

## Urinary Tract Infections: Across the Lifespan

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## Declaration

- Nothing to Declare
- Not affiliated with any drug company
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## Objectives

- Describe the signs and symptoms of urinary tract infection across the lifespan
- List common bacteria causing UTI
- Describe risks for UTI
- List long term consequences of recurrent UTI
- Describe conservative and non-antibiotic measures to prevent UTI
- Recall when to refer patients for further evaluation

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**Obstruction**

- BPH-benign prostatic hyperplasia
- Stricture
- Malignancy
- Renal stones-proteus cultures
- Urethra Diverticulum-symptoms of UTI-on exam urethra exquisitely tender- 3 D's dysuria, dyspareunia, dribbling
- Bladder Diverticulum- outpouching of bladder
- Congenital bladder neck obstruction-infants also in adults

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**Impaired voiding**

- Neurogenic bladder
- Cystocele
- Vesicoureteral reflux
- Pelvic floor dysfunction

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**Iatrogenic**

- Indwelling urethral catheter
- Intermittent catheterization
- Ureteral stent
- Nephrostomy tube
- Urologic Procedure-recent
- Renal transplant

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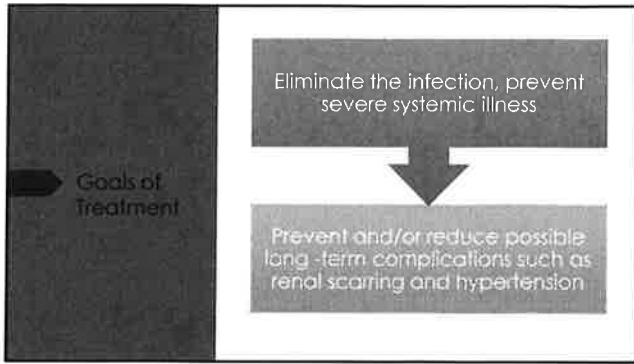
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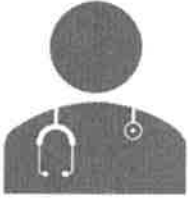
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**Pyelonephritis**

- Fever
- Chills
- Rigor
- Vomiting
- Flank pain
- Back pain
- CVA tenderness

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**Complications and Long-Term Consequences**

- UTI in infancy is risk factor for recurrent abdominal pain in childhood
- Renal insufficiency - congenital problems and pyelonephritis
- First two years of life vulnerable for scarring with decrease risk until 8 years and older.
- 10% of children with renal scar will develop hypertension in adolescence and early adulthood
- Females with renal scarring increased risk for toxemia in pregnancy

Renal insufficiency and End-stage renal disease possible from pyelonephritis



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**Pediatric Urinary Tract Infections**

- Cystitis second leading cause of pediatric medical visits
- 1 million office visits in the United States
- More common in premature infants than term infants
- Risk in girls 5-8% as compared to boys 2% except in first year of life
- Tenfold increased risk for uncircumcised boys
- Children and adolescents with psychosis are more prone to UTI

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**Clinical Presentation**

- Infancy symptoms may be nonspecific
- Uncircumcised boys may develop UTI 2 years of life and may be only presenting symptom
- Infants may present with irritability, feeding or sleep
- Watch for presentation of signs including fever, irritability, lethargy, irritability, anuria, white/mucoid stools
- Diagnosis

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**Specific Symptoms Infant**

- Increase or decrease number of wet diapers
- Weak or dripping urinary stream suggests neurogenic bladder or obstruction
- Constant dripping of urine or wetting of diapers suggests ectopic ureter
- Malodorous urine
- Pain or discomfort exhibited with urination

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**Clinical Presentation of older children**

- Irritability, lethargy
- Poor feeding, vomiting, diarrhea
- Ill in appearance, fever
- Hematuria, urgency
- Daytime wetting
- Suprapubic pain

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**Second Year of Life to Adolescents**

**Lower urinary tract symptoms and signs**

- Suprapubic pain
- Abdominal pain
- Dysuria
- Urinary frequency
- Urgency
- Cloudy malodorous urine
- Daytime wetting
- Nocturnal enuresis of recent onset
- Suprapubic tenderness

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**Differential Diagnosis**

- Viral infection
- Post vaccination fever
- Kidney stone
- Vaginal foreign body
- Orchitis
- Urethritis secondary to sexually transmitted disease
- Kawasaki disease
- Appendicitis

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### Labs- clean catch specimen

- Urinalysis and urine culture should be performed when UTI is suspected
- Infant, voided specimen attaching a sterile bag to the perineum- non-invasive easy to obtain, culture necessary due to contamination possibility
- Clean catch midstream urine specimen after proper cleaning for children able to void on demand
- Have young girls sit backward on the toilet to minimize contamination
- Uncircumcised boys retract the foreskin
- Suprapubic aspiration
- catheterization for severely ill child may be indicated -8fr feeding tube

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Prompt treatment while waiting on culture

Easy to administer, achieve a high concentration in urine

Have minimal or no effect on fecal or vaginal flora c-difficile

Low incidence of bacterial resistance

Low cost

Minimal or no toxicity

Least broad spectrum

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ψ Cephalosporins- Suprax, Omnicef, Ceftin

z Nitrofurantoin- Macrobid, Macrodanin

Ⓜ Ampicillin

Ⓜ AAP guidelines state oral and parenteral are equal in efficacy in treating UTI

Ⓜ Potential antibiotics recommended in infants <2 months, toxic, unstable, immunocompromised, unable to tolerate oral medications or not responding to treatment.

Ⓜ Optimal duration of treatment is controversial 5-7 days depending on age, risk factors, severity and response.

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**Imaging**

- Workup for UTI
- Consider radiation exposure (diagnostic right now)
- Renal and bladder ultrasound (imaging of choice post void residual is essential)
- A voiding cystourethrogram is preferred for screening for vesicoureteral reflux- costly and invasive and exposed to radiation- post void residual is important
- Cystoscopy in some cases if suspect a duplicate system, unresponsive to treatment, moderate to severe reflux.

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**Follow Up**

- 1-2 days after administration of antibiotics to ensure no new risk factors have developed.
- Validate urine culture
- If new risk factors bring patient back in to re-evaluate
- Stop antibiotics if culture returns no growth to prevent resistance.
- Refer infant for further workup.

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**Education and Prevention**

- Instruct parent-children to void every 1.5 to 2 hours and not hold urine
- Take time to void-look for the potty dance
- Encourage adequate fluid intake- urine can be used to determine hydration
- Good hygiene
- Treat underlying condition- constipation
- Treat dysfunctional voiding-referral to pediatric urology

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**When to Refer**

Younger children run more risk of kidney damage than older children or adults

General consensus is to refer with children have 3 or more UTIs in a 6 - month period or if symptoms recur immediately after treatment.- don't wait

Consider that fever in newborn may indicate urological anomaly

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**Adolescents/Young Adult/Premenopausal Women**

- Symptoms are typically straightforward
- Adolescent UTIs are markers for sexual activity or complications of that activity
- Sexual history
- Look for evidence of STI
- Pregnancy test
- Patients with HIV- UTI's 5 times more prevalent

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Use of spermicide

A new sexual partner

A mother with history of UTI

History of UTI during childhood

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### Treatments/Prevention

- Self-start therapy 1-3 days- instruct about worsening symptoms
- Post-coital therapy- 1 dose (find out how often having intercourse first)
- Cranberry extract pills- daily usually not sustainable in this age group
- Pyridium 200 mg prescription or OTC for symptoms
- Persistent UTI-rule out other causes of symptoms such as BV, yeast by obtaining catheterized specimen and imaging
- 8-fr pediatric feeding tube-cost saving- useful in all age groups, less irritating
- Same bacteria refer and send cultures with patient

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### Adolescents/Young Adults

- Counsel about sexual activity and its consequences
- Discuss birth control
- Consider HPV vaccine discussion
- Wipe from front to back
- Avoid anal intercourse followed by vaginal intercourse
- Void after intercourse
- Increase water intake

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### Urinary Tract Infections: Women

- Approximately 50-60 percent of women at one point in their lifetime.
- Women 30 times more likely to develop UTI than men.
- 1 in 3 women will develop a UTI by the age of 24.
- 20-40% of women who have had 1 prior episode of cystitis will experience another.
- 25-50% will experience recurrent episodes.
- Healthcare costs estimated \$2 billion in the U.S.

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### Natural Defenses Prevention UTI

- Normal vaginal flora: lactobacilli, coagulase negative staph, Corynebacterium and streptococci form barriers against bacteria
- Urine high osmolality, high urea concentration, low pH, high organic acids are protective
- Bladder-epithelium receptors recognize bacteria and initiate an immune/inflammatory response.
- Kidneys- IgG and IgA local immunoglobulin/antibodies

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### Breaking Down Defenses

Underlying diseases: Diabetes, sickle cell, gout, aging

Diabetes: compromised immune system

HIV: UTIs five times more prevalent and occur more frequently

Pregnancy: bacteriuria in pregnancy 4-7%

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- History of UTI before menopause
- Urinary incontinence
- Atrophic vaginitis due to estrogen deficiency
- Cystocele/ Prolapse
- Increased postvoid residual
- Inadequate fluid intake
- Diarhea/Constipation/IBS/Crohns

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**Symptoms**

Dysuria- pain with urination related to inflammation of the bladder or urethra

Usually first symptom

Women report symptoms at the end of urethra and only present when voiding which goes away afterward.

More severe pain can occur in the bladder just at the end of voiding indicating inflammation of the bladder

Associated symptoms are urinary frequency and urgency, flank pain and gross hematuria

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**Diagnosis**

- Subjective data from a patient with lack of clear diagnostic criteria on laboratory testing makes the diagnosis of UTI highly imprecise.
- No evidence exists to support withholding antimicrobials
- Providers must be aware that continued intermittent courses of antibiotics are associated with adverse events particularly in older patients
- Effort should be made to avoid unnecessary treatment unless there is high suspicion of UTI.

American Urological/Canadian Urological Society of Urodynamics and Female Urology Guidelines 2019

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**2019 Guidelines for Treatment of Recurrent Uncomplicated (rUTI) UTI in Women AUA, CUA, SUTU**

Obtain a complete history and pelvic exam in women with recurrent UTI. (clinical principle)

Diagnosis of rUTI must document positive cultures associated with symptomatic episodes (clinical principle)

Repeat urine studies when initial urine specimen is suspect for contamination, with consideration for catheterized specimen (Clinical Principle)

Cystoscopy and upper tract imaging should be routinely obtained in patients with rUTI. (Expert Opinion)

Clinicians should obtain UA, urine culture and sensitivity with each symptomatic acute cystitis episode prior to initiating treatment.

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At what age did you start having urinary tract infections?  
 Did your UTI symptoms ever go away for a period of time and then come back?  
 How many infections have you had in the past year?  
 What are your usual symptoms?  
 When treated with antibiotics how long does it take before your symptoms improve?  
 Are your symptoms related to intercourse?  
 Have you ever been hospitalized for urinary tract infection?  
 Do you have a history of kidney stones?  
 Any problems with diarrhea or constipation?  
 Ever been told you have C-difficile?

History

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**Physical Exam**

- **V.S.** - looking for fever or signs of sepsis
- **Abdomen**- palpation all 4 quadrants- usual finding with UTI suprapubic tenderness
- **Back**- CVA tenderness is positive finding radiation to lower abdomen on one side think kidney stone
- **Pelvic exam**
- **Inspection**: vaginal tissues- erythema, rugae present or absent, cystocele, rectocele, vaginal discharge
- **Palpation**- urethra tender, discharge, mass
- **Palpation** of bladder-tenderness, fullness

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**Urinary tract infections: Men**

Younger men with normal anatomy and function have few UTIs- look for STI  
 Most common complaint -dysuria  
 Fever, tachycardia, flank pain  
 Medical history- prior UTIs, diabetes, prior GU surgeries, immunosuppression  
 Detailed sexual history- STI- can cause urethritis, prostatitis or epididymitis leading to UTI

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**Physical Exam**

- Abdomen- suprapubic area for enlarged bladder or suprapubic mass
- CVA- tenderness
- GU Exam
- Penis- ulcers, lesions
- Urethral meatus- erythema or discharge
- Testes and epididymis -tenderness and swelling
- Rectal- careful palpation- tender or painful stop as can lead to bacteremia

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**Prostatitis**

- Young and middle- aged men
- Pain in abdomen, testicles, penis or with ejaculation
- Bladder irritation, blood in semen
- Acute-spiking fevers, chills, body aches, cloudy urine
- Hesitancy, dribbling urine

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**Epididymitis**

- Tender
- Scrotal pain and swelling
- Urinary urgency and frequency, dysuria

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### Orchitis

- Advanced epididymitis
- Testicles are now tender, warm, swollen,
- Viral orchitis occurs in post pubertal boys infected with mumps
- Sterility occurs in 10%

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### Pyleonephritis

- Classic symptoms
- Fever, chills, flank pain,
- Urinalysis and culture can be negative-suspect kidney stone or obstruction
- Differential diagnoses
- Appendicitis
- Diverticulitis
- Pancreatitis
- Pneumonia lower-lobe

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### Urethritis

- Gonococcal urethritis incubation period 2-6 days
- Symptoms thick, milky discharge underwear is stained and pruritis
- Non-gonococcal urethritis incubation- 2-6 weeks
- Clear discharge
- Gram stain is key to diagnosis

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**Prostatitis Treatment**

- Prostate is difficult for antibiotics to penetrate.
- Course of antibiotic needs to be at least 30 days.
- Cipro was drug of choice but resistance is now high.
- Bactrim is good alternative.
- Follow-up and educate patient to go to ED if fever, nausea, vomiting

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**Follow –up Evaluation**

- Should not perform a post-treatment test of cure urinalysis or urine culture in asymptomatic patients (AUA Expert Opinion)
- Clinicians should repeat urine cultures to guide further management when UTI symptoms persist following antimicrobial therapy (AUA Expert Opinion)

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**Asymptomatic Bacteriuria**

- Clinicians should omit surveillance urine testing, including urine cultures in asymptomatic patients with rUTIs. (Moderate Recommendation; Evidence Level: Grade C)
- Clinicians should not treat asymptomatic bacteriuria in patients. (Strong recommendation; Evidence Grade B)

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**Antibiotic Treatment**

- Clinicians should use first-line therapy:
  - Nitrofurantoin
  - TMP-SMX
  - Fosfomycin
- Dependent on local antibiogram for treatment of UTI in women
- (Strong Recommendation; Evidence Level: Grade B)
- rUTI experiencing acute cystitis episodes with short duration of antibiotics as reasonable, generally no longer than 7 days (Expert Opinion)

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**Antibiotic Prophylaxis**

- Discussion of risks, benefits, alternatives- clinicians may prescribe antibiotic prophylaxis to decrease risk of future UTIs in women of all ages previously diagnosed with UTIs.
- (Moderate Recommendation; Evidence Level: Grade B)
- This does not have to be an antibiotic daily. It can be a dose of every other day or every 3<sup>rd</sup> day. (Memory)
- A once daily dose of antibiotic for 1 month and give a holiday to see how long it takes for infection to return.

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**Non-antibiotic Prophylaxis**

- Cranberry prophylaxis for women with rUTI may be offered. (Conditional Recommendation; Evidence Level: Grade C)
- This should be cranberry pills not juice. (my expert opinion)
- Estrogen in peri- and post-menopausal women with rUTIs, should be recommend vaginal estrogen therapy to reduce **if there is no contraindication to estrogen therapy**. (Moderate; the risk of future UTIs Recommendation; Evidence Level: Grade B)- generic estrace/compounded estrace cream
- Hiprex- (Urex) (mandelamine hippurate or mandelamine mandate)

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### Non-antibiotic prophylaxis

- Probiotics- intravaginally trial of intravaginal probiotics and low dose estrogen
- D-Mannose-simple sugar that flushes E.coli- compared in studies to Macrobid and Bactrim
- Uquora-drink after sex is a repackaged D-Mannose also contains B6, potassium and magnesium and vitamin C- expensive
- Vitamin C- ascorbic acid- acidifies urine weak association
- Hyaluronic acid and chondroitin sulfate in bladder instillation
- Vaccines- limited clinical success so far

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Recent Hospital Acquired Urinary Tract Infections in Women: HCAHPS/UTI Diagnosis & Treatment Algorithm




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