Clear the Stream: cUTI Guideline Updates

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Disclosures

The planners and speaker have indicated that there are no relevant financial relationships with any ineligible companies to disclose.

Abbreviation Key

- BLBLI: beta-lactam beta-lactamase inhibitor
- BSI: bloodstream infection
- cUTI: complicated urinary tract infection
- ED: emergency department
- ESBL: extended spectrum beta-lactamase
- FQ: fluoroquinolone
- g/mg: grams/milligrams
- ICU: intensive care unit
- ID: Infectious Diseases
- IV: intravenous
- LGH: Lutheran General Hospital
- MDR: multi-drug resistant
- PO: by mouth
- SGLT2i: sodium glucose co-transporter 2 inhibitor
- SIRS: systemic inflammatory response syndrome
- SOFA: sequential organ failure assessment
- TMP-SMX: trimethoprim-sulfamethoxazole
- uUTI: uncomplicated urinary tract infection
- UTI: urinary tract infection

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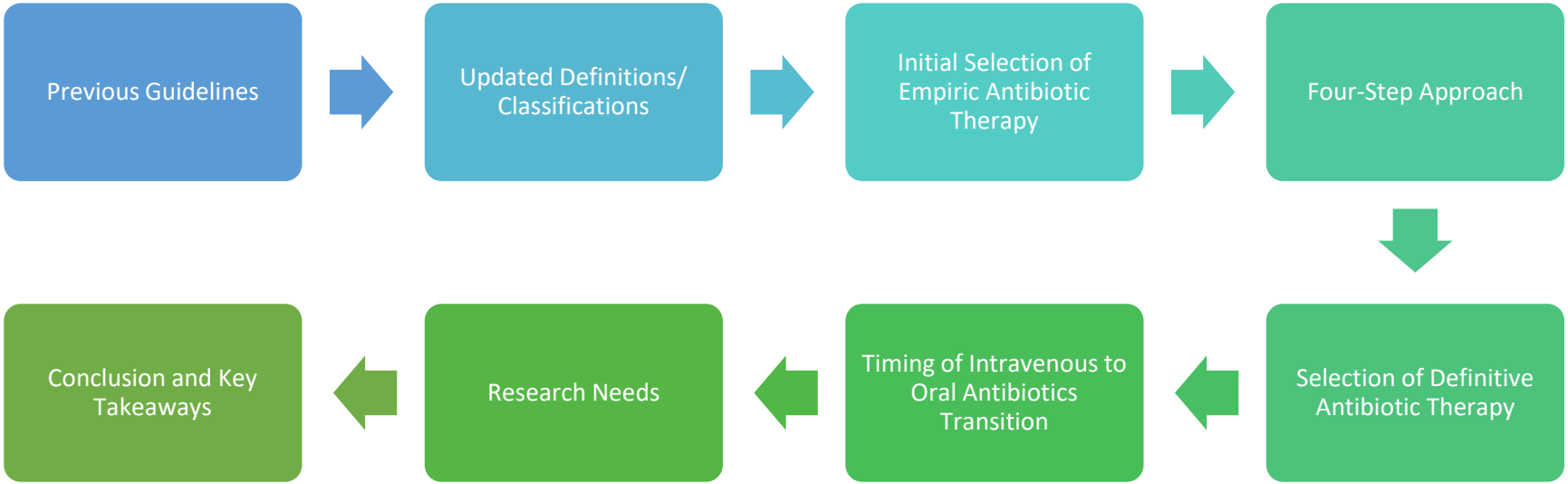
Learning Objectives

At the end of this session, learners should be able to:

1. Differentiate uncomplicated and complicated urinary tract infections using the updated guideline-defined criteria.
2. Identify recommended empiric antimicrobial therapies for complicated urinary tract infections.
3. Select appropriate definitive therapy including drug choice and duration using culture results.
4. Apply the four-step approach to formulate evidence-based treatment plans for patients with complicated urinary tract infections.

Presentation Outline



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Previous IDSA Guideline

Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women

- Excluded:
  - Men
  - Explicit guidance on complicated UTI

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Why the Update?

Increased antimicrobial resistance rates have made empiric choices increasingly uncertain

Newer antibiotics have received FDA approval for cUTI treatment

Impacts:

Empiric antibiotic choices	Route of therapy	Duration of treatment

Prevents:

Overtreatment

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Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Updated Classifications

New classifications of uUTI and cUTI

Old Classifications

Uncomplicated UTI: Acute cystitis in afebrile nonpregnant premenopausal women with no diabetes and no urologic abnormalities

Acute Pyelonephritis: Acute kidney infection in women otherwise meeting the definition of uncomplicated UTI above

Complicated UTI: All other UTIs

New Classifications

Uncomplicated UTI: Infection confined to the bladder in afebrile women or men

Complicated UTI: infection beyond the bladder in women or men

- Pyelonephritis
- Febrile or bacteremic UTI
- Catheter-associated (CAUTI)
- Prostatitis* (*not covered by these guidelines)

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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uUTI Classification

Definition:

- Clinical syndrome, confined to the bladder, with the absence of signs/symptoms that extend beyond the bladder

Clinical Presentation:

- Signs/ symptoms include
  - Dysuria
  - Urgency
  - Frequency
  - Suprapubic pain

Gupta K, et al. Infectious Diseases Society of America (IDSA), 2011.

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cUTI Classification

Definition:

- UTI with symptoms extending systemically

Clinical Presentation:

- Signs and symptoms include
  - Fever
  - Flank pain
  - Costovertebral angle tenderness
  - Other systemic illness symptoms
    - Chills
    - Rigors
    - Hemodynamic instability

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

This Guideline Doesn’t Apply To

- Bacterial prostatitis
- Epididymitis
- Orchitis

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Assessment Question #1

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Assessment Question #1

GT is a 68-year-old male who presents to the ED with flank pain that began 2 days ago. He notes he has urinary urgency and frequency and has not taken his BP meds in 2 days. No other issues or complaints.

PMH: hypertension and type 2 diabetes
Vitals: HR 95, BP 112/74, Temp 38.4C

What type of urinary tract infection does GT most likely have?

a. Acute on chronic UTI
b. Complicated UTI
c. Uncomplicated UTI
d. GT doesn't have a urinary tract infection

Predominant Pathogens & Risk Factors

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Predominant Pathogens

Gram negative bacteria – most commonly:

Escherichia coli (70-80%)	*Klebsiella pneumoniae*	*Klebsiella oxytoca*	*Proteus mirabilis*

Increasing prevalence of ESBL and FQ resistant strains

Klein RD, Hultgren SJ. *Nat Rev Microbiol*. 2020;18(4):211-226.

UTI Risk Factors

Previous UTI	Urologic instrumentation/ surgery	Neurogenic bladder	Renal transplantation
Treatment of asymptomatic bacteriuria	Urinary incontinence	Impaired cognitive function	Exposure to medications • SGLT2i • Antimicrobials

Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, 74, 909-929.e5

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Empiric Use of Antibiotics

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Empiric Antibiotic Summary

Condition of the Patient	Preferred	Alternative
Sepsis with or without shock	3rd or 4th generation cephalosporins Carbapenems Piperacillin-tazobactam Fluoroquinolones	Novel BLBLI Cefiderocol Plazomicin Older aminoglycosides
Without sepsis, IV route of therapy	3rd or 4th generation cephalosporins Piperacillin-tazobactam Fluoroquinolones	Carbapenems Newer agents (BLBLI, cefiderocol, plazomicin) Older aminoglycosides
Without sepsis, oral route of therapy	Fluoroquinolones or trimethoprim-sulfamethoxazole	Amoxicillin-clavulanate or oral cephalosporins

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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3rd & 4th Generation Cephalosporins

Ceftriaxone, and by extension third and fourth generation cephalosporins, remain one of the **preferred** classes of antibiotics for empiric treatment of cUTI without sepsis

Third or fourth generation cephalosporins may be used in patients with sepsis if not excluded based on patient-specific factors

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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3rd/4th Generation Cephalosporins: Dosing

Drug	Dose	Notes
Ceftriaxone	1-2 g IV once daily	Highly albumin bound, consider alternative if hypoalbuminemia present
Ceftazidime	1-2 g IV every 8 hours	

Cefepime (Maxipime)

Live as of 12/18/25

Population	Duration	>60 mL/min	30-60 mL/min	11-29 mL/min	≤10 mL/min	HD	CRRT	PD
Septic Shock, CNS, Cystic Fibrosis, HAP/VAP, Febrile Neutropenia, Bone and Joint, Gram-negative MIC ≥4, *Pseudomonas aeruginosa* Bacteremia, or Endocarditis	240 min	2g q8h	1g q8h	1g q12h	1g q24h	1g q24h[1]	2g q8h	1g q24h
	Load with 2g over 30 minutes for all regardless of renal function							
Other Indications	240 min	1g q8h	1g q12h	1g q24h	500mg q24h	500mg q24h[1]	---	1g q24h
	Load with 1 g over 30 minutes for all regardless of renal function							
If 30 min infusion required due to line access, may change to 30 min infusion with the same dose and frequency [1]2g TIWeek post HD (1800) also available if transitioning to outpatient								

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.
Enterprise Extended Infusion Antimicrobial Dosing Recommendations 2026.

Ceftriaxone: Patient Considerations

Once daily administration

- Facilitates outpatient antibiotic therapy
- Ease of dosing

Low cost

Intramuscular administration

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Piperacillin-tazobactam

Extended spectrum penicillin and beta-lactamase inhibitor combination

Piperacillin-tazobactam remains one of the **preferred** antibiotics for empiric treatment of cUTI without sepsis

Live as of 11/20/25

Piperacillin-Tazobactam (Zosyn)

Population	Duration	≥ 20 mL/min	<20 mL/min	HD	CRRT	PD
BMI>40, Septic Shock, Cystic Fibrosis, HAP/VAP, Febrile Neutropenia, Bone and Joint, Gram-negative MIC >8, *Pseudomonas aeruginosa* Bacteremia, or Endocarditis	240 min	4.5g q8h	3.375g q12h	3.375g q12h	4.5g q8h	3.375g q12h
	Load with 4.5g over 30 min for all regardless of renal function					
Other indications	240 min	3.375g q8h	3.375g q12h	3.375g q12h	3.375g q8h	3.375g q12h
	Load with 3.375g over 30 minutes for all regardless of renal function					
If 30-min infusion is required due to line access, see Appendix						

Population	Duration	≥ 20 mL/min	<20 mL/min
Invasive Pseudomonas MIC >8	Continuous over 24 hours	18 g	13.5 g
	Not delegated authority – reach out to pharmacy for assistance with ordering this dosing scheme		

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025. Enterprise Extended Infusion Antimicrobial Dosing Recommendations 2026.

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Piperacillin-tazobactam: Patient Considerations

Prolonged or continuous infusions

- To enhance the time : MIC ratio

May create challenge for patient, nursing staff, etc.

Medium cost

Challenges to effectiveness include rising rates of:

- ESBL-producing organisms
- Multi-drug-resistant *Pseudomonas*

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Antibiogram: Aurora St. Lukes Medical Center

ACL Laboratories

ANNUAL REPORT OF SUSCEPTIBILITY PATTERNS

January 1 - December 31, 2025

Percent of isolates susceptible[1] to antimicrobial agents at attainable concentrations

Gram Negative			Penicillins			Cephalosporins									Carbapenems		Mono-bactam	Quinolones		Aminoglycosides			Other				
ADVOCATE AURORA MEDICAL CENTER ST LUKE'S 2025	# Isolates[2]	ESBL[3]	Ampicillin	Ampicillin/sulbactam	Piperacillin/tazobactam	Cefazolin (Urine)[4]	Cefazolin	Cefuroxime axetil	Cefpodoxime	Ceftazidime	Ceftriaxone	Cefepime	Ceftazidime/avibactam[5,6]	Ceftolozane/tazobactam[5,6]	Ertapenem[6]	Meropenem[6]	Aztreonam[7]	Ciprofloxacin[7]	Levofloxacin[7]	Gentamicin	Tobramycin	Amikacin	Nitrofurantoin[8]	Trimethoprim/sulfamethoxazole	Fosfomycin[5,6,9]	Colistin[5]	Minocycline[5,6]
ENTEROBACTERALES																											
Citrobacter freundii complex[11]	80				68					68	63	98			98	100	65	92		97		100	89	90			
Citrobacter koseri	42				97			51	94	100	100	100			100	100	100	97		97		100	84	97			
Enterobacter cloacae complex[12]	223				73				70	72	67	92	99		83	99	72	87		96	95	100	29	88			
Escherichia coli[10]	2126	17	48	59	94	81	57	74	76	88	83	91	100		99	99	87	68		90	83	97	94	73			
Klebsiella (Enterobacter) aerogenes	72				75					73	76	98			96	100	75	94		98		100	15	97			
Klebsiella oxytoca[10]	120	9		70	88		0	82	86	95	89	95	95		96	98	95	92		95	97	100	78	90			
Klebsiella pneumoniae[10]	673	17		76	90	82	69	75	81	83	82	89	100		97	98	81	79		92	87	99	27	82			
Morganella morganii	43			9	86						67	100			96	97	71	72		88		100		76			
Proteus mirabilis	362		80	91	100	93	16	94	98	97	96	99	100		100	99	98	83		96	98	99		85			
Providencia rettgeri																											
Providencia stuartii																											
Serratia marcescens	100									93	91	100	100		97	97	98	93		99	87	98		100			
NONFERMENTERS																											
Acinetobacter baumannii complex[13,14]																											
Pseudomonas aeruginosa	564				87					89		89	99	98		92	81	87	84		98	99					
Stenotrophomas maltophilia	34																		94					100			94

Not reported due to intrinsic resistance or susceptibility panel restrictions.

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Antibiogram: Lutheran General Hospital

ACL Laboratories

ANNUAL REPORT OF SUSCEPTIBILITY PATTERNS

January 1 - December 31, 2025

Percent of isolates susceptible[1] to antimicrobial agents at attainable concentrations

Gram Negative			Penicillins			Cephalosporins								Carbapenems		Mono-bactam	Quinolones		Aminoglycosides			Other				
AAH Lutheran General Hospital* 2025	**# Isolates[2]**	**ESBL[3]**	**Ampicillin**	**Ampicillin/sulbactam**	**Piperacillin/tazobactam**	**Cefazolin (Urine)[4]**	**Cefazolin**	**Cefuroxime axetil**	**Cefpodoxime**	**Ceftazidime**	**Ceftriaxone**	**Cefepime**	**Ceftazidime/avibactam[5,6]**	**Ceftolozane/tazobactam[5,6]**	**Ertapenem[6]**	**Meropenem[6]**	**Aztreonam[7]**	**Ciprofloxacin[7]**	**Levofloxacin[7]**	**Gentamicin**	**Tobramycin**	**Amikacin**	**Nitrofurantoin[8]**	**Trimethoprim/sulfamethoxazole**	**Fosfomycin[5,6,9]**	**Colistin[5]**	**Minocycline[5,6]**
ENTEROBACTERALES																										
Citrobacter freundii complex[11]	55				65						58	92	100		92	96		87		96	90	100	94	92			
Citrobacter koseri	61				98					96	96	100	100		100	100	96	96		98	94	100	91	100			
Enterobacter cloacae complex[12]	149				81				77	81	76	93	100		87	98	81	91		97	97	100	35	90			
Escherichia coli[10]	2128	17	49	61	92	80	49	72	74	87	81	90	100		99	99	85	63		88	83	96	96	75	83		
Klebsiella (Enterobacter) aerogenes	78				74				56	65	66	94	96		90	96	72	94		100	96	98	21	97			
Klebsiella oxytoca[10]	88	3		80	92		0	89	100	98	92	98	97		98	100	92	97		97	97	100	92	95			
Klebsiella pneumoniae[10]	647	19		67	82	75	54	66	69	74	74	81	96		89	91	73	71		91	79	93	25	74			
Morganella morganii	61			16	93					72	80	96	97		94	100	84	62		86	97	98		70			
Proteus mirabilis	434		62	82	98	91	10	84	82	85	89	95	99		99	99	98	56		85	77	94		68			
Providencia rettgeri																											
Providencia stuartii	63				84				51	26	53	79	79		84	90	86	7				67		66			
Serratia marcescens	73									85	82	95	98		95	97	86	82		93	77	88		93			
NONFERMENTERS																										
Acinetobacter baumannii complex[13]	89			47	14					23		24				16		15		44	46	45				85[#]	83
Pseudomonas aeruginosa	502				69					82		81	96	95		74	76	76	71		91	97					
Stenotrophomas maltophilia	54																		75					92			92

Not reported due to intrinsic resistance or susceptibility panel restrictions.

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Antibiogram: Wake Forest Baptist

ATRIUM HEALTH WAKE FOREST BAPTIST ANTIBIOTIC SUSCEPTIBILITY REPORT
%SUSCEPTIBLE: INPATIENTS (January-December 2025)

GRAM NEGATIVE RODS	Number Tested	Cefazolin	Ceftriaxone	Cefepime	Ciprofloxacin	Levofloxacin	Ertapenem	Meropenem	Ampicillin + Sulbactam	Piperacillin + Tazobactam	Trimethoprim Sulfamethoxazole	Minocycline	Amikacin	Gentamicin	Tobramycin
Escherichia coli	1255	70	78	81	68	—	99	99	58	96	69	—	99	86	83
Klebsiella pneumoniae	465	66	72	73	69	—	98	99	64	93	70	—	100	84	82
Proteus mirabilis	239	78	90	92	71	—	99	99	90	98	76	—	99	89	87
Serratia marcescens	138	—	83	96	77	—	97	99	—	86	97	—	99	98	75
Enterobacter cloacae complex	129	—	—	89	87	—	87	99	—	79	86	—	100	96	96
Klebsiella aerogenes	81	—	—	95	92	—	93	98	—	74	96	—	100	98	100
Klebsiella oxytoca	61	22	78	86	86	—	98	98	59	85	80	—	98	85	85
Citrobacter freundii complex	50	—	80	98	94	—	92	98	—	86	92	—	100	94	94
Providencia species	35	—	—	71	57	—	100	100	48	80	88	—	97	77	68
Pseudomonas aeruginosa	450	—	—	90	83	—	—	90	—	89	—	—	—	—	—
Stenotrophomonas maltophilia	102	—	—	—	—	91	—	—	—	—	98	47	—	—	—
Acinetobacter baumannii complex	34	—	—	64	58	—	—	61	91	—	91	—	94	70	88

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Antibiogram: Carolinas Medical Center

Atrium Health – CMC INPATIENTS 2024
Antibiotic Susceptibility Surveillance Report

Gram Negative Organisms[1]	# of Isolates Tested	Penicillins			Cephems					Miscellaneous											
		Ampicillin	Ampicillin-Sulbactam[7]	Piperacillin-Tazo[6]	Cefazolin	Ceftazidime	Ceftriaxone	Cefepime[6]	Aztreonam	Ertapenem	Meropenem	Gentamicin	Tobramycin	Amikacin	Ciprofloxacin	Levofloxacin	Nitrofurantoin[2]	Tetracycline[3]	Trimethoprim-Sulfa	Fosfomycin[5]	Ceftolozane/Tazo
***Escherichia coli*- Total**	1352	44	51	92	63		83	85	83	99	99	88	87	99	71	74	96	67	68		
Escherichia coli- ESBL*	185									99	100	65	60	94	18	26	93	39	35	97	
***Klebsiella pneumoniae*- Total**	546		74	90	76		85	86	84	98	98	93	93	99	83	90	54	77	82		
Klebsiella pneumoniae- ESBL*	72									100	100	59	54	100	23	56	37	44	19		
Klebsiella aerogenes	99			84			71	95	77	95	97	100	100	100	97	97	34	74	100		
***Enterobacter cloacae* complex**	197			77			59	85	67	85	99	97	96	100	91	94	29	92	100		
***Proteus mirabilis*- Total**	258	86	91	98	80		96	96	95	100	99	94	95	100	82	83			86		
***Proteus vulgaris*- Total**	34		64	100			35	82	73	100	100	100	100	100	94	97			97		
Serratia marcescens	142			78			67	92	71	100	100	97	78	99	90	97			98		
***Citrobacter freundii* complex**	65			84			53	90	54	93	96	96	93	100	90	90	93	89	93		
Citrobacter koserii	33			100	100		100	100	100	100	100	100	100	100	100	100	83	100	100		
Morganella morganii	51			94			76	96	72	100	100	96	96	100	68	70		50	68		
***Providencia* species**	50			94			80	86	72	100	100	52	52	98	70	66		0	66		
***Pseudomonas aeruginosa*- Total**	472			90				90	82		93			97[4]	84	79					
Pseudomonas aeruginosa- MDRO*	74			31				31	10		71			90[4]	55	33					94
Stenotrophomonas maltophilia	58															93			100		
Acinetobacter species	54		96			92	75	96			100	94	96	100	92	98			96		
Acinetobacter baumanni complex*	35		97			97	68	91			100	88	97	100	94	97			94		

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Assessment Question #2

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Assessment Question #2

GT is a 68-year-old male who presents to the ED with flank pain that began 2 days ago. He notes he has urinary urgency and frequency and has not taken his blood pressure medications in 2 days. He has no other issues or complaints. He has not been recently hospitalized and has no history of urinary tract infections.

PMH: hypertension and type 2 diabetes mellitus
Vitals: HR 95, BP 112/74, Temp 38.4ºC

GT is diagnosed with a cUTI with pyelonephritis and will be admitted for intravenous antibiotics. Based on his presentation, which of the following is the most appropriate empiric antibiotic therapy?

A. Ceftriaxone
B. Cefazolin
C. Meropenem
D. Vancomycin

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Title: Antimicrobial Prescribing Use Criteria (Enterprise)	**Published Date:** 11/17/2025 **Last Review / Revised Date:** 11/1/2025
Document Type: ☐ Policy ☐ Procedure ☒ Guideline ☐ Other	**Content Applies to Patient Care:** ☒ Adults ☒ Pediatrics (Under 18) ☐ N/A
Scope: ☒ Enterprise ☐ Division(s): ☐ Area Name: ☐ Entity Name: ☐ Department Name:	

Restricted Antimicrobials

Amphotericin B (liposomal)	Ceftolozane - Tazobactam	Foscarnet	Linezolid	Paxlovid
Artesunate	Ciprofloxacin	Fosfomycin	Maribavir	Peramivir
Aztreonam	Dalbavancin	Ibrexafungerp	Meropenem	Posaconazole
Cefiderocol	Daptomycin	Imipenem-Cilastatin	Meropenem - Vaborbactam	Remdesivir
Cefotaxime	Eravacycline	Imipenem - Cilastatin - Relebactam	Micafungin	Sulbactam-Durlobactam
Ceftaroline	Ertapenem	Isavuconazole	Minocycline (IV)	Tigecycline
Ceftazidime - Avibactam	Fidaxomicin	Levofloxacin	Moxifloxacin	Voriconazole

Antimicrobial Prescribing Use Criteria

Enterprise Antimicrobial Prescribing Use Criteria, 2026.

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Fluoroquinolones

Class remains one of the **preferred** for empiric cUTI treatment in those without sepsis and low resistance rates

Long history in treatment of urinary tract infections

Widespread use and overuse has led to resistance rate **increases**

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

2024 Enterprise Antibiogram Data

Location (Site/Source)	Pathogen	Total	Cefazolin (UTI)	Ceftriaxone	Ciprofloxacin
Carolinas Medical Center (Non-ICU/All Sources)	*E. coli*	1352	-	83	71
	K. pneumoniae	546	-	85	83
	P. mirabilis	258	-	96	82
Lutheran General (Inpatient/All Sources)	*E. coli*	2147	79	81	66
	K. pneumoniae	639	73	72	69
	P. mirabilis	461	87	87	50
St. Lukes (Inpatient/All Sources)	*E. coli*	2198	84	85	73
	K. pneumoniae	657	86	85	83
	P. mirabilis	398	96	96	81
Wake Forest Baptist (Inpatient/Urine)	*E. coli*	843	81	82	72
	K. pneumoniae	251	71	73	65
	P. mirabilis	117	87	90	62

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Fluoroquinolones:
Dosing & Considerations

Drug	Dose	Comments
Levofloxacin	500-750 mg PO/IV every 24 hours	Reserve use for patients without fluoroquinolone exposure in the past 3 to 12 months or without history of fluoroquinolone-resistant urinary isolate
Ciprofloxacin	500-750 mg PO every 12 hours 400 mg IV every 12 hours	
Moxifloxacin	Not recommended for urinary tract infections (inadequate urinary distribution)	

Excellent bioavailability

Ease of administration

Low – medium cost

Adverse side effects: QTc prolongation, tendonitis, CNS effects, arthralgia, phototoxicity

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Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Carbapenems

Carbapenems are **preferred** for the treatment of cUTI with sepsis

In those without sepsis, carbapenems are **not** first-line

Broad-spectrum of activity, stable against many beta-lactamases

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Carbapenems: Dosing

Drug	Dose	Comments
Meropenem	1-2g IV every 8 hours over 180 minutes	Preferred empiric agent from this class due to broad coverage Formulary restricted
Ertapenem	1g IV once daily	Gap in coverage: *Pseudomonas aeruginosa* Formulary restricted
Imipenem-cilastatin	500 mg – 1g IV every 6 hours	Formulary non-stock

Meropenem/ertapenem: ID consult or clinical pharmacist review against established criteria
Imipenem-cilastatin: ID consult *and* clinical pharmacist review against established criteria

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.
Enterprise Antimicrobial Prescribing Use Criteria 2026.
MW Region Pharmacist Adult Dose Adjustments Guideline v.21.

Carbapenems:
Patient Considerations

No oral options

Reserve for critically-ill patients

- Healthcare-associated infections
- Risk factors for resistant pathogens (e.g. ESBL producing organisms)

Medium cost

Important antimicrobial stewardship priority

- To preserve their effectiveness

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Novel β-lactam/ β-lactamase inhibitors

Crucial role against multidrug-resistant pathogens

Restricted to septic shock patients in which preferred antimicrobials are likely inappropriate due to

- Previous culture data
- Risk factors

Reserve for:

- Known multi-drug-resistant pathogens
- Carbapenem resistant pathogens

High cost

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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BLBLI's: Dosing

Drug	Dosing	Comments
Ceftazidime-Avibactam	2.5g IV every 8 hours	Treatment limited to: - Carbapenem-resistant Enterobacterales - Difficult-to-treat *Pseudomonas aeruginosa* with documented susceptibility Preferred for ESBL-producing gram-negative infections in those unable to tolerate carbapenems (e.g. DDI with valproic acid)
Ceftolozane-Tazobactam	1.5g IV every 8 hours over 4 hours	Treatment limited to: - Difficult-to-treat *Pseudomonas aeruginosa*
Meropenem-Vaborbactam	4g IV every 8 hours	Treatment limited to: - Carbapenem-resistant Enterobacterales - *Klebsiella pneumoniae* carbapenemases producing Enterobacterales - Isolates resistant to ceftazidime/avibactam

All BLBLI's are formulary restricted: ID consult and clinical pharmacist review against established criteria

MW Region Pharmacist Adult Dose Adjustments Guideline v.21.
Enterprise Antimicrobial Prescribing Use Criteria, 2026.

Cefiderocol

Alternative antibiotic to empirically treat cUTI due to:

- Stewardship considerations
- Uncertainties about real-world effectiveness

Resistance already emerging

Reserve for infections with metallo-beta-lactamase carbapenemases

Dosing: 2g IV every 6 hours

Formulary restricted for MDR Gram-negative pathogens with documented resistance to all front-line antimicrobials

Susceptibility testing is required (not required at the time of initiation)

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.
MW Region Pharmacist Adult Dose Adjustments Guideline v.21.

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Older Aminoglycosides

Amikacin, gentamicin, and tobramycin are an **alternative** for empiric treatment of cUTI

- Use in populations with increasing rates of ESBL-producing organisms
- Extended interval dosing = cUTI
- One-time dose = uUTI

Class-wide adverse drug effects: nephrotoxicity, ototoxicity

Therapeutic drug monitoring essential

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Oral Empiric Antibiotics

No specific preferred guideline recommendation

Ideal for outpatient management candidates

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Oral Antibiotic Options

Antibiotic	Oral Absorption	Urinary Excretion	Dose (normal renal function)
Amoxicillin-clavulanate	80%	A 50-70%, C 25-40%	875/125 mg every 8-12 hours
Cefpodoxime	50%	80%	200-400 mg every 12 hours
Cefuroxime	52%	90%	500 mg every 12 hours
Cephalexin	90%	90%	500-1000 mg every 6 hours
Ciprofloxacin	70%	40-50%	500-750 mg every 12 hours
Levofloxacin	99%	64-100%	500-750 mg daily
Other oral b-lactams (amoxicillin, cefadroxil, cefaclor, cefdinir)	More limited data on clinical outcomes compared to higher bioavailable alternatives, use with caution if alternatives not available		
Trimethoprim-sulfamethoxazole	70-90%	T 66%, S 84%	800/160 mg every 12 hours

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Oral Antibiotics: Patient Considerations

- Decrease unnecessary hospital admission rates
- High resistance rates to fluoroquinolones
- Utilize prior urine cultures to guide treatment choice
- Assess both oral absorption and urinary excretion
- Optimize dosing of oral-beta lactams with low bioavailability

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Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Assessment Question #3

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Assessment Question #3

AH is a 78-year-old male who presents with altered mental status, hypotension, tachycardia, and dysuria. Patient met sepsis criteria and the rapid blood culture panel resulted with DTR *Pseudomonas aeruginosa* with documented resistance to ceftazidime-avibactam. He will be admitted for antibiotic treatment.

PMH: HTN, HLD, GERD

Vital Signs: BP 90/50, HR 110, T 38^{o}C

What is the most appropriate empiric antibiotic?

A. Ceftolozane-tazobactam
B. Cefiderocol
C. Amoxicillin-clavulanate
D. Ertapenem

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Empiric Antibiotic Summary

Condition of the Patient	Preferred	Alternative
Sepsis with or without shock	3rd or 4th generation cephalosporins Carbapenems Piperacillin-tazobactam Fluoroquinolones	Novel BLBLI Cefiderocol Plazomicin Older aminoglycosides
Without sepsis, IV route of therapy	3rd or 4th generation cephalosporins Piperacillin-tazobactam Fluoroquinolones	Carbapenems Newer agents (BLBLI, cefiderocol, plazomicin) Older aminoglycosides
Without sepsis, oral route of therapy	Fluoroquinolones or trimethoprim-sulfamethoxazole	Amoxicillin-clavulanate or oral cephalosporins

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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How to Select Empiric Therapy: Four Step Approach

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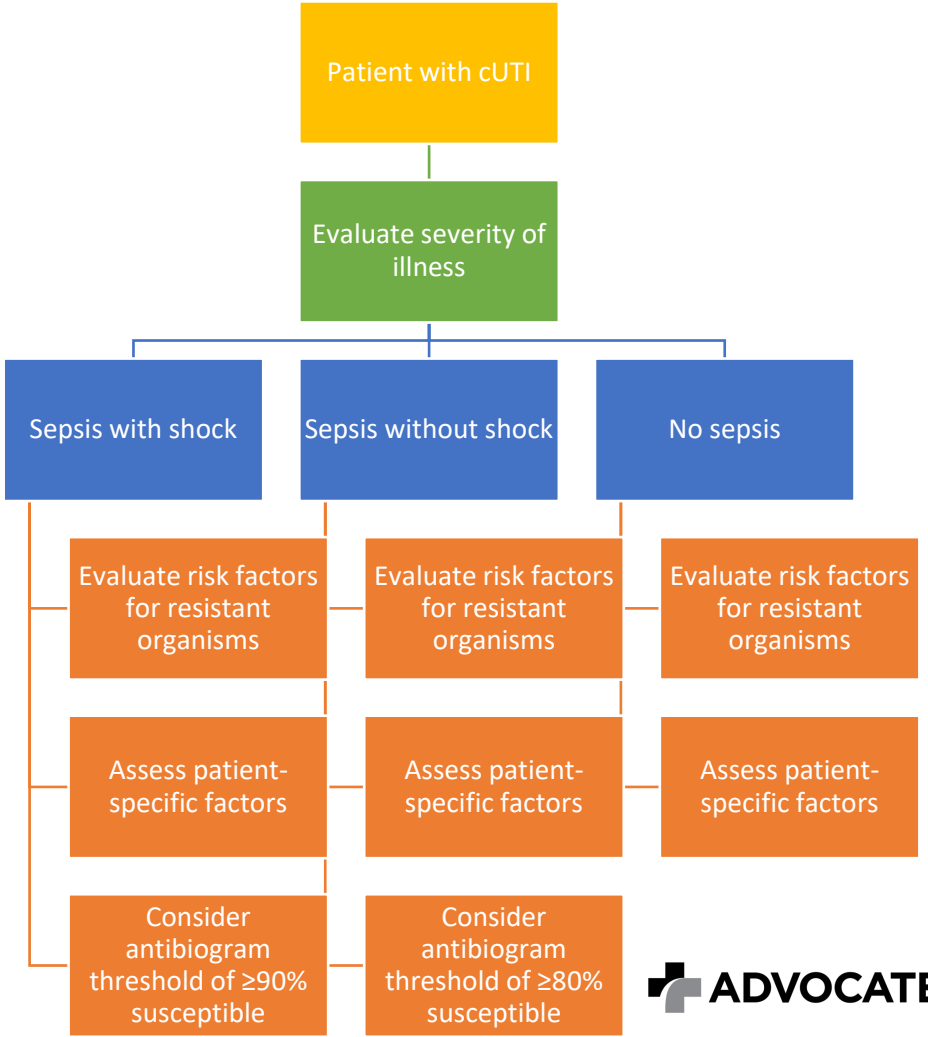
Empiric Antibiotic Selection



Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Four-Step Approach

Assess the following:

- Severity of illness
- Risk factors for resistance
- Patient-specific considerations
- If septic, consider the antibiogram

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Step 1: Severity of Illness

Inappropriate empiric antibiotics have impact on mortality

Does the patient have sepsis?

- Life-threatening organ dysfunction caused by a dysregulated host response to infection
- SOFA score increase in 2 points
  - In hospital mortality >10%
- SIRS criteria more sensitive than specific
  - Do not correlate as well with severity of illness/ outcomes as SOFA criteria

Step 2: Resistant Organisms

More recent urine cultures may be a better guide than distant urine cultures

- Median of 3-6 months

Most recent antibiotic exposure

FQ exposure in past 12 months

- Strong predictor of resistance
- More recent exposure (< 3 months) = stronger resistance prediction

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Step 3: Patient Considerations

Assess other patient-specific considerations

- Risk of allergic reaction
- Contraindications
- Drug-drug interactions

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Step 4: Antibiogram

Assess antibiogram for patients with sepsis

Antibiogram needs to be:

- Local
- Recent
- Relevant to the patient

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Application to Pharmacy Practice

You receive an order for cefepime for RT, a 50-year-old male patient being transferred from the ED to the ICU for sepsis due to suspected UTI, you follow the four-step approach to determine antibiotic appropriateness:

- Severity of illness
- Risk factors for resistance
- Patient-specific considerations
- If septic, consider the antibiogram

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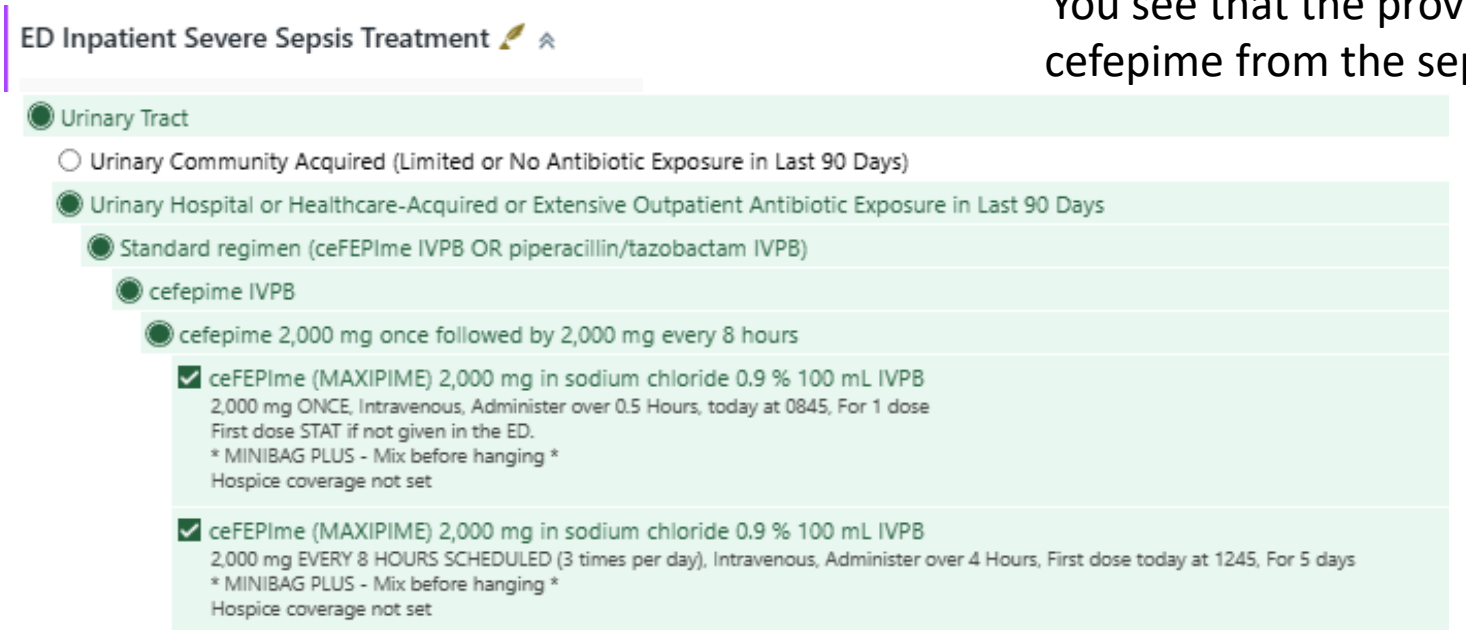
Step 1

Severity of illness

You see that the provider selected cefepime from the sepsis order set



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Steps 2 & 3

Risk factors for resistance

You investigate the patient's history and find that he spends half of every year abroad.

Patient-specific considerations

You also find that RT was seen in urgent care 1 month ago for urinary frequency and had ESBL *E. coli* for which he was prescribed TMP-SMX. He has no antibiotic allergies or drug-drug interactions.

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Step 4

If septic, consider the antibiogram

Under typical circumstances, cefepime would be an extremely reliable treatment option.

ANNUAL REPORT OF SUSCEPTIBILITY PATTERNS

January 1 - December 31, 2025

Percent of isolates susceptible[1] to antimicrobial agents at attainable concentrations

Gram Negative			Penicillins			Cephalosporins								Carbapenems		Mono-bactam	Quinolones		Aminoglycosides			Other				
ADVOCATE AURORA MEDICAL CENTER ST LUKE'S 2025	# Isolates[2]	ESBL[3]	Ampicillin	Ampicillin/sulbactam	Piperacillin/tazobactam	Cefazolin (Urine)[4]	Cefazolin	Cefuroxime axetil	Cefpodoxime	Ceftazidime	Ceftriaxone	Cefepime	Ceftazidime/avibactam[5,6]	Ceftolozane/tazobactam[5,6]	Ertapenem[6]	Meropenem[6]	Aztreonam[7]	Ciprofloxacin[7]	Levofloxacin[7]	Gentamicin	Tobramycin	Amikacin	Nitrofurantoin[8]	Trimethoprim/sulfamethoxazole	Fosfomycin[5,8,9]	Colistin[5]	Minocycline[5,6]
ENTEROBACTERALES																										
Citrobacter freundii complex[11]	80				68					68	63	98			98	100	65	92		97		100	89	90			
Citrobacter koseri	42				97			51	94	100	100	100			100	100	100	97		97		100	84	97			
Enterobacter cloacae complex[12]	223				73				70	72	67	92	99		83	99	72	87		96	95	100	29	88			
Escherichia coli[10]	2126	17	48	59	94	81	57	74	76	88	83	91	100		99	99	87	68		90	83	97	94	73			
Klebsiella (Enterobacter) aerogenes	72				75					73	76	98			96	100	75	94		98		100	15	97			
Klebsiella oxytoca[10]	120	9		70	88		0	82	86	95	89	95	95		96	98	95	92		95	97	100	78	90			
Klebsiella pneumoniae[10]	673	17		76	90	82	69	75	81	83	82	89	100		97	98	81	79		92	87	99	27	82			
Morganella morganii	43			9	86						67	100			96	97	71	72		88		100		76			
Proteus mirabilis	362		80	91	100	93	16	94	98	97	96	99	100		100	99	98	83		96	98	99		85			
Providencia rettgeri																											
Providencia stuartii																											
Serratia marcescens	100									93	91	100	100		97	97	98	93		99	87	98		100			
NONFERMENTERS																										
Acinetobacter baumannii complex[13,14]																											
Pseudomonas aeruginosa	564				87					89		89	99	98		92	81	87	84		98	99					
Stenotrophomas maltophilia	34																		94					100			94

Not reported due to intrinsic resistance or susceptibility panel restrictions.

10. Includes both ESBL and non-ESBL isolates.

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Assessment Question #4

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Assessment Question #4

After completing your patient assessment of RT using the four-step approach, which of the following recommendations would you discuss with the provider?

A. Change to ceftriaxone since the patient doesn't have a cephalosporin allergy
B. Change to meropenem-vaborbactam since he's 50 years old and has a history of ESBL *E. coli*
C. Change to meropenem since he has a recent history of ESBL *E. coli*
D. No change needed

Transitioning to Definitive Therapy

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Definitive Therapy Selection

De-escalating antibiotics should be based on urine culture:

- Identification
- Susceptibilities

Optimizing the effectiveness of therapy:

- Improve clinical cure
- Reduce recurrence of infection

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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De-escalation Considerations

Antibiotic stewardship

IV vs PO

Cost of treatment options

Administration resources

Therapeutic drug monitoring

Inpatient vs outpatient

- Culture call-back

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Timing of IV to PO Antibiotic Transition

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Timing of IV to PO Transition

cUTI **without** bacteremia and:

- Treated initially with parenteral therapy
- Clinically improving
- Able to take oral medication
- Effective oral option available

→ Transition to PO antibiotics

Why? Reduces

- Reduces avoidable IV catheter-related ADRs
- Reduces costs/ resources
- Improved practicality of administration

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Timing of IV to PO Transition

cUTI **with** Gram-negative bacteremia and:

- Treated initially with parenteral therapy
- Clinically improving
- Able to take oral medication
- Effective oral option available

Before transitioning, patients should be:

- Afebrile
- Hemodynamically stable
- Achieved source control

→ Transition to PO antibiotics

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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IV/PO Stepdown Study #1

Study Type	Multicenter observational cohort study, between Jan 2016 and Dec 2022, 759 patients
Outcome	60-day recurrence of infection
Intervention	IV β-lactam to oral stepdown therapy within 7 days using FQ, TMP-SMX, or high-bioavailability β-lactams (HBBLs: amoxicillin, amoxicillin-clavulanate, and cephalexin)
Baseline Characteristics	Mean age 70 years, female 55%, pyelonephritis 40%, *E. coli* 82%, *Klebsiella* species 17%
Results	Effectiveness differences: FQs (adjusted hazard ratio, 1.09 [95% confidence interval, .49-2.43]) TMP-SMX (1.44 [.54-3.87]) HBBLs (3.83 [1.76-8.33])
Conclusion	FQs and TMP-SMX have similar effectiveness as IV β-lactams, HBBLs associated with higher recurrence rates Limitation: HBBLs not optimally dosed for bacteremia

Veillette JJ, et al. *Open Forum Infect Dis.* Apr 2024;11(4):ofae193.

IV/ PO Stepdown Study #2

Study Type	Retrospective, multicenter, cohort study from July 2016 to July 2018, n =372 hospitalized patients with BSI due to *E. coli*, *K. pneumoniae*, or *P. mirabilis*
Outcome(s)	Composite of treatment failure (30-day readmission due to recurrence, 30-day all-cause mortality, and change in oral antibiotic)
Intervention	Oral stepdown therapy with either FQ, TMP-SMX, or β-lactam
Baseline Characteristics	B-lactam group: 200 patients, FQ or TMP-SMX: 197 patients, female 66%, duration of IV therapy 5 days, *E. coli* 82.8%, urinary source of infection 85%
Results	Median total duration of therapy: 14 days in both groups Treatment failure composite: - FQ or TMP-SMX 5.8% compared to β-lactam 7% (p= 0.561)
Conclusion	No difference in treatment failure rates in those receiving oral β-lactams compared to oral FQ or TMP-SMX for step-down therapy

Drug	Dose
Amoxicillin	1000 mg every 8 hours
Amoxicillin-clavulanate	875/125 mg every 12 hours
Cephalexin	1000 mg every 6 hours
Ciprofloxacin	750 mg every 12 hours
TMP-SMX	160/800 mg every 12 hours
Levofloxacin	750 mg every 24 hours

McAlister MJ, et al. *Am J Health Syst Pharm*. 2023;80(Suppl 1):S33-S41.

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IV/PO Stepdown Study #3

Study Type	Retrospective, multicenter, observational cohort from 3 Michigan hospitals from Feb 2020 to Oct 2022 194 patients with gram negative bacteremia from a urinary source
Outcome	Composite recurrent bacteremia or mortality within 30 days of therapy
Intervention	Active empiric intravenous antibiotics and transitioned to appropriately dosed oral cephalexin, amoxicillin, FQ, or TMP-SMX
Baseline Characteristics	Mean age 71 years, more females in standard therapy group, median 11 days treatment (4 days IV, 7 days PO), *E. coli* 77%, *Klebsiella* spp. 17%
Results	Primary outcome occurred in beta-lactam group 1.3% vs standard therapy 1.7%, OR 1.27 [95% CI 0.11-14.2]
Conclusion	High-dose oral b-lactams are as safe and effective as oral FQ and TMP-SMX for the treatment of bacteremia from a urinary source

Geyer AC, et al. *Antimicrob Steward Healthc Epidemiol*. 2023;3(1):e148.

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Title: Adult IV to Oral Antimicrobial Step-Down Therapy Guidelines (IL & WI Divisions)	**Published Date:** 11/06/2025 **Last Review / Revised Date:** 11/06/2025
Document Type: ☐ Policy ☐ Procedure ☒ Guideline ☐ Other	**Content Applies to Patient Care:** ☒ Adults ☐ Pediatrics (Under 18) ☐ N/A
Scope: ☐ Enterprise ☒ Division(s): IL & WI Divisions ☐ Area Name: ☐ Entity Name: ☐ Department Name:	

APPENDIX B – Duration of Antibiotic Therapy in Uncomplicated Enterobacterales Bacteremia

Table 1. Source & Severity of Bacteremia: Percent of Total Cohort[1]

Source of Bacteremia (n=1,769)		Severity of Infection (n=1,769)
Urinary Tract 39.6%	Catheter Associated 16.6%	ICU Admission on Day 1 of Bacteremia: 29.2%
GI 19.7%	Pneumonia 8.2%	Pitt Bacteremia Score: Median 2 (IQR 1-3)
Biliary 12.2%	Skin and Soft Tissue 1%	Inadequate Source Control During Therapy: 2.2%

Table 2. Oral Therapy: Usual Doses – Normal Renal Function[3]

Oral Step Down with clinical improvement & source control Longer duration (10-14 days) has been suggested for oral beta-lactams	
Amoxicillin 1g PO TID	Cefpodoxime 400mg PO BID[b]
Amoxicillin/Clavulanate 875/125mg TID up to Amox/Clav ER 2 tabs BID	Ciprofloxacin 750mg PO BID
Cephalexin 1g PO QID or Cefadroxil 1g PO BID[a,b]	TMP/SMX 5 mg/kg (TMP) PO BID[c]

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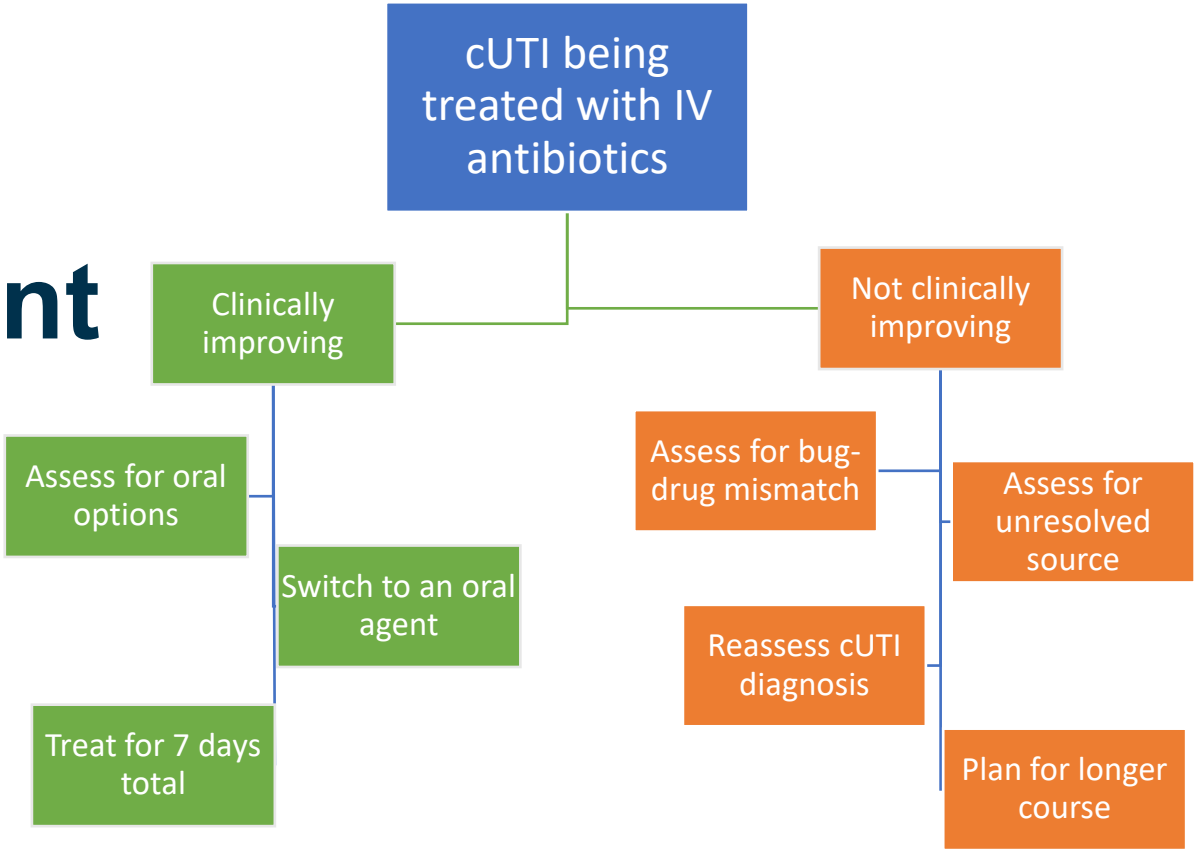
IV to PO Switch Assessment



Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Duration of Antibiotics

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cUTI Treatment Duration

cUTI without associated bacteremia and clinically improving on effective therapy

Fluoroquinolone: 5-7 days total

Non-fluoroquinolone: 7-10 days

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Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

cUTI Treatment Duration

cUTI with associated Gram-negative bacteremia and clinically improving on effective therapy

Typical Duration: 7 days

Those who would benefit from 14 days:

- Suspected acute bacterial prostatitis
- Lack of source control

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Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

Future Needs & Conclusions

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Research Needs

Optimal use of antibiograms	Oral beta-lactams	Management of underrepresented populations
• Specifically in non-septic cUTI patiens	• Optimal dosing • Effectiveness	• Immunocompromised • Severe CKD • Indwelling catheters • Recent urologic procedures

Trautner BW, et al. Infectious Diseases Society of America (IDSA), 2025.

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Key Takeaways & Conclusions

New cUTI classifications

Empiric treatment depends on presence/ absence of sepsis

Four-step approach to choosing empiric therapy

Transition to definitive therapy once susceptibilities have resulted

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References

Enterprise Antimicrobial Prescribing Use Criteria. 2026.

Geyer AC, VanLangen KM, Jameson AP, Dumkow LE. Outcomes of high-dose oral beta-lactam definitive therapy compared to fluoroquinolone or trimethoprim-sulfamethoxazole oral therapy for bacteremia secondary to a urinary tract infection. Antimicrob Steward Healthc Epidemiol. 2023;3(1):e148. doi:10.1017/ash.2023.435.

Gupta K, Hooton TM, Naber KG, et al. International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: A 2010 update by IDSA and ESCMID. Clin Infect Dis. 2011;52(5):e103-e120. doi:10.1093/cid/ciq257.

Klein RD, Hultgren SJ. Urinary tract infections: Microbial pathogenesis, host-pathogen interactions and new treatment strategies. Nat Rev Microbiol. 2020;18(4):211-226. doi:10.1038/s41579-020-0324-0.

Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 74:909-929.e5.

McAlister MJ, Rose DT, Hudson FP, Padilla-Tolentino E, Jaso TC. Oral β-lactams vs fluoroquinolones and trimethoprim/sulfamethoxazole for step-down therapy for E coli, Proteus mirabilis, and Klebsiella pneumoniae bacteremia. Am J Health Syst Pharm. 2023;80(Suppl 1):S33-S41. doi:10.1093/ajhp/zxac202.

MW Region Adult IV to Oral Antimicrobial Step-Down Therapy Guidelines. 2025.

MW Region Pharmacist Adult Dose Adjustments Guideline v.21.

Singer M, Deutschman CS, Seymour CW, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). *JAMA*. Feb 23 2016;315(8):801-10. doi:10.1001/jama.2016.0287

Trautner BW, Cortés-Penfield NW, Gupta K, et al. 2025 Guideline on Management and Treatment of Complicated Urinary Tract Infections. Infectious Diseases Society of America; July 17, 2025. https://www.idsociety.org/practice-guideline/complicated-urinary-tract-infections.

Veillette JJ, May SS, Alzaidi S, et al. Real-world effectiveness of intravenous and oral antibiotic stepdown strategies for gram-negative complicated urinary tract infection with bacteremia. Open Forum Infect Dis. 2024;11(4):ofae193. doi:10.1093/ofid/ofae193.

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Questions?

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