



Best Practice Reminder

**Avoid Nitrofurantoin in
the Treatment of
Pyelonephritis**

This document has been prepared by the Dr Tessa Lewis (GP & Medical Adviser) and Dr Ian Hill-Smith (GP & Director of the National Minor Illness Centre) with support from the All Wales Prescribing Advisory Group (AWPAG) and the All Wales Therapeutics and Toxicology Centre (AWTTC), and has subsequently been endorsed by the All Wales Medicines Strategy Group (AWMSG).

Please direct any queries to AWTTC:

All Wales Therapeutics and Toxicology Centre
The Routledge Academic Centre
University Hospital Llandough
Penlan Road
Llandough
Vale of Glamorgan
CF64 2XX

awttc@wales.nhs.uk

029 218 26900

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Grŵp Strategaeth Meddyginiaethau Cymru Gyfan
All Wales Medicines Strategy Group



BEST PRACTICE REMINDER: AVOID NITROFURANTOIN IN THE TREATMENT OF PYELONEPHRITIS

Appropriate antibiotic use in suspected urinary tract infection (UTI) reduces the risk of infection with multi-resistant organisms and treatment failure which can lead to sepsis. Improving the management of UTIs is important for patient safety and antimicrobial stewardship. For guidance on antibiotic use in patients with UTI, please refer to the All Wales Medicines Strategy Group (AWMSG) [Primary Care Empirical Urinary Tract Infection Treatment Guidelines](#)¹, NICE guidelines and local formulary information.

Pyelonephritis (see [NICE Clinical Knowledge Summary on diagnosis](#))

Whenever there are systemic features associated with a urinary infection (including, fever, rigors, nausea, vomiting or flank pain), pyelonephritis or sepsis should be suspected as these are not features of cystitis (for more information on recognition and management of sepsis, see NICE guideline NG51 – [Sepsis: recognition, diagnosis and early management](#)). If pyelonephritis is suspected, a mid-stream urine (MSU) test should be requested.

Nitrofurantoin should not be used if there are symptoms of pyelonephritis (such as fever), because it will not achieve adequate levels in renal tissue².

Rationale

When treating a typical female patient with symptoms of lower UTI (such as frequency, dysuria and new nocturia), treatment with a three-day course of nitrofurantoin modified release (MR) is a recommended option¹. In this example, nitrofurantoin is an excellent antibiotic choice because it is very rapidly eliminated by the kidneys into the urine, which is the site of the infection. Blood levels are low, so systemic side-effects and the impact of the antibiotic on healthy bacteria in the gut are minimised.

Avoid nitrofurantoin in patients with an estimated Glomerular Filtration Rate (eGFR) < 45 mL/min/1.73m². For further information on cautionary use in patients with renal impairment, please refer to the product Summary of Product Characteristics and BNF.

Because nitrofurantoin cannot reach the required therapeutic concentrations in renal tissue, it should not be used to treat pyelonephritis (upper urinary tract infection)².

A seven-day antibiotic course should be used in cases of complicated lower UTI¹.

Suspected UTI – General action points for healthcare professionals

- **Is it really a UTI?** Consider vaginal discharge, post-menopausal atrophy, sexually transmitted infection. If a patient presents with confusion, other causes should also be considered (see Box 1. PINCH ME)³.
- **Ask about severity:** Symptoms and signs which could be associated with pyelonephritis and sepsis.
- **Consider other relevant factors:** for example, catheter or pregnancy-associated, recurrent, structural or functional abnormality. This may influence your treatment choice and duration.

Box 1. PINCH ME
(other causes of delirium)

P: Pain
I: other Infection
N: poor Nutrition
C: Constipation
H: poor Hydration

M: other Medication
E: Environment change

Current practice

Informal quiz responses from autumn 2019 (over 175 responses) suggest many prescribers are not aware that nitrofurantoin is inappropriate for treating pyelonephritis.

Examples of nitrofurantoin prescribing (2020)

1. A young woman with severe flank pain, nausea and fever, prescribed nitrofurantoin over the phone.
Note: The likely diagnosis is pyelonephritis. Antibiotics such as nitrofurantoin, fosfomycin and pivmecillinam, are to be avoided as they do not reach adequate levels in renal tissue.
2. A gentleman in his late 70s with a three-day history consistent with UTI, with a 38-39°C fever for two days with shivers and flank pain. When assessed on day three he had no fever and was prescribed nitrofurantoin.
Note: Nitrofurantoin should not be used to treat suspected upper urinary tract infection (i.e. pyelonephritis)⁴.

* **Complicated** infection can be defined as all males with a UTI, or females with renal impairment, abnormal urinary tract, poorly controlled diabetes or immunosuppression¹.

3. A man with new lower UTI symptoms, history of sepsis secondary to UTI and acute kidney injury requiring intensive hospital treatment seven months ago. Renal function not known at point of prescribing nitrofurantoin.

Question: Would you be comfortable prescribing nitrofurantoin in these circumstances?

This patient may be at higher risk of treatment failure given the past history. If recent renal function cannot be established, be aware that in patients with renal impairment, renal secretion of nitrofurantoin is reduced. This may reduce the antibacterial efficacy, increase the risk of side effects (e.g. nausea, vomiting, loss of appetite), and may result in treatment failures⁴.

Table 1. Pyelonephritis (acute): antibiotic prescribing options in non-pregnant women and men (options are listed alphabetically)^{1,2}

Antibiotic	Dosage and course length	Antibiotic choice supported by:	
		AWMSG (under review) ^{*1}	NICE ²
Prescribers should follow local prescribing guidelines whenever possible and check recent MSU results.			
Cefalexin	500 mg twice or three times a day for 7 to 10 days		✓
Ciprofloxacin (consider safety issues [†])	500 mg twice a day for 7 days	✓	✓
Co-amoxiclav	500/125 mg three times a day for 7 to 10 days	✓ (7 days only)	✓ (Only if culture results available and susceptible)
Trimethoprim	200 mg twice a day for 14 days		✓ (Only if culture results available and susceptible)
Antibiotics that don't achieve adequate levels in renal tissue such as nitrofurantoin, fosfomycin and pivmecillinam, are to be avoided.			
MSU = mid-stream urine test			
* At the time of publication (February 2021), the All Wales Antimicrobial Guidance Group is in the process of reviewing their All Wales antimicrobial prescribing guidance prior to endorsement by AWMSG (including the antibiotic choices recommended in <i>Primary Care Empirical Urinary Tract Infection Treatment Guidelines</i>).			
† See MHRA advice for restrictions and precautions for using fluoroquinolone antibiotics due to very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at first signs of a serious adverse reaction (such as tendonitis); prescribing with special caution in people over 60 years; avoiding co-administration with a corticosteroid (MHRA, March 2019).			
See MHRA advice for precautions for using fluoroquinolones in patients at risk of heart valve regurgitation. Fluoroquinolones should only be used after careful benefit-risk assessment and after consideration of other therapeutic options. Patients should be advised to seek immediate medical attention if they experience: a rapid onset of shortness of breath, especially when lying down flat in bed; swelling of the ankles, feet, or abdomen; new-onset heart palpitations (MHRA, December 2020).			

Resources

- All Wales Medicines Strategy Group and All Wales Antimicrobial Guidance Group guidelines (2018)
 - [Primary Care Empirical Urinary Tract Infection Treatment Guidelines](#)
- NICE/PHE UTI antimicrobial prescribing guidelines (2018)
 - [Urinary tract infection \(lower\): antimicrobial prescribing \(NG109\)](#)
 - [Pyelonephritis \(acute\): antimicrobial prescribing \(NG111\)](#)
 - [Urinary tract infection \(catheter-associated\): antimicrobial prescribing \(NG113\)](#)
- Rapid update quiz slide set is available [here](#) – can be used in practice clinical meeting.
- RCGP [TARGET Antibiotics Toolkit](#)
- Public Health Wales – [Urinary Tract Infection resources and tools](#) (including Audit and Quality Improvement tools)

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