



UNITED ARAB EMIRATES
MINISTRY OF HEALTH & PREVENTION

National Guidelines on the Empiric Antibiotic Treatment of Urinary Tract Infections

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Purpose & Scope

- 1.1 The National Antimicrobial Stewardship Committee has compiled this guideline on the empiric antibiotic management of urinary tract infection to provide health professionals with evidence-based information and recommendations for the antibiotic treatment of urinary tract infections (UTIs). The guideline is based on the best current clinical evidence, taking into consideration the antimicrobial resistance patterns and trends in the United Arab Emirates (UAE); however, they can never replace clinical expertise when making treatment decisions for individual patients, but rather help to focus decisions. This guideline is subject to revision and will be modified based on changes in international guidelines and UAE's national antibiogram every three years.
- 1.2 The National Antimicrobial Stewardship Committee strongly recommends either adopting this guideline or developing/amending a facility-based guideline using this document as a reference tool.
- 1.3 The committee panel is composed of infectious diseases specialists, infection control practitioners, medical intensivists, epidemiologists, public health specialists, microbiologists, clinical pharmacists and researchers practicing in public and private sectors.

Policy statement

- 2.1. These guidelines are applicable to the following patients' population
 - 2.1.1. Adult patients in the outpatient settings
 - 2.1.2. Adult patients in the inpatient settings
 - 2.1.3. Pregnant women
- 2.2. The guidelines are not applicable to patients with:
 - 2.2.1. Urosepsis: defined as life threatening organ dysfunction caused by a dysregulated host response to infection originating from the urinary tract.
 - 2.2.2. Catheter- associated UTIs: UTIs occurring in a person whose urinary tract is currently catheterized or has had a catheter in place within the past 48 hours



Definitions

3.1. Classification of Urinary Tract Infections:

- Different classification systems of UTI exist. Most widely used are those developed by the Centers for Disease Control and Prevention (CDC), Infectious Diseases Society of America (IDSA), European Society of Clinical Microbiology and Infectious Diseases (ESCMID) as well as the U.S. Food and Drug Administration (FDA).
- In these guidelines, urinary tract infections are divided into the following categories:
 - a) **Uncomplicated cystitis:** Acute, sporadic or recurrent lower UTI, limited to non-pregnant, premenopausal women with no known relevant anatomical and functional abnormalities within the urinary tract or comorbidities. Patients usually presents with urgency, frequency, dysuria and/or supra-pubic pain or tenderness.
 - b) **Uncomplicated pyelonephritis:** Acute, sporadic or recurrent upper UTI, limited to non-pregnant, premenopausal women with no known relevant anatomical and functional abnormalities within the urinary tract or comorbidities. Patient usually presents with fever, rigors and costovertebral pain or tenderness.

Complicated UTIs: Acute, sporadic or recurrent lower (cystitis) and/or upper (pyelonephritis) UTI occurring in patients with an increased chance of a complicated course. Risk factors associated with complicated UTI are listed in table 1

Procedure and responsibility

Procedure sequence		Responsibilities
4.1	Asymptomatic Bacteriuria in Adults: Urinary growth of bacteria in an asymptomatic individual (asymptomatic bacteriuria - ABU) is common and corresponds to a commensal colonization.	Physician
4.2	Treatment of ABU should be performed only in cases of proven benefit for the patients to avoid the risk of selecting antimicrobial resistance. Screening urine cultures should not be collected in asymptomatic patients except in the following conditions: <ul style="list-style-type: none">○ Pregnancy○ Prior to urological procedures	Physician



4.3	Asymptomatic bacteriuria (ABU) 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 without symptoms or signs. Pyuria may or may not be present.	Physician
4.4	In the absence of signs or symptoms attributable to a urinary tract infection, patients with a positive urine culture should not be treated with antibiotics irrespective of whether there is pyuria, high bacterial colony count, or a multi-drug resistant organism. Exceptions to this recommendation include <ul style="list-style-type: none"> ○ Pregnant patients ○ Prior to a urologic procedure ○ High risk neutropenic patients (neutropenia > 7days, Absolute neutrophilic count (ANC) <100 cells/mm³) ○ Immunocompromised ○ Post-renal transplant recipients (In the first two months post-transplantation, or in renal transplant recipients with urinary stents or nephrostomy tubes) 	Physician
4.5	Management of Urinary Tract Infection: <ul style="list-style-type: none"> • When choosing empiric antibiotic to treat urinary tract infections, previous urine culture result should be taken into consideration • Patients with complicated or recurrent urinary tract infection should be referred to urology or infection disease specialist for further evaluation • If patients did not show significant clinical improvement after starting first line antibiotics, consider obtaining ultrasound of the kidney to rule out obstruction or emphysematous pyelonephritis as causes for poor response to antibiotics 	Physician
4.6	Obtain urine culture sample prior start antibiotic	Nurse
4.7	Review / verify antibiotic order for appropriateness in selection & dose. Recommend for intravenous to oral switch when applicable. Recommend for Culture streamline upon release of culture result. Ensure availability of antibiotic agents for the treatment of UTIs.	Pharmacist / Clinical Pharmacist
4.8	Empiric Antibiotic Treatment of Uncomplicated/ Complicated Cystitis: Based on the most common organisms that causes urinary tract infections and United Arab Emirates antibiogram, empiric antibiotic treatment for cystitis is summarized in table 2. All listed doses are based on normal renal function.	Physician
4.9	Empiric Antibiotic Treatment of Uncomplicated/ Complicated Pyelonephritis: Based on the most common organisms that causes urinary tract infections and United Arab Emirates Antibiogram, empiric antibiotic treatment for pyelonephritis is summarized in table 3. All listed doses are based on normal renal functions.	Physician



4.10	Empiric Antibiotic Treatment of Uncomplicated/ Complicated Pyelonephritis in Penicillin Allergic Patient: Empiric options for treating pyelonephritis in patients with type I hypersensitivity reaction to penicillin includes: <ul style="list-style-type: none">○ Vancomycin 15-20 mg/kg + Gentamicin 5-7 mg/kg once daily for 5-7 days○ Vancomycin 15-20 mg/kg + Amikacin 15 mg/kg once daily for 5-7 days○ Ertapenem 1gm IV once daily for 5-7 days	Physician
4.11	Urinary Tract Infection in Pregnant Women: As in non-pregnant women, E. coli is the predominant uropathogen found in both asymptomatic bacteriuria and urinary tract infection (UTI) in pregnant women.	Physician
4.12	Current guidelines from the Infectious Diseases Society of America recommend screening all pregnant women for asymptomatic bacteriuria at least once in early pregnancy.	Physician
4.13	Asymptomatic bacteriuria during pregnancy increases the risk of pyelonephritis and has been associated with adverse pregnancy outcomes, such as preterm birth and low birth weight infants. As many as 20 percent of women with severe pyelonephritis develop complications that include septic shock syndrome or its variants, such as acute respiratory distress syndrome.	Physician
4.14	Table 4 summarizes the empiric antibiotic treatment of urinary tract infection in pregnant women.	Physician
4.15	Additional Recommendations: Fosfomycin is not recommended if there is concern for pyelonephritis or perinephric abscess. It is useful in uncomplicated cystitis caused by multidrug-resistant (MDR) infections without oral alternatives and in men with cystitis if there is concern for prostatitis.	Physician
4.16	Nitrofurantoin should be avoided if there is concern for pyelonephritis, if creatinine clearance is than 60 ml/min, in patients with G6PD deficiency, or in pregnant patients at term. It should be used with caution in patients who are more than 65 years or in men due to concern for sub-therapeutic prostatic levels. Nitrofurantoin is active against Enterococcus spp. Including vancomycin-resistant enterococci (VRE).	Physician
4.17	For the dose calculation of aminoglycosides, total body weight (TBW) is used in underweight and non-obese patients. Use of ideal body weight (IBW) for determining the mg/kg/dose may also be considered. For obese patients (total body weight > 20 % over Ideal body weight), dosage requirement may best be estimated using an adjusted body weight (ABW) of: $IBW + 0.4 (TBW - IBW)$.	Physician
4.18	If aminoglycosides are used in combination with amoxicillin/clavulanate, ceftriaxone, cefepime, cefotaxime or ceftazidime, they should be continued until results of culture and sensitivity is available.	Physician
4.19	Consider de-escalation from intravenous to oral antibiotics if the patient is clinically improving and results of culture and sensitivity are available.	Physician



4.20	Trimethoprim/sulfamethoxazole is not considered appropriate initial empiric therapy for urinary tract infection due to current high resistance rates in UAE.	Physician
4.21	If patient has a previous culture that shows extended spectrum beta lactamase (ESBL) producing Escherichia coli or Klebsiella species, initial empiric antibiotic therapy should be active against ESBL-producing organisms.	Physician
4.22	Fosfomycin is a pregnancy category B drug, though data is limited.	Physician
4.23	Nitrofurantoin is pregnancy category B drug. It is contraindicated in pregnant patients at term (38 to 42 weeks' gestation), during labor and delivery, or when the onset of labor is imminent.	Physician
4.24	All aminoglycosides are pregnancy category D and should be avoided. For pregnant women with acute pyelonephritis, with documented penicillin allergy, treatment should be based on consultation with an infectious disease consultant (if available)	Physician
4.25	Its responsibility of Hospital Antibiotic Stewardship committee (ASPC) to adapt the guideline with respect of hospital antibiogram	Hospital Antibiotic stewardship committee
4.26	Its responsibility of ASPC to follow the compliance rate of guideline and design action plan accordingly	Hospital Antibiotic stewardship committee
4.27	Its responsibility of ASPC to educate the healthcare provider about guideline, and assure effort to make it accusable e.g. integrated in Electronic medical record, Hospital Intranet	Hospital Antibiotic stewardship committee

Tools/Attachments Forms

- 5.1 Attachment 1: Risk Factors for Complicated Urinary Tract Infections (UTIs)
- 5.2 Attachment 2: Summary of the National Guidelines on Empiric Antibiotic Treatment of Urinary Tract Infections (UTIs)
- 5.3 Attachment 3: Summary of the National Guidelines on Empiric Antibiotic Treatment of Asymptomatic Bacteriuria and Urinary Tract Infections (UTIs) in Pregnant Women
- 5.4 Attachment 4: National Cumulative Antibiogram, United Arab Emirates (2019)



Key performance Indicators

Compliance with hospital First line empiric antibiotic for treatment of UTI (Inpatient, Outpatient)

1. (In-patient) Numerator/Denominator: Number of inpatients diagnosed with UTIs receiving appropriate empiric antibiotic(s) as per UTIs guideline in a calendar month / Total number of inpatients diagnosed with UTIs in the same calendar month X 100
2. (Out-patient) Numerator/Denominator: Number of outpatients diagnosed with UTIs receiving appropriate empiric antibiotic(s) as per UTIs guideline in a calendar month / Total number of outpatients diagnosed with UTIs in the same calendar month X 100

Compliance with Duration of antibiotic for treatment of UTI

1. (In-patient) Numerator/Denominator:

Number of inpatients diagnosed with UTIs receiving appropriate duration of antibiotic(s) as per UTIs guideline in a calendar month / Total number of inpatients diagnosed with UTIs in the same calendar month X 100

2. (Out-patient) Numerator/Denominator:

Number of outpatients diagnosed with UTIs receiving appropriate duration antibiotic(s) as per UTIs guideline in a calendar month / Total number of outpatients diagnosed with UTIs in the same calendar month X 100



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Attachment 1: Risk Factors for Complicated Urinary Tract Infections (UTIs)

Table 1: Risk Factors for Complicated Urinary Tract Infections (UTIs)

<ul style="list-style-type: none">• Male gender• Postmenopausal women• Pregnancy• Nephrolithiasis• Urologic surgery• Urinary obstruction• Urinary retention• Neurogenic bladder• Bacteremia secondary to urinary tract infection	<ul style="list-style-type: none">• Cystocele• Polycystic kidney disease• Renal Transplant• Moderate/severe chronic kidney disease or on hemodialysis• Moderate/severe liver disease• Congestive heart failure• Cardiomyopathy• Hemiplegia• Bedridden or using a wheelchair	<ul style="list-style-type: none">• Spinal cord injury• Diabetes mellitus with HbA1c >8%• Receiving chemotherapy for a malignancy or malignancy not in remission• Immunodeficiency or immunosuppressive treatments• Sickle cell disease• Asplenia
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Attachment 2: Summary of the National Guidelines on Empiric Antibiotic Treatment of Urinary Tract Infections (UTIs)

Table 2 Empiric Antibiotic Treatment of Uncomplicated/Complicated Cystitis		
Condition	First Choice	Alternative
Uncomplicated Cystitis	Nitrofurantoin slow release 100 mg PO every 12 hours for 5 days OR Nitrofurantoin 100 mg PO every 6-8 hours for 5 days OR Fosfomycin 3 gm PO one dose (repeat 3 gm PO in 72 hours if needed)	Amoxicillin/Clavulanic acid 1 gm PO every 12 hours for 5 days
Complicated Cystitis	Nitrofurantoin slow release 100 mg PO every 12 hours for 5-7 days OR Nitrofurantoin 100 mg PO every 6-8 hours for 5-7 days OR Fosfomycin 3 gm PO every 48-72 hours for 3 doses	Amoxicillin/Clavulanic acid 1 gm PO every 12 hours for 5-7 days

PO: Per oral, mg: milligrams, gm: grams, kg: kilograms

Table 3 Empiric Antibiotic Treatment of Uncomplicated/Complicated Pyelonephritis		
Condition	First Choice	Alternative
Uncomplicated Pyelonephritis	Amoxicillin/Clavulanic acid 1.2 gm IV every 8 hours for 7-10 days + either gentamicin 5-7 mg/kg or amikacin 15 mg/kg once daily for 3 doses OR Ceftriaxone 2 gm IV once daily for 7-10 days + either gentamicin 5-7 mg/kg or amikacin 15 mg/kg once daily for 3 doses	Gentamicin 5-7 mg/kg or amikacin 15 mg/kg once daily for 7-10 days
Complicated Pyelonephritis	Piperacillin –tazobactam 4.5 gm IV every 6-8 hours for 7-10 days History of ESBL, previous colonization with ESBL: Ertapenem 1gm IV once daily for 7-10 days	Cefepime 1-2 gm IV every 8-12 hours for 7-10 days plus either gentamicin 5-7 mg/kg or amikacin 15 mg/kg once daily for 3 doses

IV: Intravenously, mg; milligrams, gm: gram, kg: kilograms, ESBL: extended spectrum beta lactamase



Attachment 3: Summary of the National Guidelines on Empiric Antibiotic Treatment of Asymptomatic Bacteriuria and Urinary Tract Infections (UTIs) in Pregnant Women

Table 4 Empiric Antibiotic Treatment of Asymptomatic Bacteriuria and Urinary Tract Infections in Pregnant Women		
Condition	First Choice	Alternative
Asymptomatic bacteriuria in a pregnant female	Nitrofurantoin slow release 100 mg PO every 12 hours for 5 days OR Nitrofurantoin 100 mg PO every 6 hours for 5 days OR Fosfomycin 3 gm PO one dose (repeat 3 gm PO in 72 hours if needed)	Amoxicillin/Clavulanic acid 1 gm PO every 12 hours for 5 days
Complicated cystitis	Nitrofurantoin slow release 100 mg PO every 12 hours for 5 -7days OR Nitrofurantoin 100 mg PO every 6 hours for 5-7 days OR Fosfomycin 3 gm PO every 48-72 hours for 3 doses	Amoxicillin/Clavulanic acid 1 gm PO every 12 hours for 5-7 days
Pyelonephritis	Piperacillin –tazobactam 4.5 gm IV every 6-8 hours for 7-10 days History of ESBL, previous colonization with ESBL: Ertapenem 1gm IV once daily for 7-10 days	Cefepime 2 gm every 8-12 hours IV for 7-10 days

PO: per oral, IV: intravenous, IV: Intravenously, mg; milligrams, gm: gram, kg: kilograms, ESBL: extended spectrum beta lactamase



Attachment 4: National Cumulative Antibigram (2019): Percent susceptible isolates (%S) for *Escherichia coli* and *Klebsiella pneumoniae* (isolates from urinary tract), all isolates/patients, and by location type (IP/OP/ICU), United Arab Emirates, 2019

Antibiotic	E. coli (N=28,390)					K. pneumoniae (N=8,169)				
	N (All)	%S (All)	%S (OP) ^A	%S (IP) ^B	%S (ICU) ^C	N (All)	%S (All)	%S (OP) ^A	%S (IP) ^B	%S (ICU) ^C
Ampicillin	25,255	38	40	28	18	7,428	R	R	R	R
Ampicillin + Amikacin	21,563	99	99	98	97	6,421	97	98	90	81
Amoxicillin/Clavulanic acid	25,107	74	75	70	55	7,335	77	80	67	51
Amoxicillin/Clavulanic acid + Gentamicin	24,959	93	94	90	79	7,299	94	95	88	73
Amoxicillin/Clavulanic acid + Amikacin	21,447	99	100	99	97	6,335	95	99	91	78
Piperacillin/Tazobactam	25,118	95	95	91	83	7,403	88	92	79	65
Cefuroxime (II.)	10,361	49	50	30	37	2,835	55	53	40	47
Cefoxitin (II.)	9,135	91	92	84	77	2,566	87	88	78	81
Cefotaxime (III.)	17,754	70	72	60	40	5,318	74	78	62	47
Cefpodoxime (III.)	3,468	68	71	57	49	963	74	77	68	61
Cefpodoxime (III.) + Gentamicin	3,463	93	95	89	77	962	94	96	90	78
Ceftriaxone (III.)	9,032	69	70	62	41	2,564	74	76	62	59
Ceftriaxone (III.) + Gentamicin	9,028	92	93	89	78	2,561	94	95	89	84
Ceftriaxone (III.) + Amikacin	8,970	99	99	98	96	2,555	97	99	91	87
Ceftazidime (III.)	25,202	79	81	72	60	7,415	77	80	65	55
Ceftazidime (III.) + Gentamicin	25,183	94	95	91	80	7,405	94	96	88	77
Ceftazidime (III.) + Amikacin	21,650	100	100	99	97	6,437	97	98	90	82
Cefepime (IV.)	21,707	79	81	73	65	6,424	83	86	73	64
Cefepime (IV.) + Gentamicin	21,693	94	95	90	82	6,410	95	97	90	81
Cefepime (IV.) + Amikacin	21,628	100	100	99	97	6,403	97	99	92	86
Cefepime (IV.) + Tobramycin	583	86	90	83	81	233	85	93	78	84
Aztreonam	3,983	72	70	58	33	1,975	77	76	60	57
Meropenem	24,953	99	99	98	97	7,297	96	97	91	82
Meropenem + Tobramycin	3,988	100	100	99	97	1,175	97	99	93	95
Imipenem	22,712	99	98	98	97	6,621	94	96	89	79
Ertapenem	19,441	98	98	98	96	5,734	95	96	89	78
Amikacin	21,681	99	99	98	97	6,449	96	98	90	81
Gentamicin	25,229	89	90	84	72	7,420	92	94	86	75



Ciprofloxacin	25,305	50	59	39	31	7,430	68	70	50	48
Trimethoprim/Sulfamethoxazole	25,335	62	63	56	48	7,445	77	79	66	53
Fosfomycin	7,070	N/A^D	N/A^D	N/A^D	N/A^D	2,852	N/A^D	N/A ^D	N/A ^D	N/A ^D
Nitrofurantoin	19,344	94	95	92	85	7,383	34	35	30	21

^A OP: outpatient, includes outpatient, emergency and community. ^B IP: inpatient (non-ICU). ^C ICU: intensive care unit. ^D *E. coli* and *K. pneumoniae* are usually highly susceptible to Fosfomycin (Pal T, 2017) (Al-Zarouni M, 2012) (Abdullah AA, 2005) (Falagas ME, 2016).
Data source: UAE National AMR Surveillance System. Data shown is from 250 surveillance sites (79 hospitals, 171 centers/clinics), 2019. Data is from non-duplicate urinary tract isolates only (first isolate per patient)