

Cystitis: Management and antimicrobial stewardship considerations

Circular: September 2025

ISSN 2982-0014

Introduction

Cystitis is inflammation of the bladder, most commonly caused by bacterial infection and is among the most frequent infections encountered in community, hospital, and aged care settings. It is a major driver of antimicrobial prescribing and, when mismanaged, can contribute to antimicrobial resistance (AMR), adverse drug effects, and increased healthcare costs¹⁻³. While cystitis falls within the broader category of urinary tract infections (UTIs), it is typically considered an uncomplicated infection unless patient factors or clinical severity indicate otherwise. Other related conditions include catheter-associated UTIs and asymptomatic bacteriuria, while complicated UTIs include pyelonephritis and prostatitis. Effective management of cystitis relies on accurate diagnosis, appropriate antimicrobial selection where indicated, and guidance from evidence-based guidelines or microbiology results.



Risks of inappropriate antimicrobial use

- Increased morbidity and mortality
- Prolonged infection and/or treatment failure
- Antimicrobial adverse effects and/or toxicity
- Greater healthcare burden and cost
- Antimicrobial resistance

Guideline recommendations – Cystitis¹

Non-pregnant adult females

- For non-pregnant adult females < 65 years who are not immunocompromised and present with mild, uncomplicated symptoms (dysuria, urinary frequency, or urgency without systemic features), initial **non-antibiotic management** may be considered

Evidence suggests that many mild cases of cystitis are **self-limiting**, with symptoms often improving within a few days. Non-antibiotic management includes the use of simple analgesia including paracetamol or non-steroidal anti-inflammatory medicines (e.g., ibuprofen), increased oral fluid intake, and supportive measures

If symptoms persist or worsen despite initial supportive measures, commence empirical therapy in line with *Therapeutic Guidelines*:

1. Nitrofurantoin 100 mg orally 6-hourly for 5 days^{**}
2. Fosfomycin 3 g orally as a single dose
3. Trimethoprim 300 mg orally once daily for 3 days^{†‡}
4. If all of the above are **unsuitable**, consider cefalexin 500 mg orally 12-hourly for 5 days[†]

- For adult females ≥ 65 years, empirical antibiotics with analgesia are generally recommended. *Therapeutic Guidelines* recommends for empirical therapy:

1. Nitrofurantoin 100mg orally 6-hourly for 5 days^{**}
2. Fosfomycin 3g orally as a single dose
3. Trimethoprim 300mg orally daily for 3 days^{†‡}
4. If all of the above are **unsuitable**, consider cefalexin 500mg orally 12-hourly for 5 days[†]

Pregnant patients

- Always obtain a midstream urine sample for culture and susceptibility testing before starting antibiotics. Empirical therapy should be commenced while awaiting results, with regimens adjusted for safety in pregnancy and susceptibility results. *Therapeutic Guidelines* recommends for empirical therapy:

1. Nitrofurantoin 100mg orally 6-hourly for 5 days[†]
2. Cefalexin 500mg orally 12-hourly for 5 days[†]
3. Fosfomycin 3g orally as a single dose

Adult males

- Uncomplicated cystitis is **uncommon** and bacterial prostatitis should be excluded prior to treatment. If prostatitis is **unlikely**, *Therapeutic Guidelines* recommends for empirical therapy:

1. Nitrofurantoin 100mg orally 6-hourly for 5 days^{**}
2. Trimethoprim 300mg orally daily for 7 days^{†‡}
3. If all the above are **unsuitable**, consider cefalexin 500mg orally 12-hourly for 7 days[†]

Special clinical considerations

- Patients who are immunocompromised, present with systemic features (e.g., flank pain, vomiting, fever ≥ 38°C, costovertebral tenderness), or experience recurrent infections require a broader assessment.

Consider pyelonephritis, prostatitis, or sepsis as these patients may require hospitalisation and intravenous antimicrobials.

* Nitrofurantoin is safe and effective for short-term treatment (5–7 days) of acute cystitis in patients with an eGFR ≥30 mL/min, with serious adverse effects generally associated with prolonged use

† Dosage adjustment may be required in adults with kidney impairment

‡ Trimethoprim is no longer recommended as first-line therapy due to increasing *Escherichia coli* resistance rates

National Antimicrobial Prescribing Survey

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Asymptomatic bacteriuria¹⁻³



Definition: Presence of bacteria in the urine (confirmed on culture) without signs or symptoms of UTI.



When to screen: Indicated only in pregnant patients and those undergoing elective urological procedures that breach the mucosa.



Pregnancy: Targeted antimicrobial therapy reduces the risk of pyelonephritis, preterm birth, and low birth weight. Consider screening at 12 to 16 weeks gestation (or at the first antenatal visit if later), using a midstream urine culture.



Elective urological procedures: Patients with confirmed bacteriuria should be treated with antimicrobials even if asymptomatic. The aim is to reduce bacterial load at the time of surgery and minimise perioperative infection risk.

Management:

Where antimicrobial therapy is indicated, it should be guided by urine culture and susceptibility results.

Do **not** screen or treat asymptomatic bacteriuria in other populations (e.g., older adults, catheterised patients, or those with diabetes). Antimicrobial therapy does not improve outcomes in these groups and increases the risk of adverse effects and AMR.

Catheter-associated UTI^{1,2}



Clinical suspicion: Consider in catheterised patients with **new or worsening signs and symptoms**, such as fever, rigors, altered mental status, or flank pain.



Diagnostic testing: Do **not** perform routine urine cultures in asymptomatic catheterised patients. Only obtain urine samples when a catheter-associated UTI is suspected.



Specimen collection: Always **remove or replace the catheter** prior to collecting a urine sample and before initiating antimicrobial therapy, to improve accuracy and reduce biofilm contamination.

Management:

Do **not** treat asymptomatic catheterised patients.

- When treatment is indicated, select antimicrobials based on urine culture and susceptibility results.
- **Catheter removal is essential** before starting antimicrobials, as biofilm limits antimicrobial penetration. Treatment without catheter removal often results in transient improvement and contributes to AMR.

Prevention:

Prophylactic antimicrobials are **not recommended** either to prevent catheter-associated UTIs or following routine urethral catheter removal.

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Hospital NAPS 2024



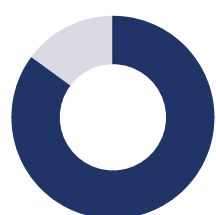
890

prescriptions were for empiric treatment of acute cystitis



2%

of all antimicrobial prescriptions



87%

of prescriptions had an indication documented



62%

of prescriptions had a review or stop date documented



24%

of prescriptions were intravenous

Compliance with guidelines*



41% of prescriptions (342 prescriptions) were non-compliant with guidelines

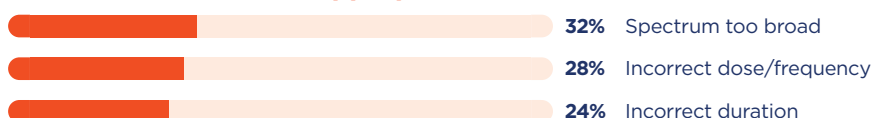
*Excluding 34 prescriptions for directed therapy and 21 prescriptions which were not assessable/no guidelines available

Appropriateness



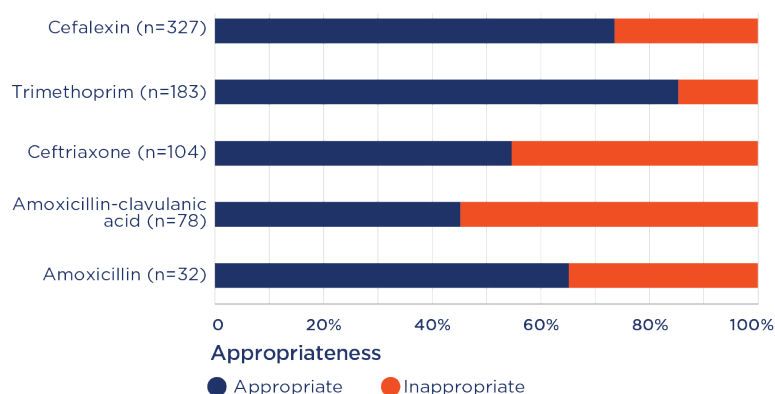
30% of prescriptions (268 prescriptions) were deemed inappropriate

Common reasons for inappropriateness



Most common antimicrobials and prescribing appropriateness*

Antimicrobials (n=number of prescriptions)



Most common reasons for inappropriateness

(% out of all inappropriate prescriptions per antimicrobial)

Cefalexin

49% incorrect dose/frequency

Trimethoprim

52% incorrect duration

Ceftriaxone

54% spectrum too broad

Amoxicillin-clavulanic acid

53% spectrum too broad

Amoxicillin

55% incorrect duration

*Excluding prescriptions marked as not assessable (17 prescriptions for acute cystitis)



Tips

- Avoid amoxicillin-clavulanic acid for empirical treatment of cystitis as it provides unnecessary broad spectrum of activity, which promotes antimicrobial resistance and increases the risk of *Clostridioides difficile* infection
- Avoid quinolones (e.g., ciprofloxacin, norfloxacin) due to increased risk of adverse effects and development of resistance

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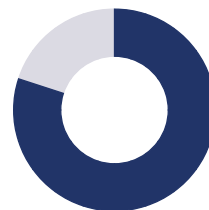
Aged Care NAPS 2024



15%
of all prescriptions
were for cystitis
(1,418 prescriptions)



42%
were prescribed
for prophylaxis



82%
of prescriptions
had an indication
documented



22%
of these
prescriptions had
a duration > 6
months



65%
of these had a
duration > 7 days
at the time of
auditing



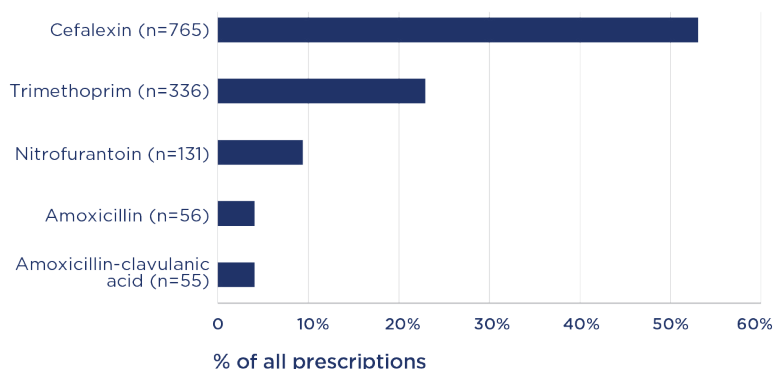
62%
of prescriptions had
a review or stop
date documented

Key messages

- The usual treatment duration for uncomplicated acute cystitis is 3 to 5 days in females (except for fosfomycin, which is a single dose) and 7 days in males¹
- UTI prophylaxis is generally reviewed or ceased after 6 months. If UTI recurs, reassess the patient to determine most appropriate preventive strategy
- Cease antibiotics if there is no clinical benefit or if the urine culture does not support a UTI diagnosis, especially in residential aged care homes where overtreatment is common and contributes harm to residents and antimicrobial resistance¹

Top 5 antimicrobials prescribed in Residential Aged Care Homes for cystitis

Antimicrobials (n=number of prescriptions)



Notes²

- Nitrofurantoin is the first-line treatment of acute cystitis in adults, due to increasing *Escherichia coli* resistance to trimethoprim
- Amoxicillin-clavulanic acid is **not** recommended for empirical treatment, as it provides unnecessarily broad spectrum activity
- Cefalexin is **only** recommended when nitrofurantoin, trimethoprim, and fosfomycin (in non-pregnant females) are unsuitable

¹Excluding prescriptions marked as not assessable (14 prescriptions for acute cystitis)

Non-antibiotic therapies¹

Treatment

- There is insufficient evidence to support the use of cranberry products, ascorbic acid (vitamin C), or methenamine hippurate (e.g., Hiprex®) for the treatment of acute cystitis.
- Urinary alkalinisers (e.g., Ural®) may relieve symptoms but can reduce the efficacy of nitrofurantoin and should be avoided during its use.

Prophylaxis

- For non-pregnant females under 50 years with recurrent UTIs, evidence suggests that methenamine hippurate reduces the incidence, and cranberry products may be effective as prophylaxis although further research is required to confirm efficacy, optimal product, and dosing.
- Ascorbic acid does not appear to be effective

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Implications for clinical practice

-  Ensure appropriate assessment of clinical signs and symptoms to differentiate UTI from asymptomatic bacteriuria prior to initiating antimicrobials
-  Switch to directed antimicrobial therapy using the narrowest effective antimicrobial based on susceptibility results
-  Document the indication, intended duration, and review date clearly to improve patient care and support antimicrobial stewardship
-  Reserve intravenous therapy for patients who are systemically unwell or unable to tolerate oral therapy. Consider switching to oral therapy once patient is clinically stable and able to tolerate oral treatment
-  Refer to evidence-based guidelines e.g., *Therapeutic Guidelines*, to ensure correct regimen, dose, frequency, and duration are prescribed. Management guidelines are regularly reviewed and updated to reflect resistance patterns and support antimicrobial stewardship through shortened treatment durations
-  Review and reassess the need of long-term UTI prophylaxis, at least every 6 months

About the NAPS

The National Antimicrobial Prescribing Survey (NAPS) is a standardised auditing program assisting hospitals, residential aged care homes, and other health services with assessing the quality of antimicrobial prescribing. It is coordinated by the Royal Melbourne Hospital Guidance Group and the National Centre for Antimicrobial Stewardship (NCAS), based in Melbourne, Australia. The NAPS is a program partner in the Antimicrobial Use and Resistance in Australia (AURA) surveillance program and is funded by and collaborates with the Australian Government Department of Health, Disability and Ageing, and also works closely with the Australian Commission on Safety and Quality in Health Care.

To learn more about the program, visit the NCAS website: www.ncas-australia.org
For support, contact the NAPS team via email: support@naps.org.au

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Preferred citation: Royal Melbourne Hospital and the National Centre for Antimicrobial Stewardship. 2025. National Antimicrobial Prescribing Survey. Cystitis: Management and antimicrobial stewardship considerations. Circular: September 2025. Melbourne. Royal Melbourne Hospital and the National Centre for Antimicrobial Stewardship.

1. Antibiotic [published March 2025]. In: *Therapeutic Guidelines*. Melbourne: Therapeutic Guidelines Limited; accessed 02/06/2025. <https://www.tg.org.au>
2. EAU Guidelines on Urological Infections [published March 2025]. In: European Association of Urology. Arnhem: European Association of Urology; accessed 02/06/2025. <https://uroweb.org/guidelines/urological-infections>
3. Givler DN, Givler A. Asymptomatic Bacteriuria. [Updated 2023 Jul 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan. <https://www.ncbi.nlm.nih.gov/books/NBK441848/>