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PATIENT ENGAGEMENT, EDUCATION, AND LITERACY FOR PELVIC FLOOR DISORDERS (J ANGER, SECTION EDITOR)

# Patient Engagement in Management of Recurrent Urinary Tract Infections

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## Abstract

**Purpose of Review** Recurrent urinary tract infections (rUTIs) are highly prevalent among women and can be challenging to manage for both clinicians and patients. This review aims to outline and analyze important studies relevant to clinical care and provide patient-centered recommendations.

**Recent Findings** The current literature supports that the treatment of rUTIs is multifaceted, and improving patient engagement requires clinical strategies that prioritize improving women's quality of life. Culture-directed treatment of recurrent infections to prevent collateral damage from antibiotics is supported by the 2019 Recurrent Uncomplicated Urinary Tract Infections in Women Guidelines published by the American Urological Association, Canadian Urology Association, and Society of Urodynamics, Female Pelvic Medicine, and Urogenital Reconstruction. Qualitative studies have identified important considerations for patients such as antibiotic and non-antibiotic treatment options, financial costs, as well as physical and mental health impairments.

**Summary** Solely treating the physical symptoms caused by recurrent urinary tract infections without discussing prevention strategies and quality of life challenges caused by rUTIs will likely lead to poor patient engagement and satisfaction. Building a medical practice with ancillary physician support to expedite and increase convenience may help meet patient expectations and ease the burden of care identified in prior studies. Physicians should prioritize antibiotic stewardship and be mindful that microbiome research has demonstrated that healthy bladders have been found to have commensal bacteria, which may act as barriers against uropathogens, thus helping prevent urinary tract infections.

**Keywords** Urinary tract infections · Recurrent urinary tract infections · Quality of life · Patient satisfaction · Patient engagement

## Introduction

Urinary tract infections (UTIs) are highly prevalent among women, with 60% of women suffering from a UTI at least once and 25–50% of women experiencing multiple infections in their lifetimes [1, 2]. Recurrent urinary tract infections (rUTIs) are defined as two or more UTIs within 6 months or three or more UTIs within 12 months [3••]. The diagnosis and management of UTIs cost 1.6 billion dollars per year in the USA, which does not account for the evaluation and treatment of recurrent infections [1]. rUTI is a burdensome health condition, causing both physical and mental strain for patients. This condition is also challenging for physicians to treat, as they must comprehensively manage symptoms while judiciously prescribing antibiotics for acute episodes of UTI and, at the same time, help patients identify effective long-term prevention strategies.

Prior studies have demonstrated superior clinical outcomes with increased patient engagement, eliciting patient input regarding interventions to influence patient behavior and outcomes [4]. There are three levels of patient

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engagement efforts that aim to improve health outcomes, maximize the quality of care, and lower costs. Shared decision-making with patient input regarding treatment preferences after diagnosis is the cornerstone of the first level [4]. The first level of engagement balances evidence-based treatment options and a patient's goals of care to finalize a treatment plan. In the second level, organizations gather consumer input to develop care that is congruent with patient needs. In the third level, policy making, patients are involved in the decisions for resource allocation. For example, patients could participate in focus groups to generate recommendations for research and initiative funding priorities [4]. To advance our understanding of patient risk factors and preventive strategies regarding lower urinary tract symptoms (LUTS), the Prevention of Lower Urinary Tract Symptoms in Women (PLUS) Research Consortium supports patient-centered research to elicit patient input [5]. Treatment of rUTI should target all levels of patient engagement.

## Evaluation, Diagnosis and Management of Uncomplicated rUTIs

Treatment of rUTIs should depend on patient symptoms, urinalysis, and urine cultures to prevent the overuse of antibiotics. Most recently, in 2019, the American Urological Association (AUA) published uncomplicated rUTI guidelines, which propose first-line antibiotic agents and recommend culture-directed antibiotic treatments, rather than empiric, treatment to standardize care [6••]. Incorporating antibiotic stewardship reduces collateral damage associated with the overuse of antimicrobials, which selects drug-resistant organisms and thus colonization of multidrug-resistant organisms [7••].

A proper evaluation of a patient involves thorough history taking and pelvic examination. Obtaining a medical history should include characterization of baseline irritative LUTS, frequency of infections, previous culture results, and prior antibiotic use. While reviewing a patient's prior UTIs history, it is essential to consider that a UTI can be diagnosed with the presence of more than $10^5$ colony forming units/milliliter (CFU/mL) on urine culture, or more than $10^2$ CFU/mL in the presence of symptoms [8]. Not all prior infections may fit the criteria.

The presence of acute onset dysuria along associated with urinary frequency and no vaginal discharge can increase the likelihood of a UTI to 90% [9]. However, an alternative diagnosis such as overactive bladder, interstitial cystitis/bladder pain syndrome, and genitourinary syndrome of menopause (GSM) should be considered when reported symptoms are discordant with urine microbiology data. A case–control study of postmenopausal women found that rUTI is strongly associated with urinary incontinence, symptomatic cystocele, and a high post void residual volume [10, 11]. Genitourinary syndrome of menopause represents signs and symptoms associated with vulvovaginal atrophy due to lower levels of estrogen that change the urogenital epithelium and microbiome, which predisposes women to LUTS and rUTI. Cross-sectional or ultrasound imaging, urodynamics, and cystoscopy can be used in evaluation of patients with rUTIs if there is a progression of infection or concern for a complicated UTI in a non-index patient [7••]. Urodynamics may be warranted for evaluation of bladder outlet obstruction in the setting of recurrent infections with a prior history of bladder or pelvic surgery.

The AUA 2019 rUTI guideline statement recommends three first-line antimicrobial agents: nitrofurantoin 100 mg twice daily for 5 days, trimethoprim-sulfamethoxazole double strength twice daily for 3 days, or a single dose of fosfomycin 3 g [6••]. Antibiotic selection should account for local antibiogram data, a compilation of facility-specific organism resistance to guide empiric coverage. Antibiotic duration should typically be no longer than 7 days. Despite these recommendations, a single-institution retrospective analysis of referral patterns for rUTI to Female Pelvic Medicine and Reconstructive Surgery (FPMRS) specialists identified that only about 40% of patients received one of the recommended first-line medications, and most patients were treated empirically without the use of a urine culture [12•].

Prophylactic antibiotics can also be considered in the treatment armamentarium of rUTI, although the duration of treatment is unclear as continuous use is not evidence-based [6••]. Prior data has supported low-dose antibiotic prophylaxis for 6–12 months [13••]. Patients might prefer a self-start antibiotic prescription, which involves treatment of a UTI before urine culture results finalize, instead of continuous antibiotic prophylaxis. Historically, the notion of self-start therapy allowed women to start an antibiotic without obtaining a urine culture. However, self-administered antibiotic treatment without urine culture results has fallen out of routine urologic practice, and is now discouraged in society-based guidelines [3••, 6••]. Gupta et al. conducted an uncontrolled, prospective clinical trial regarding self-start antibiotic therapy in a university-based primary care clinic in 172 women older than 18 years of age with a history of rUTI [14]. After self-diagnosing, a UTI based on symptoms, the women self-started a fluoroquinolone and collected a clean catch urine sample to deliver to the student clinic within 24 h. The study identified that 88 of the 172 women experienced at least one UTI, and there was a total of 172 symptomatic cystitis episodes. Out of the 172 presumed UTI episodes, pre-therapy urinalyses and cultures identified an organism in 144 cases, sterile pyuria in 19 cases, and no bacteriuria or pyuria in 9 cases. A cure rate of 92% with a high patient satisfaction was reported as women felt they could start treatment sooner and had a shorter duration of

symptoms. However, some important considerations regarding the study are that the average age of women was 23 years old, their definition of rUTI was at least two UTIs in the previous 12 months, and urine culture susceptibility data results were not reported. Furthermore, the sequelae of collateral damage and microbiome alteration are not discussed. A time-driven activity-based cost analysis, which accounts for costs of each stage of care delivery and resource utilized, regarding the financial burden of managing rUTI found that, out of all preventive antibiotic regimens (self-start, post-coital, continuous prophylaxis), daily prophylaxis was most costly [15••]. In contrast, the self-start regimen was a cheaper alternative with possibly a higher recurrence rate.

## Quality of Life Impact of rUTIs

Although the objective criteria to diagnose a UTI include symptoms and culture data consistent with an infection, UTIs cause more complex quality of life issues affecting different health domains for patients [16••]. Flower et al. analyzed patient conversations regarding UTIs on a popular United Kingdom web forum, and identified patient concerns such as maintaining intimate and social relationships [17]. The authors found that many women shared symptoms online because many felt their presenting symptoms were not typical and were often not validated by physicians. We recently conducted a digital ethnographic analysis, which involves the analysis of non-experimental conversations, of social media posts about women with UTI using inductive coding analysis and a latent Dirichlet allocation probabilistic topic modeling to generate patient experience themes [18••]. Similarly, our study found that women turned to online sources regarding UTIs due to quality of concerns which included worsening sexual dysfunction, fear, and pain. Additionally, the authors found online forums to be a source of support by which women could learn about treatment options beyond antibiotics, risks, and prevention factors. In particular, the social media analysis identified a high interest in homeopathy treatment options. Frequently discussed modifiable risk factors included dehydration and personal genital hygiene [18••].

A prior web-based survey in five European countries by Wagenlehner et al. analyzed the financial toxicity and mental health deficits caused by UTIs [19••]. They found that half of the women reported suffering from rUTIs for more than 10 years. Additionally, the cost of antibiotic treatments was high, and many women expressed frustrations with frequent antimicrobial modifications due to poor symptom improvement. On average, women missed 3 days of work per year due to UTIs. They also found both lower physical pain and mental health scores in women reporting an acute infection. Interestingly, women, 4 weeks after an acute infection, experienced prolonged lower mental health scores, despite improvement in the physical domain score.

Ellis and Verma surveyed women with and without a UTI diagnosis using the RAND 36-item health questionnaire (SF-36) to investigate overall versus disease-specific quality of life impact from UTIs [20]. The SF-36 mental health parameters include vitality, emotional well-being, social function, role limitation of tasks efficiencies or social functioning due to stressors, and mental fatigue. The physical health domains are general health perception, physical functioning, pain, role limitation of daily living, and recreational activities. They found that women with UTIs scored lower in all physical and mental health domains. Similarly, Renard et al. performed a 6x-month observational study of 575 patients with rUTIs and used the Hospital Anxiety and Depression (HAD) score and the Leicester scale (a functional handicap measure) to examine self-reported quality of life. Baseline data demonstrated that about 62% of patients experienced anxiety. By the end of the 6 months, 95% of patients had received prophylactic antibiotics, and the HAD and Leicester scores decreased by 44%, representing a statistically significant improvement in self-reported anxiety, depression, and functional handicap with decreasing UTI incidence [21]. Although starting medication may subjectively improve symptoms, it is essential to avoid antimicrobial prophylaxis when it is only for patient appeasement (vs. a true clinical indication).

## Patient perspectives on Management Strategies and Alternative Therapies

Shared decision-making and effective doctor-patient communication are integral components of patient engagement and satisfaction. rUTI treatment should address discrepancies in expectations between patients and physicians, as prior qualitative literature has identified miscommunication as a significant barrier to patient satisfaction.

Lecky et al. identified the following challenges to an effective UTI consultation: brief allocated time for a visit, a rushed appointment with lack of symptom validation, telephone consults (pre-COVID 2019) rather than in-person appointments, minimal details in patient handouts to initiate an appropriate dialog, and prior use of antimicrobials which may accustom women to justify requiring antibiotics for cystitis episodes [22•]. Whereas the general practitioners viewed rUTI appointments as routine, patients expressed not being asked many questions, thus feeling like their perspectives were not acknowledged. The in-depth phone interviews with patients also revealed fear and significant knowledge variation. Women incorrectly believed that antibiotic resistance occurred when an individual, rather than bacterial organisms, became resistant to antibiotics. A qualitative

analysis by Pat et al. identified that physicians and patients were in disagreement about the appropriate timing of a urologist referral as patients reported having to prompt their primary care provider for a referral [23].

Many primary care physicians in the Lecky et al. study reported feeling pressure to prescribe antibiotics (when not indicated) to fulfill patient expectations [22•]. However, only a minority of patients expressed a preference for immediate antibiotics due to prior treatment success. Most women prioritized pain relief, antibiotics when appropriate, explanation of possible etiologies, prevention strategies, and counseling about the risks of uncomplicated cystitis progressing to pyelonephritis. Although controversial, prior data support that antibiotics have not been shown to prevent the development of pyelonephritis in patients with uncomplicated UTIs [24].

Leydon et al. recruited twenty-one women for one-on-one interviews from a primary care-based trial that randomized women to different treatment arms, including empiric antibiotic treatment, delayed empiric antibiotic treatment, antimicrobial prescription based on symptoms, antibiotic treatment according to a dipstick or pending final urinalysis, and culture results [25]. They found that patients preferred quality of life challenges to be discussed and were amenable to the strategy of antibiotic delay pending a reassessment of symptoms 48 h before starting antibiotics. Patients are often receptive to delayed initiation of antibiotics (pending culture results) and symptom management using non-steroidal anti-inflammatory drugs and urinary tract analgesics with proper counseling and reassurance.

In a more recent qualitative analysis, Scott et al. conducted six focus groups of twenty-nine women with rUTI from a tertiary urology practice to elicit patient perspective themes regarding prevention and treatment of UTIs [26]. The authors identified seven themes categorized into two categories: the negative effects of taking antibiotics and frustration with medical professionals. Women expressed concern about antibiotic resistance and collateral damage associated with antibiotic use, specifically the use of broad-spectrum antibiotics, and treatment in the absence of infection was mentioned. Similar to prior findings, women advocated for research of non-antibiotic treatment options and better patient rapport building by not underestimating the quality of life effects they experienced.

It has been well established that women with LUTS are not forthcoming when discussing their symptoms and thus rely on online sources, such as forums, to obtain and share information [26, 27••, 28–30]. Burton et al. previously analyzed the level of evidence supporting online peer recommendations for five different LUTS conditions, which included UTI [27••]. The majority of UTI recommendations among lay people were not evidence-based and included dietary modifications, hygiene routines, and various alternative therapies without supporting scientific evidence (i.e., activated charcoal and bacteriophage therapy). Although the authors report that the frequency of recommendations to increase fluid intake was high, the use of vaginal estrogen was only recommended once despite the evidence supporting its safety and efficacy in rUTI prevention in peri- and post-menopausal women [6••, 31]. About one-third of the online prevention recommendations included comments supporting the use of cranberry supplements, vitamin C, and D-mannose.

Although prophylaxis using cranberry products is a conditional recommendation in the recent AUA guideline, more evidence supporting cranberry is on the horizon, and the use of these supplements has been demonstrated to have low adverse events [6••, 32]. It is important to note the proanthocyanidins, the active agent in cranberry products that prevent the adhesion of bacteria to urothelium, are found in different concentrations depending on the formulation [6••]. Patients may inquire about other alternative therapies that are not strongly supported in the recent AUA rUTI guideline statement. It is worthwhile for physicians to be aware of non-antibiotic options and counsel patients about alternative therapies as these options are frequently discussed online. Additionally, patients may desire low-evidence alternative therapies with minimal risk if this strategy aligns with their shared-decision treatment plan.

## Improving Care Delivered to Patients with rUTIs

Providing patients with educational handouts discussing important topics such as bowel-bladder health, non-antibiotic options for prevention, the collateral damage caused by antibiotics, and developing contingency plans for acute episodes of a UTI or worsening symptoms can lessen patient anxiety. Although patients may prefer longer appointments or more frequent visits to reassess symptoms, these options may not be feasible for specialists. Arranging appointments with advanced practice providers in the urology clinic, including nurse practitioners and physician assistants, can be a solution for the time constraints of urologists, who must triage expert consultations and may have longer wait periods for appointment availability.

Standing urine specimen orders allow patients to provide samples at the onset of urinary symptoms, and can make navigating rUTI treatment more convenient for patients. Although requiring repeat cultures can frustrate patients, physicians should explain that obtaining a urine culture reduces high-cost services such as parenteral antibiotics more than 50% of the time, easing the burden and frustration of repetitive urine testing [33].

It is not uncommon for women to blame themselves for recurrent infections [34••]. However, educating women that a healthy bladder does not have to be aseptic is crucial. Bladder microbiome research has identified interspecies bacterial antagonism in UTI prevention, in which asymptomatic bacteriuria with commensal organisms prevents colonization of microorganisms responsible for symptoms [35••].

## Conclusion

Treatment of women with rUTIs should target physical symptoms and incorporate quality of life discussions. The development of individualized patient-centered treatment strategies should focus on incorporating the perspectives reviewed. Physicians should judiciously prescribe antibiotics when appropriate and tailor treatment plans accordingly for pre- and post-menopausal women. Emerging urinary and vaginal microbiome research will likely provide new options for antibiotic refractory patients and aid in understanding the pathophysiology of rUTIs [34••].

### Declarations

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

**Conflict of Interest** The authors declare no competing interests.

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