

# **Importance Ratings and Summary of Antibacterial Uses in Humans in Australia**

**Version 1.1**

**Australian Strategic and Technical Advisory Group on AMR (ASTAG)**

**February 2015**

## Importance Ratings and Summary of Antibacterial Uses in Humans in Australia Version 1.1

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## Version control

The Importance Ratings and Summary of Antibacterial Uses in Humans in Australia document (the “Antibacterial Importance Ratings”) was reviewed by the Australian Strategic and Technical Advisory Group on AMR (ASTAG) in February 2015. Some amendments were made, which are reflected in this version 1.1.

Australian Antimicrobial Resistance Standing Committee (AMRSC)

Version 1.0, July 2014

Revisions by the Australian Strategic and Technical Advisory  
Group on AMR (ASTAG)

Version 1.1, February 2015

## Purpose

The purpose of the Antibacterial Importance Ratings tables is to provide guidance to clinicians and the pharmaceutical industry about the importance of antibacterial agents available for human use in Australia (refer table 1), as well as those agents not used in human health but that have the potential to select for cross resistance to antibacterials listed in table 1 (refer table 2).

Details are also given on the current ways in which all antibacterials are used in humans. This list is for guidance only, and does not include every use of the agent or class. All agents with significant antibacterial activity are included in the table, even if their primary use is for other than treatment of bacterial infections (e.g. pyrimethamine, a dihydrofolate reductase inhibitor whose main role is treatment of malaria and toxoplasmosis, but with the same antibacterial activity as trimethoprim, and therefore has the potential to select for resistance to this class).

ASTAG uses this information as a guide in providing advice to regulatory agencies and government committees including the Australian Pesticides and Veterinary Medicines Authority (APVMA), Therapeutic Goods Administration (TGA), Advisory Committee for Medicines Scheduling (ACMS), Advisory Committee for Chemicals Scheduling (ACCS) and Pharmaceutical Benefits Advisory Committee (PBAC), as a method of assessing the risk to human health after exposure of susceptible humans to either an antibacterial or antibacterial-resistant bacteria. In risk assessment terms, this table is relevant to the “severity of impact” which is an important element to overall risk characterisation. As an example, if an antibacterial is rated as ‘High’, ASTAG would consider that the severity of impact caused by bacteria resistant to that antibacterial is high, as there are few or no alternatives to many infections. Rating in this table does not affect other parts of risk assessment including hazard, exposure, impact or probability of disease as a result of exposure.

## Background

The previous version of this document was released by the Antimicrobial Resistance Standing Committee (AMRSC), a former standing committee of the Australian Health Protection Principal Committee (AHPPC), building on earlier versions developed by the Expert Advisory Group on Antimicrobial Resistance (EAGAR) of the National Health and Medical Research Council (NHMRC). The document is intended to provide advice on risk assessments for new antibacterial agents and extensions of indications of currently registered antibacterials. The term ‘antibacterial’ is preferred in this document as the more common term ‘antimicrobial’ technically includes agents without antibacterial properties (e.g. antifungals), and such agents are not addressed here. The importance of the antibacterial or class of antibacterials in human medicine is taken into account in these risk assessments.

The ASTAG was formed in 2014, to provide advice to the Australian Antimicrobial Resistance Prevention and Containment Steering Group. It has assumed many of the roles of AMRSC, including the regular updating of the Antibacterial Importance Ratings. ASTAG is aware of documents with similar purposes including the WHO document ‘Critically Important Antimicrobials for Human Medicine, 3<sup>rd</sup> rev, 2011’ and the OIE ‘List of Antimicrobials of Veterinary Importance’, January 2014. ASTAG takes these documents into consideration when allocating its ratings, but has in some circumstances given a different rating because of the Australian context.

## A note to readers

The Antibacterial Importance Ratings capture the knowledge of experienced professionals and is based upon the best available evidence at the time of completion. Readers should not rely solely on the information contained within this document. Antibacterial Importance Ratings is not intended to be a substitute for advice from other relevant sources including, but not limited to, the advice from a health professional. Clinical judgment and discretion may be required in the interpretation and application of this information.

The Antibacterial Importance Ratings will change over time as resistance levels change, new drugs are introduced, and optimum drug choices alter because of new medical evidence. Consequently the table will be updated at regular intervals.

**TABLE 1 Antibacterial agents used in human health in Australia**

Antibacterial class and antibacterial	Importance Rating <sup>1</sup>	Uses P, T, R	Comments <sup>2</sup>	APVMA registered
<b>Narrow-spectrum penicillins</b>				
Benzylpenicillin (pen G), phenoxymethylpenicillin (pen V)	Low	P2, T3, R1	Primary agents in pneumococcal and streptococcal infection	Yes (Benzylpenicillin)
Procaine penicillin	Low	P2, T3, R1	Intramuscular – occasional substitute for benzylpenicillin	Yes
Benzathine penicillin	Low	P3, T3, R1	Intramuscular – syphilis treatment and rheumatic fever prophylaxis	Yes
<b>Moderate-spectrum penicillins</b>				
Amoxicillin, ampicillin	Low	P2, T3, R1	Principal role in respiratory tract infections; widespread IV hospital use in combination for a range of moderate and serious infections. Surgical and endocarditis prophylaxis	Yes
<b>Antistaphylococcal penicillins</b>				
Flucloxacillin, dicloxacillin	Medium	P3, T3, R1	Standard treatment for <i>Staphylococcus aureus</i> infections (not MRSA) Surgical prophylaxis, especially orthopaedics	
<b><math>\beta</math>-lactamase inhibitor combinations</b>				
Amoxicillin-clavulanate	Medium	P1, T3, R1	Second line agent for respiratory tract infections; role in certain types of skin/soft tissue infections and mixed staphylococcal/Gram-negative infections and aerobic/anaerobic infections.	Yes
Piperacillin-tazobactam, Ticarcillin-clavulanate	High	P1, T2, R2	Valuable agents for a range of severe mixed aerobic-anaerobic infections including intra-abdominal infections, aspiration pneumonia, skin/soft tissue infections. Primary agents for <i>Pseudomonas aeruginosa</i> Neutropenic sepsis	
<b>1st Generation Cephalosporins</b>				
Cephalexin, cephalothin, cefazolin	Medium	P3, T3, R1	Treatment of minor and staphylococcal infections in penicillin allergic patients. Prophylaxis in orthopaedic and other surgery	Yes (Cephalexin)
<b>2nd Generation Cephalosporins</b>				
Cefaclor, cefuroxime-axetil	Medium	P0, T2, R1	Treatment of respiratory infections in penicillin-allergic patients	Yes (Cefuroxime)

Antibacterial class and antibacterial	Importance Rating <sup>1</sup>	Uses P, T, R	Comments <sup>2</sup>	APVMA registered
<b>Cephameycins</b>				
Cefoxitin	Medium	P3, T1, R2	Useful anti-anaerobic activity, major role in surgical prophylaxis	
<b>3rd Generation Cephalosporins</b>				
Ceftriaxone	High	P2, T3, R2	Major agent in severe pneumonia and meningitis. Used in selected cases for treatment of gonorrhoea and alternative for prophylaxis of meningococcal infection	
Cefotaxime	High	P0, T3, R2	Major agent in severe pneumonia and meningitis	
<b>4th Generation Cephalosporins (and anti pseudomonal)</b>				
Ceftazidime and cefepime	High	P1, T3, R3	Restricted role in pseudomonal infection and neutropenic sepsis	
<b>Anti-MRSA Cephalosporins</b>				
Ceftaroline	High	P1, T1, R3	Restricted role in MRSA infection	
<b>Carbapenems</b>				
Imipenem, meropenem, ertapenem	High	P0, T3, R4	Very broad-spectrum reserve agents for multi-resistant and serious Gram-negative and mixed infections	
<b>Monobactams</b>				
Aztreonam	High	P0, T3, R4	Reserve agents for resistant Gram-negative infections or patients with severe $\beta$ -lactam allergy	
<b>Tetracyclines</b>				
Tetracycline, doxycycline, minocycline	Low	P2, T3, R1	Major agents for minor respiratory tract infections and acne. Supportive role in pneumonia for treating <i>Mycoplasma</i> and <i>Chlamydia pneumoniae</i> . Malaria prophylaxis (doxycycline)	Yes (Doxycycline) (Tetracycline)
<b>Glycylcyclines</b>				
Tigecycline	High	P0, T1, R4	Reserve agent for multi-resistant gram-positives and some multi-resistant gram-negatives	
<b>Glycopeptides</b>				
Vancomycin	High	P2, T3, R2	Drug of choice for serious methicillin-resistant staphylococcal infections. Reserve agent for enterococcal infection when there is resistance or penicillin allergy	

Antibacterial class and antibacterial	Importance Rating <sup>1</sup>	Uses P, T, R	Comments <sup>2</sup>	APVMA registered
Teicoplanin	High	P1, T1, R4	Substitute for vancomycin if intolerance or outpatient IV therapy	
<b>Aminoglycosides</b>				
Neomycin (including framycetin)	Low	P1, T2, R1	Topical agent for skin infection and gut suppression	Yes
Gentamicin, tobramycin	Medium	P2, T3, R1	Standard agents in combination for serious and pseudomonal infection. Gentamicin used in combination for endocarditis	Yes (Gentamicin)
Amikacin	High	P0, T2, R4	Reserve agents for Gram-negatives resistant to gentamicin and tobramycin	
Spectinomycin <sup>3</sup>	Medium	P0, T2, R5	Spectinomycin only used for gonorrhoea (infrequently)	Yes
Streptomycin <sup>3</sup>	Low	P0, T1, R5	Rare use in treatment of TB and enterococcal endocarditis	Yes
Capreomycin	Low	P0, T1, R5	Rare use in TB	
Paromomycin <sup>3</sup>	Low	P0, T1, R5	Rare use for <i>Cryptosporidium</i> and <i>Dientamoeba</i> infection	
<b>Sulfonamides and DHFR inhibitors</b>				
Sulfadiazine <sup>3</sup>	Low	P0, T3, R5	Treatment of acute toxoplasmosis	Yes
Silver sulfadiazine	Low	P3, T1, R1	Prevention of wound infections, especially in burns	
Sulfacetamide	Low	P0, T3, R1	Treatment of conjunctivitis	Yes
Trimethoprim	Low	P2, T3, R1	Treatment and prophylaxis of UTI	Yes
Trimethoprim-sulfamethoxazole (=co-trimoxazole)	Medium	P2, T3, R1	Minor infections, especially treatment and prophylaxis of UTI. Standard for treatment and prophylaxis of <i>Pneumocystis jiroveci</i> infection and nocardiosis. Important for community-acquired MRSA infections	
Sulfadoxine-pyrimethamine	Low	P1, T1, R3	Treatment and prophylaxis of malaria	Yes (Sulfadoxine)
Proguanil	Low	P2, T1, R3	Malaria prophylaxis	
Pyrimethamine	Low	P0, T3, R1	Treatment of toxoplasmosis	



Antibacterial class and antibacterial	Importance Rating <sup>1</sup>	Uses P, T, R	Comments <sup>2</sup>	APVMA registered
<b>Oxazolidinones</b>				
Linezolid	High	P0, T1, R4	Treatment of multi-resistant Gram-positive infections, especially MRSA and VRE	
<b>Macrolides</b>				
Azithromycin	Low	P3, T3, R2	Treatment of <i>Chlamydia trachomatis</i> infections. Major agent for treatment and suppression of atypical mycobacterial infection	
Clarithromycin	Low	P2, T2, R1	Treatment of minor Gram-positive infections. Major agent for treatment and suppression of atypical mycobacterial infection	
Erythromycin, roxithromycin	Low	P1, T3, R1	Treatment of minor Gram-positive, <i>Chlamydia</i> and <i>Mycoplasma</i> infections.	Yes (Erythromycin)
Spiramycin <sup>3</sup>	Low	P0,T1,R5	Treatment of toxoplasmosis in pregnancy	Yes
<b>Lincosamides</b>				
Clindamycin, lincomycin	Medium	P1, T3, R2	Reserved for Gram-positive and anaerobic infections in penicillin-allergic patients. Clindamycin topical used for acne	Yes
<b>Streptogramins</b>				
Quinupristin with dalfopristin <sup>3</sup>	High	P0, T1, R4	Reserve agent for multi-resistant Gram-positive infections (MRSA and vancomycin-resistant <i>Enterococcus faecium</i> )	
Pristinamycin <sup>3</sup>	High	P0, T1, R5	As for quinupristin-dalfopristin	
<b>Nitroimidazoles</b>				
Metronidazole, tinidazole	Medium	P2, T3, R1	Major agents for the treatment and prevention of anaerobic infections in hospitals. Principal agents for the treatment of giardiasis and trichomoniasis	Yes (Metronidazole)
<b>Quinolones</b>				
Norfloxacin	High	P1, T3, R2	Treatment and prevention of complicated UTI	
Ciprofloxacin	High	P2, T3, R3	Major oral agent for the treatment of Gram-negative infections resistant to other agents. Minor role in Meningococcal prophylaxis	
Moxifloxacin	High	P0, T3, R4	Restricted role in the management of serious respiratory infections, especially pneumonia in patients with severe penicillin allergy	

Antibacterial class and antibacterial	Importance Rating <sup>1</sup>	Uses P, T, R	Comments <sup>2</sup>	APVMA registered
Ofloxacin	High	P0, T2, R3	Topical treatment of severe eye infections	
Levofloxacin <sup>3</sup>	High	P0, T1, R5	Reserve treatment for <i>Helicobacter pylori</i> infection	
<b>Antimycobacterials</b>				
Isoniazid	High	P2, T3, R4	Primary agent for treatment and prevention of tuberculosis	
Ethambutol, pyrazinamide <sup>3</sup>	High	P1, T3, R4	Primary agent for treatment of TB	
Cycloserine, p-aminosalicylic acid <sup>3</sup> , prothionamide <sup>3</sup>	High	P0, T1, R4/R5	Reserve agents for complicated or resistant TB	
<b>Antileprotics</b>				
Clofazimine <sup>3</sup> , dapsone	High	P0, T3, R4	Usage predominantly for treatment of leprosy	
<b>Rifamycins</b>				
Rifampicin (Rifampin)	High	P3, T3, R2	Meningococcal and <i>H. influenzae</i> type b prophylaxis; Standard part of TB regimens.  Important oral agent in combination for MRSA infections	Has been available under permit since 1998 for <i>Rhodococcus equi</i> infection. Permit not renewed since Sept 2012 but is available to veterinarians through Bova Compounding Chemist
Rifabutin	High	P3, T2, R4	Treatment and prophylaxis of <i>Mycobacterium avium</i> complex infections	
Rifaximin	High	P1, T0, R4	Prevention of hepatic encephalopathy	
<b>Polypeptides</b>				
Bacitracin, gramicidin	Low	P0, T2, R1	Topical agents with Gram-positive activity	Yes (Bacitracin)
<b>Polymyxins</b>				
Polymyxin B	High	P0, T2, R1	Topical agent with Gram-negative activity	Yes <sup>4</sup>
Colistin	High	P0, T1, R4	Reserve agent for very multi-resistant gram-negative infection (both inhaled and intravenous)	

Antibacterial class and antibacterial	Importance Rating <sup>1</sup>	Uses P, T, R	Comments <sup>2</sup>	APVMA registered
<b>Amphenicols</b>				
Chloramphenicol	Low	P0, T2, R1	Usage largely as topical eye preparation. Occasional need for the treatment of bacterial meningitis	Yes
<b>Nitrofurans</b>				
Nitrofurantoin	High	P2, T2, R1	Treatment and prophylaxis of urinary tract infections only	
Furazolidone <sup>3</sup>	High	P0, T1, R5	Reserve treatment for <i>Helicobacter pylori</i> infection	
<b>Fusidanes</b>				
Sodium fusidate	High	P0, T3, R2	Used in combination therapy with rifampicin for MRSA	Yes <sup>4</sup>
<b>Fosfomycins</b>				
Fosfomicin	High	P0,T1,R5		
<b>Pseudomonic acids</b>				
Mupirocin	Medium	P1, T3, R1	Topical treatment of skin infections and clearance of <i>S. aureus</i> nasal carriage (including MRSA)	
<b>Lipopeptides</b>				
Daptomycin	High		Reserve agent for serious MRSA and VRE infections	
<b>Macrocyclic lactones</b>				
Fidaxomicin	High	P0, T1, R4	Reserve agents for refractory <i>C. difficile</i> infection	

- 1 The importance of the drug class to the treatment of infections in humans, and the seriousness of the consequences of emergence of resistance.
2. Listed uses don't necessarily align with the TGA-registered uses, due to the slow evolution of indications after registration. Most closely aligned with Therapeutic Guidelines—Antibiotic
3. Not TGA-registered, but used through the Special Access Scheme
4. Generally for topical use in companion and recreational animals

Abbreviations: UTI = urinary tract infections; TB = tuberculosis; MRSA = methicillin-resistant *Staphylococcus aureus*; VRE = vancomycin resistant *Enterococcus* species

# LEGEND for TABLE 1

## AMRSC Importance Rating

### High

These are essential antibacterials for treatment of human infections where there are few or no alternatives for many infections. Also have been called “critical”, “last-resort” or “last line” antibacterials.

### Medium

There are other alternatives available but less than for those classified as Low.

### Low

There are a reasonable number of alternative agents in different classes available to treat most infections even if antibacterial resistance develops.

## Human Uses

These reflect the current use of these antibacterials in Australia in human medicine.

### P: prophylactic use

0 = not recommended for prophylactic use; 1 = rarely used; 2 = moderate; 3 = frequent or major use

### T: therapeutic use

0 = not used for treatment; 1 = infrequently used for listed indications; 2 = moderate use for listed indications; 3 = used frequently for listed indications

### R = Restriction on use (Pharmaceutical Benefits Scheme or hospitals)

- 1 = readily available
- 2 = some extra rules on use e.g. ‘Restricted benefit’ in the Pharmaceutical Benefits Scheme (PBS) or not listed on the PBS and therefore not subsidised
- 3 = higher level of restriction e.g. needs an ‘Authority required’ prescription on the PBS or not listed on the PBS and therefore not subsidised; often restricted use in hospitals
- 4 = use severely restricted (e.g. not available for prescription under PBS, available in major hospitals but only with permission from microbiologist or infectious diseases consultant, or in a special clinic)
- 5 = not TGA registered but imported under the SAS scheme

Antibacterial drug classes which are not used in humans and with no cross-resistance known to classes of antibacterials used in humans include arsenicals (roxarsone, 3-nitro-4-hydroxyphenylarsonic acid, sodium arsenilate), bambarmycins (flavophospholipol, flavomycin), bicozamycin, coumermycins (including novobiocin), ionophores (lasalocid, maduramycin, monensin, narasin, salinomycin, semduramycin), orthosomycins (avilamycin), quinoxalines (carbadox, olaquinox), coumermycins (novobiocin) and nisin.

Pleuromutulins (tiamulin, valnemulin in animals) for human use are undergoing development; one agent, retapamulin, is registered for topical use in the USA and EU.

**TABLE 2 Antibacterials not included in Table 1, but with potential to select for cross resistance to antibacterials used in Table 1**

Antibacterial class	Importance rating	APVMA registered	Not registered in Australia for any purpose
<b>Narrow-spectrum penicillins</b>	Low	Penethamate hydriodide	Phenoxyethylpenicillin (phenethicillin)
<b>Moderate spectrum penicillins</b>	Low	Nil	Aspoxicillin Azidocillin Bacampicillin Clometocillin Epicillin Hetacillin Metampicillin Penamecillin Pivampicillin Propicillin Sultamicillin Talampicillin Temocillin Tobicillin
<b>Broad-spectrum penicillins (anti-pseudomonal and/or <math>\beta</math>-lactamase stable)</b>	High	Nil	Azlocillin Carbenicillin Carindacillin Mecillinam Mezlocillin Piperacillin Pivmecillinam Sulbenicillin Temocillin Ticarcillin
<b>Antistaphylococcal penicillins</b>	Medium	Cloxacillin	Methicillin Oxacillin Nafcillin
<b><math>\beta</math>-lactamase inhibitor combinations</b>	Medium-High	Nil	Ampicillin-sulbactam Cefoperazone-sulbactam
<b>1st Generation Cephalosporins (Medium)</b>	Medium	Cephalonium Cephapirin	Cefacetile Cefadroxil Cefatrizine Cefazedone Ceforanide Cefroxadine Ceftazafur Ceftezole Cephaloglycin Cephaloridine Cephradine

Antibacterial class	Importance rating	APVMA registered	Not registered in Australia for any purpose
<b>2nd Generation Cephalosporins</b>	Medium	Nil	Cefamandole Cefonicid Cefotiam Cefprozil Cefroxadine Ceftezole Loracarbef
<b>Cefamycins</b>	Medium	Nil	Cefbuperazone Cefmetazole Cefminox Cefotetan Flomexef
<b>3rd Generation Cephalosporins</b>	High	Cefovecin Ceftiofur	Cefcapene Cefdinir Cefditoren Cefetamet Cefixime Cefmenoxime Cefodizime Cefoselis Cefazopran Cefpiramide Cefpodoxime Ceftizoxime Ceftibuten Latamoxef Cefquinome
<b>4th Generation Cephalosporins (and anti pseudomonal)</b>	High	Nil	Cefsulodin Cefoperazone Cefpirome
<b>Anti-MRSA Cephalosporins</b>	High	Nil	Ceftobiprole
<b>Penems</b>	High	Nil	Faropenem
<b>Carbapenems</b>	High	Nil	Biapenem Panipenem
<b>Monobactams</b>	High		Carumonam Norcardicin A Tigemonam
<b>Tetracyclines</b>	Low	Chlortetracycline Oxytetracycline	Clomocloxycline Demecloxycline Lymecyline Metacycline Minocycline Penimepicycline Rolitetracycline

Antibacterial class	Importance rating	APVMA registered	Not registered in Australia for any purpose
Glycylcyclines	High	Nil	Nil
Glycopeptides	High	Nil	Avoparcin Dalbavancin Oritavancin Ramoplanin Telavancin
Aminoglycosides	Low-Medium-High	Apramycin Dihydrostreptomycin Spectinomycin	Arbekacin Bekanamycin Dibekacin Isepamicin Kanamycin Netilmicin Ribostamycin Sisomicin Streptoduocin
Sulfonamides and DHFR inhibitors	Low-Medium	Sulfacetamide Sulfadimidine Sulfaquinoxaline Sulfamerazine Sulfathiazole Phthalylsulfathiazole	Baquiloprim Brodimoprim Iclaprim Ormetaprim Pyrimethamine Sulfachlorpyridazine Sulfadimerazin Sulfadimethoxazole Sulfadimethoxine Sulfafurazole = sulfisoxazole Sulfaguanidine Sulfaisomidine Sulfalene Sulfamazone Sulfamethazine Sulfamethizole Sulfamethoxazole (alone) Sulfamethoxine Sulfamethoxypyridazine Sulfametomidine Sulfamethoxydiazine Sulfametrole Sulfamonomethoxine Sulfamoxole Sulfanilamide Sulfaperin Sulfaphenazole Sulfapyridine Sulfathiourea Tetroxaprim Ormosulfathiazole

Antibacterial class	Importance rating	APVMA registered	Not registered in Australia for any purpose
<b>Oxazolidinones</b>	High	Nil	Tolezolid
<b>Macrolides</b>	Low	Kitasamycin Oleandomycin Tilmicosin Tulathromycin Tylosin	Dirithromycin Flurithromycin Gamithromycin Josamycin Midecamycin Miocamycin Mirosamycin Rokitamycin Telithromycin Terdecamycin Tildipirosin Troleandomycin Tylvalosin
<b>Lincosamides</b>	Medium	Nil	Pirlimycin
<b>Streptogramins</b>	High	Virginiamycin	Nil
<b>Nitroimidazoles</b>	Medium	Dimetridazole Ronidazole	Ordinazole
<b>Quinolones</b>	High	Enrofloxacin Ibafloxacin Marbofloxacin Orbifloxacin	Cinoxacin Danofloxacin Difloxacin Enoxacin Fleroxacin Flumequine Garenoxacin Gemifloxacin Grepafloxacin Lomefloxacin Miloxacin Nalidixic acid Oxolinic acid Pazufloxacin Pefloxacin Pipemidic acid Piromidic acid Pradofloxacin Prulifloxacin Rosoxacin Rufloxacin Sarafloxacin Sitafloxacin Sparfloxacin Temafoxacin Trovafoxacin



Antibacterial class	Importance rating	APVMA registered	Not registered in Australia for any purpose
Antimycobacterials	High	Nil	Calcium aminosaliclylate Capreomycin Morinamide Sodium aminosaliclylate Terizadone Tiocarlide
Antileprotics	High	Nil	Aldesulfone
Rifamycins	High	Nil	Rifapentine Rifamycin
Polypeptides	Low	Thiostrepton	Enramycin
Polymyxins	High	Nil	Nil
Amphenicols	Low	Florfenicol	Thiamphenicol
Nitrofurans	High	Nitrofurazone	Furaltadone Nifurtoinol Nitrofuraf
Fusidanes	High	Nil	Nil
Fosfomycins	High	Nil	Nil
Pseudomonic acids	Medium	Nil	Nil
Lipopeptides	High	Nil	Nil
Macrocylic lactones	High	Nil	