

# *Urinary Tract Infection management protocol*

## Abbreviation

IV: intravenous  
IM: intramuscular  
SC, SQ: subcutaneous  
PO: oral  
Min: minute  
hr: hour  
d: day  
mo: month  
q24hr: every 24 hours  
q12hr: every 12 hours  
q8hr: every 8 hours  
q6hr: every 6 hours  
q4hr: every 4 hours  
mcg: microgram  
mg: milligram  
kg: kilogram  
MDR: multi-drug resistance  
MRSA: methicillin resistance staph. aureus  
TMP/SMZ DS: Trimethoprim-sulfamethoxazole double strength  
TMP/SMZ SS: Trimethoprim-sulfamethoxazole single strength  
UTI: Urinary tract infection

## Introduction

More than half of all antibiotics given to treat active infections in hospitals are prescribed for three infections where there are important opportunities to improve use: lower respiratory tract infection (pneumonia), urinary tract infection and skin and soft tissue infection (according to MOH hospitals reports). Availability of protocol and system to monitor the adherence is most important strategies to ensure that the use of antimicrobial in hospital setting is appropriately

**Purpose:** To help the MOH hospitals during establishment of Antimicrobials Stewardship Program at hospital settings

**Aim and scope:** The protocol is intended to provide guidance on the safe and cost-effectiveness treatment of urinary tract infection and to decrease the antimicrobial resistance. For hospital acquired infection the choice between the recommended agents should be based on local resistance data (antibiogram)

**Targeted population:** Hospitalized immunocompetent patients who are diagnosed with Urinary tract infection

**Targeted end users:** Physicians, Pharmacists/clinical pharmacists, Nurses

**Setup:** Inpatient setting

**Methodology:**

Phase I: In 2014 the Antibiotic committee under the General Administration of Pharmaceutical Care developed the antimicrobial guideline by reviewing and adopting international guideline (Infectious Disease Society of America, American Thoracic Society, American Society of Health-System Pharmacists and European Society of Clinical Microbiology and Infectious Diseases) to cover 20 infectious diseases.

Phase II: In 2016, collaboration with General Administration of infection control a group of infectious disease consultants reviewed this guideline

Phase III: In 2020-2021 The specific indications were agreed by Antimicrobial Stewardship Program central team to be implemented and monitored in MOH hospitals as a strategy. For this reason, the urinary tract infection guideline sections updated by specialized clinical pharmacists according to recent international guideline, literature and MOH formulary and then reviewed by infectious disease consultants.

**Conflict of interest:**

This protocol developed based on valid scientific evidence, critical assessment of that evidence, and objective clinical judgment that relates the evidence to the needs of practitioners and patients. No financial relationships with pharmaceutical, medical device, and biotechnology companies.

**Funding:**

No fund was provided

**Updating:**

First version of this protocol updated in 2020-2021. The protocol will be updated every three years or if any changes or updates released by international/national guidelines, pharmacotherapy references or MOH formulary

## Urinary Tract Infection

- **For hospital acquired UTI the choice between these agents should be selected based on local resistance data (antibiogram)**
- Patient should be shifted to specific antibiotic depend on the culture result within **3-5 days**
- Pyuria accompanying asymptomatic bacteriuria is not an indication for antimicrobial treatment
- Screening for and treatment of asymptomatic bacteriuria before transurethral resection of the prostate, urologic procedures for which mucosal bleeding is recommended
- Non-recommended antibiotics should be avoided e.g: macrolides and clindamycin
- Tigecycline should be avoided for the treatment of UTIs when well-established options such as aminoglycosides and β-lactams are available.

Patient Group	Therapy (Dosing Regimen)		Comments
<b>Empirically therapy of Acute Uncomplicated Cystitis <sup>(1)</sup></b>	<input type="checkbox"/> 1□ Trimethoprim-sulfamethoxazole (160/800 mg [DS] PO q12hr (3 days) <input type="checkbox"/> 2□ Nitrofurantoin monohydrate/macrocrystals 100 mg PO q12hr (5 days) <input type="checkbox"/> 3□ Fosfomycin 3 gm PO for one dose <input type="checkbox"/> 4□ Amoxicillin-clavulanate 1g PO q12hr (5-7 days) <input type="checkbox"/> 5□ Cephalexin 500 mg PO q12hr (5-7 days) <input type="checkbox"/> 6□ Ciprofloxacin 500 mg PO q 12 hr (7 days) <span style="color: red;">Local resistance to fluoroquinolone should be less than 10%</span>		<b>-Antibiogram report for MOH hospitals 2020 shows 27% E.coli resistance to fluoroquinolone</b>
<b>Empirically therapy of Acute complicated Cystitis <sup>(1)</sup></b>	<input type="checkbox"/> 1□ <u>Trimethoprim-sulfamethoxazole</u> (160/800 mg [DS] PO q12hr (7-10 days) <input type="checkbox"/> 2□ Nitrofurantoin monohydrate/macrocrystals 100 mg PO q12hr (7-10 days) <input type="checkbox"/> 3□ Ciprofloxacin 500 mg PO q 12 hr (7 days) <span style="color: red;">-Local resistance to fluoroquinolone should be less than 10%</span> <input type="checkbox"/> 4□ Amoxicillin-clavulanate 1g PO q12hr (7-10 days) <input type="checkbox"/> 5□ Cephalexin 500 mg PO q12hr (7-10d ays)		<b>-Complicated UTI is any of the following: male gender, transplant, urologic abnormalities controlled Diabetes, Pregnancy</b>
<b>Empirically therapy of Uncomplicated Pyelonephritis<sup>(1)</sup></b>	Inpatient therapy	<input type="checkbox"/> 1□ Ceftriaxone 1 gm IV q 24 hr (10 days) <input type="checkbox"/> 2□ Ciprofloxacin 400 mg IV q 12 hr (5-7 days) <input type="checkbox"/> 3□ Levofloxacin750 mg IV q 24 hr (5 days) <span style="color: red;">-Local resistance to fluoroquinolone should be less than 10%</span>	<b>-Patient can be shifted to an oral based on response and culture</b>
	Outpatient therapy	<input type="checkbox"/> 1□ Ciprofloxacin 500 mg PO q 12 hr (7 days) <input type="checkbox"/> 2□ Levofloxacin750 mg PO q 24 hr (5 days)	

		<input type="checkbox"/> 3 <input type="checkbox"/> 4	<p>-Local resistance to fluoroquinolone should be less than 10%</p> <p>Trimethoprim-sulfamethoxazole PO 160/800 mg [DS] q12hr (14 days)</p> <p><u>Second line option</u></p> <p>Amoxicillin-clavulanate 1g PO q12hr (10-14 days)</p>	
<b>Complicated Pyelonephritis, Catheter-Related <sup>(2)</sup>, Functional or Structurally abnormalities, UTI in men</b>	Inpatient therapy	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	<p><b>Low risk of resistant:</b></p> <p>Ceftriaxone 1 gm IV q24hr (14 days)</p> <p>Ciprofloxacin 400 mg IV q12hr (14 days)</p> <p>-Local resistance to fluoroquinolone should be less than 10%</p> <p><b>High risk of resistance or severely ill</b> (prior isolate in the urine of resistant pathogen, recent in-patient hospitalization, obstructive uropathy, recent fluoroquinolone or beta lactam exposure)</p> <p>Ertapenem 1g IV q24hr</p> <p>Pipracillin- Tazobactam 3.375 g IV q6hr (14 days)</p> <p>Meropenem 1g q8hr (14 days)</p>	
	Proven a carbapenem-resistant	<input type="checkbox"/> 1	<p>Ceftazidime/Avibactam 2.5g IV q8hr (14 days)</p> <p><u>*Please follow MOH formulary restriction regulation during prescribing or dispensing of these antibiotics</u></p>	
<b>Pregnancy <sup>(3)</sup></b>	Symptomatic or asymptomatic Cystitis	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<p><b>Seven-days treatment regimen</b></p> <p>Amoxicillin-clavulanate 1 g PO q12hr</p> <p>Nitrofurantoin100 mg PO q12hr</p> <p>Nitrofurantoin is contraindicated in pregnant patients at term (38-42 weeks' gestation)</p> <p>Cefuroxime 500 mg PO q12hr</p> <p>Cephalexin 500 mg PO q12hr</p>	<p>-Nitrofurantoin should be avoided near term given the risk of fatal haemolytic anaemia</p> <p>-Consider an alternative to nitrofurantoin in first trimester when alternative is available (reports of congenital abnormalities)</p>
	Pyelonephritis	<input type="checkbox"/> 1 <input type="checkbox"/> 2	<p>Ceftriaxone 1-2g IV q24hr</p> <p>Cefazolin1 g IV q8hr</p> <p>Switch to an appropriate oral regimen once patient has improvement in symptoms if culture and susceptibility results allow</p>	<p>-Avoid fluroquinolone</p>
<b>Recurrent cystitis</b>	Relapse (referral to the ID Consultant is mandatory)	<p><b>Relapse is a new episode of bacteriuria with microorganism that is same from the original one</b></p> <p>-Assess for pharmacologic reason for treatment failure.</p> <p>-Longer treatment (for 2–6 weeks, depending on length of initial course)</p>		

	<p>Reinfection (referral to the ID Consultant is mandatory)</p>	<p><b>Reinfection is a new episode of bacteriuria with microorganism that is different from the original one</b></p> <ul style="list-style-type: none"><li>- If patient has two or fewer UTIs in 1 year, use patient-initiated therapy for symptomatic episodes (3-day treatment regimens).</li><li>- If patient has three or more UTIs in 1 year and they are temporally related to sexual activity, use post-intercourse prophylaxis with TMP/SMZ SS, cephalexin 250 mg, or nitrofurantoin 50–100 mg.</li><li>- If patient has three or more UTIs in 1 year that are not related to sexual activity, use daily or 3 times/week prophylaxis with TMP/SMZ SS, cephalexin 250 mg, or nitrofurantoin 50–100 mg.</li></ul>
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#### References:

1. Thomas M. Hooton. Guidelines for Antimicrobial Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women". 2011 ; 52 : e103 -e120
2. Thomas M. Hooton,<sup>1</sup> Suzanne F. Diagnosis, Prevention, and Treatment of Catheter-Associated Urinary Tract Infection in Adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America". 2010; 50 : 625 -66
3. Wing DA, Hendershott CM, A randomized trial of three antibiotic regimens for the treatment of pyelonephritis in pregnancy. Obstet Gynecol. 1998;92(2):249.