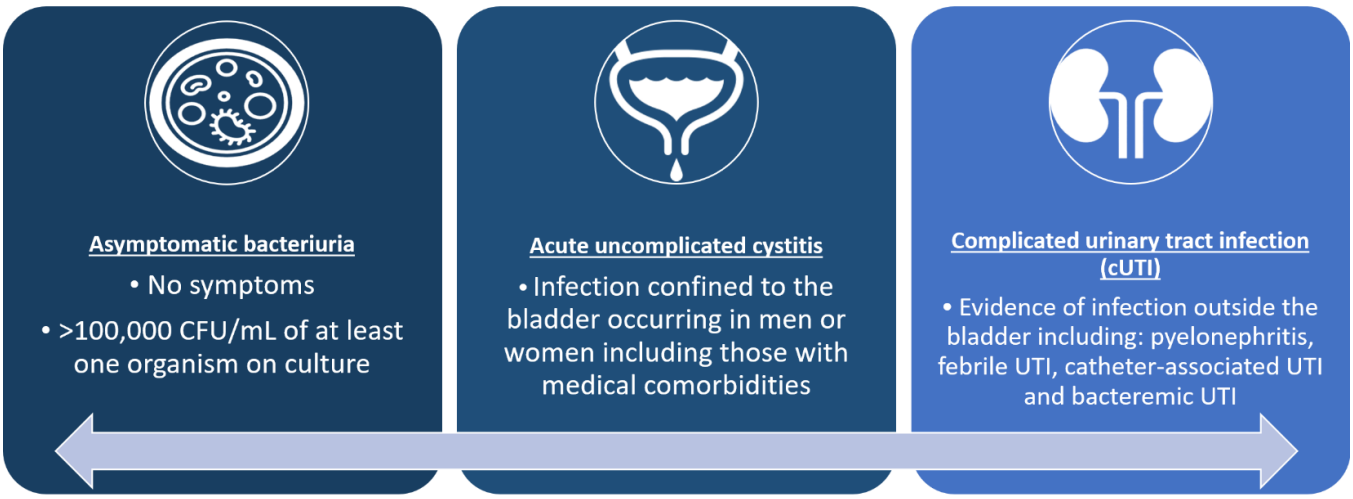
Guidance on Management of Complicated Urinary Tract Infections



Definitions

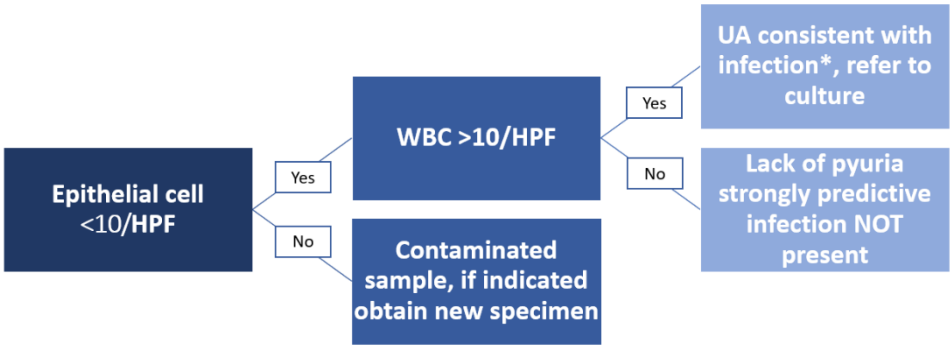
- New complicated UTI (cUTI) guidelines have defined UTI based on published literature, narrowing the definition of complicated UTI and expanding the population considered to have uncomplicated UTI (uUTI)[1]
- cUTI includes patients with symptoms suggesting extension of infection beyond the bladder including: febrile patients, pyelonephritis, catheter-associated UTI, and UTI with bacteremia.
    - Patients with urinary catheter use (indwelling suprapubic, intermittent catheterization), nephrostomy tubes, or recent urologic stenting are also considered cUTI
    - Prostatitis and renal abscesses are not currently addressed in guidelines and may need longer treatment duration
- uUTI is characterized by lower urinary tract symptoms without evidence of infection beyond the bladder and can occur in females or males, patients with underlying urologic abnormalities, immunocompromised patients, those with comorbidities including diabetes, or be recurrent.

Urinalysis and urine cultures for UTI Evaluation
• Only test when symptoms of UTI exist (Dysuria, frequency or urgency, suprapubic, CVA tenderness or febrile patients unable to provide history) • **Do not screen** for or treat positive urine cultures in patients without symptoms • **Presence of pyuria does not diagnose UTI, but absence can rule out**

Diagnosis

- UTI is a clinical diagnosis based on history and exam. Urine studies alone cannot diagnose UTI without clinical symptoms.
- Detection of bacteriuria in the absence of symptoms is designated asymptomatic bacteriuria (ASB). **Treatment of asymptomatic bacteriuria is harmful in virtually all patient populations** and should be avoided with 2 exceptions:
    - Treatment of asymptomatic bacteriuria is appropriate in pregnancy due to increased risk of progression to symptomatic UTI and pyelonephritis
    - Patients undergoing urologic procedures with mucosal trauma should receive a urine culture to guide pre-operative single dose prophylaxis (DO NOT provide a full treatment course)[2]
- Treatment of ASB will result in patient harm including increased antimicrobial resistance, antibiotic adverse effects and toxicities without benefit, increased *C. difficile* risk, vaginitis (bacterial vaginosis and candida vulvovaginitis) as well as increased risk of subsequent symptomatic UTI[3]

Figure 1: Interpretation of urinalysis



*Urinalysis (UA) should be correlated with clinical findings to make a diagnosis

- **Step 1**: Evaluate for epithelial/squamous cells. Samples with epithelial cells >10 per high powered field (HPF) or >100 squamous cells per low power field are contaminated and should not be used for UTI evaluation. Cultures from these samples typically grow multiple organisms and are uninterpretable. Obtain an additional sample if clinically relevant (patient has urinary symptoms)
- **Step 2**: Evaluate for pyuria which is defined as >10 WBC per high power field. The absence of pyuria (<10 WBC per hpf) has a negative predictive value of 92-98%. The presence of pyuria does not diagnose UTI, as the positive predictive values ranges from <10-35%[4]
- **Other Urine findings**: While patients with UTI can have blood, nitrites, and/or bacteria detected in their urine, patients without UTI can often have these same things detected. Thus, the presence or absence of these findings is neither sensitive nor specific for UTI and should NOT be used to diagnose UTI[4,5].
- **Detection of Yeast in the Urine**: The detection of yeast in the urine is generally considered a contaminant and occurs either through contamination with vaginal/skin flora or colonization of a urinary catheter. Patients with yeast detected in their urine who have an indwelling catheter should have their catheter exchanged and if UTI remains a concern repeat urine studies could be obtained. Very rarely Candida can cause UTI, although other causes of symptoms should be evaluated thoroughly and clinical findings should be strongly suggestive of infection before considering treatment[6].

Table 1: Recommended Empiric Regimens for Management of cUTI (in order of preference)

cUTI without sepsis	
• Levofloxacin 750mg PO q 24 hours ○ Avoid if patient has exposure to fluoroquinolone in the past 12 months • Trimethoprim/sulfamethoxazole 1 DS tablet PO BID • Ceftriaxone 2g IV q 24 hours	**Avoid antibiotics to which a patient has had resistance to in a urine isolate over the previous 6 months**
Sepsis without shock secondary to cUTI	

• **Patient without history of UTI with resistant organism**
  ○ Ceftriaxone 2g IV q 24 hours
• **Patient with history of urinary *Pseudomonas aeruginosa* in the last 6 months**
  ○ Cefepime 1g IV q 6 hours
  ○ Piperacillin/tazobactam 4.5g q 8 hours
• **Patient with history of urinary Extended Spectrum Beta-lactamase producing organism**
  ○ Ertapenem 1g IV q 24 hours	

Septic Shock secondary to cUTI (requires vasopressor)	

• **Patient without *Pseudomonas aeruginosa* urine culture isolates in past 6 months:**
  ○ Ceftriaxone 2g IV q 24 hours + amikacin 15mg/kg IV q 24 hours (discontinue aminoglycoside when susceptibility results return OR shock resolves)
  ○ Ertapenem 1g IV q 24 hours
• **Patient with history of *Pseudomonas aeruginosa* in the last 6 months:**
  ○ Meropenem 500mg IV q 6 hours	

Empiric Treatment

Choice of empiric antibiotics should be based on severity of patient illness and susceptibility patterns of urine cultures locally
Urine Antibiograms - www.unmc.edu/intmed/_documents/id/asp/urine-antibiogram

- **Complicated UTI without sepsis**
  - When sepsis is not present, we balance efficacy with antimicrobial stewardship/toxicity given low mortality of non-septic complicated UTI
  - Oral options can be considered for patients with complicated UTI without sepsis even when hospitalized
  - Our recommendations in order of preference:
    - **Levofloxacin 750mg PO daily**
      - Avoid if exposure to fluroquinolone within the last 12 months as this has been associated with fluroquinolone resistance
    - **Trimethoprim/sulfamethoxazole 1 DS PO BID**
    - **Ceftriaxone 2g IV daily**

- **Sepsis without shock secondary to complicated UTI**
  - Sepsis definition: SOFA score ≥ 2
  - Recommend utilizing an agent with >80% susceptibility based on local antibiogram
  - At Nebraska Medicine, the recommended agent for patients without known history of resistant organisms within the last 6 months:
    - **Ceftriaxone 2g IV daily**
  - For patients with history of resistant organisms within the last 6 months, utilize an agent that was susceptible on most recent urine culture
  - Patients with a history of urinary *Pseudomonas aeruginosa* in the last 6 months:
    - **Cefepime 1g IV q 6 hours**

- **Septic Shock secondary to complicated UTI**
  - Septic shock definition: patients whom despite fluid resuscitation require vasopressors
  - Recommend utilizing an agent with >90% susceptibility based on local antibiogram
  - Our recommendations in order of preference for patients without recent history of urinary *Pseudomonas aeruginosa*:
    - **Ceftriaxone 2g IV daily + amikacin 15 mg/kg IV daily**
      - Combination of beta-lactam therapy and aminoglycoside increases likelihood of the causative organism being susceptible. Recommend continuing aminoglycoside until shock resolves or susceptibilities return, whichever occurs first.
    - **Ertapenem 1 g IV daily**
  - Patients with history if *Pseudomonas aeruginosa* in the past 6 months:
    - **Meropenem 500mg q 6 hours IV**

Table 2: Recommended Definitive Oral Regimens for Management of cUTI (in order of preference)

Clinically improving, bacterial susceptibilities returned	
• Levofloxacin 750mg PO q 24 hours • Trimethoprim/sulfamethoxazole 1DS tablet PO BID • Cefadroxil 1 g PO BID • Cephalexin 1g PO TID • Amoxicillin 1g PO TID • Amoxicillin/clavulanate 875/125mg PO BID	**Choose agent based on susceptibility data and patient factors (allergy, comorbidity, medication interactions, etc.)**

Definitive Treatment

- When clinically improving and susceptibilities have returned, then recommend transition to a targeted definitive oral regimen if an appropriate agent is available
  - Choose an antibiotic to which the bacteria is susceptible
  - Avoid nitrofurantoin and fosfomycin as these only concentrate in the urine and are not as effective for infection outside the bladder
- Highly bioavailable agents like fluoroquinolone and TMP/SMX are preferred

    - Oral beta-lactam antibiotics may be utilized if appropriate dosing for systemic infection is utilized. The second and third generation oral cephalosporins cefuroxime and cefdinir are discouraged for cUTI, as they have poor bioavailability and poor urinary concentration.
- Choice of agent should also account for allergy, comorbidity such as severe renal dysfunction, and drug interactions
- Our recommendations in order of preference (if susceptible):
    - Levofloxacin 750mg PO q 24 hours
    - Trimethoprim/sulfamethoxazole 1 DS tablet PO BID
    - Cefadroxil 1g PO BID
    - Cephalexin 1g PO TID
    - Amoxicillin 1g PO TID
    - Amoxicillin/clavulanate 875/125mg PO BID

Table 3: Duration of therapy for Management of cUTI

Clinically improving	Not clinically improved
• Fluoroquinolone: 5 days • Other agents: 7 days • **If bacteremia:** Treat with 7 days of antimicrobial regardless of agent	• Clinically evaluate for drug-bug mismatch, renal parenchymal involvement (i.e. renal abscess, obstruction, etc.) • Consider ID consult

Duration of Therapy

- Newer data suggests that shorter courses of antimicrobial are equally effective and result in lower risk of adverse effects. This includes patients with documented gram-negative bacteremia.
- Five days of fluoroquinolones results in similar clinical outcomes to longer courses for UTI[7]
- 7 days of other agents (i.e., TMP/SMX or highly bioavailable beta-lactams) demonstrate similar outcomes to longer courses[8]
- Patients with uncomplicated gram-negative bacteremia, which encompasses most patients with cUTI, have not benefited from treatment courses longer than 7 days[9]
    - Additional guidance on defining complicated and uncomplicated bacteremia is available here: https://www.unmc.edu/intmed/_documents/id/asp/gram_negative_bacteremia_guidance_8-2023.pdf.
- Patients with complicated infections such as those with renal abscess, bacterial prostatitis, or undrained sources of infection may benefit from longer courses of therapy and Infectious Diseases consultation should be considered
- Patients in the hospital with cystitis may still be treated with shorter courses for uncomplicated UTI

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References

1. Trautner BW, Cortes-Penfield N, Gupta K, Hirsch EB, Horstman M, Moran GJ, Colgan R, O'Horo JC, Ashraf MS, Connolly S, Drekonja DM, Grigoryan L, Huttner L, Lazenby G, Nicolle L, Schaeffer A, Yawetz S, Lavergne V. Complicated Urinary Tract Infections (cUTI): Clinical Guidelines for Treatment and Management. 2025; Infectious Diseases Society of America. https://www.idsociety.org/practice-guideline/complicated-urinary-tract-infections/
2. Lightner DJ, Wymer K, Sanchez J, Kavoussi L. Best Practice Statement on Urologic Procedures and Antimicrobial Prophylaxis. *J Urol*. Feb 2020;203(2):351-356. doi:10.1097/JU.0000000000000509
3. Nicolle LE, Gupta K, Bradley SF, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America. *Clin Infect Dis*. May 2 2019;68(10):1611-1615. doi:10.1093/cid/ciz021
4. Advani SD, Turner NA, Schmader KE, et al. Optimizing reflex urine cultures: Using a population-specific approach to diagnostic stewardship. *Infect Control Hosp Epidemiol*. Feb 2023;44(2):206-209. doi:10.1017/ice.2022.315
5. Stewart JJ, Robinson JL, Chen JZ. Nitrites for Urinary Tract Infection-Time to Say Goodbye? *JAMA Intern Med*. Jul 1 2025;185(7):754-755. doi:10.1001/jamainternmed.2025.0973
6. Pappas PG, Kauffman CA, Andes DR, et al. Executive Summary: Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America. *Clin Infect Dis*. Feb 15 2016;62(4):409-17. doi:10.1093/cid/civ1194
7. Dinh A, Davido B, Etienne M, et al. Is 5 days of oral fluoroquinolone enough for acute uncomplicated pyelonephritis? The DTP randomized trial. *Eur J Clin Microbiol Infect Dis*. Aug 2017;36(8):1443-1448. doi:10.1007/s10096-017-2951-6
8. Eliakim-Raz N, Yahav D, Paul M, Leibovici L. Duration of antibiotic treatment for acute pyelonephritis and septic urinary tract infection-- 7 days or less versus longer treatment: systematic review and meta-analysis of randomized controlled trials. *J Antimicrob Chemother*. Oct 2013;68(10):2183-91. doi:10.1093/jac/dkt177
9. Balance Investigators. Antibiotic Treatment for 7 versus 14 Days in Patients with Bloodstream Infections. *N Engl J Med*. Mar 13 2025;392(11):1065-1078. doi:10.1056/NEJMoa2404991