UWTASP
tele-antimicrobial stewardship program

Relax and Recap: Urinary Tract Infections

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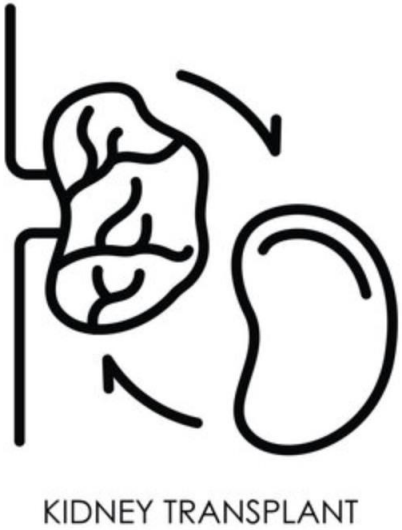
Relax and Recap

- Are there any new guidelines?
- Let's review the basics of cystitis and pyelonephritis
- What are new therapies that we should look out for in 2025?

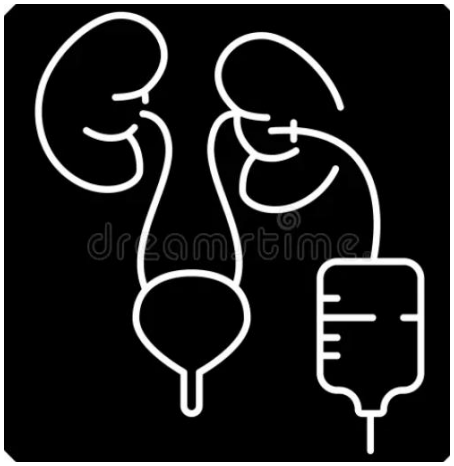
Urinary Tract Infections

Cystitis
Pyelonephritis

Acute Bacterial Prostatitis



Pyelonephritis



Nephrostomy tube

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Consensus Statement | Infectious Diseases

Guidelines for the Prevention, Diagnosis, and Management of Urinary Tract Infections in Pediatrics and Adults

A WikiGuidelines Group Consensus Statement

Table 1. Strategies to Prevent UTIs

Strategy	Level of evidence	Intervention	Comments
Continuous or postcoital antimicrobial prophylaxis	Clinical review	TMP/SMX: continuous, 40 mg/200 mg once daily or 40 mg/200 mg 3 times weekly; postcoital, 40 mg/200 mg or 80 mg/200 mg once postcoitus; Nitrofurantoin: continuous, 50 mg or 100 mg daily; postcoital, 50 mg or 100 mg once postcoitus	The decision to use antibiotic prophylaxis must balance the need for prevention against the risk of adverse drug events, antimicrobial resistance, and microbiome disruption.[a]
Cranberry products	Clear recommendation	Cranberry products containing proanthocyanidin levels of 36 mg	Cranberry products can reduce the recurrent UTIs in women, children, and individuals susceptible to UTIs. Data for older people, those with bladder emptying problems, or pregnant women is insufficient.
Probiotics	Clinical review	No recommendation	Studies were heterogenous with regard to patient populations, specific probiotics, route of administration, and study design.
Vaginal estrogen	Clear recommendation	Vaginal estrogen, such as vaginal rings, vaginal insert or vaginal cream	There is a wide variety of formulations and local delivery methods. Availability may vary in different countries or geographic regions.
Increased water intake	Clinical review	Additional 1.5L of water	Water intake was shown to decrease UTIs in 1 RCT among healthy women. Given the low-risk nature of the intervention, pending a confirmatory study, it is reasonable to offer this intervention to healthy women with recurrent UTIs.
Methenamine hippurate	Clear recommendation	Methenamine hippurate: 1 g twice daily; methenamine mandelate: 1 g every 6 hours	Methenamine is an appealing antimicrobial-sparing intervention to reduce UTIs in patients without incontinence and a fully functional bladder.

Abbreviations: RCT, randomized clinical trial; TMP/SMX, trimethoprim sulfamethoxazole; UTI, urinary tract infection.

[a] Consider use of other options reviewed in eAppendix 1 of the Supplement in more detail prior to continuous or postcoital antimicrobials.

Question 1: What Is the Role of Pharmacotherapy for the Prevention of UTIs?

Question 2: Is There a Role for Cranberry Juice or Supplements in the Prevention of UTIs?

Case

A 27-year-old woman calls her physician's office reporting 3 days of a burning sensation during urination with urinary frequency and discomfort in her lower abdomen. She recalls having the same symptoms a year ago, which was the only other time she was treated for a UTI. She is otherwise healthy and takes no medications. Her last menstrual period was 2 weeks ago.

What is the best next step in the management of this patient?

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Audience Response

(a)Ask her to submit a urine sample for urinalysis and urine culture and recommend antibiotics pending culture results.

(b)Prescribe ciprofloxacin 500mg twice daily for 7 days.

(c)Prescribe nitrofurantoin 100mg twice daily for 5 days.

(d)Prescribe amoxicillin 875mg twice daily for 5 days.

(e)Prescribe cefpodoxime 100mg twice daily for 5 days.

Acute cystitis

Normal anatomy
immunocompetent

Possible symptoms

- ✓ Dysuria
- ✓ Urinary frequency
- ✓ Urinary urgency
- ✓ Suprapubic pain
- ✓ "Feels like prior treated UTI"
- ✓ Absence of vaginal symptoms
- ✓ Absence of systemic symptoms (shaking chills, rigors)
- ✓ Absence of upper tract symptoms

Other Diagnostics:

- ✓ Not required for all patients
- ✓ **Urinalysis:** pyuria (approximately>10 WBC/HPF), presence of "many" bacteria
- ✓ **Urine dipstick:**+nitrite,+ leukocyte esterase
- ✓ Urine culture with $>10^5$ CFU growth of a pathogenic organism

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Diagnostics to confirm sx

Testing with urinalysis or urine culture up front is not indicated in most cases of *uncomplicated* cystitis.
Consider is a pregnancy test in women of childbearing age

Urinalysis tests:

urine microscopy:

Absence of pyuria effectively rules out UTI (unless neutropenic)

Urine dipstick:

- ✓ Leukocyte esterase -
  - Enzyme released by lysed WBC
- ✓ Nitrites –
  - presence of gram-negative bacteria
  - Combined specificity > 90%

When do we need a culture?

- Signs or symptoms of upper tract disease or systemic illness
- Atypical symptoms (i.e. vaginal symptoms)
- Patients at high risk of developing complications
- ✓ immunocompromised or have urological abnormalities
- Patients at risk of infection with multidrug-resistant organisms (MDRO)
- Lack of improvement or progression of symptoms after about 48-72 hours of initial empiric antibiotics.

Case discussion

- simple cystitis (burning, frequency, suprapubic pain)
- start treatment without confirmatory laboratory testing
- nitrofurantoin is the first-line agent

Nitrofurantoin	100mg BID x 5days
Bactrim	1 DS BID x 3 days
Fosfomycin	3g x 1 dose
Oral beta-lactams: *Only use if 1st line agents not available*	Amox-clav 500/125mg BID x 5-7 days Cefpodoxime 100mg BID x 5-7 days
Fluoroquinolones *Only use if 1st line agents not available*	Ciprofloxacin 250mg BID x 3 days

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Case continued...

The patient then developed subjective fevers and right lower back pain despite having taken the nitrofurantoin prescribed empirically by urgent care for 3 days.

- ✓ UCX grew>100,000 CFU/mL E coli
  - R - nitrofurantoin and trimethoprim-sulfamethoxazole
  - S -ciprofloxacin.
- ✓ switched to ciprofloxacin 500mg BID

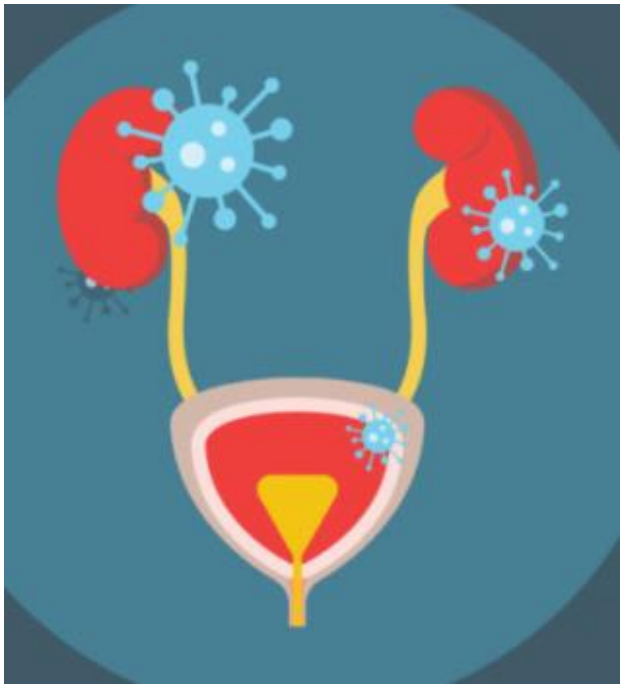
Audience Response

How many total days of ciprofloxacin would be recommended for this patient?

- **(a)**Treat for a total 3 days
- **(b)**Treat for a total 7 days
- **(c)**Treat for a total 14 days
- **(d)**Treat for a total 21 days
- **(e)** Determine treatment based on repeat urine culture results at day 7

ASCENDING INFECTION

Pyelonephritis



Cystitis

Typical symptoms:

- ✓ flank pain,
- ✓ fevers,
- ✓ rigors,
- ✓ nausea/vomiting

Urinalysis and urine cultures is recommended for all cases of suspected pyelonephritis

Imaging necessary:
for cases where the patient is critically ill, not improving on initial therapy, or suspected to have an obstruction or a complication.

Treatment

Do not use nitrofurantoin and fosfomycin for pyelonephritis because of their suboptimal penetration to renal parenchyma

Duration : 7 days of antibiotic therapy was noninferior to longer courses for treatment of pyelonephritis in most patients.

Case answer:

(b) Treat for a total 7 days

Follow-up cultures are not needed!

Pyelonephritis treatment

Antibiotic	Pyelonephritis
Nitrofurantoin	AVOID
Bactrim	Use if susceptible 1 DS BID x 7 days
Fosfomycin	AVOID
Oral beta-lactams	IV given before PO Use if susceptible Likely 7 days
Fluoroquinolones	Ciprofloxacin 500mg BID x 7 days

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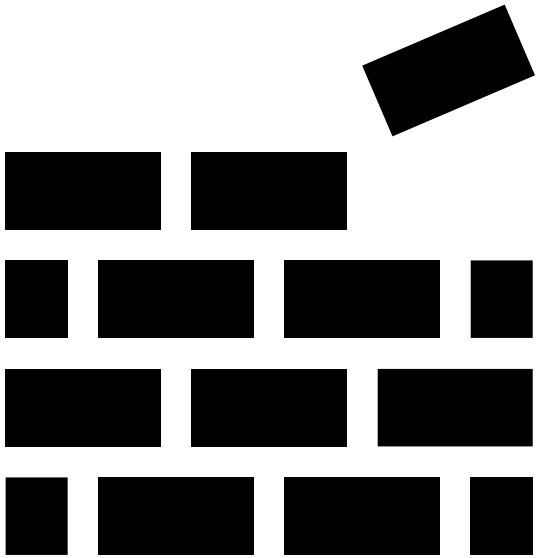
New treatments for UTI

Where is the current gap in coverage?



New drugs

Pivmecillinam (Pivya) 4/24

- Penicillin
- Cystitis (females) TID x 3 days

Sulopenem (Orlynvah) 10/24

- "penem" given with probenecid
- Cystitis (female) caused by specific bacteria BID x 5 days
- Not approved for step-down for complicated UTI

Gepoticidan- pending

- New class: triazaacenaphthylene
- Cystitis (female) BID x 5 days

https://jamanetwork.com/journals/jama/article-abstract/2819371
https://www.fda.gov/drugs/news-events-human-drugs/fda-approves-new-treatment-uncomplicated-urinary-tract-infections-adult-women-who-have-limited-or-no

Conclusion

- ✓Urinary Tract Infections are common and diverse
- ✓Cystitis and pyelonephritis are diagnosed clinically through signs and symptoms with evidence of inflammation (pyuria) and the presence of pathogenic bacteria in the urine
- ✓Treatment and duration vary based on sydrome
- ✓Look out for new therapies in 2025

Appendix

Table 2. Oral Antibiotics for the Management of Cystitis and Pyelonephritis

Antibiotic	Acute Uncomplicated Cystitis	Pyelonephritis
Nitrofurantoin	• First-line agent • 100 mg twice daily for 5 days[a]	• Avoid due to suboptimal concentrations in renal parenchyma
Trimethoprim-sulfamethoxazole	• First-line agent • 1 DS tablet twice daily for 3 days[a] • Avoid if used in the past 3 months or if prevalence of local resistance is known to exceed 20%. (Rates of TMP-SMX resistance in *E coli* isolates in most of the United States exceed 20%.)	• Can be used if bacteria are identified to be susceptible. • 1 DS tablet twice daily • *Note:* The Infectious Diseases Society of America (IDSA) recommends 14 days, but more recent data indicate that 7 days would be adequate provided the patient is improving clinically.
Fosfomycin	• First-line agent. • 3 g as 1 dose	• Avoid due to suboptimal concentrations in renal parenchyma
Oral β-lactams (eg, amoxicillin-clavulanic acid or cefpodoxime)	• Use only if the above first-line agents cannot be used • *Example* (not comprehensive list): ◇ Amoxicillin, clavulanic acid 500/125 mg twice daily for 5-7 days[a] ◇ Cefpodoxime, 100 mg twice daily for 5-7 days[a]	• Not recommended as an initial agent. • Can consider using oral β-lactam agent if pathogen known to be susceptible and after the patient receives an initial intravenous dose of a long-acting parenteral antimicrobial, such as 1 g of ceftriaxone.
Fluoroquinolones (eg, ciprofloxacin)	• Effective but use only if alternative oral antimicrobials for acute cystitis are not available or possible • *Example:* Ciprofloxacin 250 mg twice daily for 3 days[a]	• Ciprofloxacin 500 mg twice daily for 7 days

Doses listed in this table are for creatinine clearance > 60. Abbreviations: DS, double strength; TMP-SMX, trimethoprim-sulfamethoxazole.
[a]Duration of therapy for cystitis are based on guideline recommendations for *women*. For uncomplicated cystitis in men, consider duration of ~7 days provided there is no evidence of prostatitis.

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Table 3. Diagnostic Testing Performance for Urinary Tract Infections[a]

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Test results	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Dipstick				
Positive leukocyte esterase	72-97	41-86	43-56	82-91
Positive nitrite	19-48	92-100	50-83	70-88
Positive leukocyte esterase or nitrite	46-100	42-98	52-68	78-98
Microscopy, WBC/μL				
>5[b]	90-96	47-50	56-59	83-95
10	100	36	NA	NA
50	98	66	NA	NA
100	93	71	NA	NA
200	89	86	NA	NA
300	84	88	NA	NA
400	77	92	NA	NA
Imaging				
Ultrasonography	74.3	56.7	NA	NA
Computerized tomography	81-84	87.5	NA	NA
Magnetic resonance imaging	100	81.8	NA	NA

Abbreviations: HPF, high power field; NA, not applicable; NPV, negative predictive value; PPV, positive predictive value; WBC, white blood cell.

[a] See Section 2 of the Supplement for detailed supporting information.

[b] WBC/HPF.

Sensitivity -ability to identify people with a disease

Specificity - ability to identify people without a disease

Positive Predictive Value (PPV) is the probability that a person with a positive test result has the disease

Negative predictive value (NPV) is the probability that a person with a negative test result does not have a disease

https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2825634