10-MINUTE CONSULTATION

Uncomplicated urinary tract infection in women
Tammy C Hoffmann, 1 Mina Bakht, 1 Chris Del Mar 1

What you need to know

- In about a third of women with an uncomplicated urinary tract infection, the infection may resolve by about 7-10 days without the need for antibiotics
- The option of “wait and see” (which typically involves providing a delayed prescription) can be discussed as part of a shared decision making process within the consultation
- Although the risk from delaying antibiotics is low, consider pyelonephritis or sepsis in patients who are systemically unwell and have high fever, rigours, nausea/vomiting, flank pain, low blood pressure, high heart rate, high respiratory rate, not passing urine for 12-18 hours, and behaviour change

A 32 year old woman presents with suspected urinary tract infection (UTI). She is passing urine more frequently and has suprapubic pain and dysuria. After two days, her symptoms have not improved.

This article outlines how to identify uncomplicated UTI in adult non-pregnant women (18-65 years old) and discuss options with women to help them make an informed decision about its management.

What you should cover

Acute UTIs are common community infections. They affect most women at least once in their life and are far less prevalent among men. 1-3 Women with an acute UTI present with diverse symptoms that can be burdensome and adversely affect their quality of life. 4,5

History

Take a history to differentiate between an uncomplicated UTI and other causes of urinary symptoms. Recurrent UTI (≥ 3 UTIs within a year), asymptomatic bacteriuria, and infection associated with an indwelling urinary catheter each require a different approach, not covered here. Diagnostic studies support the diagnostic value of commonly recognised symptoms such as dysuria, haematuria, nocturia, urgency, and frequency, as well as those that reduce the probability that a patient has a UTI. 6,7 and table 1 lists the likelihood ratios of these symptoms. In particular, the presence of two or three of the key symptoms (haematuria or cloudy urine, dysuria, and new nocturia) are indicative of a UTI. 6,8,9 However, no individual or combination of symptoms can be fully diagnostic for a UTI. Check for red flags suggestive of acute pyelonephritis or sepsis (box 1), which would require immediate management or referral to hospital.

Table 1 | Summary likelihood ratios (LR) of symptoms suggestive of an uncomplicated urinary tract infection (UTI) 6,7

| Symptom                          | Positive likelihood ratio (95% confidence interval) |
|---------------------------------|---------------------------------------------------|
| Symptoms increasing the probability of UTI* |                                                  |
| Haematuria                      | 1.72 (1.30 to 2.27)                               |
| Dysuria                         | 1.30 (1.20 to 1.41)                               |
| Nocturia                        | 1.30 (1.08 to 1.56)                               |
| Urgency                         | 1.22 (1.11 to 1.34)                               |
| Frequency                       | 1.10 (1.04 to 1.16)                               |
| Symptoms decreasing the probability of UTI† |                                                  |
| History of vaginal discharge    | 0.3 (0.1 to 0.9)                                  |
| History of vaginal irritation   | 0.2 (0.1 to 0.9)                                  |

* All values reported for threshold of ≥ 102 colony forming units (CFU/mL (growth of bacteria on urine culture); therefore, probabilities at higher reference standards are lower.
† Values reported for threshold of ≥ 105 CFU/mL.

Box 1: Red flags for acute pyelonephritis and sepsis

Acute pyelonephritis10 11
- Flank pain (on the back, at or below level of ribcage)
- Rigors or fever ≥ 37.9°C
- Nausea or vomiting

Sepsis12
- ≥ 21 breaths/min
- Heart rate ≥ 91 beats/min

This is part of a series of occasional articles on common problems in primary care. The BMJ welcomes contributions from GPs.
Systolic blood pressure 91-100 mm Hg or 190 mm Hg (that is, ≥140 mm Hg below normal)
Not passed urine in the past 12-18 hours or more
Behaviour changes (acute deterioration, altered behaviour or mental state)

Consider other causes—These include vaginal infections (such as Trichomonas, Candida albicans, Gardnerella), vaginitis (after sexual intercourse, irritants, pelvic inflammatory disease) and vulvovaginal atrophy. Ask about:

- Recent sexual activity (UTIs are common among sexually active women)
- Previous UTI (most women with a UTI report a history of UTI during the 12 months before the current episode)
- Use of spermicidal agents or a diaphragm (spermicidal agents affect the vaginal flora, and the diaphragm increase the levels of introital and periurethral colonisation with bacteria)

What you should do

Constructing a shared decision making conversation

There are typically two main options that are reasonable to consider: immediate antibiotics or a “wait and see” approach. To enable the patient to make an informed decision, the clinician needs to explain both options, with the benefits and harms of each, and discuss the patient to make an informed decision, the clinician needs to explain immediate antibiotics or a 

Table 2 | Investigations for uncomplicated UTI in 18-65 year old non-pregnant women

| No of suggestive symptoms present | Urine dipstick score | Possibility of UTI | Further testing |
|----------------------------------|---------------------|-------------------|----------------|
|                                  | Nitrite             | Leucocyte         | RBC            |
| 2 or 3                           | May not be needed²  |                   |                |
| 1                                | +                   | −                 | +              | Likely¹   | Send urine for culture⁴   |
|                                  | +                   | +                 | −              | Likely⁵   |                          |
|                                  | +                   | −                 | +              |            |                          |
|                                  | −                   | +                 | −              |            |                          |
|                                  | −                   | +                 | −              |            | Equally likely to other diagnosis |
|                                  | −                   | −                 | −              | Less likely⁶ | No indication for urine culture |

Urine dipstick cut-off score is based on the sum of nitrite=2, leucocyte=1.5, red blood cells (RBC)=1.

What investigations might be needed?

Urine dipstick tests are the most commonly used point of care test in primary care. For the laboratory diagnosis of UTI, dipstick results can modestly improve diagnostic precision, but cannot definitively rule out a UTI (table 2). Where symptoms are highly suggestive of a UTI, a urine dipstick is usually not needed.

Elicit the patient’s expectations about management of the condition—This can include past treatments and experiences, along with fears and concerns (including symptom severity and how it may affect daily tasks); this allows for detecting and discussing misperceptions where necessary, either now or later in the process.

Explain the options:
- Wait and see (this may involve providing a delayed prescription for antibiotics and clear information about to when to use it)
- Start taking antibiotics immediately

Discuss the options’ benefits and harms (including their likely probability or size):
- Describe the natural course of an uncomplicated UTI and explain that, for some women, it will resolve within about a week without taking antibiotics. Also explain that there is uncertainty about exact timeframes and whether the patient will be one of the women who gets better without antibiotics (if not, antibiotics may need to be started later)
What is the natural course of a UTI?

There is uncertainty around the natural course of uncomplicated UTI, with few studies examining this.

In a systematic review of the placebo-controlled arms of three randomised trials (346 placebo group participants), some women seemed to improve or become symptom-free spontaneously, with most improvement occurring in the first nine days.\(^{17}\) When asked at seven days, the percentage of participants who reported being symptom-free was 37% in one study and 28% in another. One study asked women again at nine days and six weeks, with 42% and 36% respectively reporting being symptom-free. In 39% of the women, symptoms either failed to improve by six weeks or became worse. The rate of serious complications was low, with progression to pyelonephritis reported in only one placebo participant each in two of the trials.

Another estimate of the mean duration of UTI symptoms is provided by an observational study of women with suspected uncomplicated UTI.\(^{18}\) In the 511 women who had seen a clinician for their symptoms and rated the initial problem as moderately bad or worse, the mean reported symptom duration was 3.8 days. However, most of the study participants took antibiotics. For the 17 participants (approximately 3%) who did not take antibiotics, their reported mean symptom duration was 6.9 days. In a related five-arm randomised trial, a similar duration of moderately bad or worse symptoms was reported: 3.5 days in the immediate antibiotic group and 4.8 days in the delayed (by 48 hours) prescription group.\(^{19}\)

What difference do antibiotics make?

Surprisingly, we could not find a synthesis of antibiotic versus placebo randomised controlled trials for uncomplicated UTI in women under 65 years old, and therefore no quantification of the effect, perhaps because antibiotic treatment is the traditional management of uncomplicated UTI. The extent to which antibiotics reduce recovery time, reduce the risk of progression to pyelonephritis, and reduce the risk of recurrence is unknown and not presented in evidence based clinical practice guidelines.

Harms are also hard to quantify; for the antibiotics most commonly prescribed for UTI (such as nitrofurantoin, trimethoprim), we could not find synthesised evidence of their harms. For other antibiotics commonly prescribed in primary care, commonly reported adverse effects include diarrhoea, rash, and nausea.\(^{20,21}\) Candidiasis is also possible from antibiotic use. Another harm of antibiotic use is the contribution to antibiotic resistance. This is already particularly a problem for trimethoprim, with existing resistance rates of at least 30% of *Escherichia coli* isolates to trimethoprim.\(^{22}\) Patients with antibiotic resistant *E coli* UTI are more like to experience clinical response failure.\(^{23}\)

Despite being unable to quantify how much difference antibiotics make to UTI symptom duration, they are effective in treating the infection. Refer to the current NICE guideline for information on which antibiotic to use (guided by local antibiotic resistance patterns, where possible), and recommended dose and duration.\(^{24}\)

**Offering a delayed prescription**

The option of a delayed prescription will be acceptable to many patients. In a cohort study in Amsterdam, 37% of women who were asked by their general practitioner to delay antibiotic treatment were willing to do so (however no further details about how this option was presented to patients are provided in the study).\(^{25}\) When a delayed antibiotic prescription is chosen, NICE recommends advising patients to start taking them if symptoms do not start to improve within two days (or sooner if symptoms worsen).\(^{24}\) However, there is no evidence provided in support of this timeframe, and it is unclear whether the two day limit is from the start of symptoms or from first consultation. The findings from the systematic review that estimated the natural course of uncomplicated UTI\(^{17}\) suggest that a two day timeframe may be too short, with few participants likely to have improved by then, although about a third may have improved by 7-10 days. There seems to be considerable uncertainty and variability in the time for spontaneous recovery; so when “wait and see” (delayed prescribing) is discussed with the patient as an option, this should include careful description of when to reconsult or start antibiotics (box 2).

**Other treatments**

There is little evidence to support the use of various over-the-counter medications that patients will often have tried before a consultation or concurrently with antibiotics. A 2016 Cochrane review of urinary alkalisers found no randomised trials.\(^{26}\) There are no randomised trials of cranberry products for the treatment of uncomplicated UTI,\(^{27,28}\) and a Cochrane review found they did not prevent recurrent urinary tract infections in women any more than placebo or no treatment (risk ratio 0.86, 95% CI 0.71 to 1.00).\(^{29}\)

A systematic review of the effectiveness of non-steroidal anti-inflammatory drugs (NSAIDs) compared with antibiotics for uncomplicated UTI found five randomised trials.\(^{30}\) For the outcome of symptom resolution, three trials found that NSAIDs were inferior to antibiotics, but two trials (smaller, with higher or unclear risk of bias) found no significant difference between the arms. In the groups that received NSAIDs, the percentage of women with symptom resolution by day 3 or 4 ranged from 39% to 58%. In two of the three trials that reported pyelonephritis, rates were slightly higher in the NSAID group.
How you invited patients to share in decision making about treatment of their acute uncomplicated urinary tract infections

We discussed the article with two women who have had uncomplicated urinary tract infections; they emphasised the importance of information about whether alternatives to antibiotic work, about safety-netting information (box 2), and the provision of written information.

Contributors: TCH and CDM conceived the article and are guarantors. All authors wrote and reviewed the article.

Competing interests: TCH and CDM have received funding from the Australian National Health and Medical Research Council for research on reducing antibiotic resistance for acute infections and for shared decision making, and from the Australian Commission on Safety and Quality in Health Care for the development of shared decision making resources. MLB has no competing interests to declare.

Provenance and peer review: Commissioned, externally peer reviewed.

Licence: “The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, an exclusive licence (or non-exclusive for government employees) on a worldwide basis to the BMJ Publishing Group Ltd to permit this article (if accepted) to be published in BMJ and any other BMJ Group products and substances such use and exploit all subsidiary rights, as set out in our licence [https://authors.bmj.com/policies/#copyright].”

1 McCormick A, Fleming D, Charlton J, et al. Royal College of General Practitioners, Great Britain Office of Population Censuses and Surveys. Morbidity statistics from general practice: fourth national study 1991-1992. HMSO, 1995.
2 Foxman B, Barlow R, D'Armour K, et al. Urinary tract infection self-reported incidence and associated costs. Am J Epidemiol 2000;10:509-15. doi:10.1093/aje/100.7.1118930
3 Schappert SM. National ambulatory medical care survey: 1989 summary. Vital Health Stat 13 1992;1(10):1-80. pmid:1367543
4 Maltert K, Baehrlein A, Pfeing barbara. Symptom experiences in women with lower urinary tract infection. Scand J Prim Health Care 1999;17:49-53. doi:10.1080/02813499950002908 pmid:1029994
5 Ellis AK, Verma S. Quality of life in women with uncomplicated urinary tract infections: is benign disease a misnomer? Am J Obstet Gynecol 2003;189:1392-7. doi:10.1016/S0002-9378(03)00682-4 pmid:1288542
6 Siegel CJ, Yoon SS, Huguet G, et al. National Ambulatory Medical Care Survey Database: 2010-2012. National Center for Health Statistics. 2013. Available from: https://www.cdc.gov/nchs/data/ahcd/namcs_summary/namcs2012_report.pdf
7 FP 2016;30:15-23. doi:10.1016/j.jamf.2015.12.020 pmid:26984360
8 National Institute for Health and Care Excellence. Clinical knowledge summaries: urinary tract infection (lower) – women. 2020. http://www.nice.org.uk/cg899
9 Public Health England. Diagnosis of urinary tract infection: quick reference tool for primary care for consultation and local adaptation. 2020. https://assets.publishing.service.gov.uk/govern-ment/uploads/system/uploads/attachment_data/file/927195/UI_diagnostic_flowchart_NICE-October_2020FINAL.pdf
10 Colgan R, Williams M, Johnson JR. Diagnosis and treatment of acute pyelonephritis in women. Am Fam Physician 2011;84:519-26. pmid:21883302
11 National Institute for Health and Care Excellence. Clinical knowledge summaries: pyelonephritis – acute. 2020. https://www.nice.org.uk/topics/pyelonephritis acute-
12 National Institute for Health and Care Excellence. Sepsis: recognition, assessment and early management (NICE guideline NG58). 2017. https://www.nice.org.uk/guidance/ng58
13 Foord B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. Dis Mon 2003;49:53-70. doi:10.1067/mdm.2003.7 pmid:12601337
14 Fihn SD, Boyko EJ, Chen CL, Normand EH, Yarbro P, Scholes D. Use of spermicide-coated condoms and other risk factors for urinary tract infection caused by Staphylococcus saprophyticus. Arch Intern Med 1998;158:281-7. doi:10.1001/archim.158.3.281 pmid:9472200
15 Little P, Turner S, Rumsby K, et al. Validating the prediction of lower urinary tract infection in primary care: sensitivity and specificity of urinary dipsticks and clinical scores in women. Br J Gen Pract 2010;60:495-500. doi:10.3399/bjgp10X372747 pmid:20594439
16 National Institute for Health and Care Excellence. Endorsed resource - TARGET: treating your infection – urinary tract infection (UTI) (NICE guideline NG15). 2019. https://www.nice.org.uk/guidance/ng15/resources/target-treating-your-infection-urinary-tract-infection-uti-666131537
17 Hoffmann T, Peiris R, Mar CD, Cleo G, Glazou P. Natural history of uncomplicated urinary tract infection without antibiotics: a systematic review. Br J Gen Pract 2020;70:e714-22. doi:10.3399/bjgp20X712781 pmid:32958533
18 Little P, Merriman R, Turner S, et al. Presentation, pattern, and natural course of severe symptoms, and role of antibiotics and antibiotic resistance among patients presenting with suspected uncomplicated urinary tract infection in primary care: observational study. BMJ 2010;340:c633. doi:10.1136/bmj.b6633 pmid:20392213
19 Little P, Moore MV, Turner S, et al. Effectiveness of five different approaches in management of urinary tract infection: randomised controlled trial. BMJ 2010;340:c199. doi:10.1136/bmj.c199 pmid:20193214
20 Hansen NP, Scott AM, McCullough A, et al. Adverse events in people taking macrolide antibiotics versus placebo for any indication. Cochrane Database Syst Rev 2019;1:CD011825. doi:10.1002/14651858.CD011825.pub2. pmid:30656500
21 Gilles M, Ranakusuma A, Hoffmann T, et al. Common harms from amoxicillin: a systematic review and meta-analysis of randomized placebo-controlled trials for any indication. CMJ 2015;187:E21-31. doi:10.3160/cmaj1406848 pmid:25404399
22 Australian Commission on Safety and Quality in Health Care (ACSQHC). Aura 2017. Second Australian report on antimicrobial use and resistance in human health. 2017. https://www.safetyandquality.gov.au/publications-and-resources/resource-library/aura-2017-second-australian-report-antimicrobial-use-and-resistance-human-health
23 van Hecke O, Wang K, Lee JJ, Roberts NW, Butler CC. Implications of antibiotic resistance for patients’ recovery from common infections in the community: a systematic review and meta-analysis. Clin Infect Dis 2017;65:371-82. doi:10.1093/cid/cix233 pmid:28569247
24 National Institute for Health and Care Excellence. Urinary tract infection (lower). antimicrobial prescribing (NICE guideline NG109). 2018. https://www.nice.org.uk/guidance/ng109/resources.
25 Knottnerus B, Geelrijns SE, Moll van Charante EP, ter Riet G. Women with symptoms of uncomplicated urinary tract infection are often willing to delay antibiotic treatment: a prospective cohort study. BMC Fam Pract 2013;14:71. doi:10.1186/1471-2296-14-71 pmid:23927260
26 O’Kane DB, Dave SK, Gore N, et al. Urinary arialisation for symptomatic uncomplicated urinary tract infection in women. Cochrane Database Syst Rev 2016;4:CD010745. doi:10.1002/14651858.CD010745.pub2 pmid:27090883
27 Gbinje O, Allen J, Boylan AM, et al. Does cranberry extract reduce antibiotic use for symptoms of acute uncomplicated urinary tract infections (UTI)? Protocol for a feasibility study. Trials 2019;20:767. doi:10.1186/s13063-019-3860-z pmid:31870413
28 Jepson RG, Mihaljevic L, Craig J. Cranberries for treating urinary tract infections. Cochrane Syst Rev 2000-4;CD001322. pmid:10796775
29 Jepson RG, Williams G, Craig JC. Cranberries for preventing urinary tract infections. Cochrane Syst Rev 2012;6:CD001321. pmid:23076891
30 Carey MR, Vaughn VM, Mann J, Townsend W, Chopra V, Patel PK. Is non-steroidal anti-inflammatory therapy non-inferior to antibiotic therapy in uncomplicated urinary tract infections: a systematic review. J Gen Intern Med 2020;35:1821-9. doi:10.1002/1558-2133.13740-5657. pmid:32270433
31 Australian Commission on Safety and Quality in Health Care (ACSQHC). Aura 2017. Second Australian report on antimicrobial use and resistance in human health.