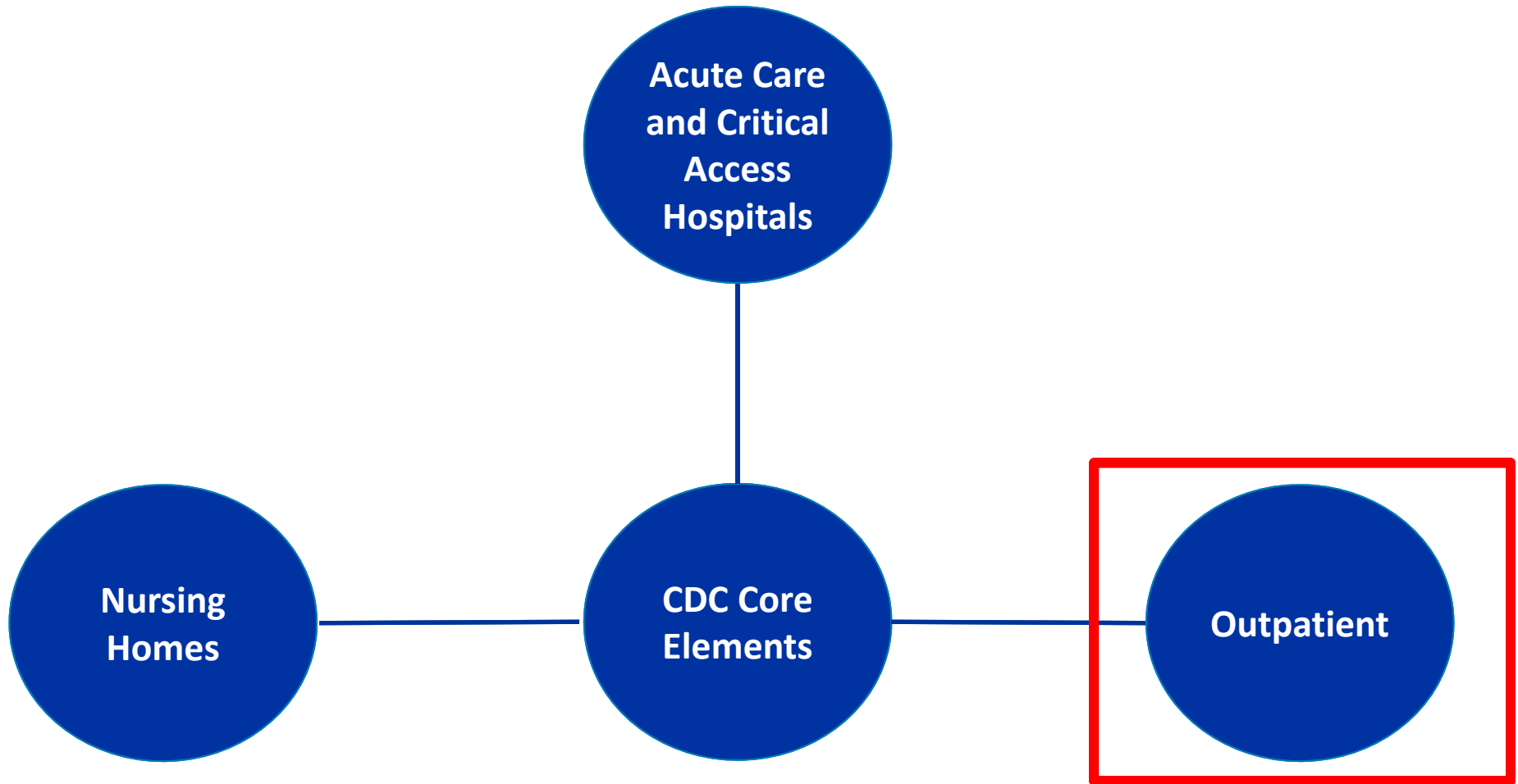
Antimicrobial Stewardship (AMS)

- Centers for Disease Control and Prevention (CDC) defines antimicrobial stewardship as the effort to measure and improve how antibiotics are prescribed by clinicians and used by patients
 - AMS ensures infections are effectively treated, protects patients from unnecessary harm related to antimicrobials, and combats antimicrobial resistance
- CDC Core Elementals recommend focusing on UTIs, community acquired pneumonia and skin and soft tissues infections since half of prescribed antibiotics in hospitals are for these disease states
- Antimicrobial Stewardship Programs are supported by several national organizations including IDSA, SHEA, CDC, Centers for Medicare and Medicaid, and Joint Commission

IDSA = Infectious Diseases Society of America

SHEA=The Society for Healthcare Epidemiology of America 10

CDC Core Elements



Outpatient Stewardship

Why it Important?

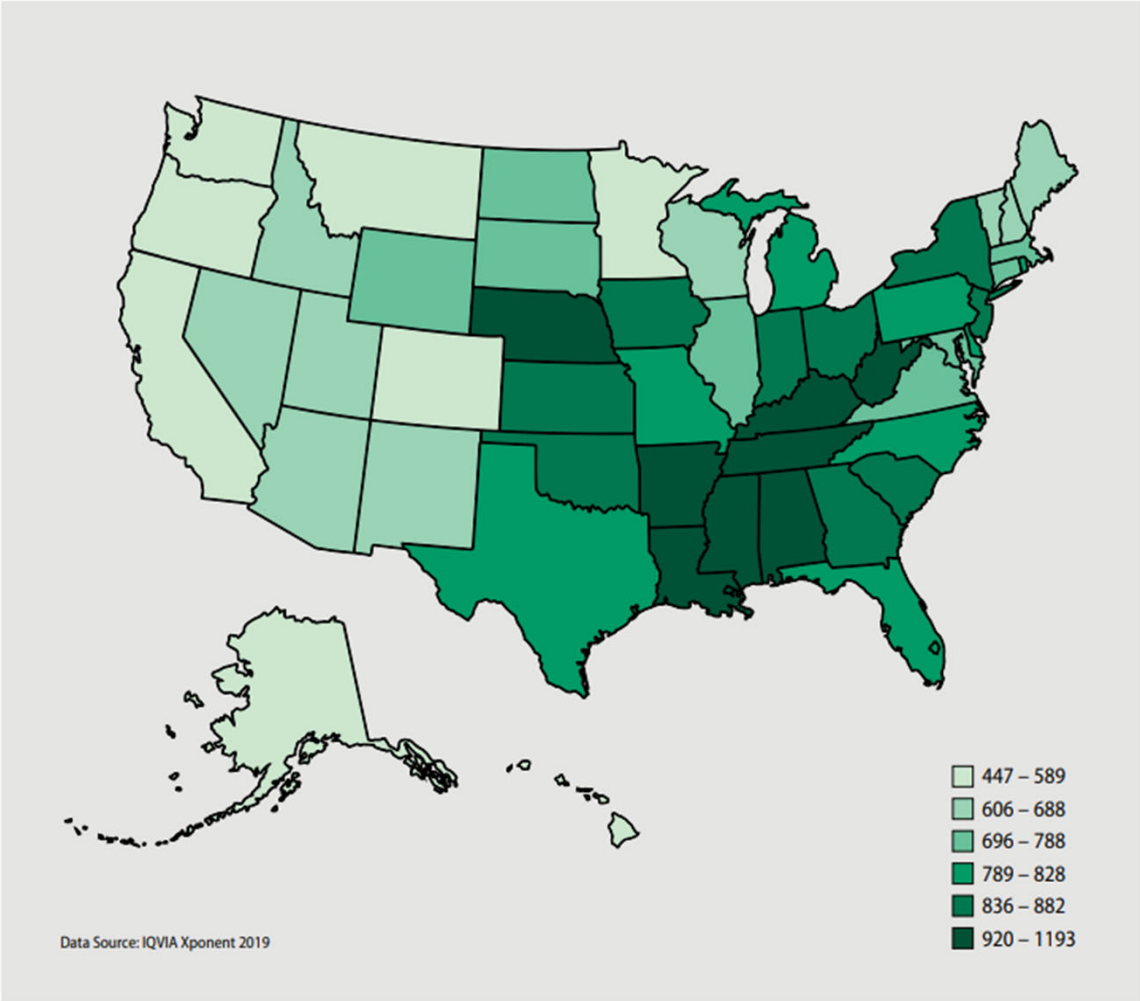
- The most modifiable risk factor for antimicrobial resistance is inappropriate prescribing of antibiotics
- The CDC reports 30% of outpatient antibiotic prescriptions are unnecessary

How we Improve?

- Improve antibiotic prescribing
- Minimize misdiagnosis or delayed diagnosis
- Ensure right drug, dose and duration are selected

Outpatient Antibiotics Prescribed in the United States

Figure 1. Community Antibiotic Prescriptions per 1,000 Population by State — 2019



Core Elements for Outpatient Stewardship

Commitment

Policy and Practice

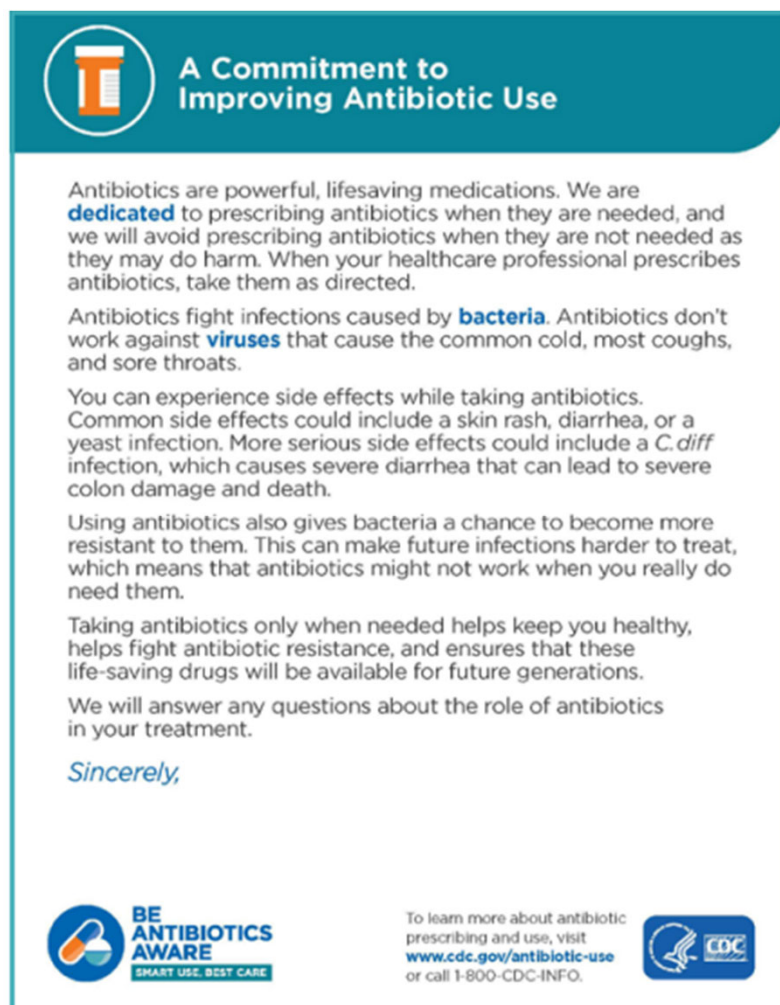
Tracking and Reporting

Education and Expertise

Outpatient Stewardship Components- Commitment

Commitment:

- Identify a leader
- Encourage all clinic staff to support AMS
- Display public commitments to AMS



A Commitment to Improving Antibiotic Use

Antibiotics are powerful, lifesaving medications. We are **dedicated** to prescribing antibiotics when they are needed, and we will avoid prescribing antibiotics when they are not needed as they may do harm. When your healthcare professional prescribes antibiotics, take them as directed.

Antibiotics fight infections caused by **bacteria**. Antibiotics don't work against **viruses** that cause the common cold, most coughs, and sore throats.


You can experience side effects while taking antibiotics. Common side effects could include a skin rash, diarrhea, or a yeast infection. More serious side effects could include a *C. diff* infection, which causes severe diarrhea that can lead to severe colon damage and death.


Using antibiotics also gives bacteria a chance to become more resistant to them. This can make future infections harder to treat, which means that antibiotics might not work when you really do need them.

Taking antibiotics only when needed helps keep you healthy, helps fight antibiotic resistance, and ensures that these life-saving drugs will be available for future generations.

We will answer any questions about the role of antibiotics in your treatment.

Sincerely,

 **BE ANTIBIOTICS AWARE**
SMART USE. BEST CARE.

To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use or call 1-800-CDC-INFO. 

Outpatient Stewardship Components- Policy & Practice and Tracking & Reporting

Policy and Practice:

- Use evidence based diagnostic criteria and treatment
- Triage unnecessary visits via pharmacist or nurse
- Require written justification for non-recommend antibiotic prescribing


Tracking and Reporting:

- Self-evaluate antibiotic prescribing
- Create a tracking and reporting system


Outpatient Stewardship Components- Education & Expertise

- Educate patients on antibiotic harms and when antibiotics are unnecessary
- Ensure clinicians have access to education materials and an expert who can assist with antibiotic prescribing

Viruses or Bacteria
What's got you sick?



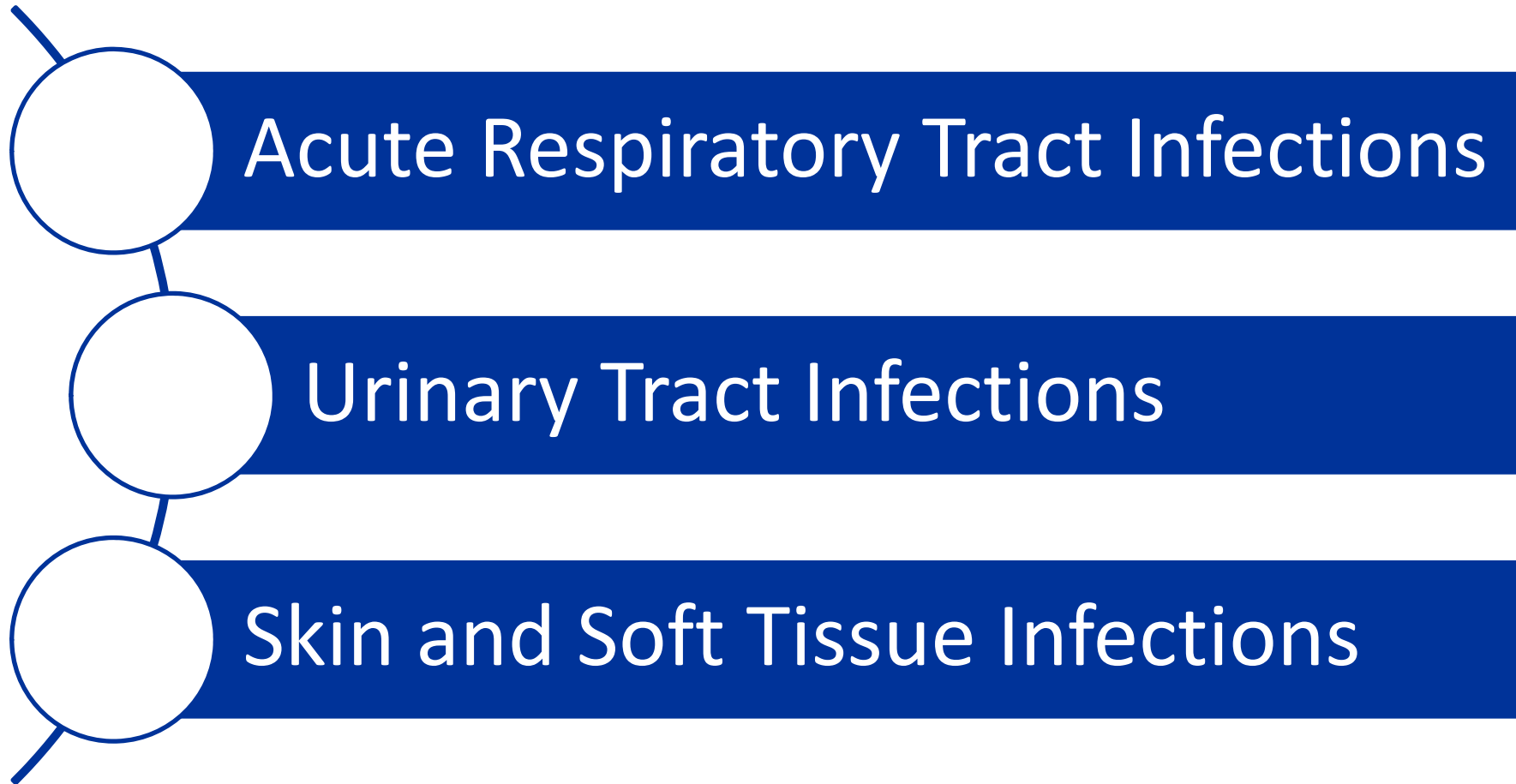
Common Condition	Common Cause			Are Antibiotics Needed?
	Bacteria	Bacteria or Virus	Virus	
Strep throat	✓			Yes
Whooping cough	✓			Yes
Urinary tract infection	✓			Yes
Sinus infection		✓		Maybe
Middle ear infection		✓		Maybe
Bronchitis/chest cold (in otherwise healthy children and adults)*		✓		No
Common cold/runny nose			✓	No
Sore throat (except strep)			✓	No
Flu			✓	No



BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

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

Disease States to Target



Acute Respiratory Tract Infections

Common Respiratory Infections

Viral

- Influenza (Flu), Respiratory Syncytial virus (RSV), Coronavirus disease (COVID-19), and acute bronchitis

Bacterial

- Pneumonia

Either

- COPD exacerbation and rhinosinusitis

Review of Viral Symptoms

Symptom	Flu	RSV	COVID-19
Fever	+/-	+	+
Cough	+	+	+
Sneezing		+	
Shortness of Air	+	+	+
Fatigue/Weakness	+	+/-	+
Runny nose	+	+	+
Sore throat	-	+	+
Body aches	+	-	+
Headache	+	+	+
Diarrhea	+/-	-	+/-
Sudden loss of taste or smell	+/-	-	+/-

Management of Viral Infections



Image take from:
thenounproject.com

Diagnosis:

- Symptoms
- Rapid molecular assays or nucleic acid amplification tests (NAATs), such as PCR tests



Image take from:
thenounproject.com

Treatment:

- Supportive Care
- Antivirals



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Vaccines:

- Vaccines should be offered/given when appropriate

When are Antibiotics Considered for Viral Infections?

Flu

- Patients who deteriorate after initial improvement (A-III)
- Patients who present with severe disease with evidence of pneumonia, respiratory failure, hypotension, and fever (A-II).

RSV

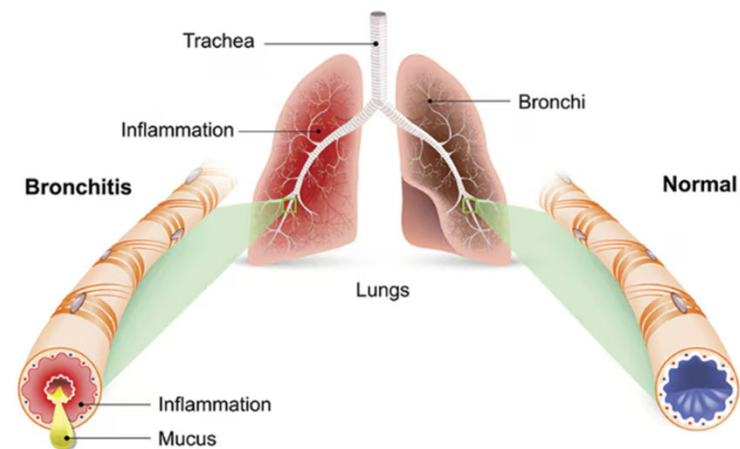
- Generally not recommended

COVID-19

- Co-bacterial infection rates are very low (primary literature reports only 1.2-3.5% of patients are co-infected)
- Only treat if strong evidence of bacterial infection

Outpatient Management of Acute Bronchitis

- CDC Core Element recommend as a target for antibiotic prescribing
- Also known as the Common Cold
 - Symptoms: chest soreness, fatigue, headache, mild body aches and sore throat
- Symptoms can last up to 3 weeks, but even prolonged courses, doesn't require antibiotics
 - Treatment: Supportive Care
 - Antibiotics only indicated for whopping cough or bacterial pneumonia



Outpatient Management of Pneumonia

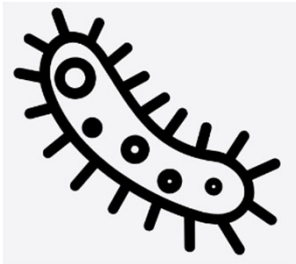
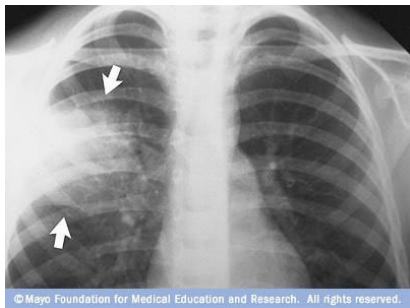


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Cultures and Pathogens:

- Cultures are not generally recommend in outpatient setting
- Most common pathogens are *Streptococcus pneumoniae*, *Hemophilus influenzae*, and *Mycoplasma pneumoniae*



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Diagnosis:

- New pulmonary infiltrate (s) on chest imaging
- At least one respiratory symptom and one systemic finding



Image taken from PowerPoint Icons

Inpatient vs Outpatient:

- Severe CAP vs non-severe
- Pneumonia severity index (PSI)

IDSA Respiratory Symptoms and Other Findings Needed for Diagnosis

TABLE 1: Diagnosis of Community-acquired Pneumonia in Adults (≥ 18 years) Without Immunocompromising Conditions^{1*}

Newly recognized pulmonary infiltrate(s) on chest imaging[†]
AND at least one respiratory symptom
AND at least one other symptom/sign or finding (see below)

Respiratory Symptoms (at least one)

New or increased cough

New or increased sputum production

Dyspnea

Pleuritic chest pain

Other Signs or Findings (at least one)

Abnormal lung sounds (rhonchi or rales)

Fever (≥ 100.4 °F)

Leukocytosis or unexplained bacteremia (above normal limits for laboratory)

Hypoxia ($< 90\%$)

*Immunocompromising conditions include inherited or acquired immune deficiency or drug-induced neutropenia, including patients actively receiving cancer chemotherapy, patients infected with HIV with suppressed CD4 counts, and solid organ or bone marrow transplant recipients.
[†]If clinical suspicion for community-acquired pneumonia is high despite negative chest radiograph, consider a CT scan of the chest.²

Table 1 from IDSA CAP Clinical Pathway

Treatment of Outpatient Pneumonia

Patient Classification	Treatment Regimen	Duration
No specific comorbidities	Amoxicillin preferred	5 days
	Doxycycline or Macrolide	5 days
Patients with comorbidities	Augmentin or 2 nd generation cephalosporin PLUS either macrolide or doxycycline	5 days
	Levofloxacin OR Moxifloxacin	5 days

Comorbidities: Heart disease, lung disease, liver disease, renal disease, diabetes, alcoholism, malignancy or asplenia

Case #1



Image taken from: Wikipedia

Moira Rose is a 62 year old female who presents to your clinic with a chief complaint of acute shortness of breath and increased clear sputum production. PMH includes T2DM, HLD, tobacco use disorder (1/2-1 ppd) and COPD. She reports that a local urgent care diagnosed her with the flu and she completed a five day course of oseltamivir a couple of days ago. After consideration, you believe she is likely experiencing a COPD exacerbation.

	Blood Pressure	Temperature	HR	RR	SpO2
Vitals	125/65	98.7°F	87	22	94

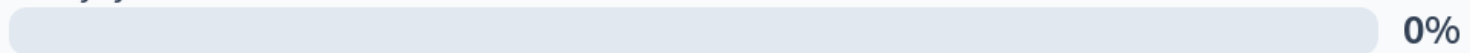
What antibiotics would you prescribe her?

Augmentin



0%

Doxycycline



0%

ofloxacin

0%

antibiotics

0%

ve of the above

0%

Outpatient Management of COPD Exacerbation

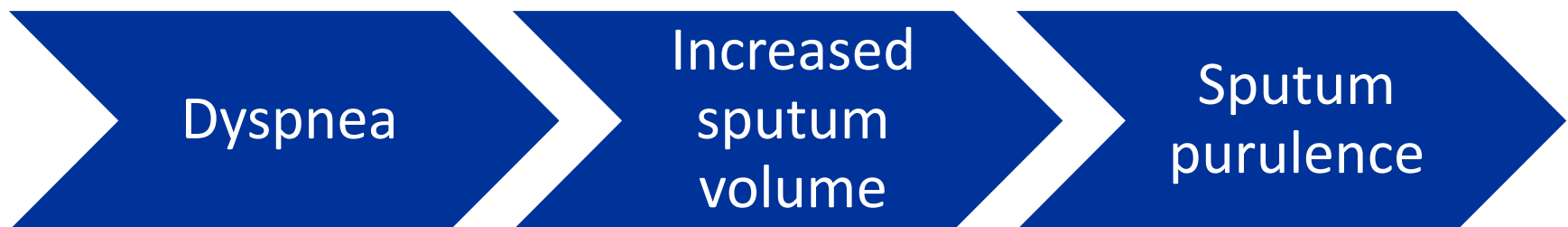
- Defined as an event characterized by dyspnea and/or cough with sputum production that worsened over < 14 days
 - Most commonly triggered by respiratory viral infections
 - Can also be triggered bacterial infections or by environmental factors such as pollution or ambient temperatures

Symptoms:

- Dyspnea
- Tachypnea
- Tachycardia
- Increased sputum volume and color
- Respiratory distress

The Role of Antibiotics in COPD Exacerbation

- Role of antibiotics remains controversial since many studies included patients with both acute and chronic bronchitis, pneumonia and COPD exacerbations
- GOLD guidelines recommend antibiotics when there are signs of bacterial infection
 - Best correlated when sputum has color (not white or clear)
 - Sensitivity 94.4% and specificity 52%



*If sputum purulent then only need one additional sign

Antibiotic Regimens for COPD Exacerbations

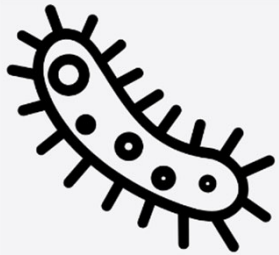


Image take from:
thenounproject.com

- Cultures are not routinely recommended
- Use local antibiogram to gauge resistance patterns of typical respiratory bacterial pathogens



Image take from:
thenounproject.com

- 1st line agents: amoxicillin/clavulanic acid, macrolide, or tetracycline
 - Fluoroquinolones should be reserved for more resistant organisms such as *Pseudomonas aeruginosa*
- Outpatient duration \leq 5 days

Case #1



Image taken from: Wikipedia

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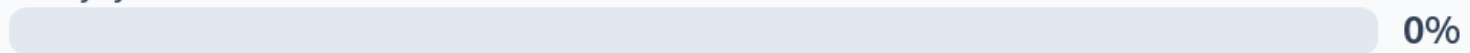
	Blood Pressure	Temperature	HR	RR	SpO2
Vitals	125/65	98.7°F	87	22	94

What antibiotics would you prescribe her?

Augmentin



Doxycycline



ofloxacin

0%

Antibiotics

0%

None of the above

0%

Rhinosinusitis

- Defined by the American Academy of Otolaryngology as purulent nasal drainage accompanied by nasal obstruction, facial pain/pressure/fullness or both
 - Additional Symptoms: post-nasal drip, runny nose, sore throat, headache and cough

Viral

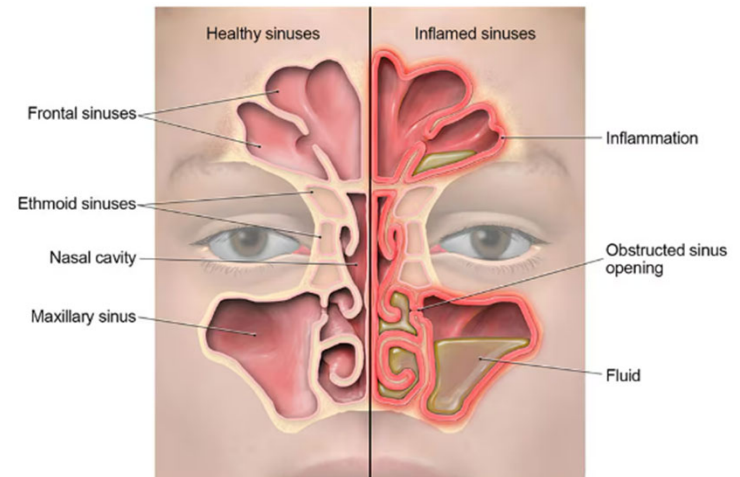
- Symptoms are present < 10 days
- Symptoms do not worsen

Bacterial

- Symptoms fail to improve within 10 days
- Patient experiences “double worsening” within 10 days

Acute Rhinosinusitis Treatment

- Acute sinusitis defined when symptom duration < 4 weeks
- AAO-HNS endorses watchful waiting (for both viral and bacterial) while trying symptomatic relief with analgesics, intranasal steroids and nasal saline
 - Exceptions: complicated sinusitis, immune deficiency, or coexisting bacterial illness
 - Should delay antibiotics up to 7 days to see if symptoms improve → Patients needs follow up
- Treatment:
 - Amoxicillin/clavulanate acid preferred over amoxicillin alone due to possible beta lactamase production in *H influenzae*
 - Penicillin allergy: Doxycycline
 - Levofloxacin or moxifloxacin rec as 2nd line
 - Clindamycin plus either cefixime or cefpodoxime is also reasonable
 - Duration: 5 days over previously recommend 10 days



Case #2

David Rose is a 30 year old male who presents to urgent care for a runny nose, post-nasal drip and sinus fullness resulting in a mild headache x 3 days. He reports taking Benadryl and Tylenol to help with symptoms, which provides temporary relief. He is inquiring about antibiotic treatment to help him feel better, as prior to this, he reports having a chest cold for a few days. Upon arrival, vitals are within normal limits. He reports anaphylaxis to penicillin.



Image taken from: looper.com

What would you recommend for treatment?

Amoxicillin/clavulanate acid 875/125 mg PO q12h x 5 days

0%

Doxycycline 100 mg PO q12h x 5 days

0%

Recommend to continue current supportive care

0%

Recommend to continue Tylenol, but replace Benadryl with a saline nasal wash

0%

None of the above

0%

Urinary Tract Infections (UTIs)

Review of UTI Symptoms

- Symptoms
 - Lower tract: dysuria, frequency/urgency, suprapubic tenderness
 - Upper tract: flank pain/costovertebral angle tenderness (CVA), fever/chills, nausea/vomiting, and lower tract symptoms

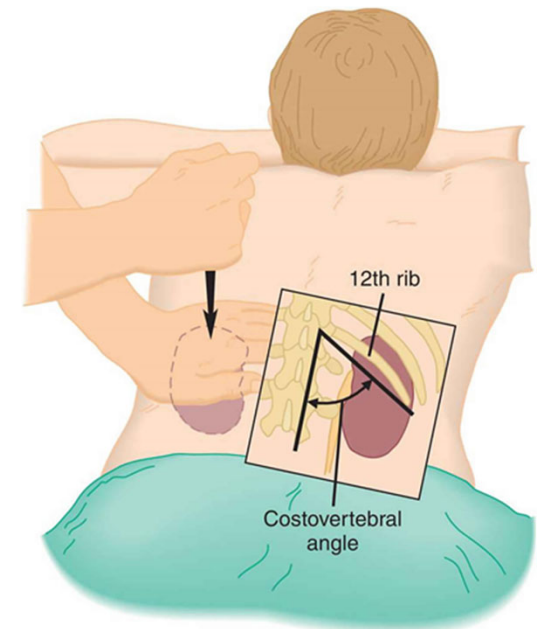


Image taken from: healthjade.net

Alternative Explanations for “UTI” Symptoms

Dermatologic condition: contact dermatitis, psoriasis, or lichen planus

Genitourinary infections: sexually transmitted infections or vaginitis

Foreign bodies: urological stents or renal stones

Medications: cyclophosphamide, calcium channel blockers, or diuretics

Idiopathic: interstitial cystitis, over active bladder, benign prostatic hyperplasia, vaginal atrophy

Malignancy: vaginal, prostate, bladder, renal, or lymphoma

Trauma: radiation to the pelvic area

UTI vs ASB in Spinal Cord Injuries

- Symptoms of a UTI described by the International Spinal Cord Society
 - New or worsening spasticity
 - Autonomic dysreflexia
 - Malaise
 - Lethargy
 - Sense of unease
 - Unexplained fever
 - New or worsening urinary incontinence or leaking around catheter

Fevers should be thoroughly worked up



Image taken from: Adobe Stock

- Normal genitourinary flora may be protective in patients with spinal cord injuries

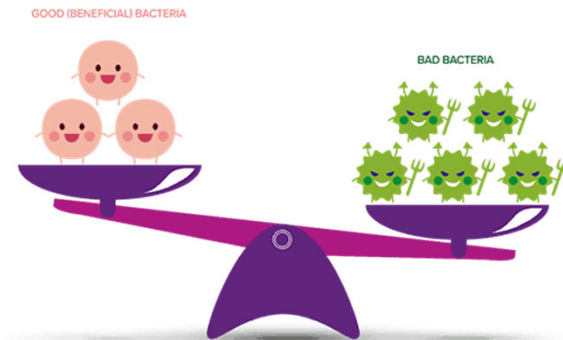


Image taken from: fleurstat.com

Altered Mental Status (AMS)

- IDSA recommends exploring other causes of delirium in patients with ASB who lack UTI symptoms or other systemic signs of infection (e.g. fever or hemodynamic instability)
 - Recommend careful observation rather than antimicrobial treatment during delirium work up
- Studies have not demonstrated a clear benefit in treating ASB

Study	Das et al. <i>Infection Control Hospital Epidemiology</i> . 2011; 32(1):84-86	Dasgupta et al. <i>Archives of Gerontology and Geriatrics</i> . 2017; 72:127-134
Methods	Cohort comprised of nursing home residents from 5 nursing homes in Connecticut	Elderly delirious patients with ASB admitted to a general medicine floor 27% were treated for ASB
Results	Change in mental status: OR 1.18, [95% CI, 0.8-1.76]; p-value 0.405	Functional Recovery: ASB treatment associated with poorer recovery: RR 1.3, [95% CI 1.14-1.48]
	Antibiotic Use: OR 30.57, [95% CI, 15.98-58.49] p-value <0.001	Clostridium difficile infection: 7.5% treatment vs 3.2% non-treatment OR 2.45, [95% CI 0.86-6.96]

IDSA = Infectious Diseases Society of America
ASB = Asymptomatic Bacteriuria

Alternatives Causes for AMS

Medications

Vitamin deficiencies

Dementia

Hospital acquired delirium

Severe hypoxia or hypertension

Dehydration

Hepatic or uremic encephalopathy

Psychiatric disorders



Image taken from: Summerfield Healthcare

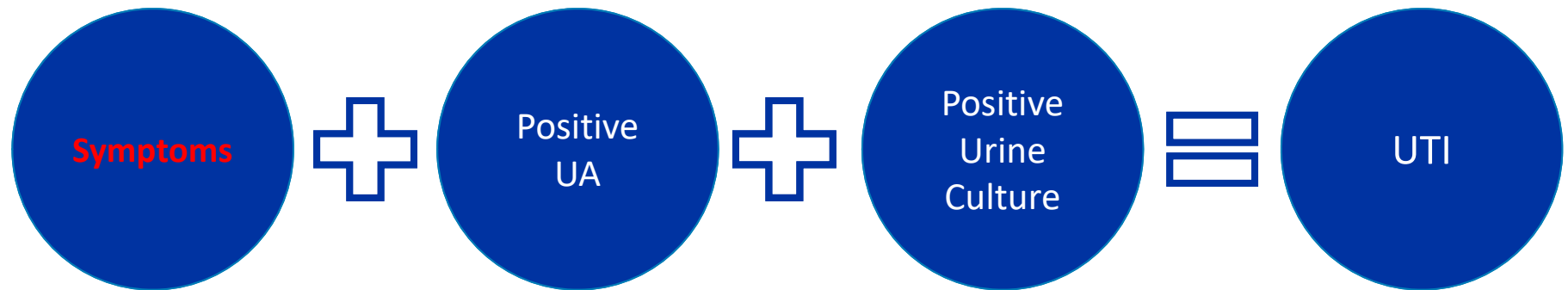
Breakdown of the Urinalysis (UA) in Relation to UTIs

Findings on a UA that could contribute/exclude the diagnosis of a UTI	
Component of UA	Interpretation of that Component
Leukocyte esterase	Genitourinary inflammation, glomerulonephritis, & infections
Nitrite	Produced by gram negative bacteria Dipstick exposed to air or phenazopyridine
RBC	Glomerulonephritis, renal stone, trauma, malignancy, or menstruation
WBC (Pyuria)	Genitourinary inflammation Cut offs can vary, but generally need at least 10 WBC
Squamous epithelial	Skin cells
Organisms	Clinical value not established Yeast typically represents colonization

Tips for Correct Interpreting the UA

- The UA and urine culture should be obtained for all patients with **symptoms** consistent with a UTI
 - Should be collected prior to antibiotics
 - Patients and nurses should receive education on how to properly collect these specimens
- Ensure patients are not neutropenic as the number of WBC in the UA will be unreliable
- A UA cannot distinguish between colonization and active infection
 - Always correlate with symptoms
- **A negative UA has a strong negative predictive value, but low positive predictive value**

Diagnosis of a UTI



Do NOT order UA or urine culture to determine diagnosis of a UTI if your patient does not endorse symptoms!

Who should not be screened for ASB

- IDSA recommends **against** screening for bacteriuria:
 - Children
 - Non-pregnant females
 - Functionally impaired patients
 - Older patients who reside at home or in long-term care facility
 - Nonrenal transplant patients
 - Diabetic patients
 - Spinal cord injuries
 - Acute mental status change
 - Patients with recent fall
 - Short-term and long-term indwelling urethral catheter



Image taken from: Redcliffe Labs

When Should We Treat ASB

IDSA recommends treatment for these patients:

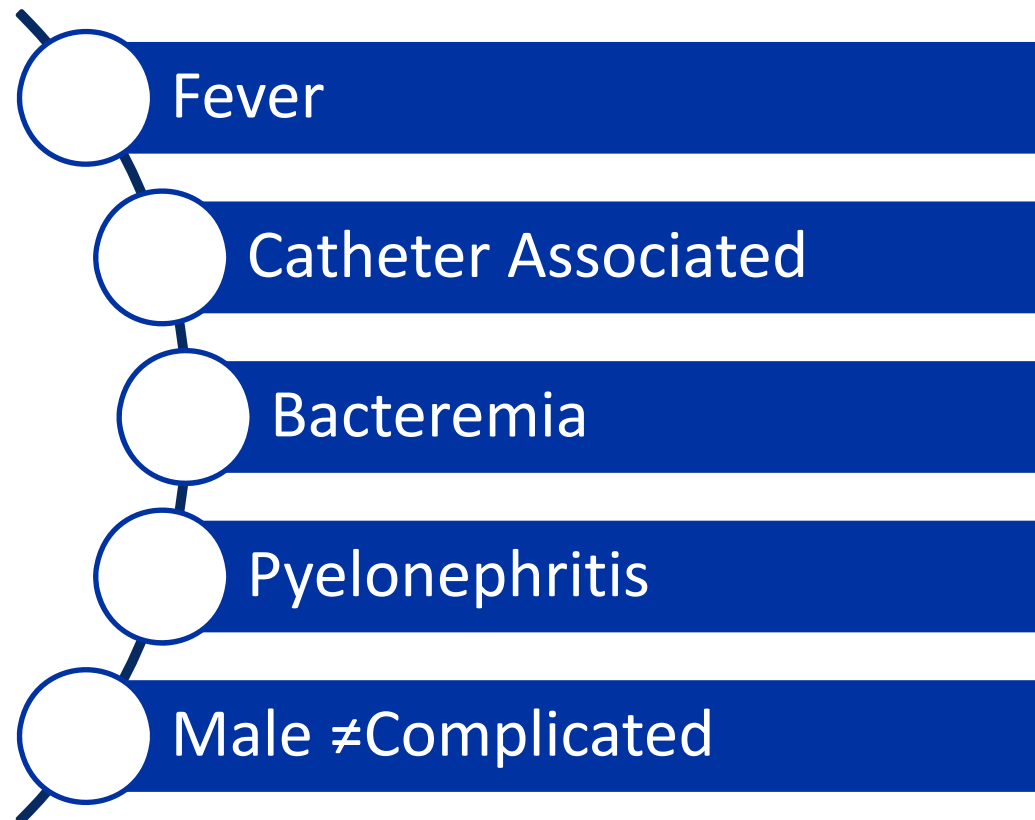
- Pregnant patients
- Patients undergoing urologic procedures associated with mucosal trauma/bleeding
 - Example: transurethral surgery of the prostate or percutaneous stone removal

IDSA makes no recommendations for or against treatment:

- Renal transplant patients
- High risk neutropenic patients

In the Pipeline...New Classification of UTIs

- IDSA UTI guidelines last updated in 2009. New guidelines are in the pipeline



Treatment of Uncomplicated Cystitis

- Treatment should be based on local susceptibility rates of common UTI organisms and on patient history (prior infections, antibiotic exposure, etc.)

Treatment	Duration
Nitrofurantoin monohydrate/macrocrystals	5 days
Fosfomicin (use caution with non- <i>E coli</i> isolates)	1 dose
TMP-SMX	3 days
Fluoroquinolones	3 days
Aminoglycosides	1 dose
Oral cephalosporins (cefadroxil, cephalexin, cefuroxime, cefpodoxime)	5 days
IV beta-lactams (if inpatient)	3 days

TMP-SMX: Trimethoprim Sulfamethoxazole 48

Treatment of Complicated Cystitis and Pyelonephritis

Treatment	Duration Complicated Cystitis	Duration Pyelonephritis
Nitrofurantoin monohydrate/macrocrystals	??	
Fosfomycin	??	
TMP-SMX	7 days	10 days
Aminoglycosides	PK/PD	PK/PD
Fluoroquinolones	5 days	5 days
Oral cephalosporins (cefadroxil, cephalexin, cefuroxime, cefpodoxime)	5-7 days	10 days
IV beta-lactams (if inpatient)	5 days	7 days

TMP-SMX: Trimethoprim Sulfamethoxazole 49

Case #3

Stanley Hudson is now an 88-year-old male living in a nice assisted living community in Florida.

Past medical history includes HTN, uncontrolled T2DM, peripheral neuropathy, CKD (eGFR 45 ml/min), HLD, GERD, CVA x 2 weeks ago, PAD and neurogenic bladder with a suprapubic catheter. He was presents to clinic for a wellness visit after being recently discharged from the hospital. His only complaint is slight fatigue and never regaining his baseline function. Upon chart review, you discovery a urine culture that was obtained during his hospital admission, but he did not receive a full course of antibiotics.



Image taken from: wsbt.com

Urine Culture	
Collected 10/22/2024	
E Coli >100,000 CFU	
Amikacin	S
Ampicillin	R
Cefazolin	R
Ceftriaxone	R
Cefepime	R
Gentamicin	S
Meropenem	S
Nitrofurantoin	S
Levofloxacin	R
TMP/SMX	R
Tobramycin	S

. What would you recommend in this situation?

Initiate treatment with IM amikacin

0%

Recommend re-admission for IV meropenem

0%

Prescribed nitrofurantoin

0%

Agree with not treating with antibiotics

0%

None of the above

0%

Case #4

Phoebe Buffay is a 30-year-old female who presents to the emergency department (ED) with a chief complaint of new urinary frequency/urgency, painful urination, chills, and R sided flank tenderness. Past medical history includes asthma. She has no known drug allergies. Remarkable vitals include a fever of 101.6°F and a heart rate of 102 beats/minute. She has no additional symptoms or complaints. Diagnostic tests were ordered and obtained upon hospital admission. Today is day 3 of admission and Phoebe is medically ready for discharge. She reports all of her initial complaints have resolved on IV ceftriaxone. What antibiotic discharge regimen would be appropriate?



Case #4 Continued

Urinalysis Collected 10/29/2024	
Blood	None
Nitrite	Positive
Leukocyte Esterase	Large
RBC	0-5
WBC	31-50
Squamous Epithelial	5-10
Bacteria	Present

Urine Culture Collected 10/29/2024	
<i>E Coli</i> >100,000 CFU	
Amikacin	S
Ampicillin	R
Cefazolin	S
Ceftriaxone	S
Cefepime	S
Gentamicin	S
Meropenem	S
Nitrofurantoin	S
Levofloxacin	S
Pip/Tazo	S
TMP/SMX	S
Tobramycin	S

What antibiotic regimen would be most appropriate for discharge?

Nitrofurantoin 100 mg PO q12h x 5 days

0%

Cefadroxil 1000 mg PO q12h x 7 days

0%

Cefdinir 300 mg PO q12h x 7 days

0%

Levofloxacin 750 mg PO x 2 days

0%

Skin and Soft Tissue Infections (SSTI)

Cellulitis

- Symptoms: redness, warmth, tender, pain & swelling
 - Almost always unilateral. Bilateral is usually chronic venous stasis
 - Can also present with blisters or fever



Image taken from: unitedveincenters.com

- Risk factors: Associated with trauma, cutaneous ulcer, injection drug use, chronic skin conditions, being overweight and chronic lymphedema
- Disease states that mimics cellulitis: Venous stasis dermatitis, trauma-related inflammation, deep vein thrombosis, nonspecific dermatitis or thrombophlebitis
- IDSA recommends hospitalization for patients that meet SIRS criteria, altered mental status, hemodynamically unstable or concerned for deeper infection
- Supportive Care: If associated with lymphedema patients should elevate his/her leg and use compression

Non-Purulent vs Purulent

Non-Purulent:



- Pathogen: Most commonly caused by Group A Streptococcus
 - MSSA ~10% of cases
 - Can also be mediated by other β -hemolytic *streptococcus*
- Antibiotics: Penicillin, amoxicillin, anti-Staphylococcus penicillins, 1st generation cephalosporins
- Duration: 5-7 days

Purulent:



- Pathogen: MRSA
 - Always debride when possible
- Antibiotics: TMP/SMX, doxycycline or linezolid
 - Check local antibiogram prior to using clindamycin
- Duration: 5- 7 days

TMP-SMX: Trimethoprim Sulfamethoxazole

55

Classification of Diabetic Foot Infection

IWGDF/IDSA 2023 Classification of Infection	
1/Uninfected	No systemic or local symptoms or signs of infection
2/Mild	Infected with at least 2 of the following: Local swelling or induration Erythema >0.5 but <2 cm around the wound Local tenderness or pain Local increased warmth Purulent discharge
<i>Rule out other causes of an inflammatory response of the skin (e.g., gout, thrombosis, trauma, acute Charcot, venous stasis, etc.)</i>	
3/Moderate*	Infection with no systemic manifestations & involving: Erythema extending >2cm from wound margin and/or Tissue deeper than skin & subcutaneous tissues (e.g., tendon, muscle, joint, bone)
4/Severe*	Any foot infection with systemic manifestations, as manifested by ≥ 2 of the following SIRS criteria: Temperature > 38°C or <36°C Heart rate >90 beats/min Respiratory rate >20 breaths/min or PaCO ₂ <4.3 kPa (32 mmHg) White blood cell count >12,000/mm ³ or <4 G/L or >10% immature (band) forms
*Add "(O)" if infection involving bone (osteomyelitis). In the absence of local or systemic inflammation, classify the foot as 3(O) if meets <2 SIRS criteria or 4(O) if meets ≥ 2 SIRS criteria	

Diabetic Foot SSTI Considerations



Image taken from
PowerPoint Icons

Consider hospitalizations:

- Patients with severe or moderate infection
- Failed outpatient management
- Needs diagnostic tests such as more sensitivity imaging not available in clinic

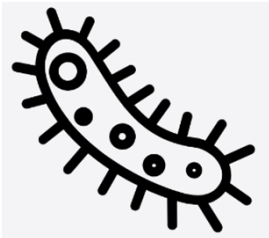


Image take from:
thenounproject.com

Pathogens:

- Cultures are helpful if they come from tissue. Superficial swabs often represent skin colonization and are **NOT** helpful
- IDSA recommends targeting beta-hemolytic streptococcus and *Staphylococcus aureus* in mild infections
 - Only target *Pseudomonas* if isolated from a good quality culture in the last few weeks

Treatment of Diabetic Foot SSTI



Image take from:
thenounproject.com

- Only treat if active signs of infection are present
 - Do not treat uninfected ulcers to reduce risk of new infection or promote ulcer healing
- For mild infections, target beta-hemolytic streptococcus
 - MRSA when risk factors are present
 - If patient recently had antibiotics, reasonable to use amoxicillin/clavulanate acid for gram negative coverage
- Duration: 1-2 weeks

ID Myth: TMP/SMX cannot be used for β -strep.

ID Fact: Previously reported TMP/SMX resistance was due to thymidine used in testing media. In one study, it was more susceptible than clindamycin or doxycycline.

B-Strep

- Amoxicillin
- Cephalexin (q6h) or Cefadroxil (q12h)
- TMP/SMX (if penicillin allergy)

MRSA

- TMP/SMX
- Linezolid
- Doxycycline

TMP-SMX: Trimethoprim Sulfamethoxazole 58

Case # 5



Image taken from: NBC.com

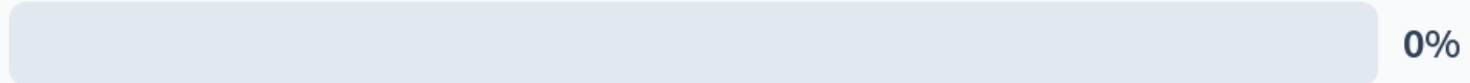
Jerry is a 54 year old male who presents to clinic for evaluation of a foot wound. He reports he recently stepped on his grand child's lego and developed a slight puncture wound one week ago that will not heal. PMH includes T2DM (9/4/2024 A1c 8.6), BMI 40, HTN, HLD and CAD. Vitals are stable. He reports never experiencing issues with his feet prior. His last hospitalization was 3 years ago and he has not taken antibiotics in several years. On exam, you appreciate an approximately 1 cm wound with erythema, localized tenderness and is mildly painful.



Image taken from the American Society of Plastic Surgeons

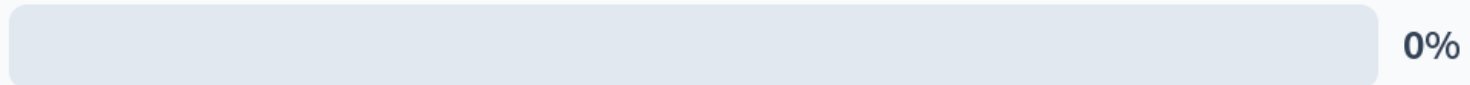
How would you classify this infection?

Not infected



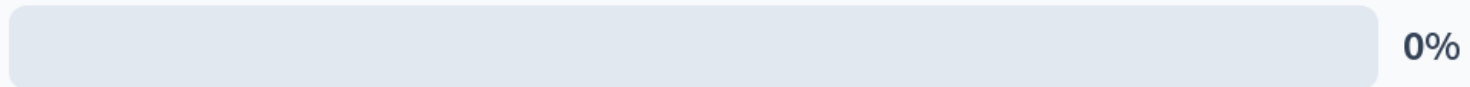
0%

Mild infection



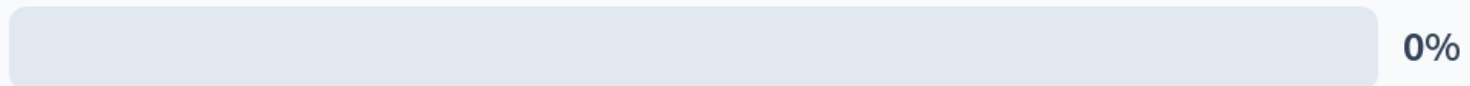
0%

Moderate infection



0%

Severe infection



0%

Case #5 Treatment Question - Jerry reports no known allergies. What antibiotic course would you offer Jerry?



Amoxicillin 1 g PO q8h x 7 days

0%

Amoxicillin/Clavulanate Acid 875/125 mg x 7 days

0%

Doxycycline 100 mg PO q12h x 5 days

0%

Levofloxacin 750 mg PO q24h x 10 days

0%

Antibiotics Might Be Harmful

Antimicrobial
resistance

Adverse reaction

*Clostridioides
difficile* infection

Increase in
emergency
department visits

Increase in
hospitalizations

Increase in
healthcare cost

Summary

- The purpose of antimicrobial stewardship is to ensure appropriate diagnosis and treatment of infections
 - Everyone can play a role in antimicrobial stewardship!
- Use of inappropriate antibiotics can lead to patient harm including adverse drug reactions, *C difficile* infections and increased risk of multi-drug resistance infections
- Approximately 50% of antibiotics prescribed in the United States are for acute respiratory illness, UTIs and SSTIs. Many of these prescriptions are likely unnecessary.
 - When indicated antibiotic selection should be based on local susceptibilities, patient history, and site of infection
 - **Treat for the shortest, effective duration possible**

QUESTIONS?



Image taken from: <http://needpix.com>



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Antimicrobial Stewardship (AMS) Essentials: Defining the Role and Responsibility of non-AMS team members

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