

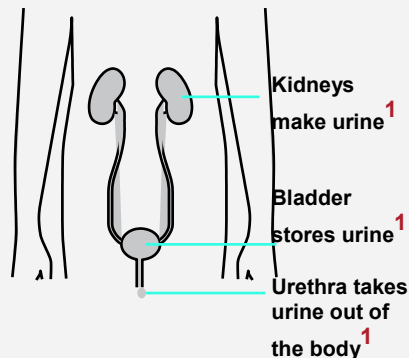
URINARY TRACT INFECTIONS

A leaflet for older adults and carers.

WHAT IS A URINE INFECTION?

A urine infection occurs when bacteria in any part of the urine system cause symptoms.^{1,2}

If a urine test finds bacteria but you are otherwise well, do not worry, this is common, and antibiotics are not usually needed.^{3,4} However, severe urine infections can be life threatening.¹



WHAT YOU CAN DO TO HELP PREVENT A URINE INFECTION?

Are you drinking enough? Look at the colour of your urine.^{5,6,7}



Drink more



- Drink enough fluid (6-8 glasses) so that you pass pale coloured urine regularly during the day, and to avoid feeling thirsty, especially during hot weather^{5,6,7,8}
- Avoid drinking too many fizzy drinks or alcohol
- There is no proven benefit of cranberry products⁹ or cystitis sachets²
- Prevent constipation.¹⁰ Ask for advice if needed
- Maintain good control of diabetes

Stop bacteria spreading from your bowel into your bladder:

- Wipe genitals from front to back after using the toilet^{11,12}
- Change pads and clean genitals if soiled^{11,12}
- Keep the genital area clean and dry;^{11,12,13} avoid scented soaps
- Wash with water before and after sex^{11,12,13}

Speak to your pharmacist about referral to a GP or other treatments.

WHAT SIGNS AND SYMPTOMS SHOULD YOU LOOK OUT FOR?

Consider these symptoms if you have a urinary catheter:

- Shivering or shaking¹⁴
- High or low temperature^{14,16,17}
- Kidney pain in your back just under the ribs^{14,16,17}



New or worsening signs of urine infection in all people:

- Pain or burning when passing urine^{14,15,16,17}
- High or low temperature^{14,15,16,17}
- Shivering or shaking^{14,17}
- Urgency (feeling the need to urinate immediately)^{14,15,16,17}
- Pain in your lower tummy above pubic area^{14,15,16,17}
- Incontinence (wetting yourself more often than usual)^{15,17}
- Passing urine more often than usual^{14,15,16,17}
- Cloudy urine,^{18,19} or visible blood in your urine^{14,16,17}
- Confusion, change in behaviour, or unsteadiness on feet¹⁹

CONSIDER OTHER THINGS THAT MAY ALSO CAUSE CONFUSION

- Pain^{20,21}
- Constipation^{20,8}
- Poor sleep^{21,22}
- Low mood²⁴
- Not drinking enough^{20,23}
- Side effects of medicine^{20,23}
- Other infection
- Change in your routine or home environment^{20,22}
- Poor diet²³

ALWAYS CONSIDER COVID-19⁴⁰

If you think you may have COVID-19 then please visit <http://www.gov.uk/coronavirus> or <http://www.nhs.uk> for the latest guidance and information

WHAT CAN YOU DO TO HELP FEEL BETTER?

- Drink enough fluid so that you pass urine regularly during the day, especially during hot weather
- Take paracetamol regularly, up to 4 times daily to relieve fever and pain^{2,26,27}
- There is no proven benefit of cranberry products or cystitis sachets^{2,9}
- If you're worried about wetting yourself, see your doctor or nurse for advice^{5,6,7,8}
- Ask for advice from your pharmacist/carer
- Drink enough fluids to avoid feeling thirsty and to keep your urine pale



WHAT MIGHT YOUR PHARMACIST / NURSE / DOCTOR DO?

- If your symptoms are likely to get better on their own you may receive self-care advice and pain relief^{2,28,29}
- Ask you to drink more fluids^{5,6,7,8}
- Ask you for a urine sample³⁰
- You may be given an antibiotic that you can use if your symptoms don't improve or you start to feel worse^{28,30}



ALWAYS TRUST YOUR PHARMACIST'S / NURSE'S / DOCTOR'S ADVICE ABOUT ANTIBIOTICS

- Antibiotics can be life saving for serious urine infections
- But antibiotics are not always needed for urinary symptoms³¹
- Common side effects of taking antibiotics include thrush, rashes, vomiting and diarrhoea; ask for advice if you are worried^{2,29}
- Antibiotics affect the bacteria in your bowel, which may make them resistant to antibiotics for at least a year^{32,33}
- Keep antibiotics working, only take them when your doctor/ nurse advises them³¹

WHEN SHOULD YOU GET HELP?

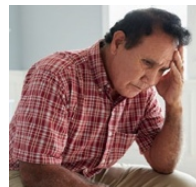
The following symptoms are possible signs of serious infection and should be assessed urgently

Contact your GP Practice or contact NHS 111 (England), NHS 24 (Scotland dial 111), NHS direct (Wales dial 0845 4647), or GP practice (NI)

Shivering, chills and muscle pain³⁴



Feeling very confused, drowsy or slurred speech^{34,35}



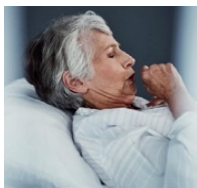
Not passing urine all day³⁴



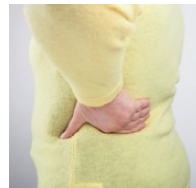
Temperature is above 38°C or less than 36°C³⁵



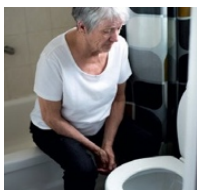
Trouble breathing^{34,35}



Kidney pain in your back just under the ribs¹⁸



Visible blood in your urine^{14,16,17}



Very cold skin³⁵



Symptoms are getting a lot worse, or not starting to improve within 2 days of starting antibiotics.^{2,14,36}

Trust your instincts, ask for advice if you are not sure how urgent the symptoms are.

Section: What is a urine infection?

1. National Institute of Health and Care Excellence (NICE). Urinary tract infections in adults. 2015 Jun. Available from: <https://www.nice.org.uk/guidance/qs90/resources/urinary-tract-infections-in-adults-2098962322117>.

RATIONALE: A NICE guideline, stating that **urinary tract infections are caused by the presence and multiplication of micro-organisms in the urinary tract**. This guideline states that urinary tract infections can result in several clinical syndromes, including acute and chronic pyelonephritis (**infection of the kidney** and renal pelvis), cystitis (**infection of the bladder**), urethritis (**infection of the urethra**), epididymitis (infection of the epididymis), and prostatitis (infection of the prostate gland). **A urinary tract infection is defined by a combination of clinical features and the presence of bacteria in the urine.**

2. National Institute for Health and Care Excellence Urinary tract infection (lower): antimicrobial prescribing. NICE Guideline 2018. Available from: <https://www.nice.org.uk/guidance/ng109>.

RATIONALE: A NICE guideline, **stating that lower UTI is an infection of the bladder usually caused by bacteria from the gastrointestinal tract entering the urethra and travelling up to the bladder.**

The guideline also recommends to give **advice about managing symptoms with self-care such as by using paracetamol, and that there are possible adverse effects of using antibiotics such as diarrhoea and nausea.**

Additionally, the guideline advises to **seek medical help if symptoms worsen rapidly or do not start to improve within 48 hours of taking an antibiotic.**

3. Abrutyn E, Mossey J, Berlin JA, Boscia J, Levison M, Pitsakis P et al. Does asymptomatic bacteriuria predict mortality and does antimicrobial treatment reduce mortality in elderly ambulatory

women: Ann Intern Med. 1994 May; 120(10):827-833. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/7818631>.

RATIONALE: A cohort study and a controlled clinical trial of non-catheterised older women examining the effect of antimicrobial treatment, conducted in a geriatric centre and 21 continuing care retirement communities. Urine cultures were taken every 6 months and comorbidity and mortality were monitored. Infected residents (n = 318) were older, and sicker, and had higher mortality (18.7 per 100 000 resident-days) than uninfected residents (n = 1173; 10.1 per 100 000 resident-days). However, **infection was not related to mortality** whereas age at entry and self-rated health were strong predictors. Urinary tract infection was not an independent risk factor for mortality, and its **treatment did not lower the mortality rate**. Authors concluded that **screening and treatment of asymptomatic bacteriuria in ambulatory elderly women to decrease mortality does not appear to be warranted**.

4. Nicolle LE, Mayhew WJ, Bryan L. Prospective randomized comparison of therapy and no therapy for asymptomatic bacteriuria in institutionalized elderly women. Am J Med. 1987 Jul; 83(1):27-33. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/3300325>.

RATIONALE: Fifty older institutionalised women with asymptomatic bacteriuria were randomly assigned either to receive therapy for treatment of all episodes of bacteriuria identified on monthly culture or to receive no therapy unless symptoms developed. Subjects were followed for one year. The therapy group had a mean monthly prevalence of bacteriuria 31 ± 15 percent lower than those in the no-therapy group. For residents receiving no therapy, 71 percent showed persistent infection with the same organism(s). Antimicrobial therapy was associated with an increased incidence of reinfection and adverse antimicrobial drug effects as well as isolation of increasingly resistant organisms in recurrent infection when compared with no therapy. **No differences in genitourinary morbidity or mortality were observed between the groups**. Thus, despite a lowered prevalence of

bacteriuria, no short-term benefits were identified and some harmful effects were observed with treatment of asymptomatic bacteriuria. These data support current recommendations of no therapy for asymptomatic bacteriuria in this population

Section: What can you do to help prevent a urine infection?

There is limited research clearly identifying linkages between lifestyle behaviours and urinary tract infections. Findings from the needs assessment indicate that patients wanted information on what they could do to prevent urine infections as they felt this was important to lessen their chances of developing a UTI.

"I think it's really helpful, I do. Because it gives you advice about how to prevent it and what to do when,... I think if you can lessen the chances of getting a UTI then that's really important so like you were saying about keeping yourself clean and things like that and using non perfumed soaps and all that sort of stuff."

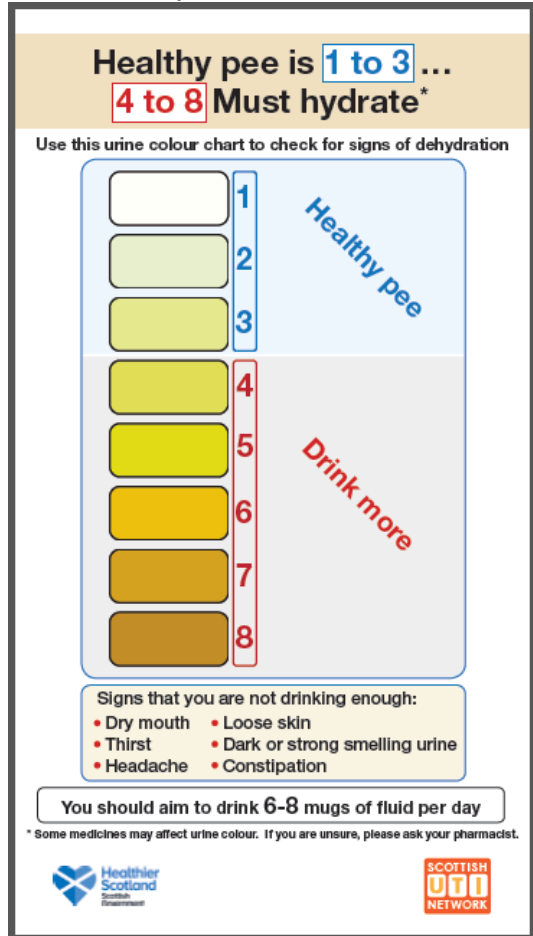
Through needs assessment work and expert consensus we have provided some recommendations for lifestyle behaviours that may prevent urine infections and support overall health and wellbeing. See available research below:

5. Scottish UTI Network. Healthy pee is 1 to 3 ... 4 to 8 Must hydrate.

In: Health Protection Scotland, ed2017. Available from:

<http://www.hps.scot.nhs.uk/haic/sutin.aspx>

RATIONAL: The Scottish UTI Network developed their own urine colour chart and gave us permission to replicate it in this leaflet.



6. Kavouras SA. Assessing hydration status. *Current Opinion in Clinical Nutrition and Metabolic Care*. 2002;5(5):519-524. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/12172475>

RATIONALE: A literature review to examine the available techniques in assessing hydration status. The author concludes that **urine colour in most circumstances reflects the level of hydration** and is closely related to several urinary and plasma indices of hydration. Although, urine colour can be influenced by diet, drugs and illness.

7. Armstrong LE, Maresh CM, Castellani JW, et al. Urinary Indices of Hydration Status. International Journal of Sport Nutrition. 1994;4(3):265 - 279. Available from:

<http://journals.humankinetics.com/doi/pdf/10.1123/ijsn.4.3.265>

RATIONALE: Attempting to simplify the analysis of urine, Professor Armstrong oversaw a series of experiments, beginning in 1994, testing the validity of a numbered urine colour chart. The logic underlying the first study **(1) proposed that virtually anyone could determine her/his hydration state, if urine colour were directly proportional to the gain or loss of body water.** The initial laboratory study involved developing a **numbered scale of colours ranging from very pale yellow (number 1) to brownish green (number 8).** This research demonstrated that urine colour likely would be useful and effective during daily activities, exercise, and heavy labour.

ScienceDaily. Women who get frequent UTIs may reduce risk by drinking plenty of water. 2017;

<https://www.sciencedaily.com/releases/2017/10/171005190252.htm>.

Accessed 15/02, 2018.

8. Beetz R. Mild dehydration: a risk factor of urinary tract infection? Eur J Clin Nutr. 2003;57 Suppl 2:S52-58. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/14681714>

RATIONALE: A review of the literature. The discussion pertains to bacterial eradication from the urinary tract being partially dependent on urine flow and voiding frequency. **The authors postulate a connection between fluid intake and the risk of UTIs. However, experimental and clinical data on this subject are conflicting.** Experimental studies concerning the effect of water intake on susceptibility and course of UTIs were predominantly performed in the 60 s and 70 s. Despite many open questions, there has been no continuous research in this field. Only few clinical studies producing

contradictory results are available on the influence of fluid intake concerning the risk of UTI. One explanation for the inconsistency between the data might be the uncertainty about the exact amounts of fluid intake, which was mostly recorded in questionnaires. So far, there is no definitive evidence that the susceptibility for UTI is dependent on fluid intake. **Nevertheless, adequate hydration is important and may improve the results of antimicrobial therapy in UTI.** Results of experimental and clinical studies concerning urinary hydrodynamics are the basis for **advice given by expert committees to patients with UTI to drink large volumes of fluid, void frequently, and completely empty the bladder.** The combination of the behaviourally determined aspects of host defence and not simply increasing fluid intake is important in therapy and prophylaxis of UTI.

Included in the leaflet is the recommendation to remain hydrated as this is felt to be important to prevent dehydration, improve results for any antimicrobial therapy, to ensure frequent voiding and to prevent constipation.

ScienceDaily. Women who get frequent UTIs may reduce risk by drinking plenty of water. 2017;
<https://www.sciencedaily.com/releases/2017/10/171005190252.htm>.
Accessed 15/02, 2018.

9. Jepson RG, Williams G, Craig JC Cranberries for preventing urinary tract infections. Cochrane Database Syst Rev 2012; 10: CD001321. Available from: <http://cochranelibrary-wiley.com/doi/10.1002/14651858.CD001321.pub5/epdf>

RATIONALE: Data included in the meta-analyses showed that, compared with placebo, water or no treatment, cranberry products did not significantly reduce the occurrence of symptomatic UTI in **Older people: (RR 0.75, 95% CI 0.39 to 1.44)**. Many studies reported low compliance and high withdrawal/dropout problems which they attributed to palatability/acceptability of the products, primarily the

cranberry juice. Most studies of other cranberry products (tablets and capsules) did not report how much of the 'active' ingredient the product contained, and therefore the products may not have had enough potency to be effective. It is for this reason that we do not recommend use of cranberry products in the leaflet.

10. Characha G, Greensteinb A, Rabinovicha P, Groskopf I, Weintraub M. Alleviating Constipation in the Elderly Improves Lower Urinary Tract Symptoms. *Gerontology*. 2000;47:72-76.

Available from: <https://www.ncbi.nlm.nih.gov/pubmed/11287730>

RATIONALE: Prospective cohort study of fifty-two patients aged 65-89 years with chronic constipation and lower urinary tract symptoms (LUTS). Before treatment of constipation was initiated and on their monthly visits, patients completed a questionnaire regarding their constipation pattern, urinary symptoms, sexual function and mood, and underwent urinalysis. Urinary tract anatomy and residual urine were evaluated by abdominal ultrasound at the commencement and completion of the study. Patients were followed up for 4 months.

Fewer patients reported urgency, frequency and burning sensation during urination. Urinary stream disturbances improved in 32 of the 52 patients. Residual urine volume also significantly decreased. There was also a **significant decrease in the number of patients with bacteriurial events** and an improvement in sexual activity and mood.

Included in the leaflet is the recommendation to drink plenty of fluids and to prevent constipation as this may reduce urinary symptoms.

11. Amiri FN, Rooshan MH, Ahmady MH, Soliamani MJ. Hygiene practices and sexual activity associated with urinary tract infection in pregnant women. *Eastern Mediterranean Health Journal*. 2009;15(1). Available from:

http://apps.who.int/iris/bitstream/10665/117613/1/15_1_2009_0104_0110.pdf

RATIONALE: This study is in younger pregnant women but results showing that poorer hygiene is associated with UTIs may be transferable to older adults. This is a case–control study to determine the association of urinary tract infection (UTI) with genital hygiene practices and sexual activity in pregnant women attending prenatal clinics in Babol, Islamic Republic of Iran. A sample of 100 pregnant women with positive urine cultures (cases) were compared with 150 healthy pregnant women matched for age, social, economic and education status and parity (controls). Factors associated with UTI included sexual intercourse ≥ 3 times per week (OR = 5.62), recent UTI (OR = 3.27), **not washing genitals precoitus (OR = 2.16), not washing genitals postcoitus (OR = 2.89)** not voiding urine postcoitus (OR = 8.62) **and washing genitals from back to front (OR = 2.96). Low intake of fluids and voluntary urinary retention** were associated with UTI in women in this study.

12. Scholes D, Hooton TM, Roberts PL, Stapleton AE, Gupta K, Stamm WE. Risk factors for recurrent urinary tract infections in young women. *J Infect Dis.* 2000 Oct; 182(4):1177-1182. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/10979915>.

RATIONALE: This study is not in older women but the results could be transferable to an older sample. A case-control study of two populations in Seattle (USA), in which 229 university women and female health maintenance organisation enrollees with recurrent urinary tract infections were recruited. Independent risk factors for recurrent UTIs included: **intercourse frequency within the previous month without washing** (OR 5.8; 95% CI 3.1 to 10.6); spermicide use in the last 12 months (OR 1.8; 95% CI 1.1 to 2.9); new sexual partner during the past year (OR 1.9; 95% CI 1.2 to 3.2). Advice is given on how to prevent recurrent UTIs, including: **voiding after intercourse; increased fluid intake**; avoiding use of condoms with spermicide-coated lubricants. Noted were a few differences between case patients and control subjects in a wide variety of other behavioural exposures that have been reported or proposed as risk

factors for RUTI. **These included pre- and postcoital voiding, frequency of urination, wiping patterns, douching, use of hot tubs, frequent use of pantyhose or tights, and others.**

This reference is used to support the use of good hygiene practices when caring for genitals in order to prevent UTI.

13. Moore EE, Hawes SE, Scholes D, Boyko EJ, Hughes JP, Fihn SD. Sexual Intercourse and Risk of Symptomatic Urinary Tract Infection in Post-Menopausal Women. *Journal of General Internal Medicine*. 2008;23(5):595-599. Available from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2324148/>

RATIONALE: A 2-year, prospective, observational study of post-menopausal women to determine whether recent sexual intercourse, as documented by daily diaries, is associated with an increased risk of symptomatic UTI. One thousand and seventeen randomly selected post-menopausal women were enrolled. Women were asked to enter daily diary information on vaginal intercourse, medication use, and genito-urinary symptoms. The outcome of interest was symptomatic UTI. Of the 913 women, seventy-eight experienced 108 symptomatic UTIs, and 361 (40%) reported sexual intercourse in their diaries.

There was an increased hazard for UTI 2 calendar days after the reporting of sexual intercourse in the diaries (adjusted hazard ratio [HR], 3.42, 95% CI 1.49–7.80), while there was no evidence for an increased hazard associated with intercourse at other times. When the UTI criterion was relaxed from ≥ 105 CFU/mL to ≥ 104 CFU/mL, adding 9 UTI events to the analysis, the HR for UTI 2 days after intercourse changed slightly to 3.26 (95% CI 1.43–7.43). This evidence suggests that, as with younger women, **recent sexual intercourse is strongly associated with incident UTI** in generally healthy post-menopausal women. This study was not aimed at preventing UTI but does show that recent sexual intercourse in older women is associated with increased UTIs and therefore improved sexual hygiene may help in this group.

Section: If you have any of these symptoms seek advice from your pharmacist, nurse or doctor

14. Scottish Intercollegiate Guidelines Network (SIGN). Management of bacterial urinary tract infection in adults. 2012 Jul. Available from: <http://www.sign.ac.uk/assets/sign88.pdf>.

RATIONALE: A SIGN guideline, outlining symptoms of bacterial urinary tract infections as: **dysuria; frequency of urination; suprapubic tenderness; urgency; polyuria; haematuria**. Expert consensus is that, in women with symptoms of vaginal itch or discharge, alternative diagnoses to UTI should be explored. This guideline also provides details of UTI symptoms suggestive of pyelonephritis, including: **loin pain; flank tenderness; fever; rigors; other manifestations of systemic inflammatory response**, and suggests admission to hospital if there is no response to antibiotic treatment within 24 hours.

15. Arinzon Z, Shabat S, Peisakh A, Berner Y. Clinical presentation of urinary tract infection (UTI) differs with aging in women. Archives of Gerontology and Geriatrics. 2011 Oct, 55(2012:) 145–147. Available from: <http://www.sciencedirect.com/science/article/pii/S0167494311002202?via%3Dihub>

RATIONALE: An observational study of women over the age of 45 from a community clinic with confirmed UTI. Women who presented with urinary symptoms were divided into 2 age groups (45-54 years, n = 102, mean age 48.14 years and > 65 years n = 94, mean age 69.21 years). To obtain a homogeneous group, women aged 55-64 were excluded. Those with a confirmed UTI (>103cfu/ml of an uropathogen in midstream urine culture) were asked questions related to demographics, behaviours, medical history and symptoms. **There was a positive correlation between being older and reporting urine urgency, painful voiding, incontinence, low back-pain, and lower**

abdominal pain. Frequency, painful and burning urination and bladder pain was reported less with the older age group (though still reported). **Older women reported more generalized unspecific symptoms (lower abdominal pain, lower back pain, chills, constipation, and diarrhoea) and incontinence issues.** The study indicates that clinical presentation of UTI in older and younger (study specified pre and post-menopausal) women is slightly different. **The differences are presented not only by the voiding itself and by local symptoms but also by unspecified generalized symptoms that is especially important in older patients.**

16. Chu CM. Diagnosis and Treatment of Urinary Tract Infections Across Age Groups. American Journal of Obstetrics and Gynecology. 2018. Available from:

[http://www.ajog.org/article/S0002-9378\(17\)32805-3/pdf](http://www.ajog.org/article/S0002-9378(17)32805-3/pdf)

RATIONALE: An expert review of diagnosis and treatments of UTIs in different age groups. Authors suggest that the most diagnostic symptoms of urinary tract infections include change in **frequency, dysuria, urgency,** and presence or absence of vaginal discharge, but suggest that **urinary tract infections may present differently in older women.** Other symptoms include **suprapubic, vaginal, and urethral tenderness, as well as haematuria.** It is important to note that systemic symptoms, such as **nausea, vomiting, flank pain, upper back pain, and fevers may indicate ascension of infection to the upper urinary tract and should not be treated as uncomplicated UTI.**

17. Loeb M, Brazil K, Lohfeld L, McGeer A, Simor A, Stevenson K et al. Effect of a multifaceted intervention on number of antimicrobial prescriptions for suspected urinary tract infections in residents of nursing homes: cluster randomised controlled trial. *BMJ*. 2005 Sep; 331(7518):669. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1226247/>.

RATIONALE: A cluster randomised controlled trial in 24 nursing homes in Ontario, Canada, and Idaho, United States, with 12 allocated to a multifaceted intervention, and 12 allocated to usual care. A diagnostic and treatment algorithm was implemented in the multifaceted intervention, suggesting that urine cultures should only be ordered if there is a **fever of >37.9°C, or a 1.5°C increase** above baseline on at least two occasions over the previous 12 hours, and one or more of the following: **dysuria; urinary catheter; urgency; flank pain; shaking chills; urinary incontinence; frequency; gross haematuria; suprapubic pain**. Antibiotics should only be prescribed on a positive or pending culture ($>10^5$ CFU/mL). Fewer courses of antimicrobials were prescribed in the intervention nursing homes than in the usual care homes (weighted mean difference -0.49; 95% CI -0.93 to -0.06). The difference in total antimicrobial use between intervention and usual care groups was not significantly different (weighted mean difference -0.37; 95% CI -1.17 to 0.44). A multifaceted intervention using algorithms can reduce the number of antimicrobial prescriptions for UTIs in residents of nursing homes.

This algorithm is widely used and is a generally accepted tool for diagnosing and treating UTI. It is for this reason that the clinical features referred to in this algorithm have been highlighted in the leaflet.

18. Massa LM, Hoffman JM, Cardenas DD. Validity, Accuracy, and Predictive Value of Urinary Tract Infection Signs and Symptoms in Individuals With Spinal Cord Injury on Intermittent Catheterization. The Journal of Spinal Cord Medicine. 2016;32(5):568-573.

Available from: <https://www.ncbi.nlm.nih.gov/pubmed/20025153>

RATIONALE: A prospective cohort based on data from the first 3 months of a 1-year randomized controlled trial to evaluate UTI

prevention effectiveness of hydrophilic and standard catheters on fifty-six community-based individuals on intermittent catheterization (IC). Analysis of monthly urine culture and urinalysis data combined with analysis of monthly data collected using a questionnaire that asked subjects to self-report on UTI signs and symptoms and whether or not they felt they had a UTI. Overall, **"cloudy urine" had the highest accuracy** (83.1%), and second highest positive predictive value (61.3%) and sensitivity (65.5%). **"Foul smell in urine" had the second highest accuracy** (79.2%) and the third best sensitivity (48.3%).

19. Juthani-Mehta M, Quagliarello V, Perrelli E, Towle V, Van Ness PH, Tinetti M. Clinical features to identify urinary tract infection in nursing home residents: a cohort study. J Am Geriatr Soc. 2009;57(6):963-970. Available from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2692075/pdf/nihms97952.pdf>

RATIONALE: A prospective, observational cohort study conducted in five nursing homes. 551 nursing home residents were followed for one year for the development of clinically suspected UTI. Measurements included the combined outcome of bacteriuria (>100,000 colony forming units on urine culture) plus pyuria (>10 white blood cells on urinalysis). After 178,914 person-days of follow-up, 228 participants had 399 episodes of clinically suspected UTI with a urinalysis and urine culture performed; 147 episodes (37%) had bacteriuria plus pyuria. The clinical **features associated with bacteriuria plus pyuria were dysuria, change in character of urine, and change in mental status**. Absence of these clinical features identified residents at low risk of having bacteriuria plus pyuria (25%), while presence of dysuria plus one or both of the other clinical features identified residents at high risk of having bacteriuria plus pyuria (63%).

This study highlights the importance of altered mental state (confusion) and urine characteristics (odour and colour) in identifying

UTI, hence their inclusion in the leaflet.

Section: Although confusion is caused by urine infection consider other things that may also cause confusion

20. Pryor C, Clarke A. Nursing care for people with delirium superimposed on dementia. Nurs Older People. 2017;29(3):18-21. Available from:

<http://nrl.northumbria.ac.uk/30550/1/PryorAAM.pdf>

RATIONALE: This review describes a simple mnemonic called PINCH ME (**Pain, INfection, Constipation, deHydration, Medication, Environment**) which can help identify potential underlying causes of delirium superimposed on dementia (DSD) and considerations for care planning in patients with dementia. The mnemonic can easily be adapted to different clinical settings. This article explores the dichotomy in healthcare provision for 'physical' and 'mental' health, and the unique role nurses have when caring for people with DSD. In this article, dementia is contrasted with delirium and subtypes of delirium presentation are discussed. Nurses can recognise DSD through history gathering, implementation of appropriate care and effective communication with families and the multidisciplinary team.

Several members of the leaflet development steering group use the PINCH ME mnemonic in their clinical practice. Participants of the needs assessment (Carers and GP staff) reported it was very useful and reflected their own practice and experience of patients with confusion.

21. Siddiqi N, Harrison JK, Clegg A, et al. Interventions for preventing delirium in hospitalised non-ICU patients. Cochrane Database Syst Rev. 2016;3:CD005563. Available from:

<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005563.pub3/abstract>

RATIONALE: A systematic review to assess the effectiveness of interventions for preventing delirium in hospitalised non-Intensive Care Unit (ICU) patients. This review suggests that **lack of sleep and pain are important risk factors for delirium** although this was not the focus of the review.

22. Young J, Inouye SK. Delirium in older people. BMJ.

2007;334(7598):842-846. Available from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1853193/pdf/bmj-334-7598-cr-00842.pdf>

RATIONALE: A clinical review of delirium in older adults that demonstrates that the following are risk factors and precipitators of delirium: **Old age (over 65 years), physical frailty, severe illness, multiple diseases, dementia, admission to hospital with infection or dehydration, visual impairment, deafness, polypharmacy, alcohol excess, renal impairment, malnutrition** Precipitants (more than one may be present) **Lower respiratory tract infection, urinary infection/catheters, constipation, electrolyte disturbance (dehydration, renal failure, hyponatraemia or hypernatraemia), drugs (especially those with anticholinergic activity or psychoactive drugs), alcohol withdrawal, pain, neurological disorder (stroke, epilepsy, subdural haematoma), hypoxia, sleep deprivation, surgery (such as fractured neck of femur), environmental.** Medline and the Cochrane Library were searched from 1996 to 2006. Additional material from personal libraries of delirium references, focusing particularly on systematic reviews were also included.

23. Ahmed S, Leurent B, Sampson EL. Risk factors for incident delirium among older people in acute hospital medical units: a systematic review and meta-analysis. Age Ageing. 2014;43(3):326-

333. Available from:

<https://academic.oup.com/ageing/article/43/3/326/17725>

RATIONALE: A systematic review and meta-analysis of eleven articles. Total study population 2338 (411 patients with delirium/1927 controls). **The commonest factors significantly associated with delirium were dementia, older age, co-morbid illness, severity of medical illness, infection, 'high-risk' medication use, diminished activities of daily living, immobility, sensory impairment, urinary catheterisation, urea and electrolyte imbalance and malnutrition.** In pooled analyses, dementia (OR 6.62; 95% CI (confidence interval) 4.30, 10.19), illness severity (APACHE II) (MD (mean difference) 3.91; 95% CI 2.22, 5.59), visual impairment (OR 1.89; 95% CI 1.03, 3.47), urinary catheterisation (OR 3.16; 95% CI 1.26, 7.92), low albumin level (MD -3.14; 95% CI -5.99, -0.29) and length of hospital stay (OR 4.85; 95% CI 2.20, 7.50) were statistically significantly associated with delirium.

24. Inouye SK. Delirium in Older Persons. The new england journal of medicine. 2006;354(11): 1157-1165. Available from:

<http://www.nejm.org/doi/pdf/10.1056/NEJMr052321>

RATIONALE: A review article of delirium in older adults that demonstrates that **low mood and other emotional disturbances** can be a symptom or sign of delirium.

25. Inouye SK. Predisposing and Precipitating Factors for Delirium in Hospitalized Older Patients. Dement Geriatr Cogn Disord.

1999;10:393-400. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/10473946>

RATIONALE: This investigation proposes a multifactorial model of delirium aetiology, involving a complex interrelationship of predisposing (vulnerability) factors and precipitating factors (acute insults). An overview of risk factors for delirium identified in 14 studies published since 1980 is provided. Although these studies identify key risk factors for delirium, they do not allow the examination of the

interrelationship of predisposing and precipitating factors. Thus, presented are two prospective cohort studies which empirically examine: (1) predisposing (vulnerability) factors, (2) precipitating factors, and (3) the interrelationship of predisposing and precipitating factors. 3 of the studies examined in this review identified **dehydration as a risk factor for delirium**. Other risk factors identified include **cognitive impairment, older age, psychoactive drug use, severe illness/comorbidity, azotemia/dehydration, male gender, alcohol abuse, infection/fever, metabolic abnormality**.

Section: What can you do to help feel better?

26. Little P. Antibiotics or NSAIDs for uncomplicated urinary tract infection? BMJ. 2017;359:j5037. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/29117972>

RATIONALE: An editorial discussion around antibiotics or NSAID's for UTIs. The author suggests **Paracetamol could be used more regularly as the first line analgesic in UTIs** as it seems to be associated with a lower risk of adverse outcomes compared to nonsteroidal anti-inflammatories. The authors conclude however, that more evidence is needed to support the use of paracetamol in treating UTIs.

27. Kronenberg A, Butikofer L, Odutayo A, et al. Symptomatic treatment of uncomplicated lower urinary tract infections in the ambulatory setting: randomised, double blind trial. BMJ.

2017;359:j4784. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/29113968>

RATIONALE: PHE decided to not include Ibuprofen as a recommended self-care treatment for older adults with UTI, due to the increased risk of pyelonephritis in this study with NSAID. However, there may be a place for the use of NSAIDs for pain relief with antibiotics but more studies are needed to establish any risks from

this. This study is a Randomised, double blind, non-inferiority trial in 17 general practices in Switzerland. 253 women with uncomplicated lower UTI were randomly assigned 1:1 to symptomatic treatment with the NSAID diclofenac (n=133) or antibiotic treatment with norfloxacin (n=120). The primary outcome was resolution of symptoms at day 3 (72 hours after randomisation and 12 hours after intake of the last study drug). The prespecified principal secondary outcome was the use of any antibiotic (including norfloxacin and fosfomycin as trial drugs) up to day 30. Analysis was by intention to treat. Six women in the diclofenac group (5%) but none in the norfloxacin group received a clinical diagnosis of pyelonephritis (P=0.03). **Diclofenac is inferior to norfloxacin for symptom relief of UTI and is likely to be associated with an increased risk of pyelonephritis**, even though it reduces antibiotic use in women with uncomplicated lower UTI.

The steering group felt strongly that Ibuprofen should not be recommended as a self-care pain relief due to the risk of pyelonephritis identified in this study.

Section: What might your pharmacist/nurse/doctor do?

28. Public Health England. National Antibiotic Management Guidance: The TARGET Antibiotics Toolkit. 2012; Available from: <https://www.gov.uk/government/publications/managing-common-infections-guidance-for-primary-care>

RATIONALE: The guidance states: 'As antibiotic resistance and Escherichia coli bacteraemia in the community is increasing, **use nitrofurantoin first line, always give safety net and self-care advice, and consider risks for resistance**'

29. Leydon GM, Turner S, Smith H, Little P, UTIS Team. Women's views about management and cause of urinary tract infection:

qualitative interview study. *BMJ*. 2010 Feb; 5(340):1-7. Available from: <http://www.bmj.com/content/bmj/340/bmj.c279.full.pdf>

RATIONALE: A retrospective study, aiming to explore the views of women with urinary tract infections on the acceptability of different strategies for managing the infection, including delayed use of antibiotics, and the cause of infection. 21 women presenting to general practices across Southern England were included. **Results indicated that women preferred not to take antibiotics, and were open to alternative management approaches**, due to wanting to avoid the side-effects of antibiotic therapy. Most of the participants with experience of antibiotic use had developed **thrush, skin rash, and gastrointestinal side-effects as a consequence**, and this mediated their desire for antibiotic medication. **The authors conclude that if women are asked to delay taking antibiotics, the clinician must address the particular worries that women might have, and explain the rationale for not using antibiotics immediately. Safety netting is important if this strategy is used.**

30. Public Health England. Urinary tract infection: diagnosis guide for primary care. Gov.uk 2017. Available from: <https://www.gov.uk/government/publications/urinary-tract-infection-diagnosis>

RATIONALE: Guidance for primary care on diagnosing and understanding culture results for urinary tract infection (UTI). The guidance states '**Only send urine for culture if two or more signs of infection, especially dysuria, fever >38°C, or new incontinence**' and 'treat with first line agents if UTI probable'.

Section: Always trust your pharmacist's/nurse's/doctor's advice about antibiotics

31. National Institute for Health and Care Excellence. Antimicrobial stewardship: changing risk related behaviours in the general population. 2017. Available from:

<https://www.nice.org.uk/guidance/ng63/resources/antimicrobial-stewardship-changing-riskrelated-behaviours-in-the-general-population-pdf-1837572082117>

RATIONALE: This guideline covers making people aware of how to correctly use antimicrobial medicines (including antibiotics) and the dangers associated with their overuse and misuse. It also includes measures to prevent and control infection that can stop people needing antimicrobials or spreading infection to others. **It aims to change people's behaviour to reduce antimicrobial resistance and the spread of resistant microbes.** The guideline also includes the importance of self-care advice for the general public.

32. Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients – systematic review and meta-analysis. *BMJ*. 2010 May; 18(340):1-11. Available from:

<http://www.bmj.com/content/bmj/340/bmj.c2096.full.pdf>

RATIONALE: A systematic review and meta-analysis, aiming to investigate subsequent antibiotic resistance in individuals prescribed antibiotics in primary care. 24 studies were included, 22 of which involved patients with symptomatic infection, and two of which involved healthy volunteers. In five studies of urinary tract bacteria (14,348 participants), the pooled odds ratio for resistance was 2.5 (95% CI 2.1 to 2.9) within two months of antibiotic treatment, and 1.33 (95% CI 1.2 to 1.5) within 12 months. Studies reporting the quantity of antibiotic prescribed found that **longer duration and multiple courses were associated with higher rates of resistance.** The authors conclude that individuals prescribed an antibiotic in primary care for a urinary infection develop bacterial resistance to that antibiotic. **The effect is greatest in the month immediately following treatment, but may persist for up to 12 months.** This effect not only increases the population carriage of organisms resistant to first line antibiotics, **but also creates the conditions for increased use of second-line antibiotics in the community.**

33. Alanis AJ. Resistance to antibiotics: are we in the post-antibiotic era? *Arch Med Res.* 2005 Dec; 36(6):697-705. Available from: <http://www.sciencedirect.com/science/article/pii/S0188440905002730>.

RATIONALE: A review article, stating that serious infections caused by bacteria that have become resistant to commonly used antibiotics have become a major global healthcare problem in the 21st century. This review states that the single largest cause of antibiotic resistance is the indiscriminate and inappropriate use of antibiotics in outpatient clinics, hospitalised patients, and in the food industry. **The authors state that antibiotics should only be taken on advice from a healthcare professional** for a bacterial infection that shows susceptibility to that particular antibiotic. This review also states that new mechanisms of resistance have resulted in the simultaneous development of resistance to several antibiotic classes, creating very dangerous multidrug-resistant bacterial strains, also known as ‘super-bugs’. The potential negative consequences of this are that they put society at risk for the spread of potentially serious multi-drug resistant bacterial infections.

Section: When should you get help?

34. The UK Sepsis Trust. Do I have sepsis? 2016 Mar. Available from: <https://sepsistrust.org/news/what-is-sepsis/>.

RATIONALE: A UK Sepsis Trust website. The website states that if someone has early signs of a **flu-like illness, chest infection, diarrhoea and vomiting, or an inability to eat and drink**, together with one of the symptoms of sepsis, immediate medical advice should be sought. This website defines the symptoms of sepsis as: **slurred speech; extreme shivering or muscle pain; passing no urine (in a day); severe breathlessness; skin mottled or discoloured.**

35. National Institute of Health and Care Excellence (NICE). Sepsis: Recognition, diagnosis and early management. 2016 Jul. Available from: <https://www.nice.org.uk/guidance/ng51/resources/sepsis-recognition-diagnosis-and-early-management-1837508256709>.

RATIONALE: A NICE guideline for health care staff, stating that people with sepsis may have non-specific, non-localised presentations, such as feeling generally unwell without a high temperature of over 38°C. This guideline presents a risk stratification tool for adults, children and young people aged 12 years and over with suspected sepsis. Where high temperature is recognised as a cause for concern, this guideline also lists **a tympanic temperature of less than 36°C as a moderate to high risk criteria for sepsis** along with objective evidence of **new altered mental state, respiratory rate of 25 breaths per minute or above, or new need for 40% oxygen or more to maintain oxygen saturation more than 92% (or more than 88% in known chronic obstructive pulmonary disease)** heart rate of more than 130 beats per minute systolic blood pressure of 90 mmHg or less, or systolic blood pressure more than 40 mmHg below normal **not passed urine in previous 18 hours (for catheterised patients, passed less than 0.5 ml/kg/hour)** **mottled or ashen appearance cyanosis of the skin, lips or tongue non-blanching rash of the skin.**

36. Little P, Turner S, Rumsby K, Warner G, Moore M, Lowes JA et al. Dipsticks and diagnostic algorithms in urinary tract infection: development and validation, randomised trial, economic analysis, observational cohort and qualitative study. *Health Technol Assess*. 2009 Mar; 13(19):1-73. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/19364448>.

RATIONALE: A collation of six studies, aiming to estimate clinical and dipstick predictors of infection and develop and test clinical scores, and to compare management using clinical and dipstick scores with commonly used alternative strategies. The results showed that, in women with uncomplicated UTI, the negative predictive value when

nitrite, leukocytes, and blood are all negative was 76%. The positive predictive value for having nitrite and either blood or leukocytes was 92%. Moderate to severe UTI is defined as having a higher symptom score of two or more of: urine cloudiness; smell; nocturia; dysuria.

Results also suggested that women suffer 3.5 days of moderately bad symptoms with immediate antibiotics, and 4.8 days if taking antibiotics is delayed for 48 hours. The authors conclude that, to achieve good symptom control and reduce antibiotic use, clinicians should either offer a 48-hour delayed antibiotic prescription to be used at the patient's discretion, or target antibiotic treatment by dipsticks (positive nitrite or positive leukocytes and blood) with the offer of a delayed prescription if dipstick results are negative. **Those treated with empirical therapy should, however, seek further advice if their symptoms do not start to improve within 48 hours.**

Additional reading – papers not cited in the leaflet

37. Kranjcec B, Papes D, Altarac S. D-mannose powder for prophylaxis of recurrent urinary tract infections in women: a randomized clinical trial. World J Urol. 2014;32(1):79-84. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/23633128>

RATIONALE: In 1 RCT Kranjcec et al 2014 (N=308) compared D-mannose (2gms in 200mls per day) with antibiotic prophylaxis (nitrofurantoin 50mg a day) and with no treatment. **Patients in the D-mannose group and the antibiotic prophylaxis group had a significantly lower risk of recurrent UTI episodes during therapy compared to patients in the no treatment group (RR 0.239 and 0.335, P<0.0001).** Patients in the D-mannose group had a significantly lower risk of side effects compared to patients in Nitrofurantoin group (RR 0.276, P<0.0001), but the clinical importance of this finding is low because Nitrofurantoin was well tolerated. D-mannose works by sticking to *E.coli* lectin on their fimbria preventing adhesion to the bladder, so promoting an immune response. This is high quality evidence and there is no reason why this should not give similar

results in older women although further studies will be needed in both age groups to confirm these excellent results.

Health professionals may want to consider recommending D-mannose as an alternative preventative treatment.

38. Eriksen BC. A randomized, open, parallel-group study on the preventive effect of an estradiol-releasing vaginal ring (Estring) on recurrent urinary tract infections in postmenopausal women. *Am J Obstet Gynecol*. 1999 May; 180(5):1072-1079. Available from: <http://www.sciencedirect.com/science/article/pii/S0002937899705971>.

RATIONALE: A randomised controlled trial of moderate quality, including 108 postmenopausal women, aiming to detect a difference in time until the first recurrence of a urinary tract infection during treatment with an estradiol-releasing silicone vaginal ring, versus no oestrogen treatment. 53 women were randomly assigned to the estradiol-releasing vaginal ring (Estring) group, and 55 were assigned to the control group. **Results indicated that approximately 45% of the women with the vaginal ring remained free of disease, in comparison to approximately 20% in the control group (p=.008).** The vaginal ring lowered vaginal pH, and the time to first recurrence was effectively prolonged by the treatment. The authors conclude that the use of vaginal oestrogen can be considered for the prevention of recurrent UTI in postmenopausal women.

Health professionals may want to consider recommending vaginal hormone treatment to postmenopausal women as an alternative preventative treatment.

39. Perrotta C, Aznar M, Mejia R, Albert X, Ng CW. Oestrogens for preventing recurrent urinary tract infection in postmenopausal women. *Cochrane Database Syst Rev*. 2008(2):CD005131. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/18425910>

RATIONALE: A meta-analysis of 9 RCTs examining the efficacy of oestrogen in decreasing the rate of recurrent urinary tract infection in postmenopausal women and their safety. All studies within the meta-10 analysis included post-menopausal women defined as more than 12 months since their last menstrual period. Recurrent urinary tract infection was defined as 3 episodes of infection in the last 12 months or 2 episodes of infection in the last 6 months. The meta-analysis included comparisons of oral oestrogens 14 versus placebo, vaginal oestrogen versus placebo and vaginal oestrogen versus oral 15 antibiotics. The main efficacy outcome was reduction in recurrent urinary tract infection. **They found that oestrogen administered as a cream with an applicator showed a significant reduction in recurrent urinary tract infection when compared to placebo during an 8-35 month treatment period, and vaginal oestrogen cream was significantly more effective than ofloxacin (600mg a 46 day) in reducing recurrent urinary tract infection at the end of the 3-month treatment period.** The benefit only lasted as long as participants were on treatment. No benefit was seen 2 months after stopping treatment.

Health professionals may want to consider recommending vaginal hormone treatment to postmenopausal women as an alternative preventative treatment.

40. UK Government advice on Coronavirus (COVID-19). November 2020.
Available at: <https://www.gov.uk/coronavirus>

RATIONALE: Latest Government guidance for healthcare professionals and patients on COVID-19. A high temperature can be a sign of a UTI but it is also a sign of COVID-19. Guidance as of November 2020 states that if you exhibit signs of COVID-19 you should arrange for a test and self-isolate.