

Do I *Really* Need Meropenem? Common ID Curbsides

Hayden Andrews, M.D.
Assistant Professor of Internal Medicine
University of Texas Southwestern Medical Center
Dallas, TX

Outline

- Using a case-based format, will review common questions we receive related to GNR infections that may not require full ID consultation

Objectives

- You will be able to:
 - Classify a UTI based on its clinical syndrome
 - Choose the appropriate empiric antibiotic for serious GNR infections
 - Choose the appropriate antibiotic based on susceptibility data
 - Decide the duration of antibiotic for GU infections and bacteremia

Case

55F who presents to the ED with with three days of worsening dysuria, R flank pain, and fever. On exam, febrile to 101.5, tachy to 110s, and BP 90s/50s. WBC 15, lactate 2.5, UA >100 WBC and CT abdomen/pelvis with R kidney fat stranding without abscess. The ED starts vancomycin + cefepime and admits to medicine.

Case

55F who presents to the ED with with three days of worsening dysuria, R flank pain, and fever. On exam, febrile to 101.5, tachy to 110s, and BP 90s/50s. WBC 15, lactate 2.5, UA >100 WBC and CT abdomen/pelvis with R kidney fat stranding without abscess. The ED starts vancomycin + cefepime and admits to medicine.

How would you classify this patient?

- A) Uncomplicated UTI
- B) Complicated UTI without sepsis
- C) Complicated UTI with sepsis

The framework

Is my patient sick (i.e. sepsis?)

The framework

Is my patient sick (i.e. sepsis?)

Yes

Empiric broad-spectrum
antibiotics

Anti-MRSA (e.g. vancomycin)

+

Anti-gram negatives (e.g.
ceftriaxone or cefepime)

The framework

Is my patient sick (i.e. sepsis?)



GNR Infection Schema

- Step 1 Classify the Infection

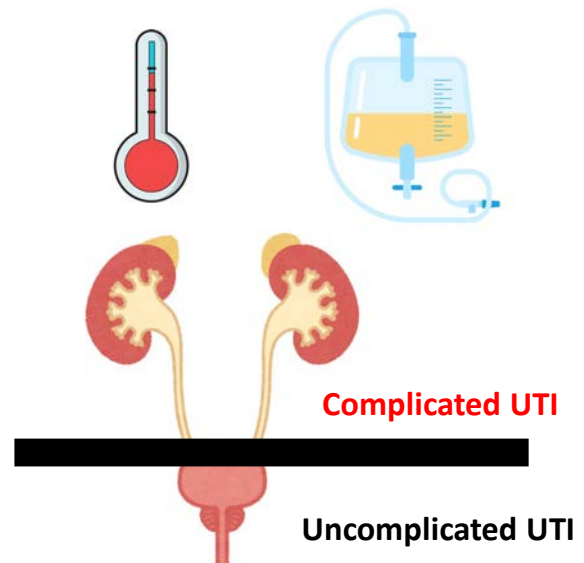
GNR Infection Schema

- Step 1 Classify the Infection

Traditional UTI Classification
Uncomplicated UTI • Nonpregnant women
Acute pyelonephritis
Complicated UTI • <i>Everyone else</i> (including all men!)

GNR Infection Schema

- Step 1 Classify the Infection



GNR Infection Schema

- Step 1 Classify the infection: **uncomplicated vs complicated UTI**
- Step 2 Assess disease severity

GNR Infection Schema

- Step 1 Classify the infection: **uncomplicated vs complicated UTI**
- Step 2 Assess disease severity



Case

55F who presents to the ED with with three days of worsening **dysuria**, **R flank pain**, and **fever**. On exam, febrile to 101.5, **tachy to 110s**, and BP 90s/50s. WBC 15, **lactate 2.5**, UA >100 WBC and CT abdomen/pelvis with **R kidney fat stranding** without abscess. The ED starts vancomycin + cefepime and admits to medicine.

How would you classify this patient?

- A) Uncomplicated UTI
- B) Complicated UTI without sepsis
- C) Complicated UTI with sepsis**

Case

55F who presents to the ED with with three days of worsening dysuria, R flank pain, and fever. On exam, febrile to 101.5, tachy to 110s, and BP 90s/50s. WBC 15, lactate 2.5, UA >100 WBC and CT abdomen/pelvis with R kidney fat stranding without abscess. The ED starts vancomycin + cefepime and admits to medicine.

While admitting the patient, the micro lab calls with a CRITICAL RESULT **1/4 bottles with GNRs.**

Case

55F who presents to the ED with with three days of worsening dysuria, R flank pain, and fever. On exam, febrile to 101.5, tachy to 110s, and BP 90s/50s. WBC 15, lactate 2.5, UA >100 WBC and CT abdomen/pelvis with R kidney fat stranding without abscess. The ED starts vancomycin + cefepime and admits to medicine.

While admitting the patient, the micro lab calls with a CRITICAL RESULT
1/4 bottles with GNRs.



UTI: Case

55F who presents to the ED with with three days of worsening dysuria, R flank pain, and fever. On exam, febrile to 101.5, tachy to 110s, and BP 90s/50s. WBC 15, lactate 2.5, UA >100 WBC and CT abdomen/pelvis with R kidney fat stranding without abscess. The ED starts vancomycin + cefepime and admits to medicine.

While admitting the patient, the micro lab calls with a CRITICAL RESULT
1/4 bottles with GNRs.



Case

While admitting the patient, the micro lab calls with a CRITICAL RESULT 1/4 bottles with GNRs. What antibiotic would you order?

- A) Ceftriaxone
- B) Cefepime
- C) Piperacillin-tazobactam
- D) Meropenem
- E) Ciprofloxacin

GNR Infection Schema

- Step 1 Classify the infection: **uncomplicated vs complicated UTI**
- Step 2 Assess disease severity: **Sepsis???**
- Step 3 Make an empiric antibiotic selection

GNR Infection Schema

- Step 1 Classify the infection: **uncomplicated vs complicated UTI**
- Step 2 Assess disease severity: **Sepsis???**
- Step 3 Make an empiric antibiotic selection
 - Antibiotic **penetrates** the site of infection and treats **typical pathogens** for this infection
 - Risk for MDR pathogens (e.g., Pseudomonas)
 - Prior broad-spectrum antibiotics in the last 90 days
 - Prior culture data

GNR Infection Schema

- Step 3 Make an empiric antibiotic selection
 - Prior culture data: the PAST predicts the FUTURE...within reason

[illegible]

GNR Infection Schema

- Step 3 Make an empiric antibiotic selection
 - Prior culture data: the PAST predicts the FUTURE...within reason

Index - Provider Vitals Fever Comp I/O Lab Table Lab 72h 60 Day Micro Radiology Last 6 Weeks 60 Day Micro

Select view (60 day reports are sorted by UPDATED date, All available sorted by COLLECTED date)

60 day Micro (update date) 60 day Abnormal (update date) 60 day Blood (update date) 60 day Urine (update date) 60 day Respiratory (update date) 60 day Other (update date)

All available Micro All available Abnormal All available Blood All available Urine All available Respiratory All available Other

Micro Susceptibility Report

All Culture Results (Sorted by Organism)

Collected D/T	Specimen Source	Organism	Order ID	Method	Amikacin	AMINOGLYCOSIDE	AMINOGLYCOSIDE + CLAVULANATE	AMINOGLYCOSIDE + CLAVULANATE	AMPCILLIN	AMPCILLIN-SULBACTAM	AZITHROMYCLIN	CEFAZOLIN	CEFTIOXIME	CEFTIOXIME	CEFTIOXIME	CLINDAMYCIN	CLINDAMYCIN	ERYTHROMYCLIN	GENTAMICIN	IMPENEM	LEVOFLOXACIN	MEROPENEM	NITROFURANTOIN	PENICILLIN G	PHENACETIN-TAZOBACTAM	TEICoplanin	TORSEMIDE	TRIMETHOPRIM-SULFAMETHOXAZOLE	VANCOMYCIN
Urine	Urine	Escherichia coli		SS																									
Urine	Urine	Escherichia coli		SS																									

ESBL ☹️ ➔ 😊

- Extended Spectrum Beta-Lactamase
 - Hydrolyze many broad-spectrum beta-lactams (e.g., ceftriaxone)
 - A family of resistance genes for Enterobacterales (i.e., your GNRs)
 - More common in Asia but becoming increasingly common in the U.S.
 - Not feasible to sequence genes of all clinical isolates

ESBL ☹️ → 😊

- Extended Spectrum Beta-Lactamase

- Hydrolyze many broad-spectrum beta-lactams (e.g., ceftriaxone)
- A family of resistance genes for Enterobacterales (i.e., your GNRs)
- More common in Asia but becoming increasingly common in the U.S.
- Not feasible to sequence genes of all clinical isolates

Component	Value
Staphylococcus Species	Not Detected
--Staphylococcus aureus	Not Detected
--Staphylococcus epidermidis	Not Detected
--Staphylococcus saprophyticus	Not Detected
Enterococcus faecalis	Not Detected
Enterococcus faecium	DETECTED †
VanA/B - Vancomycin Resistance Gene	DETECTED †
Detection of vanA/B indicates vancomycin resistance	
Streptococcus Species	Not Detected
--Streptococcus pyogenes (Group A)	Not Detected
--Streptococcus agalactiae (Group B)	Not Detected
--Streptococcus pneumoniae	Not Detected
Enterobacteriaceae Family	Not Detected
--Enterobacter cloacae complex	Not Detected
--Escherichia coli	Not Detected
--Klebsiella aerogenes	Not Detected
--Klebsiella oxytoca	Not Detected
--Klebsiella pneumoniae	Not Detected
--Proteus species	Not Detected
--Salmonella Species	Not Detected
--Serratia marcescens	Not Detected
Pseudomonas aeruginosa	Not Detected

ESBL ☹️ → 😊

- Extended Spectrum Beta-Lactamase

- Hydrolyze many broad-spectrum beta-lactams (e.g., ceftriaxone)
- A family of resistance genes for Enterobacterales (i.e., your GNRs)
- More common in Asia but becoming increasingly common in the U.S.
- Not feasible to sequence genes of all clinical isolates

Clinically: ESBL = GNR with ceftriaxone (CTX) resistance

ESBL ☹️ → 😊

- Extended Spectrum Beta-Lactamase

- Hydrolyze many broad-spectrum beta-lactams (e.g., ceftriaxone)
- A family of resistance genes for Enterobacterales (i.e., your GNRs)
- More common in Asia but becoming increasingly common in the U.S.
- Not feasible to sequence genes of all clinical isolates

Clinically: ESBL = GNR with ceftriaxone (CTX) resistance

A **resistance** mechanism NOT a **virulence** mechanism

ESBL ☹️ → 😊

- Extended Spectrum Beta-Lactamase

- Clinically: GNR with ceftriaxone resistance
- Treatment:

IDSA 2023 Guidance on the Treatment of Antimicrobial Resistant Gram-Negative Infections

Published by IDSA on 6/7/2023. Document is current as of 12/01/22, 7/1/2023

A Focus on Extended-spectrum β -lactamase-Producing Enterobacterales, AmpC β -Lactamase-Producing Enterobacterales, Carbapenem-Resistant Enterobacterales, *Pseudomonas aeruginosa* with Difficult-to-Treat Resistance, Carbapenem-Resistant *Acinetobacter baumannii*, and *Stenotrophomonas maltophilia*

Tamma, P et al Clin Infect Dis 2023

ESBL ☹️ → 😊

- Extended Spectrum Beta-Lactamase

- Clinically: **GNR with ceftriaxone resistance**
- Treatment: (with guidance from patient's prior susceptibility results)
 - Severe infection (e.g., sepsis): carbapenem (**meropenem/ertapenem**)
 - Complicated UTI without sepsis: **TMP-SMX ("Bactrim")** or fluoroquinolones (e.g., **ciprofloxacin/levofloxacin**)
 - Uncomplicated UTI: **nitrofurantoin** (yesssss please!!!), **TMP-SMX**, or **fosfomycin** (E coli only). Alternative: single-dose aminoglycoside (e.g., **gentamicin**)

Tamma, P et al Clin Infect Dis 2023

ESBL ☹️ → 😊

- Extended Spectrum Beta-Lactamase

- Clinically: **GNR with ceftriaxone resistance**
- Treatment: (with guidance from patient's prior susceptibility results)
 - Severe infection (e.g., sepsis): carbapenem (**meropenem/ertapenem**)
 - Complicated UTI without sepsis: **TMP-SMX ("Bactrim")** or fluoroquinolones (e.g., **ciprofloxacin/levofloxacin**)
 - Uncomplicated UTI: **nitrofurantoin** (yesssss please!!!), **TMP-SMX**, or **fosfomycin** (E coli only). Alternative: single-dose aminoglycoside (e.g., **gentamicin**)
- CONTROVERSY:
 - The use of cefepime and piperacillin-tazobactam (...maybe, but do discuss with ID/pharmacy)

Tamma, P et al Clin Infect Dis 2023

ESBL ☹️ → 😊 And ampC ☹️☹️ → 😊

- Extended Spectrum Beta-Lactamase

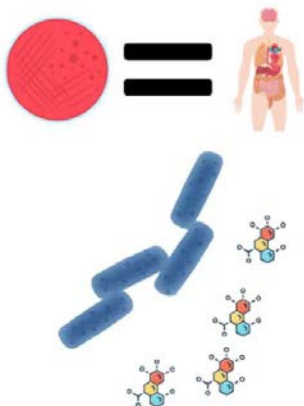
- Clinically: **GNR with ceftriaxone resistance**
- Treatment: (with guidance from patient's prior susceptibility results)
 - Severe infection (e.g., sepsis): carbapenem (**meropenem/ertapenem**)
 - Complicated UTI without sepsis: **TMP-SMX ("Bactrim")** or fluroquinolones (e.g., **ciprofloxacin/levofloxacin**)
 - Uncomplicated UTI: **nitrofurantoin** (yesssss please!!!), **TMP-SMX**, or **fosfomycin** (E coli only). Alternative: single-dose aminoglycoside (e.g., **gentamicin**)

- ampC

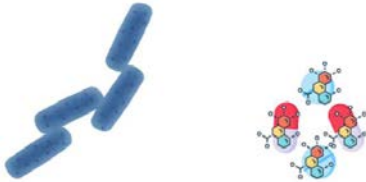
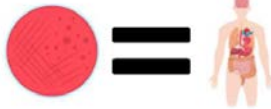
- Clinically: **Enterobacter cloacae**, **Klebsiella aerogenes**, **Citrobacter freundii**

Tamma, P et al Clin Infect Dis 2023

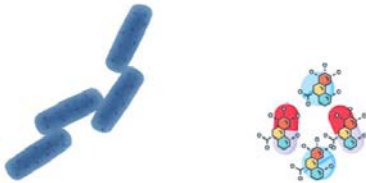
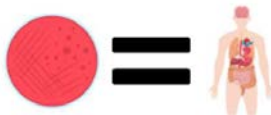
ESBL



ESBL

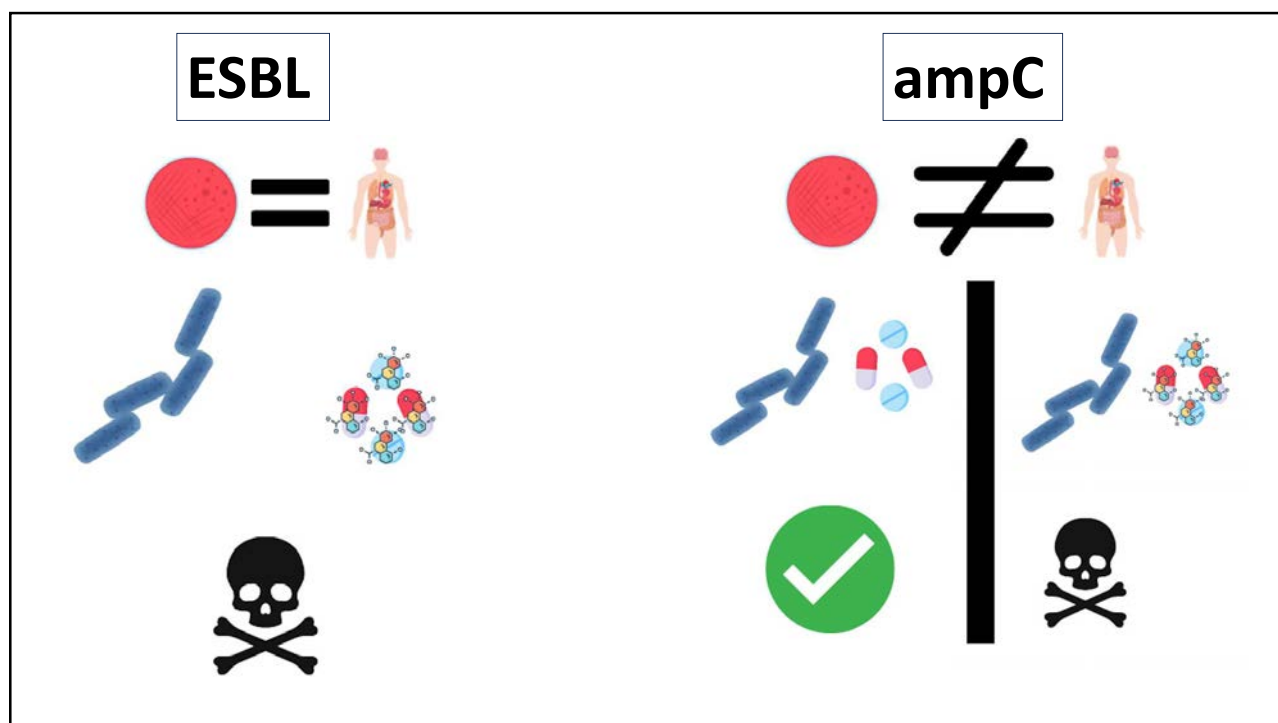


ESBL



ampC





ESBL ☹️ → 😊 And ampC ☹️☹️ → 😊

Susceptibility		
	KLEBSIELLA (ENTEROBACTER) AEROGENES	
	MIC METHOD	
Amikacin	<=2	Susceptible
Amoxicillin + Clavulanate	>=32	Resistant
Cefepime	<=1	Susceptible
Cefoxitin	>=64	Resistant
Ceftazidime	>=64	Resistant
Ceftriaxone	<=1	Susceptible ¹
Ciprofloxacin	<=0.25	Susceptible
Ertapenem	<=0.5	Susceptible
Gentamicin	<=1	Susceptible
Levofloxacin	<=0.12	Susceptible
Meropenem	<=0.25	Susceptible
Piperacillin-tazobactam	>=128	Resistant
Tetracycline	<=1	Susceptible
Tobramycin	<=1	Susceptible
Trimethoprim/sulfamethoxazole	<=20	Susceptible

¹ Antibiotic failure has been associated with prolonged treatment of this organism using third generation cephalosporins (e.g., ceftriaxone or ceftazidime), even if initially reported as "susceptible." Consider alternative therapy (e.g., cefepime) and/or infectious disease consultation if >4 days of treatment is anticipated.

ESBL ☹️ → 😊 And ampC ☹️☹️ → 😊

- Extended Spectrum Beta-Lactamase
 - Clinically: **GNR with ceftriaxone resistance**
 - Treatment: (with guidance from patient's prior susceptibility results)
 - Severe infection (e.g., sepsis): carbapenem (**meropenem/ertapenem**)
 - Complicated UTI without sepsis: **TMP-SMX ("Bactrim")** or fluoroquinolones (e.g., **ciprofloxacin/levofloxacin**)
 - Uncomplicated UTI: **nitrofurantoin** (yesssss please!!!), **TMP-SMX**, or **fosfomycin** (E coli only).
Alternative: single-dose aminoglycoside (e.g., **amikacin**)
- ampC
 - Clinically: **Enterobacter cloacae, Klebsiella aerogenes, Citrobacter freundii**
 - Treatment:
 - Severe infection: **cefepime** (preferred, MIC≤2) or carbapenem
 - Other infections: same as above for ESBL

Tamma, P et al Clin Infect Dis 2023

Case

While admitting the patient, the micro lab calls with a CRITICAL RESULT 1/4 bottles with GNRs. You reviewed her risk factors for MDR pathogens and prior micro report showing ESBL E coli in the urine 6 months ago. What antibiotic would you order?

- A) Ceftriaxone
- B) Cefepime
- C) Piperacillin-tazobactam
- D) Meropenem
- E) Ciprofloxacin

Case

While admitting the patient, the micro lab calls with a CRITICAL RESULT 1/4 bottles with GNRs. You reviewed her risk factors for MDR pathogens and prior micro report showing ESBL E coli in the urine 6 months ago. What antibiotic would you order?

- A) Ceftriaxone
- B) Cefepime
- C) Piperacillin-tazobactam
- D) Meropenem
- E) Ciprofloxacin

Case

55F who presents to the ED with with three days of worsening dysuria, R flank pain, and fever. On exam, febrile to 101.5, tachy to 110s, and BP 90s/50s. WBC 15, lactate 2.5, UA >100 WBC and CT abdomen/pelvis with R kidney fat stranding without abscess. The ED starts vancomycin + cefepime and admits to medicine.

While admitting the patient, the micro lab calls with a CRITICAL RESULT 1/4 bottles with GNRs and on review of her prior micro, she grew ESBL E coli in the urine 6 months ago. She is started on meropenem IV.

On HD2, the patient has clinically improved to her baseline and blood + urine cultures have speciated with E coli with below susceptibility profile.

Case

55F who was admitted with a complicated UTI with bacteremia secondary to E coli who has now clinically improved on two days of meropenem. What antibiotic would you use to complete treatment?

- A) PICC, Ertapenem
- B) PICC, Cefepime
- C) TMP-SMX
- D) Amoxicillin-clavulanate
- E) Ciprofloxacin

Susceptibility		Escherichia coli	
		MIC METHOD	
Amikacin	<=2	Susceptible	
Amoxicillin + Clavulanate	8	Susceptible	
Ampicillin	>=32	Resistant	
Cefepime	2	Susceptible	
Cefoxitin	<=4	Susceptible	
Ceftazidime	<=1	Susceptible	
Ceftriaxone	>=64	Resistant	
Ciprofloxacin	>=4	Resistant	
Ertapenem	<=0.5	Susceptible	
Gentamicin	>=16	Resistant	
Levofloxacin	>=8	Resistant	
Meropenem	<=0.25	Susceptible	
Piperacillin-tazobactam	<=4	Susceptible	
Tetracycline	<=1	Susceptible	
Tobramycin	8	Intermediate	
Trimethoprim/sulfamethoxazole	<=20	Susceptible	

GNR Infection Schema

- Step 1 Classify the infection: **uncomplicated vs complicated UTI**
- Step 2 Assess disease severity: **Sepsis???**
- Step 3 Make an empiric antibiotic choice: **risk for MDR (recent IV antibiotics??) and prior cultures in the last ~year**
- Step 4 Make a culture-directed antibiotic choice
 - Clinical improvement on empiric therapy?
 - Source control?
 - Antibiotic that is SS with appropriate levels in desired space
 - Nitrofurantoin/Fosfomycin → excellent bladder concentration (not tissue)
 - PO >> IV

Case

55F who was admitted with a complicated UTI with bacteremia secondary to E coli who has now clinically improved on two days of meropenem. What antibiotic would you use to complete treatment?

- A) PICC, Ertapenem
- B) PICC, Cefepime
- C) TMP-SMX
- D) Amoxicillin-clavulanate
- E) Ciprofloxacin

Susceptibility		Escherichia coli MIC METHOD	
Amikacin	<=2	Susceptible	
Amoxicillin + Clavulanate	8	Susceptible	
Ampicillin	>=32	Resistant	
Cefepime	2	Susceptible	
Cefoxitin	<=4	Susceptible	
Ceftazidime	<=1	Susceptible	
Ceftriaxone	>=64	Resistant	
Ciprofloxacin	>=4	Resistant	
Ertapenem	<=0.5	Susceptible	
Gentamicin	>=16	Resistant	
Levofloxacin	>=8	Resistant	
Meropenem	<=0.25	Susceptible	
Piperacillin-tazobactam	<=4	Susceptible	
Tetracycline	<=1	Susceptible	
Tobramycin	8	Intermediate	
Trimethoprim/sulfamethoxazole	<=20	Susceptible	

Case

55F who was admitted with a complicated UTI with bacteremia secondary to E coli who has now clinically improved on two days of meropenem. What antibiotic would you use to complete treatment?

- A) PICC, Ertapenem
- B) PICC, Cefepime
- C) **TMP-SMX**
- D) Amoxicillin-clavulanate
- E) Ciprofloxacin

Susceptibility		Escherichia coli MIC METHOD	
Amikacin	<=2	Susceptible	
Amoxicillin + Clavulanate	8	Susceptible	
Ampicillin	>=32	Resistant	
Cefepime	2	Susceptible	
Cefoxitin	<=4	Susceptible	
Ceftazidime	<=1	Susceptible	
Ceftriaxone	>=64	Resistant	
Ciprofloxacin	>=4	Resistant	
Ertapenem	<=0.5	Susceptible	
Gentamicin	>=16	Resistant	
Levofloxacin	>=8	Resistant	
Meropenem	<=0.25	Susceptible	
Piperacillin-tazobactam	<=4	Susceptible	
Tetracycline	<=1	Susceptible	
Tobramycin	8	Intermediate	
Trimethoprim/sulfamethoxazole	<=20	Susceptible	

Case

55F who presents to the ED with with three days of worsening dysuria, R flank pain, and fever. On exam, febrile to 101.5, tachy to 110s, and BP 90s/50s. WBC 15, lactate 2.5, UA >100 WBC and CT abdomen/pelvis with R kidney fat stranding without abscess. The ED starts vancomycin + cefepime and admits to medicine.

While admitting the patient, the micro lab calls with a CRITICAL RESULT 1/4 bottles with GNRs and on review of her prior micro, she grew ESBL E coli in the urine 6 months ago. She is started on meropenem IV.

On HD2, the patient has clinically improved to her baseline and blood + urine cultures have speciated with ESBL E coli. She is rotated from meropenem to PO TMP-SMX ("Bactrim").

Case

You are completing her discharge. What duration of total antibiotics (inclusive of the time on IV) will you recommend?

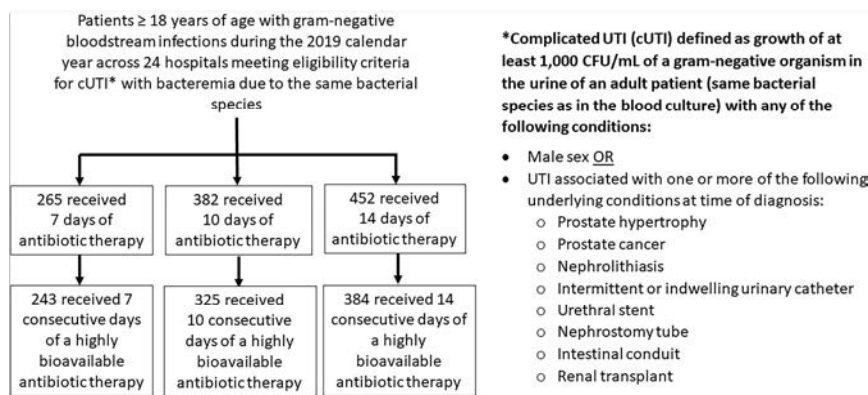
- A) 5 days
- B) 7 days
- C) 10 days
- D) 14 days

GNR Infection Schema

- Step 1 Classify the infection: **uncomplicated vs complicated UTI**
- Step 2 Assess disease severity: **Sepsis???**
- Step 3 Make an empiric antibiotic choice: **risk for MDR (recent IV antibiotics??) and prior cultures in the last ~year**
- Step 4 Make a culture-directed antibiotic choice: **de-escalate to PO antibiotics if improved/source control**
- Step 5 Decide duration

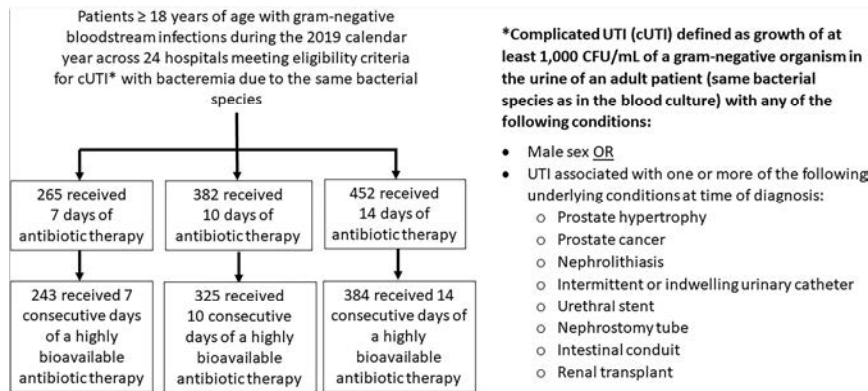
GNR Infection Schema

- Step 5 Decide duration



GNR Infection Schema

• Step 5 Decide duration



No difference between 7-day arm (IV beta lactam or TMP-SMX/FQ) and 14-day arm for risk of recurrent infection within 30 days

McAteer, J et al. Clin Infect Dis 2023

Case

You are completing her discharge. What duration of total antibiotics (inclusive of the time on IV) will you recommend?

- A) 5 days
- B) 7 days
- C) 10 days
- D) 14 days

GNR Infection Schema

- Step 1 Classify the UTI: **uncomplicated vs complicated**
- Step 2 Assess disease severity: **Sepsis???**
- Step 3 Make an empiric antibiotic choice: **risk for MDR (recent IV antibiotics??) and prior cultures in the last ~year**
- Step 4 Make a culture-directed antibiotic choice: **de-escalate to PO antibiotics if improved/source control**
- Step 5 Decide duration: **3-5 days for all uncomplicated UTI and 7-10 days for complicated UTI with highly bioavailable abx (**excluding prostatitis)**

UTI: MEN ...oh no

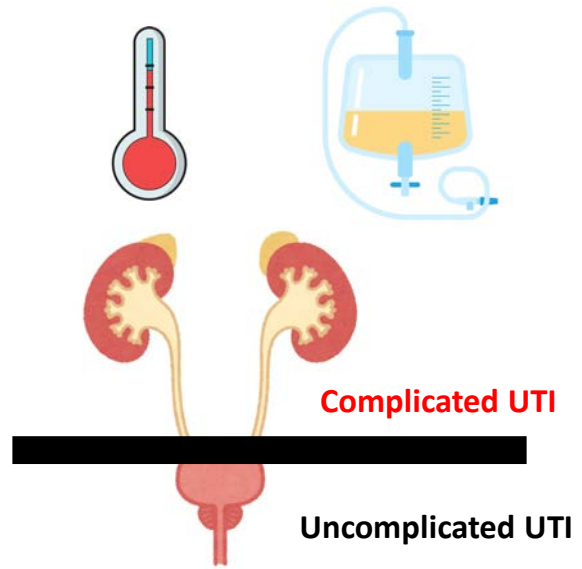
55M with three days of dysuria. He sees his PCP with UA showing 3+ leukocyte esterase and started on PO ciprofloxacin. Two days later the urine culture returns with E coli. PCP refers to ED for PICC and 14 days of IV antibiotics. The ED starts ertapenem and admits to medicine. What antibiotic would you use?

- A) Nitrofurantoin X 5 days
- B) Ertapenem X 14 days
- C) Ertapenem X 7 days
- D) Gentamicin X 1 dose

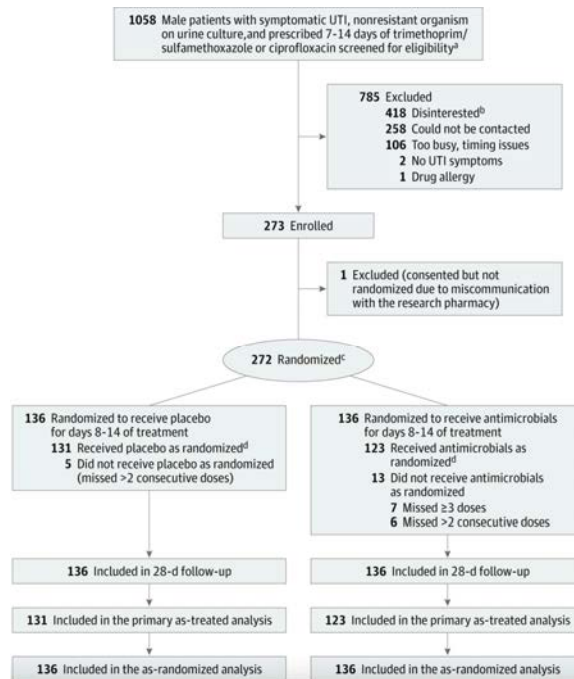
Susceptibility		Escherichia coli
		MIC METHOD
Amikacin	<=2	Susceptible
Ampicillin	>=32	Resistant
Cefazolin	>=64	Resistant
Cefepime	2	Susceptible
Ceftriaxone	>=64	Resistant
Ciprofloxacin	>=4	Resistant
Ertapenem	<=0.5	Susceptible
Gentamicin	>=16	Resistant
Levofloxacin	>=8	Resistant
Meropenem	<=0.25	Susceptible
Nitrofurantoin	<=16	Susceptible
Piperacillin-tazobactam	<=4	Susceptible
Tetracycline	<=1	Susceptible
Tobramycin	>=16	Resistant
Trimethoprim/sulfamethoxazole	<=20	Susceptible

GNR Infection Schema

- Step 1 Classify the Infection



Trautner B, et al. IDWeek 2023 Boston, MA



Drekonja, D et al. JAMA 2021

Table 3. Primary and Secondary Outcomes

Characteristic	No./total No. (%)		
Resolution of UTI symptoms 14 days after stopping active antimicrobials	7-Day antimicrobial + 7-day placebo group	14-Day antimicrobial group	Absolute difference, % (1-sided 97.5% CI) ^a
As-treated population (primary analysis)	122/131 (93.1)	111/123 (90.2)	2.9 (-5.2 to ∞)
As-randomized population	125/136 (91.9)	123/136 (90.4)	1.5 (-5.8 to ∞)
Recurrence of UTI symptoms within 28 days of stopping study medication (secondary outcome)	7-Day antimicrobial + 7-day placebo group	14-Day antimicrobial group	Absolute difference, % (2-sided 95% CI) ^b
As-treated population	13/131 (9.9)	15/123 (12.9)	-3.0 (-10.8 to 6.2)
As-randomized population	14/136 (10.3)	23/136 (16.9)	-6.6 (-15.5 to 2.2)

Abbreviation: UTI, urinary tract infection.

^a The primary analysis used a 1-sided 97.5% CI for noninferiority, which was established if the lower bound of the 1-sided 97.5% CI did not cross the noninferiority margin of -10% difference in symptom resolution.

^b The secondary outcome was analyzed using a 2-tailed superiority hypothesis test of differences in proportions (2-sample test for equality of proportions with continuity correction) with $\alpha = .05$ and with 2-sided 95% CIs.

Drekonja, D et al. JAMA 2021

UTI: MEN ...oh no

55M with three days of dysuria. He sees his PCP with UA showing 3+ leukocyte esterase and started on PO ciprofloxacin. Two days later the urine culture returns with E coli. PCP refers to ED for PICC and 14 days of IV antibiotics. The ED starts ertapenem and admits to EDB. What antibiotic would you use?

- A) Nitrofurantoin X 5 days
- B) Ertapenem X 14 days
- C) Ertapenem X 7 days
- D) Gentamicin X 1 dose

Susceptibility		Escherichia coli
		MIC METHOD
Amikacin	<=2	Susceptible
Ampicillin	>=32	Resistant
Cefazolin	>=64	Resistant
Cefepime	2	Susceptible
Ceftriaxone	>=64	Resistant
Ciprofloxacin	>=4	Resistant
Ertapenem	<=0.5	Susceptible
Gentamicin	>=16	Resistant
Levofloxacin	>=8	Resistant
Meropenem	<=0.25	Susceptible
Nitrofurantoin	<=16	Susceptible
Piperacillin-tazobactam	<=4	Susceptible
Tetracycline	<=1	Susceptible
Tobramycin	>=16	Resistant
Trimethoprim/sulfamethoxazole	<=20	Susceptible

UTI: MEN ...oh no

55M with three days of dysuria. He sees his PCP with UA showing 3+ leukocyte esterase and started on PO ciprofloxacin. Two days later the urine culture returns with E coli. PCP refers to ED for PICC and 14 days of IV antibiotics. The ED starts ertapenem and admits to EDB. What antibiotic would you use?

A) Nitrofurantoin X 5 days

B) Ertapenem X 14 days

C) Ertapenem X 7 days

D) Gentamicin X 1 dose

Susceptibility		Escherichia coli
		MIC METHOD
Amikacin	<=2	Susceptible
Ampicillin	>=32	Resistant
Cefazolin	>=64	Resistant
Cefepime	2	Susceptible
Ceftriaxone	>=64	Resistant
Ciprofloxacin	>=4	Resistant
Ertapenem	<=0.5	Susceptible
Gentamicin	>=16	Resistant
Levofloxacin	>=8	Resistant
Meropenem	<=0.25	Susceptible
Nitrofurantoin	<=16	Susceptible
Piperacillin-tazobactam	<=4	Susceptible
Tetracycline	<=1	Susceptible
Tobramycin	>=16	Resistant
Trimethoprim/sulfamethoxazole	<=20	Susceptible

UTI: Catheter

- Is it really a UTI????? (Positive urine culture  infection)
- Remove it!!!!
- If ongoing need of catheter, exchange it when starting antibiotics. (Biofilm)
 - Outcomes are improved
- Duration: complicated UTI (7-10 days)

Review

- Empiric antibiotics guided by the infectious syndrome, severity of illness, MDR risk and prior cultures
 - Please always review the prior cultures!!
- ESBL ~ defined as GNR with CTX resistance (**NOT A VIRULENCE FACTOR!**)
 - Carbapenem for severe infection
 - Otherwise use SS, non-beta lactam PO antibiotics with same treatment durations as otherwise indicated
 - Don't forget about nitrofurantoin, fosfomycin, and X 1 aminoglycoside for uncomplicated UTI!
- Male factor alone does not equal cUTI
- GNR bacteremia alone does not alter treatment duration or preclude eventual use of PO antibiotics

Thank you!

Hayden Andrews, M.D.
Assistant Professor of Internal Medicine
University of Texas Southwestern Medical Center
Dallas, TX