

# NC CLASP OUTPATIENT STEWARDSHIP YEAR 2, SESSION 6

Outpatient Antimicrobial Stewardship:  
Urinary Tract Infections and Sexually Transmitted Infections  
February 28, 2024

# CONFLICT OF INTEREST DISCLOSURES

- ▶ The views and opinions expressed in this series are those of the speakers and do not reflect the official policy or position of any agency of the US or NC government or UNC.
- ▶ Our speakers have the following financial relationships with the manufacturer(s) and/or provider(s) of commercial services discussed in this activity:
  - ▶ Dr. Willis has performed contracted research with: Pfizer (pediatric nirmatrelvir-ritonavir and maternal RSV vaccine), Novavax (pediatric COVID-19 vaccine), and Merck (monoclonal antibody for RSV prevention)
- ▶ The speakers do not intend to discuss an unapproved/investigative use of a commercial product/device in this series, and all COI have been mitigated.
- ▶ These slides contain materials from a variety of colleagues, as well as the CDC, WHO, AHRQ, etc.

# INTRODUCTIONS

Please put your name, clinic, and location in the chat!

# CME AND CE CREDIT



## ▶ CME & CE for participants

- ▶ Attendance and active participation per learning session
- ▶ Click the link in the chat during the session to document your attendance
- ▶ Complete surveys as requested

# OUTLINE: UPCOMING SESSIONS

Date	Topic
January 24 <sup>th</sup>	Pharyngitis, acute otitis media
February 28 <sup>th</sup>	UTI and STI
March 27 <sup>th</sup>	Skin and soft-tissue infections
April 24 <sup>th</sup>	Antibiotic Allergies
May Conference	TBD
June 26 <sup>th</sup>	Additional strategies to prevent antibiotic overuse

# TODAY'S OVERVIEW

- ▶ Pharyngitis and Acute Otitis Media
  - ▶ Quick review
- ▶ Urinary Tract Infections
- ▶ Sexually Transmitted Infections

# REVIEW: WHEN TO TEST FOR STREP

## ▶ Modified Centor Criteria

- ▶ McIsaac, *JAMA*, 2004

## ▶ IDSA Guidelines (2012)

- ▶ Avoid testing if viral features present
  - ▶ Cough, rhinorrhea, hoarseness, oral ulcers
- ▶ Avoid testing children <3 years of age
  - ▶ Consider if risk factors, like symptoms plus an older sibling with strep
- ▶ Follow-up posttreatment testing not recommended
- ▶ Do not test asymptomatic household contacts

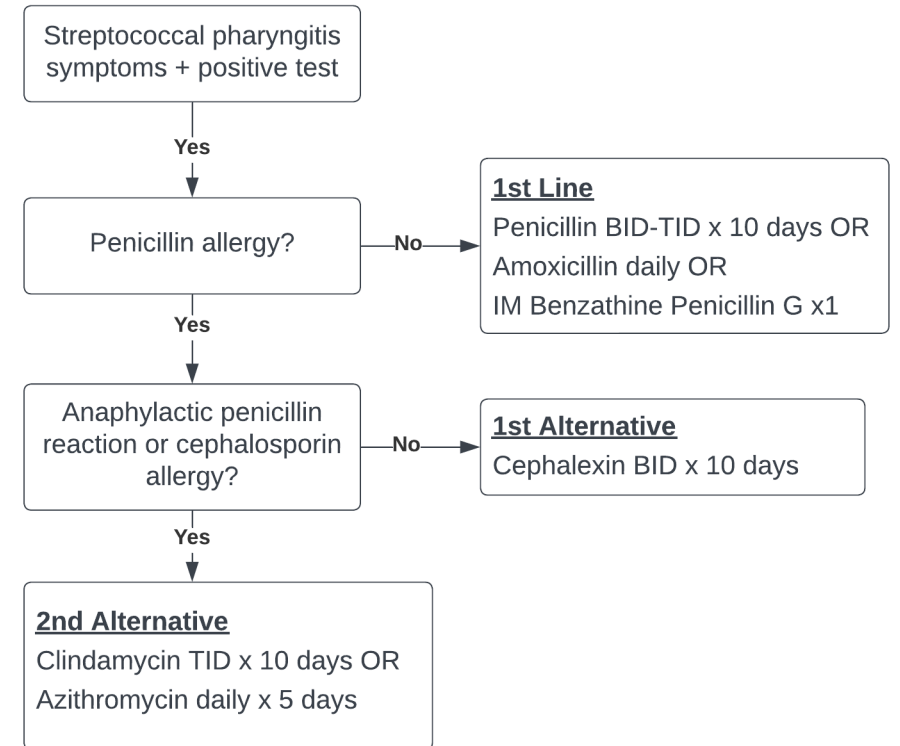
Criteria	Points
Temperature >38° C	1
Absence of Cough	1
Swollen, Tender Anterior Cervical Nodes	1
Tonsillar Swelling or Exudate	1
Age	
3-14 Years	1
15-44 Years	0
45 Years or Older	-1

Score	Risk of Streptococcal Infection <sup>8,9</sup>	Suggested Management
≤0	1%-2.5%	No Further Testing or Antibiotic
1	5%-10%	
2	11%-17%	Culture All; Antibiotics Only for Positive Culture Results
3	28%-35%	
≥4	51%-53%	Treat Empirically With Antibiotics and/or Culture

# REVIEW: STREPTOCOCCAL PHARYNGITIS TREATMENT

## IDSA Guidelines, 2012

- ▶ First-line: Penicillin IM x 1 OR oral penicillin OR oral amoxicillin
- ▶ Non-anaphylactic “allergy” to penicillin: cephalexin
- ▶ Unable to take cephalosporins:
  - ▶ Clindamycin OR azithromycin
  - ▶ There is some resistance to both, but <10%
- ▶ Not recommended: amox-clav, broad cephalosporins, fluoroquinolones



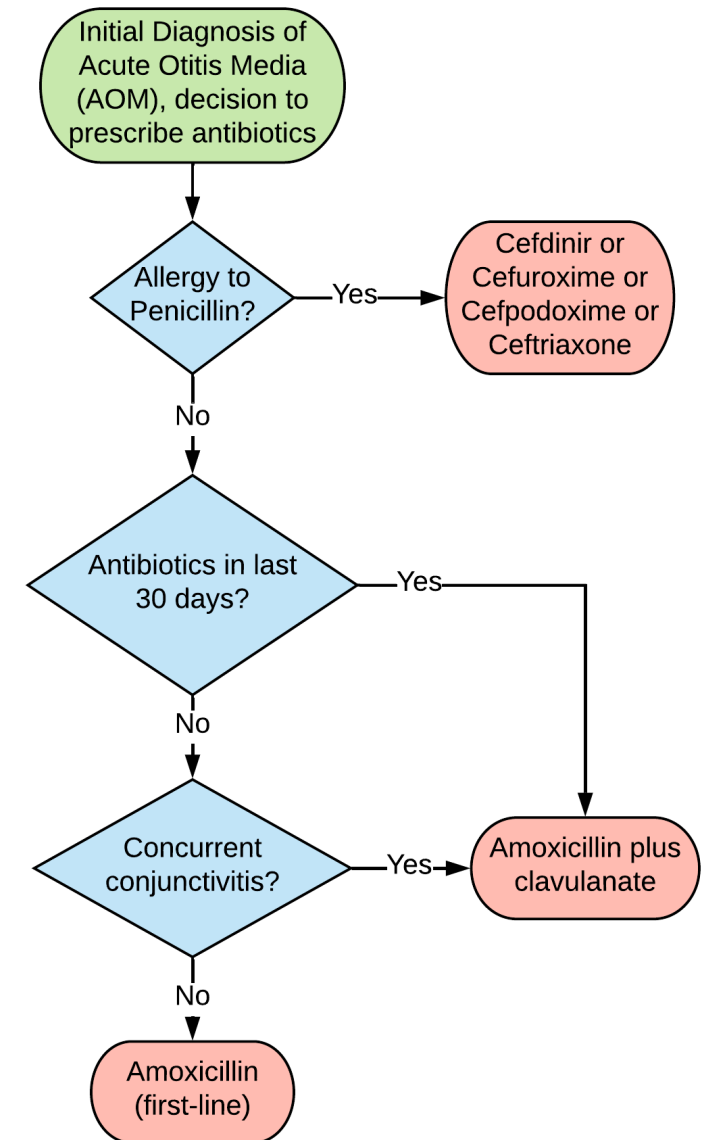


# STREP THROAT: ANTIBIOTIC STEWARDSHIP OPPORTUNITIES

- ▶ Do NOT treat without a positive test
  - ▶ No presumptive treatment
  - ▶ Negative test → extremely unlikely to benefit from antibiotics
- ▶ Avoid over-testing: colonization is common!
  - ▶ Ensure adequate pre-test probability
    - ▶ Centor criteria, screen for viral symptoms (cough, runny nose)
  - ▶ Avoid nurse-initiated throat swabs
  - ▶ Consider phone triage for pharyngitis
    - ▶ CC of sore throat and patient has cough/rhinorrhea, they can probably stay home
- ▶ Use amoxicillin or penicillin unless allergic

# REVIEW: ACUTE OTITIS MEDIA TREATMENT

- ▶ [AAP Guidelines, 2013](#)
- ▶ Amoxicillin is first-line unless:
  - ▶ Treated with amoxicillin in prior 30 days
  - ▶ or purulent conjunctivitis (usually *H. influenzae*)
  - ▶ Penicillin-allergic
- ▶ Duration:
  - ▶ <2 years or severe symptoms: 10 days
  - ▶ 2-5 years: 7 days
  - ▶ 6 years and up: 5-7 days
- ▶ Remember: oral cephalosporins are *much less* effective than high-dose amoxicillin against pneumococcus!
- ▶ Rarely recommended: azithromycin, TMP-SMX, clindamycin



# AOM: ANTIMICROBIAL STEWARDSHIP

## Stringent diagnostic criteria

- Overdiagnosis probably common

## Guideline-recommended treatment and duration

- Overuse of broad-spectrum antibiotics, excessive durations

## Defer treatment when not needed

- Older children with non-severe disease

# THREE WAYS TO OVERUSE ANTIBIOTICS

1. Prescribing antibiotics when none are indicated
2. Using an antibiotic that is too broad for the infection (or otherwise suboptimal)
3. Using an excessive duration

# CASE 1

A 15-month-old female presents to Urgent Care with three days of fever up to 104F. She has no upper respiratory symptoms and no rash. Her physical examination is completely unremarkable. PCP did a CBC yesterday that showed WBC 5.4 with 62% neutrophils. The Urgent Care provider recommends catheterized urinalysis and urine culture.

UA results: moderate leukocyte esterase, negative nitrites, 12 WBC/hpf, 2 RBC/hpf; no protein or ketones.

She receives a dose of ceftriaxone and is started on cefdinir to complete 14 days for presumed pyelonephritis. She is taking adequate PO and is discharged home.

# THREE SCENARIOS

## A

- Urine culture: positive for *E. coli*, >100K cfu/mL. Susceptible to ampicillin, cefazolin.
- Patient is improved. Provider instructs family to complete 14-day cefdinir course. PCP should obtain renal ultrasound.
- Questions?

# ANTIBIOTIC OVERUSE IN UTI

## Prescribing antibiotics when none are indicated

- Overdiagnosis of UTI is rampant – pyuria and asymptomatic bacteriuria are common
- Failure to follow up on urine culture results

## Excessive antibiotic spectrum

- Fluoroquinolones and third-gen cephalosporins common
- First-gen cephalosporins often sufficient

## Excessive antibiotic duration

- Pediatric UTI guidelines: 7-14 days. Way too long!
- Conflation of cystitis and pyelonephritis

# UTI DIAGNOSIS

## ▶ UTI diagnosis requires:

1. Symptoms consistent with UTI
  - ▶ Cystitis: Dysuria, frequency, suprapubic pain
  - ▶ Pyelonephritis/upper tract UTI: flank pain, costovertebral angle tenderness
  - ▶ However, may be difficult to elicit in nonverbal patients
    - ▶ May only have nonspecific symptoms: fever, vomiting
2. Urinalysis consistent with urinary tract infection
3. Positive urine culture

Multiple definitions exist for each of the three components



# UTI DIAGNOSIS CHALLENGES

## Young children and older adults with dementia

- Can't report symptoms
- Often present with fever only – requires suspicion
- Cath may be required

## Older Children and Adults

- Asymptomatic bacteriuria common in older adults
- Nonspecific signs in older adults
- Overlap with STIs (i.e., pyuria with negative culture)

## Everyone

- Diagnosis delay
- Culture contamination
- Culture interpretation
  - <100K colonies
  - Multiple species

# UTI DIAGNOSIS: YOUNG CHILDREN

## ▶ Symptoms:

- ▶ Verbal, toilet-trained: typical UTI symptoms (dysuria, frequency, incontinence, flank pain)
- ▶ Preverbal, non-toilet-trained: may have fever only without other explanation
  - ▶ High index of suspicion required for unexplained fever, especially in girls and uncircumcised boys

## ▶ Specimen collection:

- ▶ Non-toilet-trained: should be by urethral catheterization (requires pediatric nursing experience)
  - ▶ Bagged urine samples are virtually always contaminated
- ▶ Toilet-trained: clean-catch acceptable
  - ▶ Young children need adult help and clear instructions to prevent contamination

# UTI DIAGNOSIS: SPECIAL POPULATIONS

## ▶ Older/frail adults

- ▶ High prevalence of asymptomatic bacteriuria, F>M
- ▶ Common: difficulty reporting symptoms
- ▶ Frequent challenge: older adult with cognitive impairment and new delirium

## ▶ Indwelling catheter (urethral or suprapubic)

- ▶ High prevalence of asymptomatic bacteriuria AND pyuria
- ▶ Usually with difficulty perceiving symptoms

## ▶ These populations are at risk for antibiotic-resistant infections and C-diff

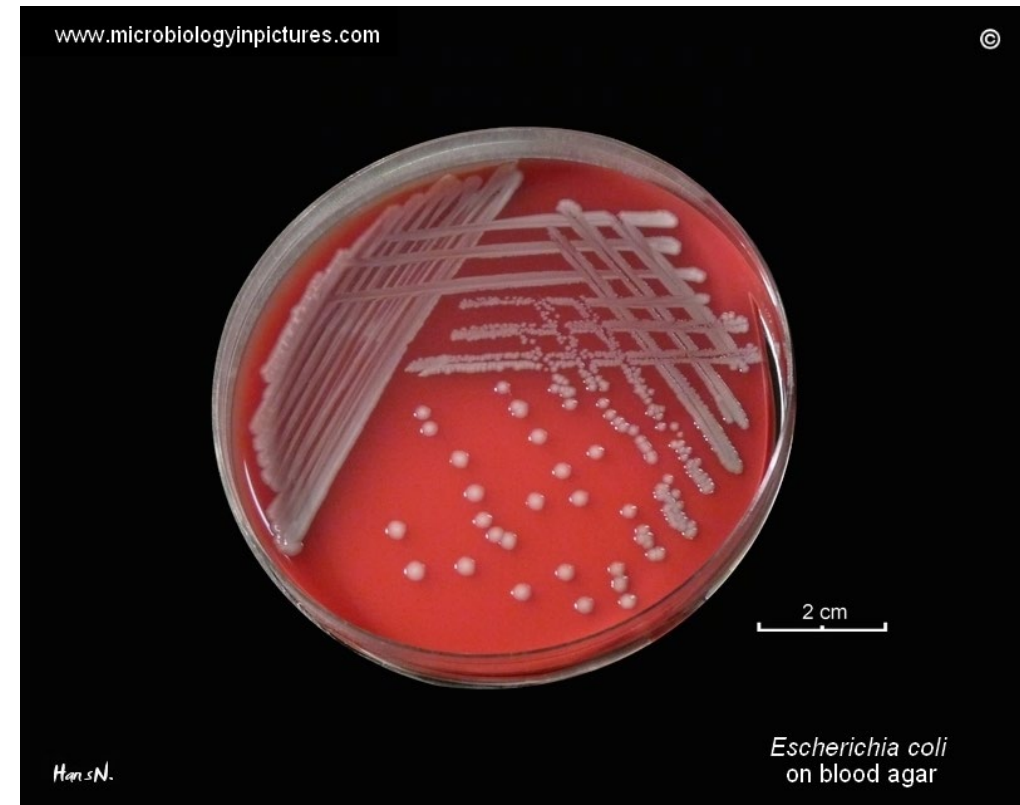
- ▶ Major challenge for antimicrobial stewardship

# UTI DIAGNOSIS: RESULTS INTERPRETATION

- ▶ Positive urinalysis and urine culture are *required* for UTI diagnosis
  - ▶ Exception: premenopausal women with previous cystitis can accurately self-diagnose
- ▶ Urinalysis can detect *pyuria*:
  - ▶ Pyuria: positive leukocyte esterase and/or >10 WBC/microL
    - ▶ False-positives occur due to noninfectious inflammatory conditions
  - ▶ Leukocyte esterase: detects WBC products, suggests inflammation if positive
    - ▶ Reported usually as neg, trace, moderate, large
  - ▶ Nitrites: produced by most Gram-negative uropathogens
    - ▶ Often negative, but highly indicative of UTI if present
  - ▶ Bacteria on urine microscopy: unreliable

# UTI DIAGNOSIS: URINE CULTURE

- ▶ Usual recommendation:
  - ▶ >100K cfu/mL of a *single* uropathogen
  - ▶ Young children: AAP uses threshold of >50K
- ▶ Contamination suggested by:
  - ▶ Organism grows but <100K
  - ▶ Multiple organisms, especially if none >100K
- ▶ Exceptions: antibiotic pre-treatment, urinary obstruction
- ▶ Avoid hard/fast cutoffs!
  - ▶ >100K E coli with negative UA: not a UTI
  - ▶ Patient has obstructing stones, high fever, >100 WBC on UA, and culture grows 10,000 *E. coli*: UTI



# UTI TREATMENT: CHALLENGES

- ▶ Empiric treatment required before culture results
- ▶ Variable susceptibility patterns
- ▶ Very different lab reporting standards
  - ▶ Reporting multiple species at low colony counts
- ▶ Confusing reporting of cephalosporins
- ▶ Changing antimicrobial susceptibility over time
  - ▶ Increasing resistance to fluoroquinolones and TMP-SMX
  - ▶ Cephalosporins getting... better??
- ▶ Compared to respiratory tract infections, much greater risk of resistance

# UTI MICROBIOLOGY

## Healthy patients:

- ▶ *E. coli* #1 by far
- ▶ Then other Gram-negative enterics: *Klebsiella*, *Proteus*
- ▶ *Enterococcus*
- ▶ *Staphylococcus saprophyticus* (cystitis only)

## Risk factors – healthcare exposure, urologic abnormalities:

- ▶ All of the above
- ▶ *Pseudomonas*
- ▶ MDR Gram-negative rods

# WHAT'S THE DEAL WITH CEPHALOSPORINS??

- ▶ For uncomplicated UTI, isolates that are susceptible to cefazolin (using urinary breakpoint) are susceptible to cephalexin and other oral cephalosporins
- ▶ Cephalexin is the most targeted option (also cheap and available)
- ▶ We use cephalexin routinely in children with pyelonephritis who have improved

## UNC Medical Center Report

Urine Culture,  
Comprehensive

>100,000 CFU/mL *Escherichia coli* !

Specimen Source: Clean Catch

Resulting Agency: UNCH MCL

### Susceptibility

	Escherichia coli MIC SUSCEPTIBILITY RESULT	
Amoxicillin + Clavulanate	Susceptible	
Ampicillin	Resistant	
Ampicillin + Sulbactam	Susceptible	
Cefazolin	Resistant	
Cephalexin	Susceptible <sup>1</sup>	
Ciprofloxacin	Resistant	
Gentamicin	Susceptible	
Levofloxacin	Resistant	
Nitrofurantoin	Susceptible	
Piperacillin + Tazobactam	Susceptible	
Tetracycline	Resistant <sup>2</sup>	
Tobramycin	Susceptible	
Trimethoprim + Sulfamethoxazole	Resistant	

<sup>1</sup> For uncomplicated UTI's only.



# UTI TREATMENT

- ▶ Pyelonephritis: generally suggested by flank pain, costovertebral angle tenderness, fever, vomiting
- ▶ Cystitis: UTI without systemic or upper-tract symptoms

Scenario	Options	Comments
Simple cystitis in adolescent or adult female	First-line: Nitrofurantoin 100 mg BID x 5 days Alternatives: Bactrim BID x 3 days; Fosfomycin 3g x1; Cephalexin 500 mg BID x 5 days	OTC Phenazopyridine or NSAIDs can help with severe dysuria
Pyelonephritis, hospitalized (not septic)	Ceftriaxone Q24 (alternative: gentamicin) High risk for antibiotic resistance: pip-tazo, cefepime Duration: 7 days (longer if abscess, obstructing stones)	Urine culture to guide results. Broader if critically ill.
Pyelonephritis, ambulatory, no significant risk factors	Ceftriaxone 1g IV or IM x1 (optional) → ciprofloxacin, TMP-SMX x 5-7 days. Can use cephalexin if susceptible and patient improved.	Urine culture to guide results.

## CASE 2

An 85-year-old F presents to the ED from a skilled nursing facility. She is a long-term care resident and has a history of moderate dementia. She was sent to the ED for increased confusion since this morning. She is afebrile and exam is unremarkable except for delirium.

The ED notes that she has been treated there for UTI three times in the past 18 months. On one occasion, urine culture grew >100K Staph epi; the other two times the cultures grew mixed Gram-negatives.

Urinalysis demonstrates trace leukocyte esterase, negative nitrites, 10-15 WBC/hpf, and moderate bacteria. She is started on ciprofloxacin to complete 10 days. Mental status improves after IV fluids and she is returned to her SNF.

► Thought? Concerns?

# STEWARDSHIP OPPORTUNITIES: UTI

- ▶ *Never* send a urine culture without urinalysis
- ▶ Avoid urine testing in patients with high likelihood of asymptomatic bacteriuria AND no specific symptoms of UTI
- ▶ Use cephalexin preferentially for patients who:
  - ▶ Do not require hospital admission
  - ▶ Do not have significant history of antibiotic-resistant UTI
- ▶ Stop antibiotics if urine culture is negative or mixed flora
- ▶ If initial broad antibiotics, target antibiotics in response to urine culture

## CASE 3

A 19-year-old female presents to Urgent Care with three days of burning with urination and frequency. She has no fever. She had a UTI about three months ago and thinks it's the same thing. Urinalysis demonstrates moderate leukocyte esterase, no nitrites, 30-40 WBC/hpf. Urine culture is pending. She is started on nitrofurantoin.

The urine culture is no growth. She has had no improvement after two days. What else do you want to know?

# SEXUALLY TRANSMITTED INFECTIONS (WHIRLWIND FASHION)

## CASE 3: FOLLOW-UP

The patient returns to Urgent Care for her continued symptoms. They take more history and find out she has had a new sexual partner for the last two months. They inconsistently use condoms; she is taking OCPs.

Pelvic exam identifies cervical discharge and erythema. There is no cervical motion tenderness.

# GONORRHEA AND CHLAMYDIA

## ▶ Symptoms:

- ▶ Female: cervicitis, urethritis, may progress to PID
- ▶ Male: urethritis, epididymitis
- ▶ Gonorrhea-specific: pharyngitis, disseminated infection (rash, septic arthritis)
- ▶ Chlamydia more commonly asymptomatic

## ▶ Diagnosis: Nucleic acid amplification testing

- ▶ Culture rarely performed

## ▶ Antimicrobial stewardship role:

- ▶ Limited. The focus is on providing adequate treatment, often to high-risk populations who may not return to care.
- ▶ Appropriate up-front treatment reduces risk of treatment failure and antibiotic resistance

# GONORRHEA AND CHLAMYDIA: TREATMENT

## ▶ CDC Guidelines

- ▶ Significant updates in 2021

## ▶ Treatment usually provided before diagnostic test results

## ▶ Gonorrhea:

- ▶ Ceftriaxone 500 mg x1 (1000mg if >150 kg). Dose raised due to reduced susceptibility.
  - ▶ Alternative (allergy): gentamicin 240 mg IM x1

## ▶ Chlamydia:

- ▶ New preferred drug: doxycycline 100 mg PO BID x 7 days
- ▶ Azithromycin 1 gram PO x1 is now second-line



# OTHER SEXUALLY TRANSMITTED INFECTIONS

## ▶ Trichomoniasis

- ▶ Causes urethritis, cystitis in males and females; can cause PID in females
- ▶ Diagnosis: NAAT testing usually; wet mount of vaginal secretions
- ▶ Treatment:
  - ▶ Females: metronidazole 500 mg BID x 7 days
  - ▶ Males: metronidazole 2g PO x1

## ▶ *Mycoplasma genitalium*

- ▶ Can cause nongonococcal urethritis in males and cervicitis in females. Often persists after treatment for gonorrhea/chlamydia
- ▶ Diagnosis: NAAT
- ▶ Empiric treatment: doxycycline x 7 days, then moxifloxacin x 7 days
- ▶ Consider ID consultation!

## ▶ Ensure screening for HIV, syphilis, HBV, HCV!

## BREAKOUT SESSION

- ▶ What challenges do you see with antimicrobial stewardship with respect to urinary tract infections?
- ▶ What strategies could you use to improve the diagnosis of UTI?
- ▶ What strategies could improve the treatment of UTI?

# UTI: ANTIMICROBIAL STEWARDSHIP RECOMMENDATIONS

- ▶ Review your antibiogram if available – focus on outpatient urine cultures
- ▶ Create your own treatment algorithm based on antibiogram
  - ▶ [UNC's UTI algorithm](#)
- ▶ Avoid urine testing if patient has high risk of asymptomatic bacteriuria (i.e., older adults) and does not have urine-specific symptoms
- ▶ No urine cultures without urinalysis
- ▶ Use urine culture results!
  - ▶ Negative: stop antibiotics
  - ▶ Positive: ensure antibiotic is adequate. Consider targeting if possible.
- ▶ Minimize durations
  - ▶ Cystitis: 3-5 days (depending on drug); pyelonephritis: 7 days usually

# THE NORTH CAROLINA CLINICAL ANTIBIOTIC STEWARDSHIP PARTNERS (NC CLASP)

- ▶ All the information from today's session will be on our website <https://spice.unc.edu/ncclasp/>



# RESOURCES

- ▶ [UNC UTI Guideline](#)
- ▶ [New York State Antibiotic Prescribing Guide](#)
  - ▶ Compendium of diagnostic and treatment guidelines for common outpatient conditions
- ▶ [CDC Treatment Recommendations](#)
  - ▶ Summarizes professional society guidelines, management of penicillin allergy
- ▶ [CDC STI Guidelines Wall Chart](#)