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A Guidelines-Based Approach to Recurrent Urinary Tract Infections in Women

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Disclosures

Una Lee, MD — Consultant: Medtronic

Jennifer Anger, MD — Abbvie, Vaneltix

Toby Chai, MD — Consultant: GlaxoSmithKline

Ann Stapleton, MD — No disclosures

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Course Description

- Reviews the AUA/CUA/SUFU Guideline on Recurrent UTIs encompassing diagnosis, treatment, antibiotic and non-antibiotic prophylaxis
  - Published 2019 | Validity Confirmed 2022 | Amended 2025
- Presents evidence supporting the guidelines and current, safe antibiotic treatment algorithms
- Second part focuses on updates, current topics, and case presentations including the 2025 IDSA Guideline on Complicated UTIs

Learning Objectives

- Review the evidence and rationale behind the 2019 rUTI guidelines, including the 2025 amendments
- Discuss recent data and updates including the 2025 IDSA Guideline on Complicated UTIs
- Discuss interactive cases highlighting common and challenging clinical scenarios
- Address common clinical questions related to recurrent UTIs in women with current evidence

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Recurrent Uncomplicated Urinary Tract Infections in Women: AUA/CUA/SUFU Guideline (2025)

To cite this guideline:

Ackerman AL, Bradley M, D'Anci KE, Hickling D, Kim SK, Kirkby E. Updates to Recurrent Uncomplicated Urinary Tract Infections in Women: AUA/CUA/SUFU Guideline (2025). J Urol. 0(0). doi: 10.1097/JU.0000000000004723

Panel Members

Jennifer Anger, MD, MPH; Una Lee, MD; A. Lenore Ackerman, MD, PhD; Roger Chou, MD; Bilal Chughtai, MD; J. Quentin Clemens, MD; Duane Hickling, MD, MSCI; Anil Kapoor, MD; Kimberly S. Kenton, MD, MS; Melissa R. Kaufman, MD, PhD; Mary Ann Rondanina, Yahir A. Santiago-Lastra, MD; Ann Stapleton, MD; Lynn Stothers, MD; Toby C. Chai, MD

Recurrent Uncomplicated Urinary Tract Infections in Women: AUA/CUA/SUFU Guideline (2025)

Ackerman AL, Bradley M, D'Anci KE, Hickling D, Kim SK, Kirkby E. Updates to Recurrent Uncomplicated Urinary Tract Infections in Women: AUA/CUA/SUFU Guideline (2025). J Urol. 0(0). doi: 10.1097/JU.0000000000004723

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Amendment Panel

A. Lenore Ackerman, MD, PhD; Duane Hickling, MD, MSCI; Megan Bradley, MD

Published 2019, Reviewed and Validity Confirmed 2022, Amended 2025

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Guidelines Methodology

Guideline Methods & 2025 Amendment

★ 2025 Update

Systematic review by Pacific Northwest Evidence-based Practice Center (EPC)

Searches: Ovid MEDLINE (1946–Jan 2018), Cochrane Central, Embase; update search Sept 2018; 2022 EPC update review of new studies

★ 2025 Amendment: searched June 2021–November 2024 (1,015 citations); new key questions on NGS and non-culture testing added

Guideline statements graded: Strong / Moderate / Conditional Recommendation; Evidence Level Grade A / B / C

Clinical Principle = widely agreed upon care component; Expert Opinion = panel consensus

Introduction: Epidemiology & Burden

~60% of women will experience symptomatic acute bacterial cystitis in their lifetime

Estimated 20–40% of women with one previous cystitis episode are likely to experience an additional episode

25–50% of those with one recurrence will experience multiple recurrent episodes

Overuse of antibiotics leads to collateral damage — antibiotic stewardship is imperative

Terminology & Definitions ★ 2025 Update

Acute Bacterial Cystitis: Acute-onset symptoms (dysuria ± urgency, frequency, hematuria, new/worsening incontinence) + pyuria (≥5 WBC/hpf) + detection of a uropathogen

★ 2025: Localized UTI (formerly "Uncomplicated UTI"): Infection in a healthy patient with normal urinary tract, no signs of upper urinary involvement or bacteremia, no complicating factors

Complicating Factors: Anatomic/functional abnormality (stone, diverticulum, neurogenic bladder), immunocompromised host, indwelling foreign body (catheter, stent)

Systemic UTI: UTI with signs of systemic infection (fever, rigors, hypotension, tachycardia) ± localized symptoms

Terminology & Definitions

Recurrent UTI (rUTI): Two separate episodes of acute bacterial cystitis within a six-month period within the preceding year

Asymptomatic Bacteriuria (ASB): Presence of bacteria in the urine that causes no illness or symptoms

Pyuria: Increased polymorphonuclear leukocytes (≥5 WBC/hpf) — indicates urinary tract inflammation

Diagnosis of rUTI requires: acute-onset urinary symptoms + pyuria + laboratory confirmation of uropathogen

Index Patient

An otherwise healthy adult female with localized (lower urinary tract) recurrent UTI in the absence of complicating factors

Associated with acute-onset symptoms attributable to the urinary tract, in the presence of pyuria AND detection of a bacterial uropathogen

Excludes: pregnant women, immunocompromised patients, anatomic/functional abnormalities, users of self-catheterization, signs of upper UTI or systemic bacteremia (fever, flank pain)

Excludes: neurological disease relevant to LUTS (neurogenic bladder, peripheral neuropathy, spinal cord injury)

Symptoms of UTI

Dysuria (urethral burning during voiding) is central to the diagnosis of UTI

Urinary urgency and frequency, hematuria, suprapubic pain, and new or worsening incontinence are variably present

Acute-onset dysuria: >90% accuracy for UTI in young women in the absence of vaginal irritation or discharge

In older women: only acute-onset dysuria ± new/worsening storage symptoms is reliable — chronic nocturia, incontinence, fatigue are NOT specific for UTI

Diagnosis of Acute Bacterial Cystitis

Requires: (1) acute-onset urinary tract symptoms, (2) pyuria ≥5 WBC/hpf, and (3) laboratory confirmation of uropathogen

Typical causative organisms: E. coli (75–95%), Proteus mirabilis, Klebsiella pneumoniae, Staphylococcus saprophyticus

Without symptoms, bacteriuria of any magnitude = ASB — does NOT require treatment

Rapid recurrence within 2 weeks may indicate bacterial persistence — consider imaging/cystoscopy for occult bacterial reservoir

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Diagnosis by Urine Culture

Bacteriologic Diagnosis — Standard Culture Limitations

10^5 CFU/mL threshold: derived 60+ years ago from asymptomatic women — sensitivity only 50–60% in symptomatic patients

~40% of catheter-confirmed E. coli UTIs have $<10^5$ CFU/mL on voided specimen (Hooton et al.)

In high-suspicion symptomatic patients: $\geq 10^2$ CFU/mL of E. coli had 88–93% PPV for bladder bacteriuria

Accuracy varies by organism: PPV 93% for E. coli but only 10% for Enterococci and 8% for Group B Streptococci

National average contamination rate: ~15%; 1–4 day result delay promotes empiric prescribing and antimicrobial resistance

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Evolving Diagnostics

Evolving UTI Diagnostic Methods — Beyond Standard Culture ★ 2025 Update

EQUC (Expanded Quantitative Urine Culture): Detects anaerobic/fastidious organisms; requires catheterized specimen; no proven clinical outcome improvement vs. standard culture (RCT)

NGS (Next-Generation Sequencing): Broad detection of all DNA (bacteria, viruses, fungi); cannot reliably quantify bacterial load; small RCT (n=44): greater symptom improvement vs. standard culture

Multiplex PCR: Pathogen-specific primers; results within hours; can pair with genotypic AST; only detects pre-selected taxa; retrospective data: fewer ED visits & hospitalizations

⚠️ **No test — including standard urine culture — can replace clinical judgement. All methods risk overdiagnosis without careful patient assessment.**

Clinical Pearls: Molecular UTI Diagnostics

★ 2025 Update

Advantages: Faster results (hours vs. days), less vulnerable to contamination, PCR genotypic AST rapidly guides antibiotic selection for MDR organisms

Limitations: PCR detects only pre-selected taxa; genotypic AST predicts resistance but cannot confirm susceptibility; may miss novel resistance mechanisms (porin loss, efflux pumps)

Overdiagnosis risk: highly sensitive methods risk overtreatment, especially in ASB; evidence base primarily in patients with complicating factors

Bottom line: Better clinical judgement — not better testing — is the path to improved antibiotic stewardship; integrate bacterial findings with full clinical picture at every encounter

Evolving UTI Diagnostic Methods

Beyond Standard Urine Culture

EQUC

Expanded Quantitative Urine Culture

- More inoculum, broader media & conditions
- Detects anaerobic & fastidious organisms missed by standard culture
- Requires catheterized specimen (limits routine use)
- No proven improvement in clinical outcomes vs. standard culture

NGS

Next-Generation Sequencing

- Amplicon or shotgun sequencing of all DNA in sample
- Broad detection — bacteria, viruses, fungi
- Cannot reliably quantify bacterial load
- Small RCT: greater symptom improvement vs. standard culture

Multiplex PCR

Polymerase Chain Reaction

- Pathogen-specific primers; faster results (hours vs. days)
- Quantifies targeted organisms; can pair with genotypic AST
- Only detects pre-selected taxa (narrower than NGS)
- Retrospective data: fewer ED visits & hospitalizations

⚠ No test — including standard urine culture — can replace clinical judgement. All methods risk overdiagnosis without careful patient assessment.

Source: AUA/SUFU Guideline — Diagnosis & Management of UTI

Clinical Pearls: Molecular UTI Diagnostics

Potential Advantages

- Faster results — hours vs. days for culture
- Less vulnerable to specimen handling & contamination errors
- PCR-based genotypic AST can guide antibiotic selection rapidly — especially useful for MDR organisms
- May reduce empiric antibiotic prescribing while awaiting culture
- Early data: fewer ED visits, hospitalizations, and repeat visits in patients with complicating factors

Important Limitations

- PCR detects only pre-selected organisms — may miss unexpected pathogens
- NGS cannot reliably quantify bacterial load
- Genotypic AST predicts resistance — cannot confirm susceptibility
- May miss novel or non-enzymatic resistance mechanisms (e.g., porin loss, efflux pumps)
- Highly sensitive methods risk overdiagnosis & overtreatment — especially in asymptomatic bacteriuria
- Evidence base primarily in patients with complicating factors of UTI; limited data in uncomplicated/atypical presentations

Bottom Line: The answer to better UTI care lies in better *clinical judgement*, not better testing. More sensitive methods will worsen antibiotic overuse unless clinicians integrate bacterial findings with the full clinical picture — symptoms, urinalysis, pre-test probability, and patient context — at every encounter.

Source: AUA/SUFU Guideline — Diagnosis & Management of UTI

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Urinary Microbiome

Human as Habitat Model— Urinary Microbiome

Old paradigm: Urine was considered sterile; UTI = "microbial infiltration of an otherwise sterile urinary tract"; any bacteriuria = infection requiring treatment

New understanding: Even in asymptomatic healthy individuals, the lower urinary tract hosts a complex microbial community — in the strictest sense, all individuals are "bacteriuric"

Commensal bacteria are symbiotic; ASB may PROTECT against symptomatic UTI — treating ASB (RCT n=673) INCREASED subsequent symptomatic UTI (47% vs 13%, RR 3.17)

>75% of the general population have chronic or fluctuating LUTS not thought to be infectious; HU2117 (nonpathogenic E. coli) intentional colonization reduced UTI risk in spinal cord injury

Paradigm shift: rUTI management goal should shift from bacterial eradication to amelioration of symptoms and prevention of complications

The Human Urinary Tract as a Habitat

Rethinking Bacteriuria & the Urinary Microbiome

Old Paradigm

Urine was considered sterile. UTI defined as "microbial infiltration of an otherwise sterile urinary tract." Any bacteriuria = infection requiring treatment.

New Understanding

Sensitive culture-dependent & -independent techniques show the lower urinary tract hosts a complex microbial community — even in asymptomatic, healthy individuals. In the strictest sense, all individuals are "bacteriuric."

Clinical Implication

The goal of rUTI management should shift from bacterial eradication to amelioration of symptoms and prevention of complications.

Supporting Evidence

>75%

of the general population have chronic or fluctuating LUTS not thought to be infectious in nature

ASB → ↑ UTI

Women with ASB treated with antibiotics had higher rates of subsequent symptomatic UTI (n=673)

HU2117

Intentional colonization with nonpathogenic E. coli safely reduced symptomatic UTI risk in spinal cord injury patients

Expectant Tx

Symptomatic treatment & watchful waiting is appropriate even when acute bacterial cystitis is confirmed in select patients

Paradigm Shift: Commensal urinary bacteria may be *protective*. The dogma that all symptomatic bacteriuria must be treated with antibiotics must be re-evaluated — antibiotic overtreatment carries real personal & societal harms.

Source: AUA/SUFU Guideline — Diagnosis & Management of Recurrent UTI

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Antibiotic Stewardship

Antimicrobial Stewardship & Collateral Damage

Antimicrobial resistance among uropathogens has increased dramatically over the past 20 years

Uncomplicated UTI is one of the most common indications for antimicrobial exposure in otherwise healthy women

Fluoroquinolones: linked to MRSA and increasing resistance in gram-negative bacilli; FDA black-box warnings for QTc prolongation, tendon rupture, and aortic rupture

Broad-spectrum cephalosporins: linked to VRE, ESBL K. pneumoniae, β-lactam-resistant Acinetobacter, and C. difficile

Multiple RCTs: antibiotics offer only mildly faster symptom improvement vs. placebo; pyelonephritis incidence is low and not substantially different with vs. without antibiotics (Gagyor 2012)

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Evaluation

GS 1 — Complete History & Pelvic Exam (Clinical Principle)

Guideline Statement 1: Clinicians should obtain a complete patient history and perform a pelvic examination in women presenting with rUTIs.

History: LUTS (dysuria, frequency, urgency, nocturia, incontinence, hematuria, pneumaturia, fecaluria), bowel symptoms, antibiotic use/allergies, back/flank pain, catheter use, vaginal symptoms

Ask about: menopausal status, post-coital UTI, contraceptive method, spermicide use, SGLT2 inhibitor use

Physical exam: pelvic myofascial pain, GSM, vulvar dermatologic conditions (lichen sclerosus, lichen planus)

Baseline genitourinary symptoms between infections are important to document for comparison

GS 2 — Urine Culture with Each Episode (Moderate Rec; Grade C)

Guideline Statement 2: Clinicians should obtain urinalysis, urine culture and sensitivity with each symptomatic acute cystitis episode prior to initiating treatment in patients with rUTIs.

Microbial confirmation at the time of acute-onset symptoms is essential for establishing rUTI diagnosis

Ongoing culture documentation provides a baseline to evaluate interventions and tailor therapy based on antimicrobial sensitivities

Symptoms warranting culture: acute-onset dysuria, frequency/urgency, new/worsening incontinence ± gross hematuria

GS 3 — Pyuria + Uropathogen Required (Clinical Principle)

Guideline Statement 3: To make a diagnosis of rUTI, clinicians should document evidence of inflammation (pyuria) and the presence of uropathogenic bacteria in association with symptomatic episodes.

10^5 CFU/mL may help distinguish bacteriuria from contamination in asymptomatic premenopausal women, but 10^2 CFU/mL may be appropriate in symptomatic individuals

Establishing the association of acute-onset symptoms with microbiological evidence of infection is essential — do not treat culture results in isolation

Contamination with vaginal/skin bacteria leads to high rates of suboptimal or unnecessary treatment

GS 4 — Repeat Culture if Contamination Suspected (Clinical Principle)

Guideline Statement 4: Clinicians should obtain repeat urine studies when an initial urine specimen is suspect for contamination, with consideration for obtaining a catheterized specimen.

Contamination likely when culture grows commensals: Lactobacilli, Group B Streptococci, Corynebacteria, non-saprophyticus coagulase-negative Staphylococci

Commensal organisms do NOT require treatment

When contamination is highly suspected, obtain a catheterized specimen before treating

GS 5 — No Routine Cystoscopy/Imaging (Expert Opinion)

Guideline Statement 5: Cystoscopy and upper tract imaging should not be routinely obtained in the index patient presenting with rUTI.

91.7% of rUTI patients had normal IVU (prospective study); only 5.5% showed positive findings, none affecting management (Fair et al.)

Higher yield in "high-risk" patients: gross hematuria, persistent microscopic hematuria, pyelonephritis, atypical presentations — imaging IS recommended in these cases

Cystoscopy useful for: prior pelvic surgery, suspected anatomic abnormalities (stricture, mesh, stones, fistula, diverticulum)

GS 6 — Self-Start Treatment (Conditional Rec; Grade C)

Guideline Statement 6: Clinicians may offer patient-initiated treatment (self-start treatment) to select rUTI patients with acute episodes while awaiting urine cultures.

Panel recommends obtaining culture data when feasible — self-start antibiotic treatment may be considered when culture procurement is not possible

Shared decision-making recommended regarding deferring therapy pending culture results

Non-antibiotic treatment (urinary analgesics) while awaiting culture is reasonable given low progression risk to pyelonephritis

Self-start therapies should be based on prior culture/sensitivity data and local antibiograms

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Asymptomatic Bacteriuria

GS 7 — No Surveillance Cultures (Moderate Rec; Grade C)

Guideline Statement 7: Clinicians should omit surveillance urine testing, including urine culture, in asymptomatic patients with rUTIs.

Without symptoms, bacteriuria of any magnitude = ASB — does NOT require evaluation or treatment

In women with rUTIs, identification of ASB between UTI episodes does NOT provide useful prognostic information

Populations that do NOT benefit from ASB screening: women with diabetes, long-term care facility residents, elderly, immunosuppressed, renal transplant patients

GS 8 — Do Not Treat ASB (Strong Rec; Grade B)

Guideline Statement 8: Clinicians should not treat asymptomatic bacteriuria in patients.

No evidence treatment of ASB improves clinical outcomes; clear evidence of harm: side effects, opportunistic infections, antibiotic resistance

RCT (n=673): antibiotic treatment of ASB vs. no antibiotics → antibiotic group had INCREASED symptomatic recurrence (47% vs. 13%, RR 3.17) and MORE resistant organisms (Ho 2010)

Only clearly recognized indications for ASB treatment: pregnant women and patients undergoing elective urologic surgery

Struvite stones: do NOT routinely treat urease-producing bacteriuria in the absence of symptoms or documented stones

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Antibiotic Treatment

GS 9 — First-Line Therapy (Strong Rec; Grade B)

Guideline Statement 9: Clinicians should use first-line therapy (nitrofurantoin, TMP-SMX, fosfomycin) dependent on the local antibiogram for the treatment of symptomatic UTIs in women.

Three first-line agents are effective and produce less collateral damage than second-line agents

TMP-SMX should NOT be used empirically when local resistance rates exceed 20%

Fluoroquinolones: FDA black-box warnings (QTc prolongation, tendon rupture, aortic rupture) — avoid as first-line

Second-line agents (β-lactams, fluoroquinolones) for resistance or allergy; single-dose therapy not recommended except fosfomycin

First-Line Antibiotics — Comparison

Nitrofurantoin: Cure 88–93% | Narrow spectrum (E. coli, S. saprophyticus) | No collateral damage | Stable resistance | 100 mg BID × 5 days | Avoid if CrCl <30 mL/min

TMP-SMX: Cure 90–100% | Covers typical uropathogens | Minimal collateral damage | Increasing resistance | 1 DS (160/800 mg) BID × 3 days | Avoid empirically if local resistance >20%

Fosfomycin: Cure 83–91% | Broad (covers VRE, ESBL GNRs) | No collateral damage | Low resistance | 3 g single dose

First-line Treatment of Uncomplicated Cystitis

- Nitrofurantoin MR 100 mg BID × 5 days
- TMP-SMX 160/800 mg BID × 3 days (if local resistance <20%)
- Fosfomycin 3g single dose (use in setting of significant renal insufficiency and in G6PD deficiency)
- Pivmecillinam 400 mg BID × 5–7 days (Pivmecillinam (marketed as Pivya) is available in the United States as of February 2026 for treating uncomplicated urinary tract infections (UTIs) in adult women. It has been widely available for decades in Europe, Canada, and other regions.)
- Avoid fluoroquinolones — IDSA strong recommendation against use for cystitis
- Two new antibiotics approved: pivmecillinam (2024) and gepotidacin (2025)

New Antibiotics for UTI

- Three new antibiotics recently approved:
  - Pivmecillinam (2024)
  - Sulopenem etzadroxil with probenecid (2025)
  - Gepotidacin (2025)
- Place in therapy to be determined

Pivmecillinam (Pivya, Utility Therapeutics)

- **Class**: beta lactam (oral prodrug of an amidinopenicillin antibiotic mecillinam)
- Available for 40 years in Europe and Canada
- Included in first-line antibiotics in 2011 IDSA Guidelines
- Good safety and tolerability profile
- **FDA approved** for susceptible isolates of *Escherichia coli*, *Proteus mirabilis* and *Staphylococcus saprophyticus*
- **Coverage**: broader than some other choices, including ESBL, *Klebsiella, Enterobacter,* and *Citrobacter*

Pivmecillinam (Pivya, Utility Therapeutics)

- Little resistance where currently used and does not appear to be emerging
- Dose: 185mg PO 3 times daily for 3 to 7 days
- Appears safe in pregnancy
- Main side effects are nausea and diarrhea
- Depletes carnitine stores
  - Do not use in patients with primary or secondary carnitine deficiency resulting from inherited disorders of mitochondrial fatty acid oxidation and carnitine metabolism or porphyria
- Available in US since February 2026

Sulopenem etzadroxil with probenecid (Orlynvah; Iterum Therapeutics)

- **Class**: penem (oral bioavailability vs carbapenem)
- **FDA approved** for treatment of uncomplicated urinary tract infection(s) caused by *Escherichia coli, Klebsiella pneumoniae, or Proteus mirabilis* in adult women who have limited or no alternative oral antibacterial treatment options.
- **Concerns**: stewardship (off-label use), higher than expected rate of ASB in trials, probenecid-related adverse effects

Gepotidacin (Bluejepa, GSK)

- **Class**: triazaacenaphthylene bacterial type II topoisomerase inhibitor
- Blocks two essential topoisomerase enzymes so need mutations in both to become resistant
- **FDA approved** for uncomplicated urinary tract infections (uUTI) caused by susceptible *Escherichia coli*, *Klebsiella pneumoniae*, *Citrobacter freundii* complex, *Staphylococcus saprophyticus*, and *Enterococcus faecalis*
- Clinical trials vs nitrofurantoin: noninferior or superior

Gepotidacin (Bluejepa, GSK)

- Broader coverage, fills gaps (e.g. covers *Proteus mirabilis*, which is intrinsically resistant to nitrofurantoin)
- In vitro activity against ESBL
- Side effects: diarrhea (16%) and nausea (9%)
- Precautions: QTc prolongation, avoid with strong CYP3A inhibitors
- Pregnancy and lactation: **insufficient data**

GS 10 — Short Antibiotic Duration (Moderate Rec; Grade B)

Guideline Statement 10: Clinicians should treat rUTI patients experiencing acute cystitis episodes with as short a duration of antibiotics as reasonable, generally no longer than seven days.

3-day course associated with decreased adverse effects, discontinuation, and GI adverse events vs. longer-duration therapy

Single-dose therapy (except fosfomycin) should NOT be used in rUTI patients

GS 11 — Parenteral Antibiotics for Resistant Organisms (Expert Opinion)

Guideline Statement 11: In patients with rUTIs experiencing acute cystitis episodes associated with urine cultures resistant to oral antibiotics, clinicians may treat with culture-directed parenteral antibiotics for as short a course as reasonable, generally no longer than seven days.

Before defaulting to IV antibiotics: order fosfomycin susceptibility testing — many ESBL bacteria retain susceptibility to fosfomycin and/or nitrofurantoin

Infectious Diseases consultation appropriate for MDR uropathogens

New Antibiotics for UTI — 2025 Update Summary

★ 2025 Update

Pivmecillinam (Pivya): Beta-lactam oral prodrug; used in Europe/Canada 40+ years; FDA approved 2024; available in US February 2026. Covers ESBL, Klebsiella, Enterobacter. Dose: 185 mg PO TID × 3–7 days. Avoid in carnitine deficiency or porphyria

Sulopenem etzadroxil + probenecid (Orlynvah): Oral penem; FDA approved for E. coli, K. pneumoniae, P. mirabilis when limited oral options. Stewardship concern: off-label use; probenecid-related adverse effects

Gepotidacin (Bluejepa, GSK): Novel dual-enzyme topoisomerase inhibitor; FDA approved 2025. Covers E. coli, K. pneumoniae, S. saprophyticus, E. faecalis, in vitro ESBL activity. Noninferior or superior to nitrofurantoin in trials. Diarrhea (16%), nausea (9%); QTc precaution

Place in therapy for all three agents to be determined — reserve for resistant or complicated cases

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Antibiotic Prophylaxis

GS 12 — Antibiotic Prophylaxis (Conditional Rec; Grade B)

Guideline Statement 12: Following discussion of the risks, benefits, and alternatives, clinicians may prescribe antibiotic prophylaxis to decrease the risk of future UTIs in women of all ages previously diagnosed with UTIs.

28 RCTs consistently demonstrate positive preventive effect, while acknowledging increased adverse events

Nitrofurantoin: rare pulmonary/hepatic toxicity (0.001%/0.0003%); avoid if CrCl <30 mL/min (Beers Criteria); caution in chronic lung disease

Continuous prophylaxis: TMP 100 mg daily | TMP-SMX 40/200 mg daily or 3×/wk | Nitrofurantoin 50–100 mg daily | Cephalexin 125–250 mg daily | Fosfomycin 3 g every 10 days

Post-coital prophylaxis: TMP-SMX 40/200 mg | Nitrofurantoin 50–100 mg | Cephalexin 250 mg — take within 2 hours of intercourse

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Non-Antibiotic Prophylaxis

GS 13 — Cranberry Prophylaxis (Moderate Rec; Grade B) ★ 2025 Upgrade ★ 2025 Update

Guideline Statement 13: Clinicians should offer cranberry as an option for prophylaxis for women with rUTIs.

Active component: proanthocyanidin (PAC) — inhibits Fim-H binding of UPEC to urothelium

8 RCTs; meta-analysis: cranberry associated with decreased risk of ≥1 UTI recurrence vs. placebo (RR 0.67, 95% CI 0.54–0.83)

★ 2025 Update: Standardize to ≥36 mg PAC for best efficacy; ideal dose ≥72 mg PAC (Xiong et al. Front Nutr 2024)

Oral juice and tablet formulations both acceptable; little risk — increased appeal for patients avoiding antibiotics

Clinicians should offer cranberry as an option for prophylaxis for women with rUTIs. (*Moderate Recommendation; Evidence Level: Grade B***)**

- 2019 Guideline: 8 randomized trials
  - 6 RCTs □ 5 RCTs included in meta analysis
- Results:
  - cranberry was associated with decreased risk of experiencing at least 1 UTI recurrence than placebo or no cranberry
- 2022 Guideline update - 4 additional studies
- 2025 Guideline update - More supportive data

Cranberry: safe broad spectrum efficacy

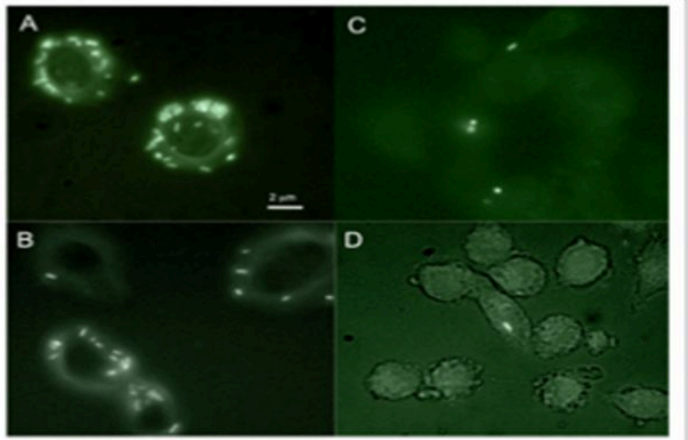


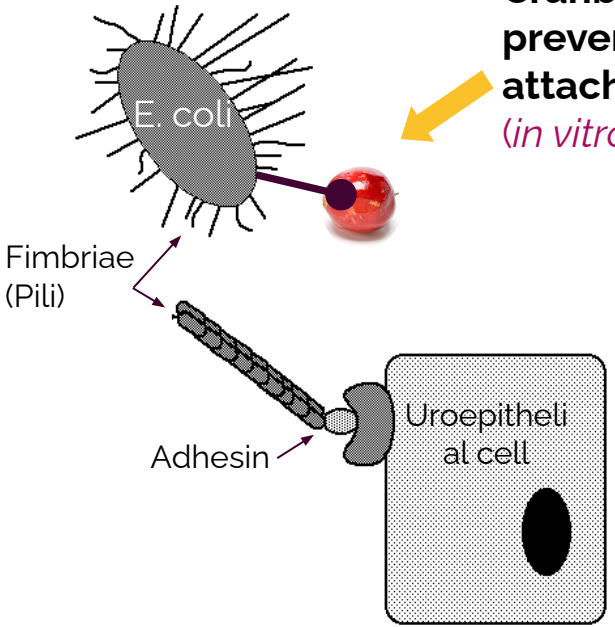
Figure 1 Fluorescence microscopy of *E. coli gfp* + strain cultured in urines of volunteers collected after cranberry powder consumption and loaded on T24 epithelial cells. A. *E. coli* cultured in urines collected after placebo consumption; B. *E. coli* cultured in urines collected 6 h after consumption of cranberry powder containing 18 mg proanthocyanidins (PAC); C. *E. coli* cultured in urines collected 6 h after consumption of cranberry powder containing 36 mg PAC; D. *E. coli* cultured in urines collected 6 h after consumption of cranberry powder containing 72 mg PAC.

- Cranberry (Vaccinium macrocarpon)
- **Soluble Proanthocyanidin (PAC)**
  - 'Active' chemical component
  - In vitro
    - Inhibits Fim-H binding to urothelium
    - Dose-dependent effect on UPEC adherence
    - Exhibits bacterial anti adhesion activity
  - BL-DMAC method to measure PAC concentrations
    - Minimum = **36 mg PAC**
    - Ideal = 72 mg PAC

Howell et al. BMC Infectious Diseases, 2010

Prevention of Bacterial Adhesion/Biofilm Development

Interrupting First Step in Infection Process



Cranberry PAC/metabolites prevent bacterial fimbriae from attaching to uroepithelial cells
(*in vitro* and in urine following intake)

E. coli Uropathogenic
P-type (PapG, Dr/Afa, S adhesins)
Type 1 (FimH adhesins)

Proteus (Catheter-associated)
Klebsiella
Pseudomonas
- Inhibits urinary biofilm formation and persistence – Reducing bacterial reservoir

Zafriri et al., Inhibitory activity of cranberry juice on adherence of type 1 and type P fimbriated *Escherichia coli* to eukaryotic cells, *Antimicrob. Agents Chemother*. 1989, 33, 92 –98

Ulrey et al., Cranberry proanthocyanidins have anti-biofilm properties against *Pseudomonas aeruginosa*. *BMC Complement Altern Med*. 2014 Dec 16;14:499.

Variability of commercial cranberry products

TABLE

Comparison of cranberry products with PAC level, antiadhesion activity of the whole product, and antiadhesion of the isolated PACs

Product	PAC level, mg/g	Antiadhesion (MIC) whole product, mg/mL	Antiadhesion (MIC) of PACs, μg/mL
1	25.4	3.5-7.5	156
2	4	Negative	5000
3	4	0.60	312
4	175	0.47	78
5	1.2	Negative	2496
6	1.4	Negative	2496
7	0.56	Negative	312–624

MIC, minimal inhibitory concentrations; *PAC*, proanthocyanidin.

Chughtai. Commercial cranberry dietary supplements. Am J Obstet Gynecol 2016.

Chughtai et al. Commercial cranberry dietary supplements. Am J Obstet Gynecol 2016.

Cranberries and Urinary Tract Infections: How Can the Same Evidence Lead to Conflicting Advice?[1–3]

DeAnn J Liska,[4]* Hua J Kern,[4] and Kevin C Maki[5]
[4]Biofortis Innovation Services, Addison, IL; and [5]Midwest Center for Metabolic & Cardiovascular Research, Chicago, IL

- Traditionally, cranberry has been used to prevent rUTIs among healthy women
- Efficacy of the cranberry on prevention of rUTIs controversial, in part because of conflicting conclusions from meta-analyses
- **Key issues: Variability of participants and outcome measures (threshold of UTI diagnosis)**
- **Heterogeneity seen when you combine complicated and uncomplicated UTIs** (Jepson 2012 Cochrane Review)
  - **Efficacy was observed in clinical trials assessing prevention of rUTIs in generally healthy women**

TABLE 4 Differences in subgroup contributions to overall relative risk estimates

Subgroup	Jepson et al., 2012 (20)			Wang et al., 2012 (19)		
	Trials, *n*	Sample size, *n*	Weight, %	Trials, *n*	Sample size, *n*	Weight, %
Women with recurrent urinary tract infections	4	594	24.5	2	250	32.3
Elderly men and women	2	413	13.7	1	376	11.4
Children	2	309	12.5	1	54	14.8
Pregnant women	2	674	19.1	1	188	0.5
People with neuropathic bladder/spinal injuries	2	353	20.2	4	307	40.9
Radiotherapy patients	1	119	10.1	—	—	—
Total	13	2462	100	9	1175	100

GS 14 — D-mannose NOT Effective Alone (Moderate Rec; Grade B) ★ 2025 ★ 2025 Update

Guideline Statement 14: Clinicians should inform patients with rUTIs that D-mannose alone for prophylaxis may not be effective in UTI prevention.

★ 2025 Update: RCT (n=598) showed NO difference in UTI recurrence between D-mannose (2 g/day) and placebo

No difference in microbiological recurrence, antibiotic prescriptions, UTI-related symptoms, or hospital admissions

D-mannose should NOT be recommended as a sole prophylactic agent

GUIDELINE STATEMENT 14

Clinicians should inform patients with rUTIs that D-mannose alone for prophylaxis may not be effective in UTI prevention. (*Moderate Recommendation; Evidence Level: Grade B*)

- High-quality large RCT (N=598) showed no difference in UTI recurrence rate between use of D-mannose (2 g/day) and placebo (RR: 0.92; 95% CI: 0.80 to 1.05).
- 2-group, double-blind randomized placebo-controlled trial took place across 99 primary care centers in the UK
- No difference in microbiological recurrence (RR: 0.90; 95% CI: 0.60 to 1.33), number of prescribed antibiotics (adjusted IRR: 0.88; 95% CI: 0.69 to 1.12), UTI-related symptoms (adjusted IRR: 0.88; 95% CI: 0.72 to 1.08) or hospital admissions (RR: 1.47; 95% CI: 0.47 to 4.61) between the two groups.
- The incidence of harm were low in both groups.

D-mannose administration is unlikely to do harm, however there is insufficient evidence to support its clinical benefit in preventing UTI episodes, and therefore cannot be recommended

Hayward G, Mort S, Hay AD et al: D-mannose for prevention of recurrent urinary tract infection among women: A randomized clinical trial. JAMA Intern Med 2024; 184: 619

GS 15 — Methenamine Hippurate (Conditional Rec; Grade C)

Guideline Statement 15: Clinicians may offer methenamine hippurate for prophylaxis for women with rUTIs.

Non-inferiority RCT (2022, n=240): Methenamine hippurate 1 g BID vs. daily antibiotic × 12 months

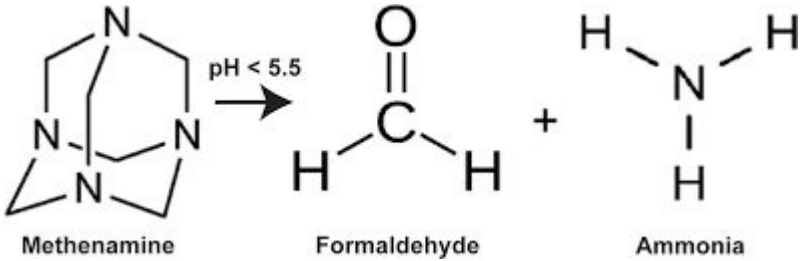
Incident rate of symptomatic UTI decreased substantially in BOTH arms; absolute difference did not exceed non-inferiority limit of 1 UTI/person-year

Useful option for patients who want to avoid long-term antibiotic prophylaxis

GUIDELINE STATEMENT 15

Clinicians may offer methenamine hippurate for prophylaxis for women with rUTIs.
(*Conditional Recommendation; Evidence Level: Grade C*)

- Methenamine is hydrolyzed into formaldehyde and ammonia.
- Formaldehyde is a bactericidal agent that kills bacteria by denaturing their proteins and nucleic acids.
- Effective against a wide range of urinary tract bacteria.
- Does not induce bacterial resistance
- Vitamin C has not been found to significantly lower urinary pH and do not enhance the effects of Methenamine in clinical trials, Therefore, concomitant use of vitamin C and methenamine is not recommended



GS 16 — Increased Water Intake (Conditional Rec; Grade C)

Guideline Statement 16: When women with rUTIs have a water intake below 1.5 L/day (50 oz), clinicians may offer increased water intake for prophylaxis.

RCT (Hooton et al. JAMA Intern Med 2018, n=140): participants with baseline <1.5 L/day fluid intake

Increased water intake: significantly fewer UTI recurrences (mean 1.7 vs. 3.2 episodes over 12 months, $p<0.001$) and fewer antibiotic prescriptions

Benefit primarily in women with LOW baseline fluid intake — counsel all patients to optimize hydration

GUIDELINE STATEMENT 16

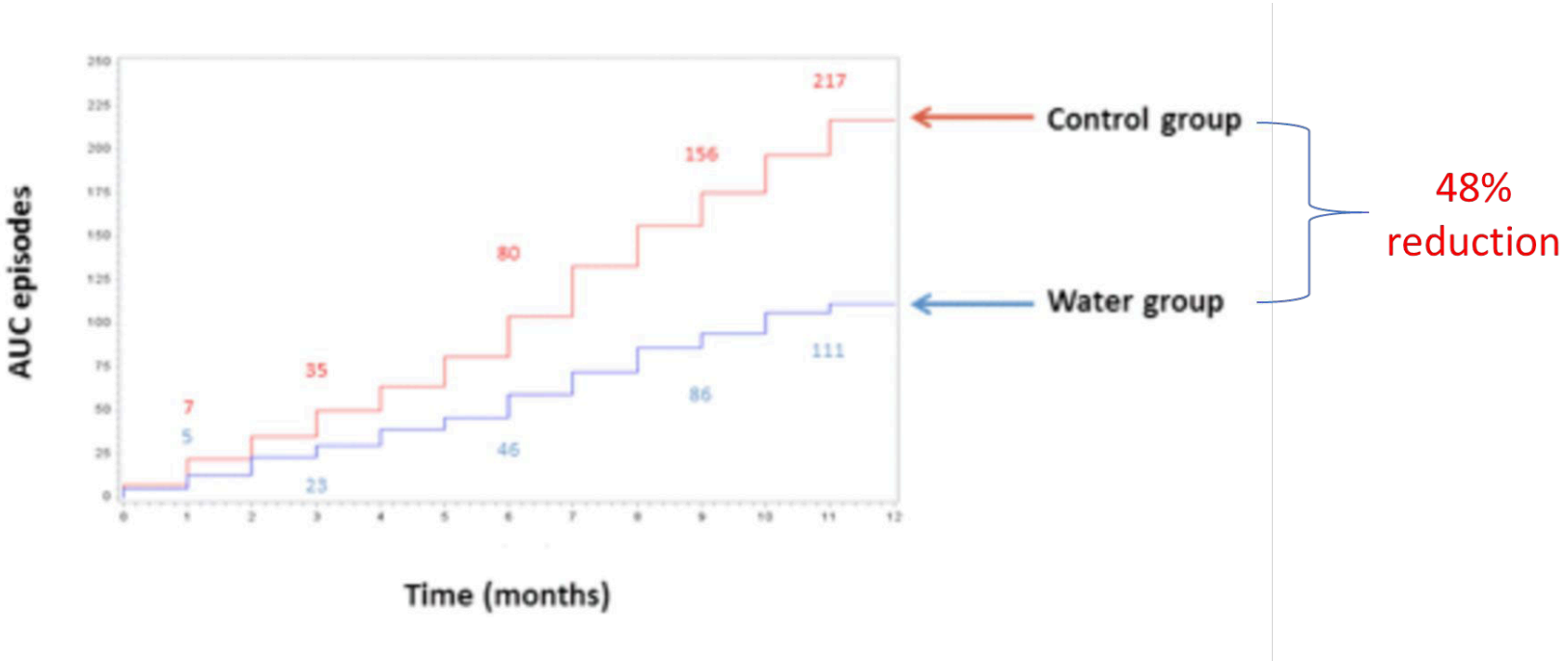
When women with rUTIs have a water intake below 1.5 L/day (50 oz), clinicians may offer increased water intake for prophylaxis. (*Conditional Recommendation; Evidence Level: Grade C*)

Increased Water Intake

- Study participants with baseline <1.5 L/day of fluid intake (n=140, mean age 36 years) found increased water intake associated with fewer UTI recurrences compared with no additional fluids (mean 1.7 versus 3.2 UTI episodes over 12 months, p<0.001).

Hooton TM et al. JAMA Intern Med 2018; 178: 1509

Reduction of UTI in Water group



AUA Non-Antibiotic Prophylaxis Evidence Summary ★

2025 Update

✓ Vaginal Estrogen (peri/postmenopausal women) — Moderate Rec / Grade B

✓ Increased Water Intake (if <1.5 L/day) — Conditional Rec / Grade C

✓ Behavioral modification: avoid spermicidal products, pelvic floor PT if dysfunctional voiding

✓ Cranberry (≥36 mg PAC) — Moderate Rec / Grade B ★ 2025 upgrade

✓ Methenamine hippurate — Conditional Rec / Grade C

✗ D-mannose alone — NOT supported (new RCT n=598) ★ 2025 downgrade

✗ Lactobacillus, herbal supplements, intravesical HA/chondroitin, biofeedback, immunoactive therapy — not supported

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Local Estrogen

GS 20 — Vaginal Estrogen (Moderate Rec; Grade B)

Guideline Statement 20: In perimenopausal and postmenopausal women with rUTIs, clinicians should recommend vaginal estrogen therapy to reduce the risk of future UTIs if there is no contraindication.

4 RCTs (mean age >65, N=313): vaginal estrogen associated with reduced risk of ≥1 UTI vs. placebo/no estrogen (RR 0.59, 95% CI 0.35–1.01)

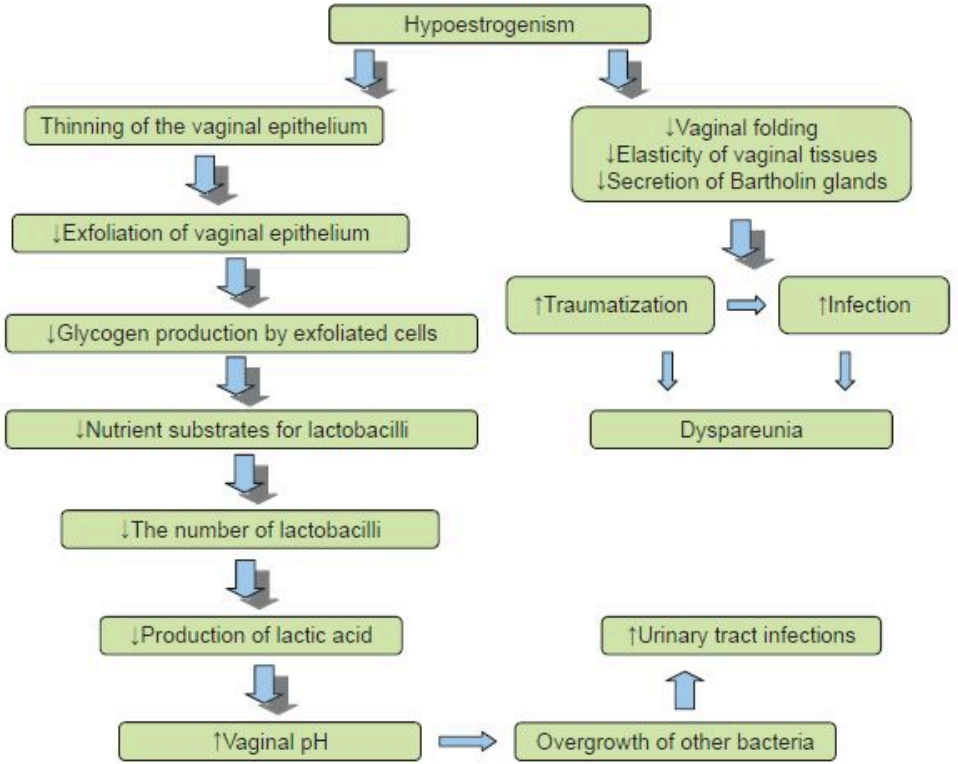
Mechanism: restores Lactobacillus dominance in vaginal flora, maintains optimal low pH, protects against genitourinary infection

Systemic estrogen should NOT be recommended for treatment of rUTI

Formulations: vaginal tablet (estradiol 10 mcg) | vaginal ring (7.5 mcg/day) | vaginal cream (estradiol or conjugated equine estrogen) — recommend patient-preferred formulation

Pathophysiology of GSM

- Importance of microbiota in vaginal health cannot be underestimated
- The dominant constituent is lactobacillus
- Production of lactic acid, as a result of the vital activity of these bacteria, ensures the maintenance of the optimum low pH of the vaginal fluid
- Thus protecting from infections of the urogenital tract



I Naumova. *Int J Women's Health*, 2018

IP15-36

Impact of Vaginal Estrogen on Serious Adverse Outcomes in Postmenopausal Women with Recurrent Urinary Tract Infections: A Retrospective Study

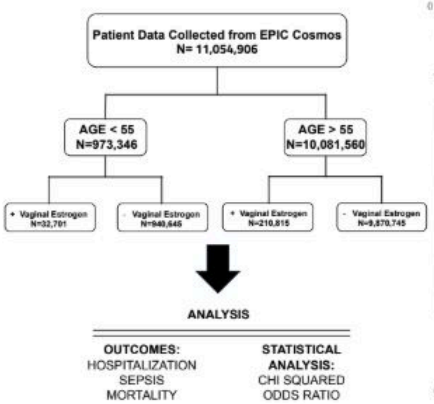
Brennan A Wells; Joseph Visingardi PharmD,MBA; Paul J Feustel MEng, PhD; Elise JB De MD
Eastern Virginia Medical School, Norfolk, VA; Albany Medical College, Albany, NY

INTRODUCTION

- Recurrent urinary tract infections (rUTI):
  - Nuisance versus serious health risk
  - Significant healthcare burden: $6 billion (2011), largely due to hospitalizations (~$10,000/admission) [1]
- Postmenopausal women at higher risk due to genital tissue changes
- Vaginal estrogen therapy:
  - Reduces rUTI incidence [2,3]
  - Improves vaginal dryness, dyspareunia, and incontinence
- Unclear impact on serious outcomes:
  - Hospitalization, Sepsis, mortality
- Study objective: Evaluate association between vaginal estrogen use and serious adverse outcomes in postmenopausal women with rUTI

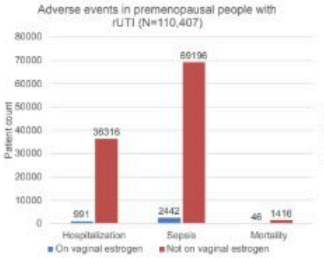
METHODS

- Data Source: Epic Cosmos
  - Cloud-based research platform aggregating de-identified patient records from participating Epic EHR systems
- Study Period: February 20, 2020 – February 19, 2023
- Patient Population: 11,054,906 women meeting rUTI criteria
- Statistical Analysis: Chi-square tests and odds ratio analysis
  - Assess associations between vaginal estrogen use and adverse outcomes



RESULTS

In postmenopausal women, there is a statistically significant relationship between the use of vaginal estrogen and serious adverse events outcomes. Incidence of sepsis was markedly lower in the estrogen group (10.6% vs. 19.4%, OR = 0.49, 95% CI: 0.49–0.50), corresponding to a 51% reduction in sepsis risk. The odds of hospitalization were reduced among women using vaginal estrogen (OR = 0.78, 95% CI: 0.76–0.80), corresponding to a 22% lower likelihood of hospital admission. The mortality rate was, likewise, significantly reduced among estrogen users (0.42% vs. 1.54%, OR = 0.27, 95% CI: 0.25–0.29), reflecting a 73% reduction in the odds of death. In contrast, the direct relationship effects of vaginal estrogen treatment was not observed among premenopausal women with rUTI, with hospitalization rates showing only a minimal difference between groups.



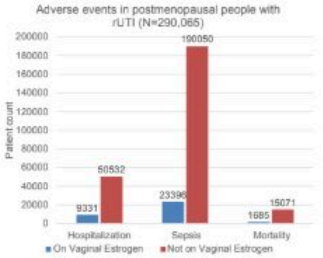


Table 1: Difference in mortality, sepsis and hospitalization rate by vaginal estrogen status for those with recurrent UTI's

	Premenopausal women with recurrent UTI		Postmenopausal women with recurrent UTI	
	Estrogen	No Estrogen	Estrogen	No Estrogen
Mortality rate	0.14%	0.15%	0.42%	1.54%
P value	0.651		<0.001	
Sepsis	7.47%	7.36%	10.63%	19.4%
P value	0.448		<0.001	
Hospitalization	3.03%	3.86%	4.06%	5.16%
P value	<0.001		<0.001	

Odds Ratio for adverse events in postmenopausal people with rUTI

Hospitalization	Sepsis	Mortality
OR = 0.78, 95% CI: 0.76–0.80	OR = 0.49, 95% CI: 0.49–0.50	OR = 0.27, 95% CI: 0.25–0.29

CONCLUSION

Vaginal estrogen use in postmenopausal women with rUTI is associated with:

- 22% risk reduction in hospitalization rates
- 51% risk reduction in sepsis
- 73% risk reduction in mortality

No significant benefit observed in premenopausal women, reinforcing a postmenopausal-specific effect.

Clinical impact:

- rUTI-related complications pose substantial and serious health burden
- Vaginal estrogen is a high value intervention to improve symptoms and serious health outcomes

FUTURE DIRECTION

- Investigate the impact of bilateral salpingo-oophorectomy on rUTI risk in women <55 years not on systemic estrogen to determine whether estrogen deficiency contributes to increased adverse outcomes.
- Assess rUTI outcomes in premenopausal women on oral hormones, comparing those with and without vaginal estrogen supplementation to evaluate potential additive protective effects.
- Broaden this study to include additional adverse outcomes
- Examine the cost-effectiveness of vaginal estrogen in reducing hospital admissions and severe rUTI-related complications to support guideline-based implementation.

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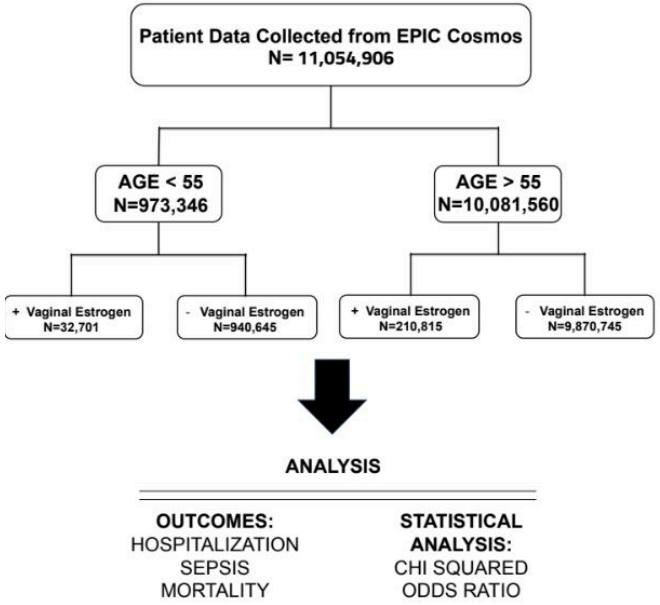
1. Medina, M., and Castillo-Pino, E. (2019). An introduction to the epidemiology and burden of urinary tract infections. Ther Adv Urol 11, 1756287219832172. 10.1177/1756287219832172.

2. Pearce, M.M., Hilt, E.E., Rosenfeld, A.B., Zilliox, M.J., Thomas-White, K., Fok, C., Kliethermes, S., Schreckenberger, P.C., Brubaker, L., Gai, X., and Wolfe, A.J. (2014). The female urinary microbiome: a comparison of women with and without urgency urinary incontinence. mBio 5, e01283-01214. 10.1128/mBio.01283-14.

3. Raz, R., and Stamm, W.E. (1993). A controlled trial of intravaginal estriol in postmenopausal women with recurrent urinary tract infections. N Engl J Med 329, 753-756. 10.1056/NEJM199309093291102.

Vaginal estrogen reduces hospitalizations, sepsis, mortality in postmenopausal women with rUTIs



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Clinical impact:

- rUTI-related complications pose substantial and serious health burden
- Vaginal estrogen is a high value intervention to improve symptoms and serious health outcomes

Elise De et al., 2025 AUA abstract

Black Box Warning removed from estrogen formulations in the US (Announced by FDA/HHS/AUA Nov 2025)

ESTRING®
(estradiol vaginal system)

PHYSICIAN'S LEAFLET

WARNINGS: ENDOMETRIAL CA

Estrogen-Alone Therapy

Endometrial Cancer

There is an increased risk of endometrial cancer in a woman
endometrial hyperplasia, which may be a precursor to endom
undertaken to rule out malignancy in all cases of undiagnosec

Cardiovascular Disorders and Probable Dementia

Estrogen-alone therapy should not be used for the prevention
Probable Dementia.)

The Women's Health Initiative (WHI) estrogen-alone substud
during 7.1 years of treatment with daily oral conjugated estro
Disorders.)

The WHI Memory Study (WHIMS)estrogen-alone ancillary
older during 5.2 years of treatment with daily CE (0.625 mg)
STUDIES and **WARNINGS, Probable Dementia** and **PRE**

In the absence of comparable data, these risks should be assu

American Urological Association

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Advocacy

- Action Center
- Federal Advocacy Priorities
- State Advocacy
- Patient Advocacy
- AUA AMA House of Delegates

FDA Announces Removal of Black Box Warning on Low-Dose Vaginal Estrogen

On November 10, 2025, the U.S. Food and Drug Administration (FDA) announced the removal of the black box warning on Estrogen Therapy. This change reflects the latest scientific evidence supporting the safety and benefits of estrogen use for appropriate patients and marks a significant step forward for women's health.

The American Urological Association is proud to have played an active role in this process over the past several years. AUA maintains that low-dose vaginal estrogen is a safe and effective treatment for certain menopause-related conditions. In addition to covering this topic at the

Vaginal Estrogen is Safe: Growing Body of Literature

- **Low dose Local Vaginal Estrogen:**
  - **Does not increase risk for primary breast cancer**
  - **Does not increase the risk of recurrence of breast cancer in women with a personal history or breast cancer.**
  - **Does not increase risk of endometrial hyperplasia or endometrial cancer**
- Serum estrogen levels with use of vaginal estrogen are below the average level for postmenopausal women
- ***In estrogen dependent cancer and/or concurrent use of Aromatase inhibitor: multidisciplinary co-management with oncologist***
- Postmenopausal women with undiagnosed vaginal/uterine bleeding should be evaluated

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Follow up

GS 17 — No Post-Treatment Test of Cure (Expert Opinion)

Guideline Statement 17: Clinicians should not perform a post-treatment test of cure urinalysis or urine culture in asymptomatic patients.

No evidence supports routine post-treatment testing in asymptomatic patients

Post-treatment bacteriuria in asymptomatic patients = ASB — do NOT treat

Routine test-of-cure promotes unnecessary antibiotic use and drives antimicrobial resistance

GS 18 — Repeat Culture for Persistent Symptoms (Expert Opinion)

Guideline Statement 18: Clinicians should repeat urine cultures to guide further management when UTI symptoms persist following antimicrobial therapy.

Persistent symptoms after completing treatment warrant repeat urine culture to assess for treatment failure or resistant organism

Use culture-directed therapy for persistent or recurrent symptomatic infections

Consider pyelonephritis, occult bacterial reservoir, or complicating factors if symptoms do not resolve

GS 19 — Evaluate for Alternative Diagnoses (Expert Opinion)

Guideline Statement 19: For patients with persistent UTI symptoms after microbiological cure, clinicians should evaluate for alternative causes to patient symptoms.

Microbiological cure (negative culture) with persistent symptoms suggests non-infectious etiology

Consider: overactive bladder (OAB), interstitial cystitis/bladder pain syndrome (IC/BPS), GSM, pelvic floor dysfunction, vulvar dermatologic conditions

Avoid repeated antibiotics for culture-negative persistent symptoms — causes harm and reinforces antibiotic resistance

Patient-Centered Care and Follow-Up

- Follow-up: do NOT perform post-treatment test-of-cure in asymptomatic patients (Expert Opinion)
- Repeat urine culture if symptoms persist after antimicrobial therapy (Expert Opinion)
- Evaluate for alternative diagnoses when symptoms persist after microbiological cure (OAB, pelvic floor pain, vulvar conditions)
- Patient burden is substantial: anxiety, sexual dysfunction, QoL impact — acknowledge and validate
- Shared decision-making: educate on self-limited nature of cystitis, low pyelonephritis risk, risks of antibiotic overuse
- Telehealth and self-start protocols improve access and reduce treatment delays

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Patient Perspectives

A greater understanding of patient perspectives on recurrent UTIs can help clinicians better meet their needs and create more satisfying health care experiences

Flower *et al. BMC Family Practice* 2014, **15**:162
http://www.biomedcentral.com/1471-2296/15/162

BMC
Family Practice

RESEARCH ARTICLE Open Access

How women manage recurrent urinary tract infections: an analysis of postings on a popular web forum

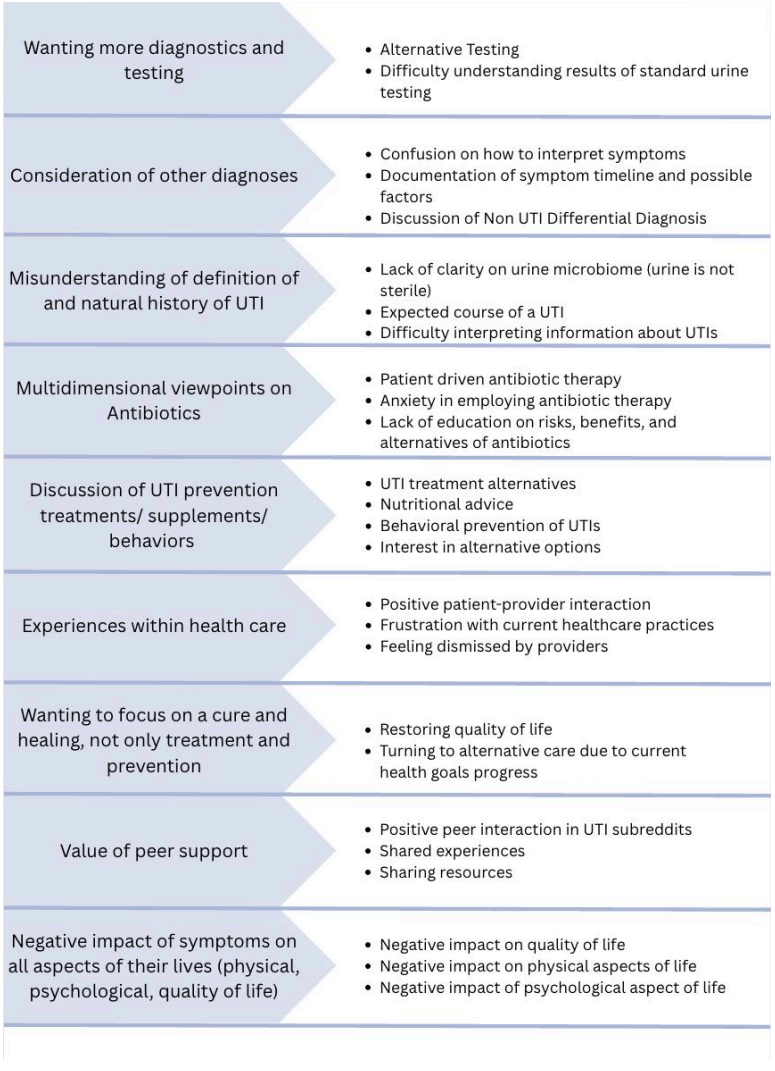
- Patients experience with recurrent UTIs is different from the medical literature
- Qualitative research findings
  - Fear of something seriously wrong with them: what is causing this?
  - Affects all aspects of their lives, bodily symptoms, emotional connection, affects relationships and sexual lives
  - Self-blame and guilt
  - Concern about antibiotic use
  - Doctors as villains and heroes
  - Desperate for a cause and a cure
  - Interested in healing and alternatives therapies
  - Wants to improve acute UTI experience, while MDs focus on prevention

QUALITATIVE ANALYSIS OF REDDIT POSTS DISCUSSING PATIENT PERSPECTIVES ON RECURRENT URINARY TRACT INFECTIONS

S Williams, S Subramanian, S Rangwala, C Palmer, U Lee

Virginia Mason Franciscan Health

- Reddit communities titled “CUTI [chronic urinary tract infection]”and “TwoXChromosomes” were queried and relevant posts extracted
- 338 pages of source document/transcript was created by reddit user posts and comments
- Inductive content analysis was performed independently by 3 researchers and consensus on themes and subthemes reached



LOWER URINARY TRACT SYMPTOMS & VOIDING DYSFUNCTION (J SANDHU, SECTION EDITOR)

Patient Distress in Women with Recurrent Urinary Tract Infections: How Can Physicians Better Meet Patients Needs?

Dena Moskowitz[1] · Una Lee[1]

- Validate patient's experiences
- Ask specifically what concerns and questions they have and talk to them in a way they can understand
- Utilize evidence and guidelines to educate, counsel, and empower patients to manage their chronic health issues
- Mutually agreed upon plan for evaluation and prevention

Patients define the value in health care

“I’ve learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.”

-Maya Angelou

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2025 Guidelines Update - Summary of Changes

2025 rUTI Guideline Amendment — Summary of Changes ★ 2025 Update

★ New Terminology: "Uncomplicated UTI" renamed to "Localized UTI" — aligns with 2025 EAU/IDSA terminology

★ New Section: Emerging Diagnostic Tools (EQUC, NGS, Multiplex PCR, Genotypic AST) — not in prior versions

★ D-mannose (GS 14): Upgraded to Moderate Recommendation — D-mannose alone is NOT effective (new RCT, n=598)

★ Cranberry (GS 13): Now Moderate Recommendation (was Conditional) — standardize to ≥36 mg PAC (Xiong 2024)

★ New Antibiotics: Pivmecillinam (FDA 2024), Sulopenem/probenecid (2025), Gepotidacin (2025)

★ 2025 EAU & IDSA Guidelines: New "Localized vs. Systemic UTI" definitional framework

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2025 EAU Guidelines on Urological Infections

REVIEW – INFECTIONS – EDITOR'S CHOICE · Volume 86, Issue 1, P27-41, July 2024 · Open Access

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European Association of Urology Guidelines on Urological Infections: Summary of the 2024 Guidelines

Jennifer Kranz [a,b] · Riccardo Bartoletti [c] · Franck Bruyère [d,e] · ... · Tunde Mezei [r] · Emma J. Smith [s] · Gernot Bonkat [t] ... Show more

2025 EAU Guidelines on Urological Infections
Overview of changes

- **Definition** of uncomplicated vs complicated UTI
- “Keep It Simple” - now Localized UTI vs Systemic UTI
- **IDSA 2025 Guideline Update on Complicated Urinary Tract Infections (7/2025): definitions very similar**
- **Localized UTI**: Cystitis with typical symptoms (frequency, urgency, suprapubic pain) without any signs and symptoms of systemic infection in either sex.
  - Typical symptoms:
    - Dysuria (pain, burning, stinging)
    - Frequency
    - Urgency Incontinence
    - Urethral purulence
    - Pressure or cramping in the lower abdomen
- Risk factors may be present and should be addressed

2025 EAU Guidelines on Urological Infections
Overview of changes

- **Systemic UTI:** A UTI with signs and symptoms of systemic infection, with or without localized symptoms originating from any site in the urinary tract in either sex.
  - Typical signs and symptoms
    - Rigors, shaking chills
    - Fever or hypothermia
    - Delirium
    - Hypotension
    - Tachycardia
    - Costovertebral angle pain/tenderness

2025 EAU Guidelines on Urological Infections
Overview of changes

- **Additional changes in cystitis section**: non-antibiotic treatments for cystitis
- **Antimicrobial Stewardship: r**ecommendations for antibiotic management, acknowledging increasing antibiotic resistance.
- **New sections** on
  - **Recurrent cystitis**
  - Urethritis
  - Acute epididymitis
  - Herpes Simplex Virus (HSV).
- **Prostate biopsy**: evidence and recommendations

2025 EAU Guidelines on Urological Infections
Overview of changes

- **Risk factors:**
- Both localized and systemic UTIs may be accompanied by risk factors that increase the likelihood of a challenging clinical course and jeopardise treatment success.
- Clinicians must be aware of these risk factors to adjust treatment if necessary.
    - Infants; geriatric or frail patients
    - Immunocompromised state
    - Male sex: prostatic involvement
    - Female sex: pregnancy, pelvic organ prolapse
    - Anatomic or functional abnormalities of the urinary tract
    - Neurourological patients
    - Antibiotic use in the past
    - Indwelling urinary catheters
    - Resistant organisms
    - Stones
    - Obstruction

2025 EAU Guidelines — Summary of Key Changes

Definitional overhaul — **"Keep It Simple": Localized UTI vs. Systemic UTI (replaces uncomplicated/complicated)**

Localized UTI: Cystitis with typical symptoms WITHOUT systemic signs, in either sex

Systemic UTI: UTI with systemic signs (rigors, fever, hypothermia, delirium, hypotension, tachycardia, CVA tenderness) ± localized symptoms

2025 IDSA Guideline Update on Complicated UTIs uses very similar definitional framework

New sections: Recurrent cystitis, Urethritis, Acute epididymitis, HSV, Prostate biopsy; expanded non-antibiotic cystitis treatments; Antimicrobial Stewardship recommendations

Risk factors requiring management: infants/frail/geriatric; immunocompromised; male sex; pregnancy/POP; anatomic abnormalities; neurourological patients; prior antibiotics; catheters; resistant organisms; stones; obstruction

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Infectious Diseases Society of America 2025 Update on Complicated Urinary Infections

IDSA: Complicated UTIs

- Women have a lifetime risk of 53% of experiencing UTI.
- While UTI is uncommon in men prior to age 50, a man's lifetime risk is a nontrivial at 14%.[8]
- Risk of experiencing a UTI increases with age in both sexes.[9]
- Given the aging US population, UTI in men is a salient issue, as is UTI in women.
- Fortunately, a reasonable evidence base now exists to support guidelines for treatment of cUTI in men and women.

IDSA Guidelines for Complicated UTI

- July 2025 IDSA released the first IDSA guidelines on management and treatment of complicated urinary tract infections (cUTIs).
- These guidelines provide practical advice for clinicians who manage patients with cUTIs in inpatient and outpatient settings.
- These guidelines expand the scope of prior UTI guidelines to address complicated UTI
  - Provide a clinically-relevant classification of uncomplicated and complicated UTI,
  - Guide the empiric choice of antibiotics for complicated UTI through a step-wise process,
  - Offer a recommendation for the timing of IV to oral switch,
  - Address duration of antimicrobial therapy.

Classification Update - Background

- Why? to better align with clinical practice, to become more congruent with the available data on male UTI, and better guide management decisions.
- Focused on the presence or absence of localized or systemic symptoms (fever) that would suggest the infection had progressed beyond the bladder.
- Focused the revised classifications on factors that would be readily apparent to the treating clinician at the point of care (e.g., vital signs and catheterization)
    - rather than factors that might not be apparent without a urologic evaluation (e.g., anatomic abnormalities or urinary retention).

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)

Box 1: Complicated UTI classifications for guidelines purposes (intended to guide treatment not diagnosis)

- Clinical presentation:
  - Complicated UTI is accompanied by symptoms which suggest an infection extending beyond the bladder, including:
    - Fever
    - Other signs or symptoms of systemic illness (including chills, rigors, or hemodynamic instability)
    - Flank pain
    - Costovertebral angle tenderness
  - Pyelonephritis is encompassed in complicated UTI.
  - UTI with systemic symptoms associated with transurethral, suprapubic, or intermittent catheterization is encompassed in complicated UTI.
- Populations:
  - Patients with complicated UTIs may have an indwelling urinary catheter, neurogenic bladder, urinary obstruction, or urinary retention as an underlying condition.
  - These guidelines are not intended to apply to bacterial prostatitis, epididymitis, or orchitis.

Box 2: Uncomplicated UTI classifications for guidelines purposes (intended to guide treatment, not diagnosis)

- Clinical presentation:
  - A clinical syndrome characterized by local bladder signs and symptoms such as dysuria, urgency, frequency, and suprapubic pain.
  - Uncomplicated UTI is presumed to be confined to the bladder and is defined by absence of signs or symptoms which suggest an infection extending beyond the bladder:
    - No fever, unless explained by a non-UTI cause
    - No other signs or symptoms of systemic illness (including chills, rigors, or unstable vital signs), unless explained by a non-UTI cause
    - No flank pain
    - No costovertebral angle tenderness
- Populations:
  - Uncomplicated UTI can occur in females or males, patients with underlying urologic abnormalities, patients with immunocompromise, and persons with diabetes. Recurrent UTI can be uncomplicated.
  - Patients with urinary catheters (including transurethral, suprapubic, and intermittent catheterization), stents, and percutaneous nephrostomy tubes generally do not have uncomplicated UTI.
  - These guidelines are not intended to apply to bacterial prostatitis, epididymitis, or orchitis.

Defining Uncomplicated UTI (2025 IDSA Reclassification)

- 2025 IDSA update revised the classification framework — now based on
  - Presence/absence of fever and systemic symptoms (not just host factors)
  - Whether infection appears to extend beyond the bladder
- Factors apparent at point of care (vitals, catheter) vs. requiring urologic workup
- Uncomplicated = localized lower tract infection, afebrile, no systemic signs
- Key shift: men with febrile UTI are now classified as complicated (not automatically all men)

- Complicated UTI = infection with fever/systemic signs OR in a patient with a catheter OR with factors predicting treatment complexity

The Four-Step Approach to Empiric Therapy for Complicated UTI (IDSA 2025)

STEP 1: Severity of illness — Sepsis or no sepsis? (Sepsis-3 criteria: SOFA increase >=2)

STEP 2: Patient-specific resistance risk factors

Prior resistant uropathogen isolated? Avoid that class

Fluoroquinolone exposure in past 12 months? Avoid FQ empirically

STEP 3: Patient-specific considerations — allergies, drug interactions, contraindications

STEP 4: For sepsis only — consult local antibiogram (>=90% susceptibility cutoff for septic shock; >=80% for sepsis)

Empiric Antibiotic Choices: Sepsis vs. No Sepsis (IDSA 2025)

SEPSIS due to cUTI:

- 3rd/4th-generation cephalosporins, carbapenems, pip-tazo, or FQ (per 4-step approach)
- Broader spectrum justified — mortality risk high; stewardship deferred to definitive therapy

NO SEPSIS:

- 3rd/4th-gen cephalosporins, pip-tazo, or FQ (carbapenems generally avoided)
- Stewardship priority — risk of infection-related mortality is low (<5%)

Newer agents (cefiderocol, novel BL/BLI, plazomicin): reserve for MDR pathogens; not empiric first-line

Always de-escalate to targeted therapy based on culture and susceptibility results

IV-to-Oral Transition (IDSA 2025)

- When to switch: patient clinically improving + able to take PO + effective oral option available (Conditional; low certainty)
- Applies even to gram-negative bacteremia with cUTI — IV-to-oral switch supported by RCT data (Conditional; very low certainty)
- Effective oral agent = achieves therapeutic levels in urine, bloodstream (if bacteremic), and relevant tissue
- Benefits: reduced line complications, nursing time, fluid load, hospital LOS, costs
- Caveat: trials largely excluded indwelling catheters, severe sepsis, severe immunocompromise, complete obstruction — individualize these cases

Duration, Special Populations and Stewardship Principles

- ·Duration — clinically improving on effective therapy:
  - FQ: 5-7 days (Conditional; moderate certainty)
  - Non-FQ: 7 days (Conditional; very low certainty)
  - GNB bacteremia with cUTI: 7 days (Conditional; low certainty)
- Men with suspected acute bacterial prostatitis: may warrant 10-14 days — evidence limited
- If not improving promptly: evaluate for ongoing nidus requiring source control (obstruction, abscess, foreign body)
- Pregnancy: treat all bacteriuria; preferred agents amoxicillin, cephalosporins, nitrofurantoin (avoid near term); no FQ, no TMP-SMX (1st/3rd trimester)
- CAUTI: remove catheter first; do NOT treat asymptomatic bacteriuria in catheterized patients
- Source control: evaluate for obstruction, abscess, or foreign body when patient fails to improve promptly

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Recurrent UTI AUA Guidelines Future Directions

Advanced Molecular Diagnostic Technologies

PCR and NGS-based diagnostic tests have preliminary data showing improved clinical outcomes vs. standard culture while decreasing time to result; studies have methodological limitations and high risk of bias

Diagnostic paradigm: do not rely on standard urine culture alone or any bacterial detection method as a substitute for clinical judgement

Correct approach: integrate clinical presentation, urinalysis, bacterial profile, and weigh benefits/harms of antibiotics at every encounter — especially given high rates of bacteriuria in asymptomatic women

UTI Vaccine

Vaccines for rUTI modulate the host response to bacterial infection and demonstrate efficacy in reducing UTI recurrence

Uromune (MV140): polybacterial vaccine of inactivated whole bacteria; administered as a sublingual spray

Systematic review and meta-analysis confirms benefit in reducing rUTI (Mak Q et al. Eur Urol Focus 2024)

Uromune approved in several European countries and Mexico — NOT currently available in the United States

ESBL Uropathogens — Clinical Management

ESBL-producing bacteria: produce enzymes that break down cephalosporins and most penicillins — most standard β-lactams ineffective

Risk factors: prior fluoroquinolone/antibiotic use, recent hospitalization, healthcare exposure, international travel

Simple cystitis: Nitrofurantoin 100 mg BID × 5 days OR Fosfomycin 3 g single dose (obtain susceptibility testing; some ESBL isolates may retain TMP-SMX susceptibility)

Complicated/systemic ESBL UTI: Carbapenems (imipenem/meropenem/ertapenem) first choice; aminoglycosides with caution (AKI risk); ID consultation recommended

New antibiotics (gepotidacin, sulopenem, pivmecillinam) have in vitro ESBL activity — place in therapy being defined

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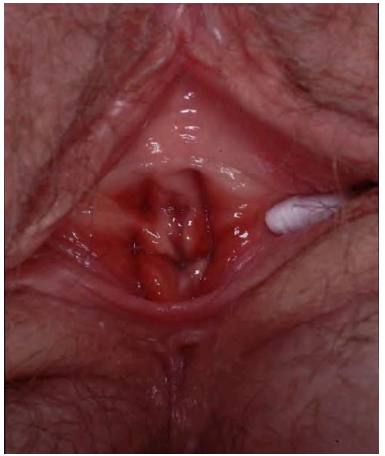
Case Presentations
Discussion
Q&A

- 84-year-old independently-living woman with recurrent UTIs.

- Has pain with initial penetration during intercourse, vaginal dryness and irritation at baseline
- UTI symptoms reported are urinary odor and cloudy urine
- Also with baseline dysuria/GU burning
- No episodes of pyelonephritis
- BMs: constipation
- Fluid intake: low

- **Guideline Statement 1. Clinicians should obtain a complete patient history and perform a pelvic examination in women presenting with rUTIs. (Clinical Principle)**

  History: Hypertension, osteoarthritis, h/o lumpectomy for breast cancer
  Medications: Metoprolol, celecoxib as needed, 5 years of tamoxifen
  Exam: Pain throughout vaginal vestibule, erythematous and patchy blanching of labia, resorption of labia minora,



- **Guideline Statement 7. Clinicians should omit surveillance urine testing, including urine culture, in asymptomatic patients with rUTIs. (Moderate Recommendation; Evidence Level: Grade C)**

  - Chronic vulvar irritation and dryness
  - Intermittent burning after urination that resolves when she applies barrier cream

How to manage her recurrent urinary infections?

- **Guideline Statement 16. In peri- and post-menopausal women with rUTIs, clinicians should recommend vaginal estrogen therapy to reduce the risk of future UTIs. (Moderate Recommendation; Evidence Level: Grade B)**

She starts vaginal estrogen and notes substantial improvements in her vulvar irritation and dysuria

- She calls the office for treatment
- She states that her primary care doctor did her routine physical including a urinalysis and culture and it demonstrated:
  - 50,000 CFU *Klebsiella pneumoniae*

How do you treat this?

- **Guideline Statement 8. Clinicians should not treat asymptomatic bacteriuria in patients. (Strong Recommendation; Evidence Level: Grade B)**

She has no acute changes in her symptoms, still has some mild urgency and frequency, mild vulvar irritation

- She presents to the ER with acute-onset dysuria, chills, and burning with urination
- **>100,000 CFU Extended-Spectrum β-Lactamase (ESBL) *E. coli***
- No fevers or flank pain, no leukocytosis

How do you treat this?

- **Guideline Statement 11. In patients with rUTIs with acute cystitis episodes associated with urine cultures resistant to oral antibiotics, clinicians may treat with culture-directed parenteral antibiotics for as short a course as reasonable, generally no longer than seven days. (Expert Opinion)**

She is treated with Zosyn initially until cultures come back and then antibiotics tailored to gentamicin

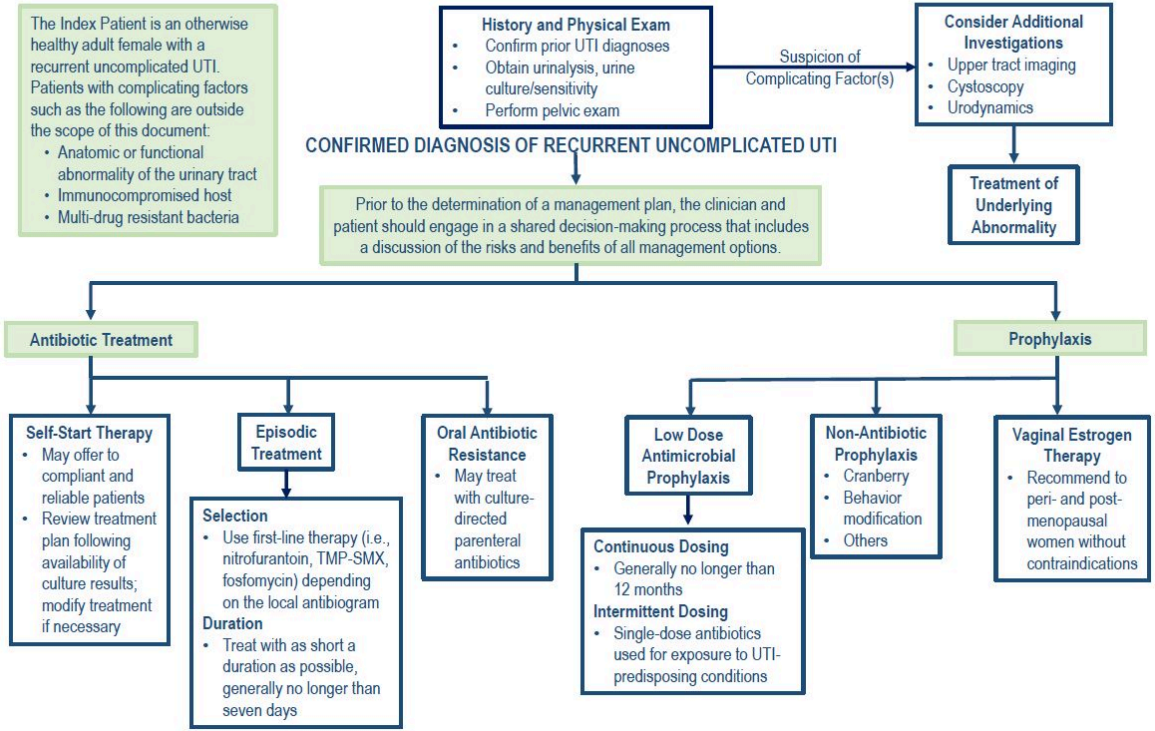
- She returns to your office for follow up after her hospital visit
- She is feeling much better, currently asymptomatic

Should you check another urinalysis?

- **Guideline Statement 14. Clinicians should not perform a post-treatment test of cure urinalysis or urine culture in asymptomatic patients. (Expert Opinion)**

Do you change her plan of care?

RECURRENT UNCOMPLICATED URINARY TRACT INFECTIONS IN WOMEN: AUA/CUA/SUFU DIAGNOSIS & TREATMENT ALGORITHM



- **Guideline Statement 12. Following discussion of the risks, benefits, and alternatives, clinicians may prescribe antibiotic prophylaxis to decrease the risk of future UTIs in women of all ages previously diagnosed with UTIs. (Moderate Recommendation; Evidence Level: Grade B)**

Continuous Prophylaxis:

TMP 100mg once daily

TMP-SMX 40mg/200mg daily

TMP-SMX 40mg/200mg 3x a week

Nitrofurantoin 50mg daily

Nitrofurantoin 100mg daily

Cephalexin 125mg once daily

Cephalexin 250mg once daily

Fosfomycin 3g every 10 days

- She continues vaginal estrogen and begins fosfomycin once every 10 days for suppression
- She takes this for 6 months and does well
- She has also increased water intake and started fiber supplements for management of bowel movements

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Case of recurrent UTI and unrecognized risk factor

Toby C. Chai, M.D.
Richard K. Babayan Professor of Urology
Boston University Chobanian & Avedisian School of Medicine

55 yo female, recently became menopausal and started getting UTIs frequently.

Despite vaginal estrogen, she still is getting frequent UTI. No LUTS. No urinary incontinence. No BM issues.

Meds:

Vaginal estrogen cream
Empagliflozin (SGLT2 inhibitor for management of DM type 2)
Simvastatin

PMH:
DM2 diagnosed 3 years ago
Hyperlipidemia

PSH: 2 C-sections

Physical Exam:

Pelvic: estrogenized mucosa, no prolapse, no pelvic muscle tenderness, able to contract pelvic floor muscles

A: recurrent UTI

What do you do next?

Diabetes Ther (2019) 10:1043–1050
https://doi.org/10.1007/s13300-019-0611-9

ORIGINAL RESEARCH

A Survey of the FDA's Adverse Event Reporting System Database Concerning Urogenital Tract Infections and Sodium Glucose Cotransporter-2 Inhibitor Use

Juan Shen · Jincheng Yang · Bin Zhao

ABSTRACT

Introduction: We tested the possible association between sodium glucose cotransporter-2 inhibitor (SGLT-2i) use and urogenital tract infection (UTI) occurrences by assessing the publicly available US Food and Drug Administration Adverse Event Reporting System (FAERS).

Methods: Disproportionality analysis and Bayesian analysis were used to mine FAERS for suspected UTI data for SGLT-2i use from the first quarter of 2004 to the second quarter of 2018.

Results: On the basis of 37,100 reports, 1628 reports (4.39% of total adverse drug reactions, ADRs) were associated with UTIs; among them, the number of UTIs reported for the top four was as follows: canagliflozin, 858 (52.74%); dapagliflozin, 324 (19.91%); empagliflozin, 189 (11.62%); and empagliflozin/metformin, 183 (11.25%). Although the number of ADRs reported for these drugs is different, their risk of causing UTIs is determined. Of the reports of SGLT-2i adverse events related to UTIs, 61.73% occurred in women, which was a much higher proportion than that in men (28.50%).

Conclusion: FAERS data were consistent with clinical studies on a strong association between SGLT-2i use and UTIs. The results strongly suggest that female patients are more likely than male patients to experience UTIs when using SGLT-2i.

Enhanced Digital Features To view enhanced digital features for this article go to https://doi.org/10.6084/m9.figshare.7901660.

J. Shen
Department of Pharmacy, The Third Affiliated

Urine Culture		**>100,000 CFU/mL *Escherichia coli***	
Susceptibility			
		Escherichia coli	
	Antimicrobial	**SUSCEPTIBILITY**	
	Amikacin		Susceptible
	Ampicillin		**Resistant**
	Ampicillin + Sulbactam		**Resistant**
	Cefazolin		**Resistant**
	Ceftriaxone		**Resistant***
	Ciprofloxacin		**Resistant**
	Gentamicin		Susceptible
	Levofloxacin		**Resistant**
	Nitrofurantoin		Susceptible
	Trimethoprim + Sulfamethoxazole		**Resistant**
			***ESBL**

What were her risk factors for ESBL?

What are your treatment choices if she has simple cystitis?

What are your treatment choices if she has complicated UTI?

Should you obtain an infectious disease consult?

Risk factors for multidrug-resistant gram-negative urinary tract infections

Suspect multidrug-resistant gram-negative urinary tract infection in patients with a history of any of the following in the prior three months:
▪ A multidrug-resistant gram-negative urinary isolate or a fluoroquinolone-resistant *Pseudomonas aeruginosa* isolate
▪ Inpatient stay at a health care facility (eg, hospital, nursing home, long-term acute care facility)
▪ Use of a fluoroquinolone, trimethoprim-sulfamethoxazole, or broad-spectrum beta-lactam (eg, third or later generation cephalosporin)*
▪ Travel to parts of the world with high rates of multidrug-resistant organisms¶
NOTE: The predictive value of these risk factors for multidrug-resistant gram-negative urinary tract infections has not been systematically evaluated. In particular, the time interval since these exposures is not well validated. The threshold for empirically covering a multidrug-resistant infection varies with the severity of infection, with a lower threshold warranted for more severe disease.

Multidrug resistance refers to nonsusceptibility to at least one agent in three or more antibiotic classes. This includes isolates that produce an extended-spectrum beta-lactamase (ESBL).

* This includes a single antibiotic dose given for prophylaxis prior to prostate procedures.

¶ The prevalence of multidrug resistance is not well documented in all parts of the world. Some countries where the prevalence is particularly high include India, Israel, Spain, and Mexico.

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What are your treatment choices if she has simple cystitis?

Nitrofurantoin monohydrate/macrocrystals (Macrobid, 100 mg orally twice daily for five days
OR
Fosfomycin (3 g of powder mixed in water as a single dose)

Notes:
- Obtain sensitivity testing to fosfomycin if possible
- Some isolates may have susceptibility to TMP-SXT

What are your treatment choices if she has complicated UTI?
-Carbapenems: imipenem, meropenem, ertapenem are first choice for most

- Aminoglycosides?
- Risk of acute kidney injury
- Some ESBL also AG-resistant

- Recommend infectious disease consultation

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Case: 29-year-old female with 2 documented UTIs with acute symptoms in past 2 months

29-year-old female with 2 documented UTIs with acute symptoms in past 2 months.

Urine culture results both times >100K pan-sensitive *E. coli*

UA 3+ pyuria with both cultures

Seen by urology PA-C in 2016: “voiding at least 10x/day for the past 6 months. She feels constant bladder pressure and the constant desire to void. She denies dysuria, incontinence, or difficulty voiding. Patient states that she has had UTIs as a child. She has some testing and no problems were found. She states that she has had 6-7 UTIs in the past year and states that she has hematuria when she has a UTI. However, a urine culture is not typically obtained”

“trial of oxybutynin ER 10 mg daily”

MyChart message from patient 1-day later:
“I know it’s legit only been not even a full day while taking the oxybutynin. I have had to pee this many times in 1 day. Also, I’m having trouble sleeping because now I can’t stop peeing and all I’m getting out is little dribbles. In the last 5 mins I’ve gone to the bathroom maybe times. Is this normal? Cause I’d rather not deal with this constant urge to pee.”

Oxybutynin stopped and amitriptyline 25 mg qhs started – uncertain if the amitriptyline worked.

No urologic f/u until referral back to urology in 2022 by PCP

Had a C-section delivery in 2017

PCP note prior to urology referral in 2022:

#dysuria
Length of symptom 1 day
Feels similar to prior to UTI
Endorses dysuria, urgency
Denies frequency
Denies odor
Change in urine color since axo
Some hematuria (possibly on period, unclear due to recent Mirena exchange)
Denies back pain, flank pain, fevers, chills, constipation
Denies vaginal discahrge itching
Denies new sexual partners

Pelvic exam normal

Options:

1. Increased fluid intake, cranberry
2. Methenamine
3. Post-coital antibiotic prophylaxis
4. Standing urinalysis/cultures with culture directed antibiotics
5. Daily antibiotic prophylaxis

Patient started on nitrofurantoin 100 mg po qd for 6 months

F/U visit 4 months later – no UTIs, no symptoms, sexually active

Will stop daily nitrofurantoin in 2 months. Patient informed that recurrent UTI may restart – then reconsideration of the options

First-line therapy for the treatment of uncomplicated symptomatic UTI

Treatment effects	Nitrofurantoin	TMP-SMX	Fosfomycin
Cure rate	88-93%	90-100%	83-91%
Antimicrobial spectrum	narrow: E. coli, S. saprophyticus	typical uropathogens	Covers VRE, ESBL GNRs
Collateral damage	No	Minimal	No
Resistance	Low, stable X 50y	Increasing	Patient now?
Dose & duration	100 mg BID X 5d	One DS BID X 3d	3 g single dose

What now?

- **Guideline Statement 10. Clinicians should treat rUTI patients with an acute cystitis episode with as short a duration of antibiotics as reasonable, generally no longer than seven days. (Moderate Recommendation; Evidence Level: Grade B)**

    - Her symptoms resolve, but now she thinks it is time for a different prevention plan

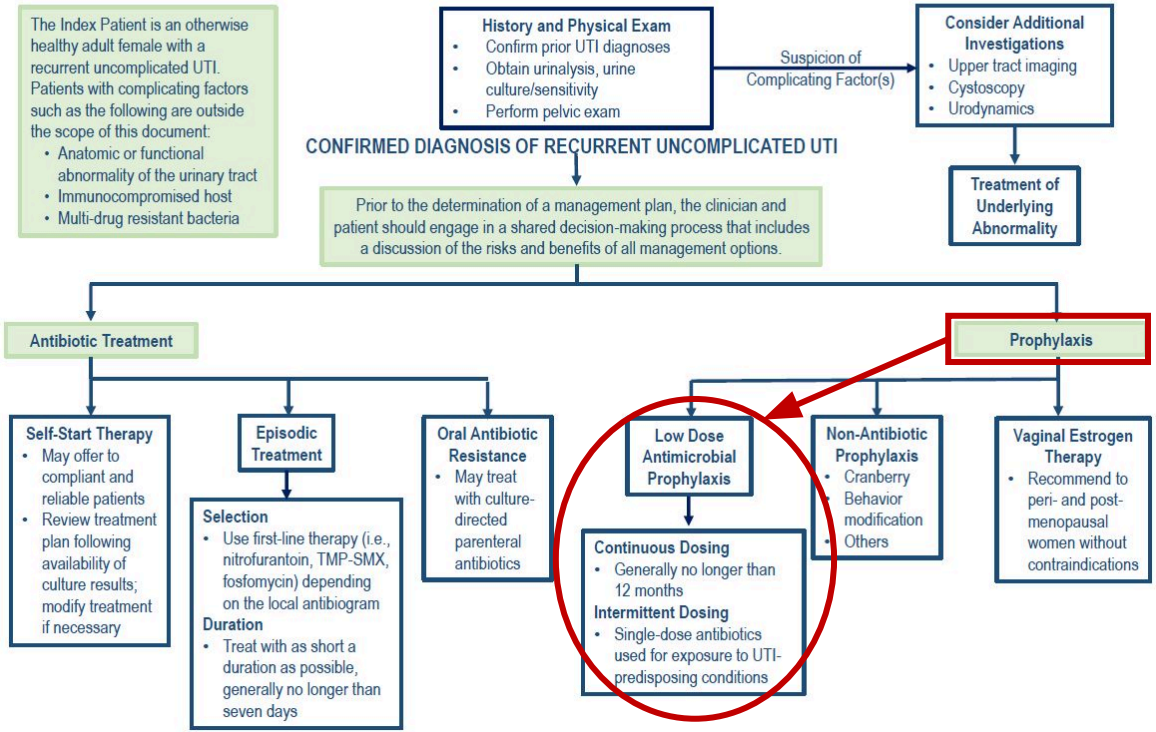
What form of prevention is appropriate?

- **Guideline Statement 12. Following discussion of the risks, benefits, and alternatives, clinicians may prescribe antibiotic prophylaxis to decrease the risk of future UTIs in women of all ages previously diagnosed with UTIs. (Moderate Recommendation; Evidence Level: Grade B)**

Post-coital Prophylaxis:

- TMP-SMX 40mg/200mg
- TMP-SMX 80mg/400mg
- Nitrofurantoin 50-100mg
- Cephalexin 250mg

RECURRENT UNCOMPLICATED URINARY TRACT INFECTIONS IN WOMEN: AUA/CUA/SUFU DIAGNOSIS & TREATMENT ALGORITHM



Case 1

- Post-coital Prophylaxis:
  - TMP-SMX 40mg/200mg
  - TMP-SMX 80mg/400mg
  - Nitrofurantoin 50-100mg
  - Cephalexin 250mg

- She takes nitrofurantoin daily for 12 months and her infections resolve

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Case Discussion

Summary of cases

Case 1 — 70-Year-Old Woman with Recurrent UTI

70-year-old woman, living independently — 3 documented UTIs with acute symptoms in past 12 months

PCP treated each UTI with ciprofloxacin and placed on vaginal estrogen cream

PCP obtained surveillance urine cultures since last UTI → found 100,000 CFU/mL E. coli pan-susceptible (asymptomatic)

PCP treated the ASB with ciprofloxacin × 7 days to "eradicate bacteria from her system"

GS 7: Omit surveillance urine testing in asymptomatic patients (Moderate Rec; Grade C)

GS 8: Do NOT treat ASB (Strong Rec; Grade B)

Case 1 — Return Visit: ESBL Organism After Travel

Two weeks after treating ASB, patient travels to Mexico; returns with acute-onset dysuria, frequency, urgency

GS 1: Obtain complete history and pelvic exam |

PMH: rUTI, HTN, osteoarthritis | eGFR 50 | Vaginal estrogen

New urine culture: >100,000 CFU/mL E. coli — ESBL (resistant to ampicillin, AMP-SUL, cefazolin, ceftriaxone, ciprofloxacin, levofloxacin, TMP-SMX; susceptible to amikacin, gentamicin, nitrofurantoin)

Risk factors for ESBL: prior fluoroquinolone use, healthcare exposure, international travel

Treatment

If simple cystitis: Nitrofurantoin 100 mg BID × 5 days OR Fosfomycin 3 g single dose (check susceptibility)

If complicated: Carbapenems first choice; ID consultation; caution with aminoglycosides (eGFR 50)

Case 1 — Follow-Up & Long-Term Plan

GS 11: Culture-directed parenteral antibiotics (Zosyn initially → taper to gentamicin) ≤7 days

GS 17: After treatment, patient asymptomatic — do NOT perform post-treatment test of cure

GS 12: Begin fosfomycin every 10 days for suppression; continue vaginal estrogen

Also: increase water intake; optimize bowel function with fiber supplements

Case 2 — Unrecognized Risk Factor

55-year-old recently menopausal woman, getting frequent UTIs despite vaginal estrogen

PMH: DM2 (3 years), hyperlipidemia

Meds: vaginal estrogen cream, Empagliflozin (SGLT2 inhibitor for DM2), simvastatin | PSH: 2 C-sections

Pelvic exam: estrogenized mucosa, no prolapse, no pelvic muscle tenderness

⚠️ ***Teaching point: SGLT2 inhibitors increase urinary glucose excretion — promotes bacterial growth; significantly increased risk of UTI and genital mycotic infections***

Management: discuss switching or deprioritizing SGLT2 inhibitor with PCP/endocrinology; optimize all other prophylactic measures

Case 3 — 29-Year-Old Female, 2 UTIs in 2 Months

29-year-old, 2 documented UTIs in 2 months; both cultures >100K pan-sensitive E. coli; UA 3+ pyuria

History: voiding ≥10×/day × 6 months, constant bladder pressure and desire to void — denies dysuria, incontinence, voiding difficulty; 6–7 UTIs in prior year

Trial of oxybutynin ER 10 mg dramatically worsened symptoms; tried amitriptyline 25 mg QHS; C-section 2017

Prevention options discussed: increased fluids, cranberry, methenamine, post-coital prophylaxis, daily antibiotic prophylaxis

Shared Decision Making Discussion

Plan: Nitrofurantoin 100 mg PO daily × 6 months → no UTIs at 4-month follow-up

Case 4 — 45-Year-Old with Post-Coital rUTI

45-year-old G2P2 woman, rUTIs temporally related to intercourse; 3–4 UTIs referred by PCP; cultures typically E. coli >100,000 CFU

GS 1: Complete history and pelvic exam — Normal | GS 5: No routine cystoscopy/imaging

Prefers to avoid antibiotics → start increased hydration + daily cranberry (≥36 mg PAC)

2 months later: acute-onset dysuria + hematuria 1 day post-intercourse | UA: 3+ LE, 3+ nitrites | Culture: >100,000 E. coli pan-sensitive

GS 9: First-line therapy (nitrofurantoin/TMP-SMX/fosfomycin) per local antibiogram — avoid cipro despite patient request

GS 10: Treat ≤7 days | Symptoms resolve → start post-coital nitrofurantoin | No UTI recurrences at 12-month follow-up

Case 5 — 84-Year-Old, Breast Cancer History

84-year-old, rUTIs; pain with initial penetration, vaginal dryness/irritation; "UTI symptoms" = urinary odor and cloudy urine; baseline dysuria/GU burning

PMH: HTN, osteoarthritis, h/o lumpectomy for breast cancer (5 years tamoxifen) | Exam: vulvar lichen sclerosus pattern

GS 7: Do NOT obtain surveillance urine culture | GS 20: Recommend vaginal estrogen — breast cancer history is NOT absolute contraindication; discuss with oncology

Starts vaginal estrogen → substantial improvement | PCP routine UA (asymptomatic): 50K CFU/mL Klebsiella → GS 8: Do NOT treat ASB

ER visit: acute-onset dysuria, chills, burning | >100K ESBL E. coli | GS 11: Zosyn → gentamicin ≤7 days

GS 17: Asymptomatic after treatment → no test of cure | GS 12: Fosfomycin every 10 days; continue vaginal estrogen; increase water intake

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Q&A/Discussion

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Thank you!