

Guidelines for Antibiotic prophylaxis in relation to urinary bladder catheterisation

Quick guide

Antibiotic prophylaxis indicated	Antibiotic prophylaxis NOT indicated
prosthetic joint / implant <6 weeks	Patients with risk factors for infective endocarditis
painless/chronic urinary retention	Patients with <i>established</i> prosthetic joints/ grafts / implants
removal of catheter following prostate surgery	painful / acute urinary retention
Based on one of the following risk factors:	catheter insertion pre-surgery
- history of symptomatic catheter-associated infection with previous catheter changes, OR	catheter insertion for fluid monitoring
- purulent urethral / suprapubic catheter site discharge, OR	catheter insertion for incontinence
- exit site colonisation with <i>S aureus</i> , OR	suprapubic catheter insertion
- multiple traumatic attempts to catheterise	

Summary of recommendations:

1. Patients with urinary tract infections (UTI) who require catheter insertion should be started on antimicrobial treatment prior to catheterisation wherever possible.
2. Uncatheterised patients known to have asymptomatic bacteriuria who require catheter insertion should be given a dose of antimicrobial prophylaxis prior to catheterisation according to susceptibilities of the urinary isolate.
3. Catheterised patients with urinary tract infections should be commenced on empirical treatment prior to catheter changes
4. Routine use of antimicrobial prophylaxis for urinary catheter insertion/change/removal solely for the prevention of endocarditis is not recommended
5. Routine use of antimicrobial prophylaxis for urinary catheter insertion/change/removal solely for the prevention of infection of *established* prosthetic joints and other medical implants is not recommended
6. Routine antimicrobial prophylaxis is not recommended for insertion of urinary catheters in patients with acute painful urinary retention
7. Routine antimicrobial prophylaxis is recommended for insertion of urinary catheters in patients with chronic painless urinary retention
8. A urine sample should be routinely collected for culture at the time of catheter insertion. Urinary tract infection, if confirmed, should be treated according to local guidelines and sensitivity results
9. Routine antimicrobial prophylaxis is not recommended for insertion of short term urinary catheters pre-operatively
10. Routine antimicrobial prophylaxis is not recommended for insertion of short term urinary catheters for fluid monitoring or incontinence management
11. Routine prophylaxis is recommended for insertion or removal of urinary catheters in the six weeks after joint replacement surgery
12. Routine prophylaxis is recommended for catheter removal following prostatic surgery
13. Prophylaxis is not otherwise recommended for catheter removal, unless the urine or urethral meatus is known to be colonised with *Staphylococcus aureus* (including MRSA)
14. Antimicrobial prophylaxis is not recommended at the time of initial insertion of long term indwelling urinary catheters or suprapubic catheters, provided there is NO clinical urinary tract infection OR known asymptomatic bacteriuria at the time of insertion (from previous urine samples).
15. Prophylaxis is not recommended for routine catheter changes unless a patient has:
 - a. a history of symptomatic urinary catheter-associated infection with previous catheter changes or purulent urethral/suprapubic catheter exit site discharge AND/OR
 - b. catheter or meatal/suprapubic catheter exit site colonisation with *Staphylococcus aureus* (including MRSA)
16. Prophylaxis may be considered following traumatic catheterisation or after multiple unsuccessful catheterisation attempts
17. Urinary catheters involved in urinary tract infection may need removal

Procedure	Prophylaxis recommended?	Evidence level	Prophylaxis- aims to reduce	Antimicrobial dose/route. Give iv/im gentamicin <1 hour prior to catheter manipulation
				Routine
A. All catheter insertions/change/removal				
i) In patients with endocarditis risk factors	NO. But follow this guideline for other indications.	C ^{1 2}	-	-
ii) In patients with <i>established</i> prosthetic joints, vascular grafts and other medical implants	NO. As above. See also B(v) for recent joint surgery in previous 6 weeks.	D	-	-
B. Short term catheterisation (<28 days)³				
i) insertion for painful (acute) urinary retention	NO. But follow UTI guideline if symptoms of UTI	B	-	-
ii) insertion for painless (chronic) urinary retention	YES (send CSU after catheterisation and treat if confirmed UTI)	D	Bacteraemia	Gentamicin 120mg iv/im single dose
iii) insertion pre-operation	NO. But catheterise after any routine surgical antimicrobial prophylaxis has been given.	B	-	-
iv) insertion for fluid monitoring, incontinence	NO	B	-	-
v) insertion or removal <6 weeks post joint replacement	YES	D	Prosthesis infection	Gentamicin 120mg iv/im single dose
vi) removal - post prostatic surgery	YES	D	UTI, bacteraemia	*Gentamicin 120mg iv/im single dose
vii) removal - all other indications	NO. Unless <i>Staphylococcus aureus</i> in urine or meatal sample	D	Bacteraemia	*Gentamicin 120mg iv/im single dose
C. Long term catheterisation (>28 days)³				
i) First time insertion	NO	B	-	-
ii) Suprapubic catheter insertion	NO	D	-	-
iii) catheter change/removal	Risk assess – see full guideline.	B ³	Bacteraemia	*Gentamicin 120mg iv/im single dose

Introduction

The aim of this guideline is to standardise the use of antimicrobial prophylaxis for urinary bladder catheterisation.

A review of antimicrobial prophylaxis recommendations for urinary bladder catheterisation has been prompted by:

- a general lack of clarity in the organisation about the need (or not) for antimicrobials in this situation and a desire for a standardised approach. The confusion in this area has been highlighted by a recent audit of gentamicin prescribing in the Trust.
- ongoing problems with *Clostridium difficile* infection in the Trust;
- publication of endocarditis prophylaxis guidelines by NICE.

Urinary tract infection (UTI) accounts for about 40% of hospital-acquired (nosocomial) infections, and about 80% of urinary tract infections acquired in hospital are associated with urinary catheters

^{4 5}. Between 5.7 and 9% of hospital-acquired bacteraemias are caused by urinary catheter-associated urinary tract infections (CA-UTI) ⁶ and attributable mortality has been reported to be 12.7% ⁷. Relative to the number of catheters inserted, secondary bacteraemia is an uncommon complication occurring in <4% of patients with urinary catheter-associated bacteriuria ⁸.

Insertion of urethral catheters is a very common procedure, carried out in 11% of inpatients in one European study ⁹ and has a variety of indications including: peri-operative urine collection, management of urinary incontinence/retention and to measure urine output in acutely unwell patients.

Many factors have been associated with catheter-associated urinary tract infections and there are multiple approaches to reducing these infections. These guidelines are solely concerned with systemic antimicrobial prophylaxis.

Where the recommendations in these guidelines do not seem appropriate for a particular patient, discussion of the patient with a microbiologist is advised.

In this guideline, the term catheter manipulation refers to either insertion, removal or change of a urinary catheter. This guideline does not cover patients who intermittently self-catheterise.

Background

There are relatively few studies of prophylaxis for routine catheter insertion. Most are not powered to detect any statistically significant difference in the rates of infection. These guidelines draw on national guidelines where available, a review of available evidence for specific areas of concern/controversy, and local consensus.

There is considerable variation in the practise of prophylaxis for urethral catheter insertion in the UK ¹⁰. Practice varies with patient group and between healthcare professionals ¹¹. Gentamicin is commonly used for insertion, change and removal; without a clear evidence base ¹⁰. The European Association of Urology guidelines on urological infection have recommended against antimicrobial prophylaxis for urinary catheter insertions. ¹²

Because urinary catheters are used in many different settings with different risks, a blanket approach to systemic antimicrobial prophylaxis would result in many patients receiving antimicrobials unnecessarily. These guidelines therefore deal with the common situations separately. Where a situation is not covered by the guideline or clinical circumstances require a different approach, discussion with microbiology is recommended.

* depending on susceptibility and vascular access – call microbiology if necessary

As a general principle, the risk of bacteraemia associated with catheterisation depends on prior urine colonisation or infection¹³.

Notes on selection of appropriate agent for prophylaxis

In some instances, for example in patients known to have prior asymptomatic bacteriuria who then undergo catheterisation, the choice of antibiotic agent should be based upon known sensitivity results for the bacterial isolate. Otherwise, the choice of antimicrobial agent for prophylaxis is based on spectrum of activity and renal excretion.

Gentamicin has broad anti-Gram-negative and anti-staphylococcal activity. It is excreted primarily in the urine, has a low propensity to cause *Clostridium difficile* infection or MRSA colonisation and is therefore an ideal agent for prophylaxis of UTI during catheter manipulation. The disadvantages of gentamicin use are the requirement for parenteral administration and a small (with single doses) risk of nephrotoxicity.

Part A: General recommendations

Recommendation: Patients with urinary tract infections (UTI) who require catheter insertion should be started on antimicrobial treatment prior to catheterisation wherever possible.

[Evidence level D]

Recommendation: Uncatheterised patients known to have asymptomatic bacteriuria who require catheter insertion should be given a dose of antimicrobial prophylaxis prior to catheterisation according to susceptibilities of the urinary isolate.

[Evidence level D]

Recommendation: Catheterised patients with urinary tract infections should be commenced on empirical treatment prior to catheter changes.

[Evidence level D]

Part B. Endocarditis, joint prostheses and other medical implants.

i) Recommendation: Routine use of antimicrobial prophylaxis for urinary catheter insertion/change/removal solely for the prevention of endocarditis is no longer recommended².

[Evidence level C]

NICE guidelines published in 2008 have recommended against routine endocarditis prophylaxis for patients deemed to be at high risk of endocarditis who undergo urological procedures (including catheter insertion). Urinary tract infections occurring in such patients should be investigated and treated appropriately.

ii) Recommendation: Routine use of antimicrobial prophylaxis for urinary catheter insertion/change/removal solely for the prevention of infection of *established* prosthetic joints and other medical implants is not recommended.

[Evidence level D]

Infections of established indwelling prostheses with urinary pathogens is a very rare complication of catheter withdrawal and does not justify the risks associated with routine prophylaxis^{14 15}.

Part B Short term urinary catheters

i) Recommendation: Routine antimicrobial prophylaxis is not recommended for insertion of urinary catheters in patients with acute painful urinary retention.

[Evidence level B]

Acute painful urinary retention is not usually associated with urinary tract infection, and prophylaxis is therefore not advised. One evidence-based review concluded that prophylaxis could not be recommended in this situation.¹⁶

A urine sample should be routinely collected for culture at the time of catheter insertion. If microscopy and culture results suggest the presence of infection then appropriate antibiotic treatment should be instituted based on sensitivity results. Urine samples collected *at the time of catheter insertion* should be labeled "Midstream urine" (MSU) rather than "CSU", so that a white blood cell count is performed.

ii) Recommendation: Routine antimicrobial prophylaxis is recommended for insertion of urinary catheters in patients with chronic painless urinary retention.

[Evidence level D]

Recommendation: A urine sample should be routinely collected for culture at the time of catheter insertion; UTI, if confirmed, should be treated according to local guidelines and sensitivity results. [Evidence level B]

Chronic painless urinary retention is associated with urinary tract infection in a high proportion of cases. Therefore antimicrobial prophylaxis is advised for catheter insertion in this setting. A urine sample should then be collected for culture at the time of catheterisation and empirical treatment commenced for urinary tract infection if clinically appropriate.

iii) Recommendation: Routine antimicrobial prophylaxis is not recommended for insertion of short term urinary catheters pre-operatively.

[Evidence level B]

A Cochrane review concluded that evidence for prophylactic antibiotics reducing the rate of bacteriuria and signs of infection in patients with short term catheters, is weak⁵. In a small placebo controlled trial of ciprofloxacin prophylaxis for removal of short term urethral catheters, there was no significant difference in rates of UTI between groups and ciprofloxacin resistance was common among the causes of post-removal UTIs¹⁷. A cost effectiveness analysis did not recommend routine use of antimicrobial prophylaxis¹⁸

Many procedures requiring urinary catheter insertion will also require antimicrobial prophylaxis for surgical site infection. It is a pragmatic recommendation that urinary catheters should be

inserted after routine peri-operative prophylaxis has been given because there is a small risk of bacteriuria at the time of any catheter insertion and Gram negative bacteria are a well recognised cause of surgical site infection. N.B Early work on urological procedures revealed that bacteraemia rarely occurred when pre-operative urine was sterile.

iv) Recommendation: Routine antimicrobial prophylaxis is not recommended for insertion of short term urinary catheters for fluid monitoring or incontinence management.

[Evidence level B]

A Cochrane review concluded that evidence for prophylactic antibiotics reducing the rate of bacteriuria and signs of infection in patients with short term catheters, is weak⁵.

v) Recommendation: Routine prophylaxis is recommended for insertion or removal of urinary catheters in the six weeks after joint replacement surgery.

[Evidence level D]

Gram negative bacilli are a well recognised cause of early prosthetic joint infection (PJI) but a rare cause of late infections. Although the urinary tract is a potential source of these early Gram negative infections,¹⁹ a large case control study of risk factors for PJI did not find a significant difference in either pre-operative pyuria or bacteriuria or post-operative nosocomial urinary tract infection between 462 cases and matched controls²⁰. There is, however, a local consensus among orthopaedic surgeons that gentamicin should be given for catheter insertion, change or manipulation during the early post-operative phase. The early post operative phase is (arbitrarily) defined as up to six weeks post surgery.

vi) Recommendation: Routine prophylaxis is recommended for catheter removal following prostatic surgery.

In addition to single dose antimicrobial prophylaxis for prostatic surgery, it has been argued that prophylaxis should be given to cover urethral catheter removal because of the well described risk of bacteraemia. [Evidence level D]

vii) Recommendation: Prophylaxis is not otherwise recommended for catheter removal, unless the urine or urethral meatus is known to be colonised with *Staphylococcus aureus* (including MRSA). [Evidence level D]

There is no evidence to support the use of prophylactic antimicrobials for catheter removal. However catheter removal does appear to be a risk factor for *Staphylococcus aureus* bacteraemia in patients with urine known to be colonised with *Staphylococcus aureus*. The pragmatic recommendation is to offer prophylaxis in this situation. (see also long term catheterisation section for rationale).

Part C: Long term indwelling urinary catheters

i) Recommendation: Antimicrobial prophylaxis is not recommended at the time of initial insertion of long term indwelling urinary catheters, provided there is NO clinical evidence of urinary tract infection AND the patient is not known to have asymptomatic bacteriuria at the

time of insertion. [Evidence Level B]

Long-term urinary catheters inevitably become colonised with bacteria regardless of antimicrobial prophylaxis at the time of insertion so prophylaxis offers no benefit.^{18 21}

ii) Recommendation: Antimicrobial prophylaxis is not recommended at the time of suprapubic urinary catheter insertion, provided there is no urinary tract infection at the time of insertion.

[Evidence Level D]

iii) Recommendation: Prophylaxis is not recommended for routine catheter changes unless a patient has:

- A) a history of symptomatic urinary catheter-associated infection with previous catheter changes, AND/OR**
- B) purulent urethral/suprapubic catheter exit site discharge, AND/OR**
- C) catheter or meatal/suprapubic catheter exit site colonisation with *Staphylococcus aureus* (including MRSA).**

[Evidence Level B,D]

NICE guidelines recommend that prophylaxis is not required for routine changes of indwelling urethral catheters on the basis of low rates of infective complications coupled with a lack of evidence that prophylaxis is effective³.

There is a high likelihood of development of resistance associated with prophylaxis strategies as illustrated by a study comparing norfloxacin and placebo in elderly nursing home patients with indwelling urethral catheters²². Although a significant reduction of catheter-associated UTI was demonstrated, 25% of strains in placebo patients compared with 90% of strains in norfloxacin patients were resistant to norfloxacin at the end of the prophylaxis period, highlighting that any benefit of prophylaxis is likely to be short-lived due to the development of resistance²².

It is recommended that a risk assessment be undertaken based on previous history of infections with catheter changes and local examination findings and urine or meatal culture results. If a patient has had previous episodes of infection associated with changes, or has a purulent meatal discharge, or urine/meatal swabs are positive for *Staphylococcus aureus* (including MRSA), then prophylaxis is recommended according to the summary table below.

Part D Urinary tract infection.

iii) Urinary catheters involved in urinary tract infection may need removal

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