

# EAU GUIDELINES ON UROLOGICAL INFECTIONS

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## Introduction

The European Association of Urology (EAU) Urological Infections Guidelines Panel has compiled these clinical guidelines to provide medical professionals with evidence-based information and recommendations for the prevention and treatment of urological tract infections (UTIs). These guidelines also aim to address the important public health aspects of infection control and antimicrobial stewardship.

### Important notice:

On March 11, 2019 the European Commission implemented stringent regulatory conditions regarding the use of fluoroquinolones due to their disabling and potentially long-lasting side effects. This legally binding decision is applicable in all EU countries. National authorities have been urged to enforce this ruling and to take all appropriate measures to promote the correct use of this class of antibiotics.

### Antimicrobial Stewardship

Stewardship programs have two main sets of actions. The first set mandates use of recommended care at the patient level conforming to guidelines. The second set describes

strategies to achieve adherence to the mandated guidance. These include persuasive actions such as education and feedback together with restricting availability linked to local formularies. The important components of antimicrobial stewardship programs are:

- regular training of staff in best use of antimicrobial agents;
- adherence to local, national or international guidelines;
- regular ward visits and consultation with infectious diseases physicians and clinical microbiologists;
- audit of adherence and treatment outcomes;
- regular monitoring and feedback to prescribers of their performance and local pathogen resistance profiles.

### Asymptomatic Bacteriuria

Asymptomatic bacteriuria in an individual without urinary tract symptoms is defined by a mid-stream sample of urine showing bacterial growth  $\geq 10^5$  cfu/mL in two consecutive samples in women and in one single sample in men.

Recommendations	Strength rating
<p>Do not screen or treat asymptomatic bacteriuria in the following conditions:</p> <ul style="list-style-type: none"><li>• women without risk factors;</li><li>• patients with well-regulated diabetes mellitus;</li><li>• post-menopausal women;</li><li>• elderly institutionalised patients;</li><li>• patients with dysfunctional and/or reconstructed lower urinary tracts;</li><li>• patients with renal transplants;</li><li>• patients prior to arthroplasty surgeries;</li><li>• patients with recurrent urinary tract infections.</li></ul>	Strong

Screen for and treat asymptomatic bacteriuria prior to urological procedures breaching the mucosa.	Strong
Screen for and treat asymptomatic bacteriuria in pregnant women with standard short course treatment.	Weak

## Uncomplicated Cystitis

Uncomplicated cystitis is defined as acute, sporadic or recurrent cystitis limited to non-pregnant women with no known relevant anatomical and functional abnormalities within the urinary tract or comorbidities.

<b>Recommendations for the diagnostic evaluation of uncomplicated cystitis</b>	<b>Strength rating</b>
Diagnose uncomplicated cystitis in women who have no other risk factors for complicated urinary tract infections based on: <ul style="list-style-type: none"> <li>• a focused history of lower urinary tract symptoms (dysuria, frequency and urgency);</li> <li>• the absence of vaginal discharge or irritation.</li> </ul>	Strong
Use urine dipstick testing for diagnosis of acute uncomplicated cystitis.	Weak
Urine cultures should be done in the following situations: <ul style="list-style-type: none"> <li>• suspected acute pyelonephritis;</li> <li>• symptoms that do not resolve or recur within four weeks after the completion of treatment;</li> <li>• women who present with atypical symptoms;</li> <li>• pregnant women.</li> </ul>	Strong

In uncomplicated cystitis a fluoroquinolone should only be used when it is considered inappropriate to use other antibacterial agents that are commonly recommended for the treatment of these infections.

<b>Recommendations for antimicrobial therapy for uncomplicated cystitis</b>	<b>Strength rating</b>
Prescribe fosfomycin trometamol, pivmecillinam or nitrofurantoin as first-line treatment for uncomplicated cystitis in women.	Strong
Do not use aminopenicillins or fluoroquinolones to treat uncomplicated cystitis.	Strong

<b>Table 1: Suggested regimens for antimicrobial therapy in uncomplicated cystitis</b>			
<b>Antimicrobial</b>	<b>Daily dose</b>	<b>Duration of therapy</b>	<b>Comments</b>
<b><i>First-line women</i></b>			
Fosfomycin trometamol	3 g SD	1 day	Recommended only in women with uncomplicated cystitis
Nitrofurantoin macrocrystal	50-100 mg four times a day	5 days	
Nitrofurantoin monohydrate/ macrocrystals	100 mg b.i.d	5 days	
Nitrofurantoin macrocrystal prolonged release	100 mg b.i.d	5 days	
Pivmecillinam	400 mg t.i.d	3-5 days	

<b>Alternatives</b>			
Cephalosporins (e.g. cefadroxil)	500 mg b.i.d	3 days	Or comparable
<b>If the local resistance pattern for <i>E. coli</i> is &lt; 20%</b>			
Trimethoprim	200 mg b.i.d	5 days	Not in the first trimenon of pregnancy
Trimethoprim- sulphamethoxazole	160/800 mg b.i.d	3 days	Not in the last trimenon of pregnancy
<b>Treatment in men</b>			
Trimethoprim- sulphamethoxazole	160/800 mg b.i.d	7 days	Restricted to men, fluoroquinolones can also be prescribed in accordance with local susceptibility testing.

*SD* = single dose; *b.i.d* = twice daily; *t.i.d* = three times daily.

## Recurrent UTIs

Recurrent UTIs are recurrences of uncomplicated and/or complicated UTIs, with a frequency of at least three UTIs/year or two UTIs in the last six months.

<b>Recommendations for the diagnostic evaluation and treatment of recurrent UTIs</b>	<b>Strength rating</b>
Diagnose recurrent UTI by urine culture.	Strong
Do not perform an extensive routine workup (e.g cystoscopy, full abdominal ultrasound) in women younger than 40 years of age with recurrent UTI and no risk factors.	Weak
Advise pre-menopausal women regarding increased fluid intake as it might reduce the risk of recurrent UTI.	Weak

Use vaginal oestrogen replacement in post-menopausal women to prevent recurrent UTI.	Strong
Use immunoactive prophylaxis to reduce recurrent UTI in all age groups.	Strong
Advise patients on the use of local or oral probiotics containing strains of proven efficacy for vaginal flora regeneration to prevent UTIs.	Weak
Advise patients on the use of cranberry products to reduce recurrent UTI episodes; however, patients should be informed that the quality of evidence underpinning this is low with contradictory findings.	Weak
Use D-mannose to reduce recurrent UTI episodes, but patients should be informed that further studies are needed to confirm the results of initial trials.	Weak
Use endovesical instillations of hyaluronic acid or a combination of hyaluronic acid and chondroitin sulphate to prevent recurrent UTIs in patients where less invasive preventive approaches have been unsuccessful. Patients should be informed that further studies are needed to confirm the results of initial trials.	Weak
Use continuous or post-coital antimicrobial prophylaxis to prevent recurrent UTI when non-antimicrobial interventions have failed. Counsel patients regarding possible side effects.	Strong
For patients with good compliance self-administered short-term antimicrobial therapy should be considered.	Strong

## Uncomplicated Pyelonephritis

Uncomplicated pyelonephritis is defined as pyelonephritis limited to non-pregnant, pre-menopausal women with no known relevant urological abnormalities or comorbidities.

<b>Recommendations for the diagnostic evaluation of uncomplicated pyelonephritis</b>	<b>Strength rating</b>
Perform urinalysis (e.g. using a dipstick method), including the assessment of white and red blood cells and nitrite, for routine diagnosis.	Strong
Perform urine culture and antimicrobial susceptibility testing in patients with pyelonephritis.	Strong
Perform imaging of the urinary tract to exclude urgent urological disorders.	Strong

<b>Recommendations for the treatment of uncomplicated pyelonephritis</b>	<b>Strength rating</b>
Treat patients with uncomplicated pyelonephritis not requiring hospitalisation with short course fluoroquinolones as first-line treatment.	Strong
Treat patients with uncomplicated pyelonephritis requiring hospitalisation with an intravenous antimicrobial regimen initially.	Strong
Switch patients initially treated with parenteral therapy, who improve clinically and can tolerate oral fluids, to oral antimicrobial therapy.	Strong

Do not use nitrofurantoin, oral fosfomycin, and pivmecillinam to treat uncomplicated pyelonephritis.	Strong
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<b>Table 2: Suggested regimens for empirical oral antimicrobial therapy in uncomplicated pyelonephritis</b>			
<b>Antimicrobial</b>	<b>Daily dose</b>	<b>Duration of therapy</b>	<b>Comments</b>
Ciprofloxacin	500-750 mg b.i.d	7 days	Fluoroquinolone resistance should be less than 10%.
Levofloxacin	750 mg q.d	5 days	
Trimethoprim sulphamethoxazol	160/800 mg b.i.d	14 days	If such agents are used empirically, an initial intravenous dose of a long-acting parenteral antimicrobial (e.g. ceftriaxone) should be administered.
Cefpodoxime	200 mg b.i.d	10 days	
Ceftibuten	400 mg q.d	10 days	

*b.i.d = twice daily; q.d = every day.*

<b>Table 3: Suggested regimens for empirical parenteral antimicrobial therapy in uncomplicated pyelonephritis</b>		
<b>Antimicrobials</b>	<b>Daily dose</b>	<b>Comments</b>
<b>First-line treatment</b>		
Ciprofloxacin	400 mg b.i.d	
Levofloxacin	750 mg q.d	
Cefotaxime	2 g t.i.d	Not studied as monotherapy in acute uncomplicated pyelonephritis.
Ceftriaxone	1-2 g q.d	Lower dose studied, but higher dose recommended.



<b>Second-line treatment</b>		
Cefepime	1-2 g b.i.d	Lower dose studied, but higher dose recommended.
Piperacillin/ tazobactam	2.5-4.5 g t.i.d	
Gentamicin	5 mg/kg q.d	Not studied as monotherapy in acute uncomplicated pyelonephritis.
Amikacin	15 mg/kg q.d	
<b>Last-line alternatives</b>		
Imipenem/ cilastatin	0.5 g t.i.d	Consider only in patients with early culture results indicating the presence of multidrug-resistant organisms.
Meropenem	1 g t.i.d	
Ceftolozane/ tazobactam	1.5 g t.i.d	
Ceftazidime/ avibactam	2.5 g t.i.d	
Cefiderocol	2 g t.i.d	
Meropenem- vaborbactam	2 g t.i.d	
Plazomicin	15 mg/kg o.d	

*b.i.d* = twice daily; *t.i.d* = three times daily; *q.d* = every day; *o.d* = once daily.

## Complicated UTIs

A complicated UTI occurs in an individual in whom factors related to the host (e.g. underlying diabetes or immunosuppression) or specific anatomical or functional abnormalities related to the urinary tract (e.g. obstruction, incomplete voiding due to detrusor muscle dysfunction) are believed to result in an infection that will be more difficult to eradicate than an uncomplicated infection.

<b>Recommendations for the treatment of complicated UTIs</b>	<b>Strength rating</b>
Use the combination of: <ul style="list-style-type: none"> <li>• amoxicillin plus an aminoglycoside;</li> <li>• a second generation cephalosporin plus an aminoglycoside;</li> <li>• a third generation cephalosporin intravenously as empirical treatment of complicated UTI with systemic symptoms.</li> </ul>	Strong
Only use ciprofloxacin provided that the local resistance percentages are < 10% when: <ul style="list-style-type: none"> <li>• the entire treatment is given orally;</li> <li>• patients do not require hospitalisation;</li> <li>• patient has an anaphylaxis for beta-lactam antimicrobials.</li> </ul>	Strong
Do not use ciprofloxacin and other fluoroquinolones for the empirical treatment of complicated UTI in patients from urology departments or when patients have used fluoroquinolones in the last six months.	Strong
Manage any urological abnormality and/or underlying complicating factors.	Strong

### **Catheter-associated UTIs**

Catheter-associated UTI (CA-UTI) refers to UTIs occurring in a person whose urinary tract is currently catheterised or has been catheterised within the past 48 hours.

<b>Recommendations for diagnostic evaluation of CA-UTI</b>	<b>Strength rating</b>
Do not carry out routine urine culture in asymptomatic catheterised patients.	Strong
Do not use pyuria as sole indicator for catheter-associated UTI.	Strong
Do not use the presence or absence of odorous or cloudy urine alone to differentiate catheter-associated asymptomatic bacteriuria from catheter-associated UTI.	Strong

<b>Recommendations disease management and prevention of CA-UTI</b>	<b>Strength rating</b>
Treat symptomatic catheter-associated-UTI according to the recommendations for complicated UTI.	Strong
Take a urine culture prior to initiating antimicrobial therapy in catheterised patients in whom the catheter has been removed.	Strong
Do not treat catheter-associated asymptomatic bacteriuria in general.	Strong
Treat catheter-associated asymptomatic bacteriuria prior to traumatic urinary tract interventions (e.g. transurethral resection of the prostate).	Strong
Replace or remove the indwelling catheter before starting antimicrobial therapy.	Strong
Do not apply topical antiseptics or antimicrobials to the catheter, urethra or meatus.	Strong

Do not use prophylactic antimicrobials to prevent catheter-associated UTIs.	Strong
Do not routinely use antibiotic prophylaxis to prevent clinical UTI after urethral catheter removal.	Weak
The duration of catheterisation should be minimal.	Strong
Use hydrophilic coated catheters to reduce CA-UTI.	Strong
Do not routinely use antibiotic prophylaxis to prevent clinical UTI after urethral catheter removal or in patients performing intermittent self-catheterisation	Weak

## Urosepsis

Urosepsis is defined as life threatening organ dysfunction caused by a dysregulated host response to infection originating from the urinary tract and/or male genital organs.

<b>Recommendations for the diagnosis and treatment of urosepsis</b>	<b>Strength rating</b>
Perform the quickSOFA score to identify patients with potential sepsis.	Strong
Take a urine culture and two sets of blood cultures before starting antimicrobial treatment.	Strong
Administer parenteral high dose broad spectrum antimicrobials within the first hour after clinical assumption of sepsis.	Strong
Adapt initial empiric antimicrobial therapy on the basis of culture results.	Strong

Initiate source control including removal of foreign bodies, decompression of obstruction and drainage of abscesses in the urinary tract.	Strong
Provide immediate adequate life-support measures.	Strong

**Table 4: Suggested regimens for antimicrobial therapy for urosepsis**

Antimicrobials	Daily dose	Duration of therapy
Cefotaxime	2 g t.i.d	7-10 days Longer courses are appropriate in patients who have a slow clinical response
Ceftazidime	1-2 g t.i.d	
Ceftriaxone	1-2 g q.d	
Cefepime	2 g b.i.d	
Piperacillin/tazobactam	4.5 g t.i.d	
Ceftolozane/tazobactam	1.5 g t.i.d	
Ceftazidime/avibactam	2.5 g t.i.d	
Gentamicin*	5 mg/kg q.d	
Amikacin*	15 mg/kg q.d	
Ertapenem	1 g q.d	
Imipenem/cilastatin	0.5 g t.i.d	
Meropenem	1 g t.i.d	

\* Not studied as monotherapy in urosepsis

b.i.d = twice daily; t.i.d = three times daily; q.d = every day.

## Urethritis

Inflammation of the urethra presents usually with lower urinary tract symptoms and must be distinguished from other infections of the lower urinary tract. From a therapeutic and clinical point of view, gonorrhoeal urethritis caused by *Neisseria gonorrhoeae* must be differentiated from non-gonococcal urethritis.

<b>Recommendations for the diagnostic evaluation and antimicrobial treatment of urethritis</b>	<b>Strength rating</b>
Perform a Gram stain of urethral discharge or a urethral smear to preliminarily diagnose gonococcal urethritis.	Strong
Perform a validated nucleic acid amplification test (NAAT) on a first-void urine sample or urethral smear prior to empirical treatment to diagnose chlamydial and gonococcal infections.	Strong
Delay treatment until the results of the NAATs are available to guide treatment choice in patients with mild symptoms.	Strong
Perform a urethral swab culture, prior to initiation of treatment, in patients with a positive NAAT for gonorrhoea to assess the antimicrobial resistance profile of the infective strain.	Strong
Use a pathogen directed treatment based on local resistance data.	Strong
Sexual partners should be treated maintaining patient confidentiality.	Strong

**Table 5: Suggested regimens for antimicrobial therapy for urethritis**

Pathogen	Antimicrobial	Alternative regimens
Gonococcal Infection	Ceftriaxone: 1 g i.m. or i.v.*, SD Azithromycin: 1-1 g p.o., SD	<ul style="list-style-type: none"> <li>Cefixime 400 mg p.o., SD <u>plus</u> Azithromycin 1 g p.o., SD</li> </ul> <p>In case of cephalosporin allergy:</p> <ul style="list-style-type: none"> <li>Gentamicin 240 mg i.m SD <u>plus</u> Azithromycin 2 g p.o., SD</li> <li>Gemifloxacin 320 mg p.o., SD <u>plus</u> Azithromycin 2 g p.o., SD</li> <li>Spectinomycin 2 g i.m., SD</li> <li>Fosfomycin trometamol 3 g p.o., on days 1, 3 and 5</li> </ul> <p>In case of azithromycin allergy, in combination with ceftriaxone or cefixime:</p> <ul style="list-style-type: none"> <li>Doxycycline 100 mg b.i.d, p.o., 7 days</li> </ul>
Non-Gonococcal infection (non-identified pathogen)	Doxycycline: 100 mg b.i.d, p.o., 7 days	Azithromycin 500 mg p.o., day 1, 250 mg p.o., 4 days
<i>Chlamydia trachomatis</i>	Azithromycin: 1.0-1.5 g p.o., SD <u>OR</u> Doxycycline: 100 mg b.i.d, p.o., for 7 days	<ul style="list-style-type: none"> <li>Levofloxacin 500 mg p.o., q.d., 7 days</li> <li>Ofloxacin 200 mg p.o., b.i.d., 7 days</li> </ul>

<i>Mycoplasma genitalium</i>	Azithromycin: 500 mg p.o., day 1, 250 mg p.o., 4 days	In case of macrolide resistance: • Moxifloxacin 400 mg q.d., 7-14 days
<i>Ureaplasma urealyticum</i>	Doxycycline: 100 mg b.i.d., p.o., 7 days	Azithromycin 1.0-1.5 g p.o., SD
<i>Trichomonas vaginalis</i>	Metronidazole: 2 g p.o., SD Tinidazole: 2 g p.o., SD	Metronidazole 500 mg p.o., b.i.d., 7 days
<b>Persistent non-gonococcal urethritis</b>		
After first- line doxycycline	Azithromycin: 500 mg p.o., day 1, 250 mg p.o., 4 days <u>plus</u> Metronidazole: 400 mg b.i.d. p.o., 5 days	If macrolide resistant <i>M. genitalium</i> is detected moxifloxacin should be substituted for azithromycin
After first- line azithromycin	Moxifloxacin: 400 mg p.o. q.d., 7-14 days <u>plus</u> Metronidazole: 400 mg b.i.d. p.o., 5 days	

SD = single dose; b.i.d = twice daily; q.d = everyday; p.o. = orally;  
i.m. = intramuscular; i.v. = intravenous.

\* Despite the lack of RCTs there is increasing evidence that intravenous treatment with ceftriaxone is safe and effective for the treatment of gonorrhoeal infections and avoids the discomfort of an intramuscular injection for patients.



## Bacterial Prostatitis

Bacterial prostatitis is a clinical condition caused by bacterial pathogens. It is recommended that urologists use the classification suggested by the National Institute of Diabetes, Digestive and Kidney Diseases of the National Institutes of Health, in which bacterial prostatitis, with confirmed or suspected infection, is distinguished from chronic pelvic pain syndrome.

<b>Recommendations for the diagnosis of bacterial prostatitis</b>	<b>Strength rating</b>
Do not perform prostatic massage in acute bacterial prostatitis (ABP).	Strong
Take a mid-stream urine dipstick to check nitrite and leukocytes in patients with clinical suspicion of ABP.	Weak
Take a mid-stream urine culture in patients with ABP symptoms to guide diagnosis and tailor antibiotic treatment.	Weak
Take a blood culture and a total blood count in patients presenting with ABP.	Weak
Perform accurate microbiological evaluation for atypical pathogens such as <i>Chlamydia trachomatis</i> or Mycoplasma in patients with chronic bacterial prostatitis (CBP).	Weak
Perform the Meares and Stamey 2- or 4-glass test in patients with CBP.	Strong
Perform transrectal ultrasound in selected cases to rule out the presence of prostatic abscess.	Weak
Do not routinely perform microbiological analysis of the ejaculate alone to diagnose CBP.	Weak

Recommendations for the disease management of bacterial prostatitis	Strength rating
<b>Acute bacterial prostatitis</b>	
Treat acute bacterial prostatitis according to the recommendations for complicated UTI.	Strong
<b>Chronic bacterial prostatitis (CBP)</b>	
Prescribe a fluoroquinolone (e.g. ciprofloxacin, levofloxacin) as first-line treatment for CBP.	Strong
Prescribe a macrolide (e.g. azithromycin) or a tetracycline (e.g. doxycycline) if intracellular bacteria have been identified as the causative agent of CBP.	Strong
Prescribe metronidazole in patients with <i>Trichomonas vaginalis</i> CBP.	Strong

**Table 6: Suggested regimens for antimicrobial therapy for chronic bacterial prostatitis**

Antimicrobial	Daily dose	Duration of therapy	Comments
Floroquinolone	Optimal oral daily dose	4-6 weeks	
Doxycycline	100 mg b.i.d	10 days	Only for <i>C. trachomatis</i> or mycoplasma infections
Azithromycin	500 mg once daily	3 weeks	Only for <i>C. trachomatis</i> infections
Metronidazole	500 mg t.i.d.	14 days	Only for <i>T. vaginalis</i> infections

b.i.d = twice daily; t.i.d = three times daily.

## Acute Infective Epididymitis

Acute epididymitis is clinically characterised by pain, swelling and increased temperature of the epididymis, which may involve the testis and scrotal skin. It is generally caused by migration of pathogens from the urethra or bladder. Torsion of the spermatic cord (testicular torsion) is the most important differential diagnosis in boys and young men.

Recommendations for the diagnosis and treatment of acute infective epididymitis	Strength rating
Obtain a mid-stream urine and a first-voided urine sample for pathogen identification by culture and nucleic acid amplification test.	Strong
Initially prescribe a single antibiotic or a combination of two antibiotics active against <i>Chlamydia trachomatis</i> and <i>Enterobacterales</i> in young sexually active men; in older men without sexual risk factors only <i>Enterobacterales</i> have to be considered.	Strong
If gonorrhoeal infection is likely give single dose ceftriaxone 500 mg intramuscularly or intravenously* in addition to a course of an antibiotic active against <i>Chlamydia trachomatis</i> .	Strong
Adjust antibiotic agent when pathogen has been identified and adjust duration according to clinical response.	Weak
Follow national policies on reporting and tracing/treatment of contacts for sexually transmitted infections.	Strong

\* Despite the lack of RCTs there is increasing evidence that intravenous treatment with ceftriaxone is safe and effective for the treatment of gonorrhoeal infections and avoids the discomfort of an intramuscular injection for patients.

## Fournier's Gangrene

Fournier's gangrene is an aggressive and frequently fatal polymicrobial soft tissue infection of the perineum, peri-anal region, and external genitalia. It is an anatomical sub-category of necrotising fasciitis with which it shares a common aetiology and management pathway.

<b>Recommendations for the disease management of Fournier's Gangrene</b>	<b>Strength rating</b>
Start treatment for Fournier's gangrene with broad-spectrum antibiotics on presentation, with subsequent refinement according to culture and clinical response.	Strong
Commence repeated surgical debridement for Fournier's gangrene within 24 hours of presentation.	Strong
Do not use adjunctive treatments for Fournier's gangrene except in the context of clinical trials.	Weak

**Table 7: Suggested regimens for antimicrobial therapy for Fournier's Gangrene of mixed microbiological aetiology**

<b>Antimicrobial</b>	<b>Dosage</b>
Piperacillin-tazobactam plus Vancomycin	4.5 g every 6-8 h IV 15 mg/kg every 12 h
Imipenem-cilastatin	1 g every 6-8 h IV
Meropenem	1 g every 8 h IV
Ertapenem	1 g once daily
Gentamicin	5 mg/kg daily
Cefotaxime <u>plus</u> metronidazole or clindamycin	2 g every 6 h IV 500 mg every 6 h IV 600-900 mg every 8 h IV

Cefotaxime <u>plus</u> fosfomycine <u>plus</u> metronidazole	2 g every 6 h IV 5 g every 8 h IV 500 mg every 6 h IV
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IV = intravenous.

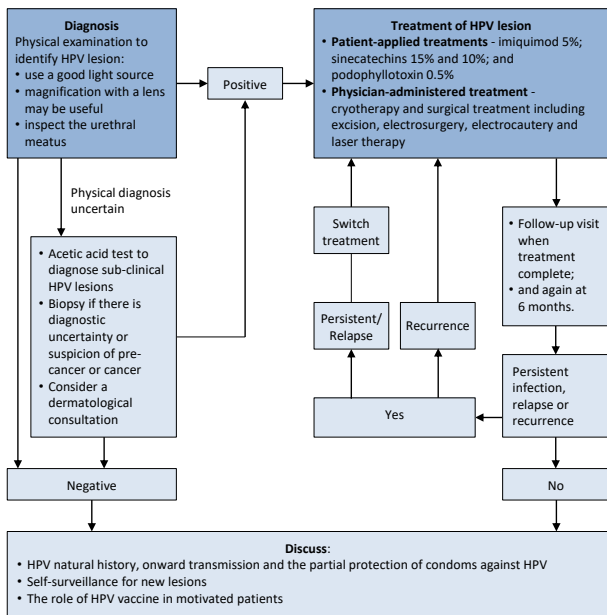
## Management of Human papilloma virus in men

Human papilloma virus (HPV) is one of the most frequently sexually transmitted viruses encompassing both oncogenic (low- and high-risk variants) and non-oncogenic viruses.

Recommendations for the treatment of anogenital warts	Strength rating
Use self-administered imiquimod 5% cream applied to all external warts overnight three times each week for sixteen weeks for the treatment of anogenital warts.	Strong
Use self-administered sinecatechins 15% or 10% applied to all external warts three times daily until complete clearance, or for up to sixteen weeks for the treatment of anogenital warts.	Strong
Use self-administered podophyllotoxin 0.5% self-applied to lesions twice daily for three days, followed by four rest days, for up to four or five weeks for the treatment of anogenital warts.	Strong
Use cryotherapy or surgical treatment (excision, electrocautery, electrocautery and laser therapy) to treat anogenital warts based on an informed discussion with the patient.	Strong
<b>Recommendation male circumcision</b>	
Discuss male circumcision with patients as an additional one-time preventative intervention for HPV-related diseases.	Strong
<b>Recommendation therapeutic HPV vaccination</b>	
Offer HPV vaccine to males after surgical removal of high-grade anal intraepithelial neoplasia.	Weak

<b>Recommendations prophylactic HPV vaccination</b>	
Offer early HPV vaccination to boys with the goal of establishing optimal vaccine-induced protection before the onset of sexual activity.	Strong
Apply diverse communication strategies in order to improve HPV vaccination knowledge in young adult males.	Strong

**Figure 1: Diagnostic and treatment algorithm for the management of HPV in men**



## Peri-Procedural Antibiotic Prophylaxis

The available evidence enabled the panel to make recommendations concerning urodynamics, cystoscopy, stone procedures (extracorporeal shockwave lithotripsy, ureteroscopy and per-cutaneous nephrolithotomy), transurethral resection of the prostate, transurethral resection of the bladder and prostate biopsy. For nephrectomy and prostatectomy the scientific evidence was too weak to allow the panel to make recommendations either for or against antibiotic prophylaxis.

<b>Recommendations for peri-procedural antibiotic prophylaxis</b>	<b>Strength rating</b>
Do not use antibiotic prophylaxis to reduce the rate of symptomatic urinary infection following: <ul style="list-style-type: none"><li>• urodynamics;</li><li>• cystoscopy;</li><li>• extracorporeal shockwave lithotripsy.</li></ul>	Strong
Use antibiotic prophylaxis to reduce the rate of symptomatic urinary infection following ureteroscopy.	Weak
Use single dose antibiotic prophylaxis to reduce the rate of clinical urinary infection following percutaneous nephrolithotomy.	Strong
Use antibiotic prophylaxis to reduce infectious complications in men undergoing transurethral resection of the prostate.	Strong
Use antibiotic prophylaxis to reduce infectious complications in high-risk patients undergoing transurethral resection of the bladder.	Weak
Perform prostate biopsy using the transperineal approach due to the lower risk of infectious complications.	Strong
Use routine surgical disinfection of the perineal skin for transperineal biopsy.	Strong
Use rectal cleansing with povidone-iodine in men prior to transrectal prostate biopsy.	Strong

Do not use fluoroquinolones for prostate biopsy in line with the European Commission final decision on EMEA/H/A-31/1452.	Strong
Use either target prophylaxis based on rectal swab or stool culture; augmented prophylaxis (two or more different classes of antibiotics); or alternative antibiotics (e.g. fosfomycin trometamol, cephalosporin, aminoglycoside) for antibiotic prophylaxis for transrectal biopsy.	Weak

**Note:** As stated in section 3.15.1.4 of the full text guideline the panel have decided not to make recommendations for specific agents for particular procedures, those listed below represent possible choices only. Urologists should choose a specific antimicrobial based on their knowledge of local pathogen prevalence for each type of procedure, their antibiotic susceptibility profiles and virulence.

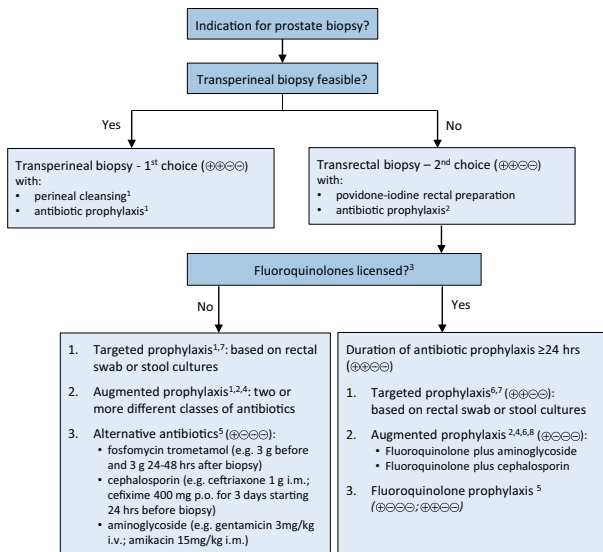
Procedure	Prophylaxis recommended	Antimicrobial
Urodynamics	No	N/A
Cystoscopy	No	
Extracorporeal shockwave lithotripsy	No	
Ureterscopy	Yes	Trimethoprim Trimethoprim-sulphamethoxazole Cephalosporin group 2 or 3 Aminopenicillin <u>plus</u> a beta-lactamase inhibitor
Percutaneous nephrolithotomy	Yes (single dose)	
Transurethral resection of the prostate	Yes	
Transurethral resection of the bladder	Yes in patients who have a high risk of suffering post-operative sepsis.	



Transrectal prostate biopsy	Yes	<ol style="list-style-type: none"> <li>1. Targeted prophylaxis - based on rectal swab or stool culture.</li> <li>2. Augmented prophylaxis - two or more different classes of antibiotics*.</li> <li>3. Alternative antibiotics <ul style="list-style-type: none"> <li>• fosfomycin trometamol (e.g. 3 g before and 3 g 24-48 hrs after biopsy)</li> <li>• cephalosporin (e.g. ceftriaxone 1 g i.m.; cefixime 400 mg p.o. for 3 days starting 24 hrs before biopsy)</li> <li>• aminoglycoside (e.g. gentamicin 3mg/kg i.v.; amikacin 15mg/kg i.m.)</li> </ul> </li> </ol>
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\* Note option 2 is against antibiotic stewardship programmes.  
*i.m.* = intramuscular; *i.v.* intravenously; *p.o.* = orally.

**Figure 2: Prostate biopsy workflow to reduce infectious complications**



1. No RCTs available, but reasonable intervention.
2. Be informed about local antimicrobial resistance.
3. Banned by European Commission due to side effects.
4. Contradicts principles of Antimicrobial Stewardship.
5. Fosfomycin trometamol (3 RCTs), cephalosporins (2 RCTs), aminoglycosides (2 RCTs).
6. Only one RCT comparing targeted and augmented prophylaxis.
7. Originally introduced to use alternative antibiotics in case of fluoroquinolone resistance.
8. Various schemes: fluoroquinolone plus aminoglycoside (3 RCTs); and fluoroquinolone plus cephalosporin (1 RCT).
9. Significantly inferior to targeted and augmented prophylaxis.

*Suggested workflow on how to reduce post biopsy infections. GRADE Working Group grades of evidence. High certainty: (++++)* very confident that the true effect lies close to that of the estimate of the effect. *Moderate certainty: (+++)* moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. *Low certainty: (+++)* confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect. *Very low certainty: (++)* very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect. Figure reproduced from Pilatz et al., with permission from Elsevier.

*i.m. = intramuscular; i.v. intravenously; p.o. = orally.*

*This short booklet text is based on the more comprehensive EAU Guidelines (ISBN 978-94-92671-16-5) available to all members of the European Association of Urology at their website, <http://www.uroweb.org/guidelines>.*