

Review of Antibiotic Prophylaxis in the Management of Recurrent Urinary Tract Infections (UTI) in Adults

Continuous antibiotic prophylaxis, while effective in the short-term, carries many risks including medication side effects in older patients¹, increased risk for multi-drug resistant organisms², and risk for *Clostridioides difficile* colitis³.

Before considering antibiotic prophylaxis for recurrent UTIs, these non-antibiotic measures should be attempted first:

- Confirm the resident is experiencing true UTIs, not asymptomatic bacteriuria
- Maintain adequate hydration
- Encourage regular voiding. Holding in urine or not draining the bladder fully increases the risk of UTIs
- Ensure appropriate personal hygiene practices and proper care of urinary catheters
- Avoid sitting in wet or dirty undergarments for prolonged periods
- For post-menopausal women with risk factors such as atrophic vaginitis, prescribe topical vaginal estrogens
- Evaluate for underlying risk factors that may be the reason for recurrent UTIs and manage those accordingly
- Consider evaluation for kidney stones or a urology evaluation in functional patients

Non-Antibiotic Therapies & Supplements to Prevent UTIs

Local estrogen therapy

The use of vaginal estrogen therapy has been an underutilized tool for preventing UTIs. Estrogen therapy helps maintain vaginal pH levels and bacterial flora balance. Multiple studies have demonstrated a reduction in the frequency of UTIs among postmenopausal women using topical vaginal estrogen therapy.^{4,5}

Methenamine hippurate (1 gram PO twice daily)

Methenamine is hydrolyzed to formaldehyde and ammonia in acidic environments which has a bactericidal effect by denaturing proteins and nucleic acid. Therefore, acidic urine increases efficacy, so patients are often advised to consume acidic foods to maintain an acidic urinary pH. While generally well-tolerated, common side effects include gastrointestinal upset and bladder irritation. It has been described as an antibiotic-sparing option for those patients with recurrent UTIs and trials indicate it may be helpful in female patients with no urinary tract abnormalities.^{6,7}

Cranberry Supplements

Cranberry may decrease the adherence of uropathogens to the uroepithelial cells due to high concentrations of proanthocyanidins (PACs). Research on cranberry effectiveness has yielded mixed results; however, several studies suggest a potential benefit in reducing the frequency of UTIs⁸. Cranberry products are available in various formulations, including juice, liquid concentrates, tablets, capsules, and powder forms. The product chosen should be evaluated to ensure it contains PACs – some cranberry flavored supplements do not actually contain any PACs. It remains unclear what the optimal dose of cranberry should be, but studies suggest that the PAC dose be at least 36 mg/day⁸. Consideration should also be given to the amount of sugar consumed daily if utilizing cranberry juice.

D-mannose

D-mannose is a sugar that mimics the host's uroepithelial receptor and competitively binds to the uropathogen decreasing bacterial attachment to the mucosa. Currently, further research with high-quality randomized clinical trials is needed to support the efficacy of D-mannose; however, D-mannose is generally well-tolerated and considered safe for most people.

Using Prophylactic Antibiotics

Use of any antibiotic for a prolonged period is associated with adverse effects and increased resistance.

If antibiotic prophylaxis is used, it should be after all other measures have failed.

Antibiotic prophylaxis is not recommended for patients with an indwelling urinary catheter.

No data has supported one agent over another for preventing UTIs, so antibiotic choice should be guided by recent culture results and sensitivities should be confirmed before initiating any prophylactic therapy. In addition, antibiotic allergies, medical comorbidities, and drug interactions should be considered. Fluoroquinolones should always be avoided due to risk for rare but catastrophic adverse events in the elderly. Therapeutic doses of antibiotics are not warranted. There is no strong evidence for or against the use of rotating antibiotics for prophylaxis of UTIs.

Some agents and doses that have been studied include:

Antibiotic	Dosing
Sulfamethoxazole-Trimethoprim	1 Single Strength tab PO once daily
Nitrofurantoin	50-100 mg PO once daily
Cephalexin	250 mg PO once daily
Trimethoprim	100 mg PO once daily

Counseling Points for Residents and Families:

- Antibiotic prophylaxis is not a lifelong treatment. The goal of a prolonged course of antibiotics is to allow time for the bladder wall to heal, making UTIs less likely. There is no evidence of additional benefit beyond 6-12 months. Therefore, antibiotic treatment should be stopped ideally after 6 months.
- Long-term antibiotic prophylaxis will cause antibiotic resistance and will limit future treatment options.

Managing Patients on Prolonged Antibiotic Prophylaxis

All patients initiated on antibiotic prophylaxis for recurrent UTIs should be reviewed at least every 3 months by the prescriber. During the review, a clinical decision should be made to stop or continue prophylactic antibiotic therapy. The decision should be documented in the patient's medical record.

If a resident develops a recurrent UTI after stopping prophylactic antibiotics, it is important to determine whether proper self-care measures are being followed. If they are, further investigation may include renal tract ultrasound, post void bladder residual volume scan, and referral to a urologist.

References:

1. Panel BtAGSBCUE. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *Journal of the American Geriatrics Society*. 2023;71(7):2052-2081.
2. Talan DA, Takhar SS, Krishnadasan A, et al. Emergence of Extended-Spectrum β -Lactamase Urinary Tract Infections Among Hospitalized Emergency Department Patients in the United States. *Annals of Emergency Medicine*. 2021;77(1):32-43.
3. Ashraf MS, Gaur S, Bushen OY, et al. Diagnosis, Treatment, and Prevention of Urinary Tract Infections in Post-Acute and Long-Term Care Settings: A Consensus Statement From AMDA's Infection Advisory Subcommittee. *Journal of the American Medical Directors Association*. 2020;21(1):12-24.e2.
4. Ferrante KL, Wasenda EJ, Jung CE, Adams-Piper ER, Lukacz ES. Vaginal Estrogen for the Prevention of Recurrent Urinary Tract Infection in Postmenopausal Women: A Randomized Clinical Trial. *Female Pelvic Med Reconstr Surg*. 2021;27(2):112-117.
5. Šimunić V, Banović I, Ciglar S, Jeren L, Pavičić Baldani D, Šprem M. Local estrogen treatment in patients with urogenital symptoms. *International Journal of Gynecology & Obstetrics*. 2003;82(2):187-197.
6. Harding C, Mossop H, Homer T, et al. Alternative to prophylactic antibiotics for the treatment of recurrent urinary tract infections in women: multicentre, open label, randomised, non-inferiority trial. *BMJ*. 2022;376:e068229.
7. Botros C, Lozo S, Iyer S, et al. Methenamine hippurate compared with trimethoprim for the prevention of recurrent urinary tract infections: a randomized clinical trial. *International Urogynecology Journal*. 2022;33(3):571-580.
8. Williams G, Stothart CI, Hahn D, Stephens JH, Craig JC, Hodson EM. Cranberries for preventing urinary tract infections. *Cochrane Database*. 2023;(11)

Pharmacist Monthly UTI Prophylactic Antibiotic Audit

Resident Name:					Sex:	Age:
Prophylactic Antibiotic Therapy	Antibiotic	Dose/Sig	Duration	Date Prescribed	Prescriber	
Is prophylaxis being cycled?	<input type="checkbox"/> Yes (List all cycled antibiotics above)				<input type="checkbox"/> No	
	If yes, how often?	<input type="checkbox"/> Monthly	<input type="checkbox"/> Every 2 months	<input type="checkbox"/> Every 3 months	<input type="checkbox"/> Other:	
Does the resident have a long-term urinary catheter?				<input type="checkbox"/> Yes		<input type="checkbox"/> No
If yes, has the physician been notified to consider discontinuing antibiotics due to concern for resistance?						
<input type="checkbox"/> Yes, Date: _____		<input type="checkbox"/> No			<input type="checkbox"/> N/A	
Additional prescriptions for UTI while on prophylaxis?				<input type="checkbox"/> Yes		<input type="checkbox"/> No
If yes, how many antibiotics in previous 12 months?						
If several antibiotics in previous 12 months, has the provider been notified to consider stopping prophylaxis due to failure of the strategy?			<input type="checkbox"/> Yes, Date: _____		<input type="checkbox"/> No	<input type="checkbox"/> N/A
Acute UTI Antibiotic Therapy (Previous 12 months)	Antibiotic	Dose/Sig	Duration	Date prescribed	Prescriber	
Any antibiotic prescribed for acute UTI same as prophylaxis?				<input type="checkbox"/> Yes		<input type="checkbox"/> No
Any urine culture with resistance to prophylaxis?	<input type="checkbox"/> Yes			<input type="checkbox"/> No		
	If yes, has the prescriber been notified to consider discontinuing antibiotic prophylaxis?			<input type="checkbox"/> Yes, Date: _____		<input type="checkbox"/> No
Has the prescriber documented review of the prophylactic antibiotic in the last 6 months?					<input type="checkbox"/> Yes, Date: _____	
Documented plan for prophylaxis duration/stop date?						
Audit conducted by:					Date:	