

FLUOROQUINOLONES (FQ) OVERVIEW



➤➤➤➤ CIPROFLOXACIN, LEVOFLOXACIN, MOXIFLOXACIN

FQs, known for **excellent tissue penetration** and **high oral bioavailability**, are effective for certain serious infections. However, their use is restricted due to **safety concerns** and **antimicrobial resistance (AMR) risks**.

	Ciprofloxacin	Levofloxacin	Moxifloxacin
Pseudomonas coverage	✓	✓	X
<i>Strep pneumoniae</i> CAP coverage	+/-	✓ (respi FQ)	✓ (respi FQ)
Atypical CAP coverage	+/-	✓ (respi FQ)	✓ (respi FQ)
Mycobacterial infection	X	✓	✓
Anaerobe coverage	X	X	✓
AmpC & ESBL tx (Step Down Option based on C&S)	✓	✓	✓
Good Bioavailability	✓ (70-80%)	✓ (99%)	✓ (90%)

WARNING



BLACK BOX WARNING!

Despite their potency, FQs are associated with **severe and potentially irreversible side effects**, including:

- Tendinitis and tendon rupture
- Peripheral neuropathy
- CNS/Neurological effects
- Worsening of myasthenia gravis
- Aortic dissection/rupture
- Blood sugar disturbance (Hypo/Hyper-glycemia)
- QTc prolongation

They are also known to cause **“collateral damages”** – increase in antibiotic resistant organisms, particularly **MRSA**, especially when used inappropriately.

In HSgB, FQ use is generally RESERVED for:

Ciprofloxacin:

- Definitive treatment of **Pseudomonas**
- Step Down treatment for **AmpC** or **ESBL**-producing organisms

Levofloxacin & Moxifloxacin:

- 2nd line TB treatment (in Resistant TB cases or when 1st line agents not tolerated)
- Opportunistic Infections (OI) treatment



FLUOROQUINOLONES

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	CIPROFLOXACIN ^[1,2,3,4]		LEVOFLOXACIN ^[1,5,6]		MOXIFLOXACIN ^[1,7,8]	
PRESCRIBING CATEGORY	A*		A*		A*/ UKK	
STRENGTH	IV: 200 mg/ 100 ml	TAB: 250 mg	IV: 500 mg/ 100 ml	TAB: 500 mg	IV: 400 mg/ 250 ml	TAB: 400 mg
USUAL DOSE	IV: 400 mg BD / TDS	500-750 mg BD	Low dose: 500 mg OD IV/PO High dose: 750-1000 mg OD IV/PO		400 mg OD IV/PO	
INDICATION WITH DOSING	<ul style="list-style-type: none"> Gonorrhoea: 250 mg PO STAT Meningococcal prophylaxis: 500 mg PO STAT Empirical Therapy in Febrile Neutropenia (<i>Suspected Pseudomonas sp.</i>): 500 mg PO q12h (Plus T. Augmentin 625 mg q8h) Bacterial Prostatitis: 500 mg PO q12h Disseminated Mycobacterium avium complex (MAC) disease: 500-750 mg PO q12h Typhoid/ Infectious Diarrhea: 500-750 mg PO q12h SSTI (<i>Pseudomonas sp.</i>): 500-750 mg PO or 400 mg IV q12h Perichondritis: 750 mg PO q12h Uncomplicated Pyelonephritis: 500 mg PO q12h Otitis externa (malignant/necrotizing): 750 mg PO q12h or IV 400 mg q8h 		<ul style="list-style-type: none"> Community Acquired Pneumonia (CAP): 500 mg IV/PO q24h Epididymo-orchitis (non-STD related): 500 mg PO q24h Disseminated Mycobacterium avium complex (MAC) disease: 500mg PO q24h Helicobacter Pylori infection (secondary treatment): 500mg PO q24h (plus PPI q12h and T. Amoxicillin 1g q12h) Second line treatment of Tuberculosis (Off-label use): 500-750 mg PO q24h Rhodococcus infection: 500-750 mg IV/PO q24h 		<ul style="list-style-type: none"> 2nd line therapy for Severe Community Acquired Pneumonia (CAP) patients with co-morbidity OR with recent antibiotic therapy, suspected infections of resistant pathogens including <i>Streptococcus pneumoniae</i>, <i>Haemophilus influenzae</i> & <i>Mycoplasma pneumoniae</i>: 400 mg IV/PO q24h Clarithromycin resistant NTM-Tuberculosis (Off-label use): 400 mg PO q24h Disseminated Mycobacterium avium complex (MAC) disease: 400 mg PO q24h* <p><i>*Alternative for patient who cannot tolerate orally or not responding to IV Levofloxacin.</i></p>	
PAEDIATRIC USE (LIMITED DATA AVAILABALE)	<ul style="list-style-type: none"> Infections in cystic fibrosis: ^[3] <ul style="list-style-type: none"> IV 10 mg/kg/dose q8h (MAX: 400 mg/dose) Complicated UTI and pyelonephritis: ^[3] <ul style="list-style-type: none"> IV 6-10 mg/kg/dose q8h (MAX: 400 mg/dose) 		6m - 5y: PO/IV 8-10 mg/kg/dose q12h ^[5] ≥5y: PO/IV 10 mg/kg/dose q24h (MAX: 750 mg/day)		≥3m-2y: PO/IV 6 mg/kg/dose q12h ^[7] (MAX: 200 mg/dose) 2 - 6y: PO/IV 5 mg/kg/dose q12h (MAX: 200 mg/dose) 6 - 12y: PO/IV 4 mg/kg/dose q12h (MAX: 200 mg/dose) 12y -18y: <45 kg: PO/IV 4 mg/kg/dose q12h (MAX: 200 mg/dose) ≥45 kg: PO/IV 400 mg q24h (MAX: 400 mg/dose)	
RENAL ADJUSTED DOSE	IV CIPROFLOXACIN: <u>CrCl 30-50:</u> 400 mg BD (MAX: 800 mg/day) <u>CrCl <30:</u> 200-400 mg OD (MAX: 400 mg/day) <u>HD/PD:</u> 200-400 mg OD	ORAL CIPROFLOXACIN: <u>CrCl 30-50:</u> 500-750 mg BD (MAX: 1000 mg/day) <u>CrCl <30:</u> 250- 500 mg OD (MAX: 500 mg/day) <u>HD/PD:</u> 250-500 mg OD	If usual dose 500 mg q24h: <u>CrCl 20-49:</u> <ul style="list-style-type: none"> 500 mg once, then 250 mg OD, IV/PO OR <ul style="list-style-type: none"> 500 mg q48h IV/PO <u>CrCl <20/ HD:</u> Initiate at 500 mg once, then 250 mg q48h, IV/PO	If usual dose 750-1000 mg q24h: <u>CrCl 20-49:</u> 750 mg q48h IV/PO <u>CrCl <20/ HD:</u> Initiate at 750 mg once, then 500 mg q48h IV/PO	No dose adjustment	
DILUTION	BRAND: CIPROXOL - Slow IV Infusion: <ul style="list-style-type: none"> Infused directly OR after mixing with NS/WFI/Ringer's solution/lactated Ringer's solution/D5/D10/QSD5/HSD5 Infuse over 60 mins 		BRAND: LEVOFLOXOL - IV infusion only: <ul style="list-style-type: none"> Use undiluted or diluted (NS/D5) Administer slowly over a period depending on the dosage: <ul style="list-style-type: none"> → 250 mg: administer over 30 min/24hr → 500 mg: administer over 60 min/24hr → 750 mg: administer over 90 min/24hr Avoid rapid or bolus IV > lead to hypotension Not for IM, intrathecal, intraperitoneal or SC 		BRAND: AVELOX -IV infusion: <ul style="list-style-type: none"> Mixed with WFI/NS/D5/D10/ Ringer's solution/ Lactated Ringer's Solution Infuse over 60 minutes <ul style="list-style-type: none"> Do not mix with other drugs or infuse through the same IV line 	
STABILITY	BRAND: CIPROXOL <ul style="list-style-type: none"> No data 		BRAND: LEVOFLOXOL <ul style="list-style-type: none"> Single use only. Discard unused portion 		BRAND: AVELOX <ul style="list-style-type: none"> 24 hours at room temperature 	
LIVER IMPAIRMENT	No dose adjustment					
PREGNANCY/ LACTATION ^[10,11]	Category C: Adverse effects in animals; no adequate studies in humans/ Not recommended: Present in human milk					

Oral Fluoroquinolone administration: ^[9]

Allow a **2-6 hour gap** with diary products, multivitamins, antacid or NG tube feeding to avoid concurrent exposure to multivalent cation (eg: Ca, Fe, Al, Mg, Zn)

- Cations bind to drugs and prevent absorption

1. HSGB Drug List 2025

2. Ciprofloxacin. In: Lexi-Drugs online [database on the internet]. Waltham (MA): UpToDate Inc.; 2025.

3. Ciproxol (Ciprofloxacin 0.2%w/v Intravenous Infusion BP). [product insert on the internet]. Ain Medicare Sdn. BHD. 2025.

4. Axcel Ciprofloxacin-250mg Tablet [product insert on internet]. Y.S.P. Industries (M) Sdn. Bhd. 2025.

5. Levofloxacin. In: Lexi-Drugs online [database on the internet]. UpToDate Inc.; 2025.

6. Levofloxol (Levofloxacin 5mg/ml, Intravenous Infusion)[product insert on the internet]. Ain Medicare Sdn. Bhd. 2025.

7. Moxifloxacin. In: Lexi-Drugs online [database on the internet]. UpToDate Inc.; 2025.

8. Avelox Infusion Solution 400mg/250mL. [product insert on the internet]. Bayer Co. (Malaysia) Sdn. Bhd. 2025.

9. HSGB Antibiotics SOS: HSGB Abx Guideline 2024

10. Briggs, G.G., Freeman, R.K. and Yaffe, S.J., 2021. Drugs in pregnancy and lactation: a reference guide to fetal and neonatal risk. Lippincott Williams & Wilkins.

11. Weiner, C.P., 2018. Drugs for Pregnant and Lactating Women E-Book. Elsevier Health Sciences.



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↑ MOST COMMON

↓ SIDE EFFECTS

↓ LEAST COMMON

SIDE EFFECTS	MONITORING PARAMETERS	CIPROFLOXACIN	LEVOFLOXACIN	MOXIFLOXACIN
Gastrointestinal upset	Symptoms: <ul style="list-style-type: none"> Gastritis: Anorexia, nausea, vomiting, abdominal discomfort, diarrhoea C. difficile-associated disease 	HIGH RISK		
Hypersensitivity reactions	Symptoms: <ul style="list-style-type: none"> Delayed-onset maculopapular cutaneous eruptions Immediate reactions: Pruritus, urticaria, angioedema, anaphylaxis Others: DRESS, AGEP, SJS 	LOW RISK		
Tendinopathy / Tendon rupture *especially >60yo & concurrently taking oral steroid	Symptoms: <ul style="list-style-type: none"> Pain and swelling of joints Muscle weakness / stiffness 	LOW RISK	LOW-MODERATE RISK	LOW RISK
Neurological effect	Symptoms: <ul style="list-style-type: none"> Dizziness, headache, transient change in mood or sleep patterns, insomnia 	LOW RISK		
Peripheral neuropathy	Symptoms: <ul style="list-style-type: none"> Numbness, tingling, burning sensation, weakness 	LOW RISK		
Psychiatry disorder	Symptoms: <ul style="list-style-type: none"> Agitation, confusion, seizures, hallucination, psychosis, suicidal thoughts 	LOW RISK		
QT prolongation	Signs and Symptoms: <ul style="list-style-type: none"> QT baseline (ECG), arrhythmia 	LOW-MODERATE RISK	MODERATE RISK	HIGH RISK
Aortic aneurysm / aortic dissection	Symptoms: <ul style="list-style-type: none"> Sudden abdominal, chest or back pain 	MODERATE RISK	HIGH RISK	MODERATE RISK
Dysglycemia	Signs: <ul style="list-style-type: none"> Blood glucose level (hypoglycemia/ hyperglycemia) 	MODERATE RISK	MODERATE RISK	HIGH RISK
Exacerbation of Myasthenia Gravis	Symptoms: <ul style="list-style-type: none"> Worsening muscle weakness Respiratory distress 	LOW RISK		
Phototoxicity	Symptoms: <ul style="list-style-type: none"> Skin erythema/ blistering 	LOW RISK		
Hepatotoxicity	Signs: <ul style="list-style-type: none"> Liver enzymes elevated (ALT, AST, ALP) Symptoms: <ul style="list-style-type: none"> Jaundice, dark urine 	LOW RISK		

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