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Genomic characterization of a local epidemic *Pseudomonas aeruginosa* reveals specific features of the widespread clone ST395

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European Committee on Antimicrobial Susceptibility Testing

Breakpoint tables for interpretation of MICs and zone diameters

Version 7.1, valid from 2017-03-10

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European Committee on Antimicrobial Susceptibility Testing

Breakpoint tables for interpretation of MICs and zone diameters

Version 7.1, valid from 2017-03-10

Notes

1. The EUCAST clinical breakpoints tables contain clinical MIC breakpoints (determined or revised during 2002-2016) and their inhibition zone diameter correlates. The EUCAST breakpoint table version 7.0 includes corrected typographical errors, clarifications, breakpoints for new agents and/or organisms, revised MIC breakpoints and revised and new zone diameter breakpoints. Changes are best seen on screen or on a colour printout since cells containing a change are yellow. New or revised comments are underlined. Removed comments are shown in strikethrough font style.
2. PK/PD (Non-species related) breakpoints are listed separately on the last page.
3. Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
4. Antimicrobial agent names in blue are linked to EUCAST rationale documents. MIC and zone diameter breakpoints in blue are linked to EUCAST MIC and zone diameter distributions, respectively.
5. The document is released as an Excel® file suitable for viewing on screen and as an Acrobat® pdf file suitable for printing. To utilize all functions in the Excel® file, use Microsoft™ original programs only. The Excel® file enables users to alter the list of agents to suit the local range of agents tested. The content of single cells cannot be changed. Hide lines by right-clicking on the line number and choose "hide". Hide columns by right-clicking on the column letter and choose "hide".
6. A zone diameter breakpoint of "S ≥ 50 mm" is an arbitrary "off scale" zone diameter breakpoint corresponding to MIC breakpoint situations where wild type isolates are categorised as intermediate (*i.e.* no fully susceptible isolates exist).
7. In order to simplify the EUCAST tables, the intermediate category is not listed. It is interpreted as values between the S and the R breakpoints. For example, for MIC breakpoints listed as S ≤ 1 mg/L and R > 8 mg/L, the intermediate category is 2-8 (technically >1-8) mg/L, and for zone diameter breakpoints listed as S ≥ 22 mm and R < 18 mm, the intermediate category is 18-21 mm.
8. For *Stenotrophomonas maltophilia* with trimethoprim-sulfamethoxazole, *Staphylococcus aureus* with benzylpenicillin and enterococci with vancomycin, it is crucial to follow specific reading instructions for correct interpretation of the disk diffusion test. For these, pictures with reading examples are included at the end of the corresponding breakpoint table. For general and other specific reading instructions, please refer to the EUCAST Reading Guide.
9. For cefuroxime and fosfomycin there are breakpoints for intravenous and oral administration.
10. By international convention MIC dilution series are based on twofold dilutions up and down from 1 mg/L. At dilutions below 0.25 mg/L, this leads to concentrations with multiple decimal places. To avoid having to use these in tables and documents, EUCAST has decided to use the following format (in bold): 0.125→**0.125**, 0.0625→**0.06**, 0.03125→**0.03**, 0.015625→**0.016**, 0.0078125→**0.008**, 0.00390625→**0.004** and 0.001953125→**0.002** mg/L.

"-" indicates that susceptibility testing is not recommended as the species is a poor target for therapy with the agent. Isolates may be reported as R without prior testing.

"IE" indicates that there is insufficient evidence that the organism or group is a good target for therapy with the agent. An MIC with a comment but without an accompanying S, I or R categorisation may be reported.

NA = Not Applicable

IP = In Preparation

Guidance on reading EUCAST Breakpoint Tables

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

The intermediate category is not listed but is interpreted as the values between the S and the R breakpoints. If the S and R breakpoints are the same value there is no intermediate category.

Agent A: No intermediate category
 Agent B: Intermediate category: 4 mg/L, 23-25 mm
 Agent G: Intermediate category: 1-2 mg/L, 24-29 mm

Disk diffusion (EUCAST standardised disk diffusion method)
 Medium:
 Inoculum:
 Incubation:
 Reading:
 Quality control:

EUCAST method for antimicrobial susceptibility testing by disk diffusion and recommendations for quality control

Breakpoints with a species name apply only to that particular species (in this example *S. aureus*)

Antimicrobial agent	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Antimicrobial agent A	1 ¹	1 ¹	X	20 ^A	20 ^A	1. Notes that are general comments and/or relating to MIC breakpoints.
Antimicrobial agent B, <i>S. aureus</i>	2 ²	4	Y	26	23	2. New comment Removed comment
Antimicrobial agent C	IE	IE		IE	IE	
Antimicrobial agent D	-	-		-	-	
Antimicrobial agent E	IP	IP		IP	IP	A. Comment on disk diffusion
Antimicrobial agent F (screen)	NA	NA	Y	25	25	
Antimicrobial agent G	0.5	2	Z	30	24	

Changes from previous version highlighted in yellow

No breakpoints. Susceptibility testing is not recommended

Zone diameter breakpoints in blue are linked to zone diameter distributions

In Preparation

Not Applicable

MIC breakpoints in blue are linked to MIC distributions

Insufficient evidence that the organism or group is a good target for therapy with the agent

Screening breakpoint to differentiate between isolates without and with resistance mechanisms

Antimicrobial agents in blue are linked to EUCAST rationale documents

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Breakpoint tables for interpretation of MICs and zone diameters

Version 7.1, valid from 2017-03-10

Version 7.1, 2017-03-10	Changes (cells containing a change, a deletion or an addition) from v. 7.0 are marked light blue. Changed comments are underlined. Removed comments are shown in strikethrough font style.
Staphylococcus spp.	Revised breakpoints <ul style="list-style-type: none">• Cefoxitin screen for <i>S. epidermidis</i> (zone diameter)• Cefoxitin screen for <i>S. pseudintermedius</i> removed and replaced with oxacillin (zone diameter). Cefoxitin MIC breakpoint changed from Note⁴ to "NA". New comments <ul style="list-style-type: none">• Cephalosporins comment E Revised comments <ul style="list-style-type: none">• Cephalosporins comment B
Topical agents	<ul style="list-style-type: none">• Mupirocin ECOFF changed from 1/1 to 1 mg/L (typo)
Dosages	<ul style="list-style-type: none">• Amoxicillin-clavulanic acid standard and high dose revised• Ceftazidime-avibactam high dose removed (typo)

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Breakpoint tables for interpretation of MICs and zone diameters

Version 7.1, valid from 2017-03-10

Version 7.0, 2017-01-01	<p>Changes (cells containing a change, a deletion or an addition) from v. 6.0 are marked yellow. Changed comments are underlined. Removed comments are shown in strikethrough font style.</p>
General	<ul style="list-style-type: none"> • Link to Guidance Document on how to test and interpret results when there are no breakpoints added to content table. • Link to ceftobiprole rational document added. • Temocillin, ceftazidime-avibactam and nitroxoline added. • Norfloxacin indication added to antimicrobial name column. • Mupirocin breakpoints moved to separate table for topical agents.
Enterobacteriaceae	<p>General</p> <ul style="list-style-type: none"> • Pictures with reading examples for the fosfomycin disk diffusion test added <p>New breakpoints</p> <ul style="list-style-type: none"> • Temocillin (information added, see note) • Ceftazidime-avibactam (MIC and zone diameter) • Fosfomycin iv and oral (zone diameter) • Nitroxoline (MIC and zone diameter) <p>Revised breakpoints</p> <ul style="list-style-type: none"> • Cefepime (zone diameter) • Ceftriaxone (zone diameter) • Cefuroxime iv and oral (zone diameter) • Aztreonam (zone diameter) • Ciprofloxacin (MIC and zone diameter) • Levofloxacin (MIC and zone diameter) • Moxifloxacin (MIC and zone diameter) • Norfloxacin (valid for uncomplicated UTI only) • Ofloxacin (MIC and zone diameter) • Trimethoprim-sulfamethoxazole (zone diameter) <p>New comments</p> <ul style="list-style-type: none"> • Penicillins comments 5 and 6 • Cephalosporins comment 3 • Miscellaneous agents comment 1 • Miscellaneous agents comments B, C and D <p>Revised comments</p> <ul style="list-style-type: none"> • <u>Miscellaneous agents comment 2</u>
<i>Pseudomonas</i> spp.	<p>New breakpoints</p> <ul style="list-style-type: none"> • Ceftazidime-avibactam (MIC and zone diameter for <i>P. aeruginosa</i>) <p>Revised breakpoints</p> <ul style="list-style-type: none"> • Ciprofloxacin (MIC and zone diameter) • Levofloxacin (MIC and zone diameter) • Colistin (MIC) <p>New comments</p> <ul style="list-style-type: none"> • Cephalosporins comment 3 • Fluoroquinolones comments 1-2 • <u>Miscellaneous agents comment 1</u>
<i>Stenotrophomonas maltophilia</i>	<p>Revised comments</p> <ul style="list-style-type: none"> • <u>Miscellaneous agents comment A</u>

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<i>Acinetobacter</i> spp.	<p>Revised breakpoints</p> <ul style="list-style-type: none"> • Doripenem (zone diameter) • Levofloxacin (MIC and zone diameter) • Amikacin (zone diameter) • Trimethoprim-sulfamethoxazole (zone diameter) <p>New comments</p> <ul style="list-style-type: none"> • Fluoroquinolones comment 1 • Miscellaneous agents comment 1
<i>Staphylococcus</i> spp.	<p>Revised breakpoints</p> <ul style="list-style-type: none"> • Cefoxitin screen for coagulase-negative staphylococci (zone diameter) • Ciprofloxacin (zone diameter - separate breakpoints for <i>S. aureus</i> and coagulase-negative staphylococci) • Levofloxacin (MIC and zone diameter - separate breakpoints for <i>S. aureus</i> and coagulase-negative staphylococci) • Moxifloxacin (MIC and zone diameter - separate breakpoints for <i>S. aureus</i> and coagulase-negative staphylococci) • Ofloxacin (zone diameter - separate breakpoints for coagulase-negative staphylococci) • Linezolid (zone diameter) • Mupirocin (breakpoints moved to Topical agent table, where zone diameter breakpoints are available as a note) <p>New comments</p> <ul style="list-style-type: none"> • Cephalosporins comment B <p>Revised comments</p> <ul style="list-style-type: none"> • Penicillins comment B • Cephalosporins comments 1/A and 2 • Aminoglycosides comment 2 • Miscellaneous agents comment 4/B (comment moved to Topical agent table)
Streptococcus groups A, B, C and G	<p>Revised breakpoints</p> <ul style="list-style-type: none"> • Levofloxacin (MIC and zone diameter) • Moxifloxacin (MIC and zone diameter)
<i>Streptococcus pneumoniae</i>	<p>General</p> <ul style="list-style-type: none"> • Flow chart instead of supplementary table for screening for beta-lactam resistance (no changes in algorithm) <p>Revised breakpoints</p> <ul style="list-style-type: none"> • Levofloxacin (zone diameter) • Norfloxacin screen (zone diameter) <p>Removed breakpoints</p> <ul style="list-style-type: none"> • Ciprofloxacin (MIC and zone diameter breakpoints) • Ofloxacin (MIC and zone diameter breakpoints) <p>Revised comments</p> <ul style="list-style-type: none"> • Fluoroquinolones comment B <p>Removed comments</p> <ul style="list-style-type: none"> • Fluoroquinolones previous comments 1 and 3
Viridans group streptococci	<p>Revised breakpoints</p> <ul style="list-style-type: none"> • Levofloxacin (MIC and zone diameter, changed to IE) • Moxifloxacin (MIC and zone diameter, changed to IE)

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<i>Haemophilus influenzae</i>	<p>General</p> <ul style="list-style-type: none"> • Piperacillin-tazobactam note B added (typo error in previous versions) • Flow chart instead of supplementary table for screening for beta-lactam resistance (no changes in algorithm) <p>Revised breakpoints</p> <ul style="list-style-type: none"> • Cefepime (zone diameter) • Cefixime (zone diameter) • Cefotaxime (zone diameter) • Ceftaroline (zone diameter, changed from IP to Note) • Ceftriaxone (zone diameter) • Ciprofloxacin (MIC and zone diameter) • Levofloxacin (MIC and zone diameter) • Moxifloxacin (MIC and zone diameter) • Ofloxacin (MIC and zone diameter) <p>New comments</p> <ul style="list-style-type: none"> • Penicillins comment 2 <p>Revised comments</p> <ul style="list-style-type: none"> • Penicillins comment 1 <p>Removed comments</p> <ul style="list-style-type: none"> • Fluoroquinolones previous comment 1
<i>Neisseria gonorrhoeae</i>	<p>General</p> <ul style="list-style-type: none"> • General information on susceptibility testing updated. <p>Revised comments</p> <ul style="list-style-type: none"> • Penicillins comment 1 <p>Removed comments</p> <ul style="list-style-type: none"> • Tetracyclines previous comment 1
<i>Neisseria meningitidis</i>	<p>General</p> <ul style="list-style-type: none"> • Indication for meropenem moved from comment to antimicrobial name.
<i>Pasteurella multocida</i>	<p>Revised breakpoints</p> <ul style="list-style-type: none"> • Amoxicillin (zone diameter) <p>Removed breakpoints</p> <ul style="list-style-type: none"> • Ampicillin (zone diameter) <p>Revised comments</p> <ul style="list-style-type: none"> • Penicillins comment A
<i>Aerococcus sanguinicola and urinae</i>	<ul style="list-style-type: none"> • New table
<i>Kingella kingae</i>	<ul style="list-style-type: none"> • New table
Topical agents	<ul style="list-style-type: none"> • Table moved from Guidance document to Breakpoint Table. Updated clinical breakpoints are highlighted in yellow.
PK/PD (Non-species related) breakpoints	<p>New breakpoints</p> <ul style="list-style-type: none"> • Ceftazidime-avibactam <p>Revised breakpoints</p> <ul style="list-style-type: none"> • Ciprofloxacin • Levofloxacin • Moxifloxacin • Norfloxacin • Ofloxacin
Dosages	<ul style="list-style-type: none"> • Several dosages added or revised. • Dosages of inhibitors added for beta-lactam beta-lactamase inhibitor combination agents.

Enterobacteriaceae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light.
Quality control: *Escherichia coli* ATCC 25922. For control of the inhibitor component of beta-lactam inhibitor-combination disks, use either *Escherichia coli* ATCC 35218 or *Klebsiella pneumoniae* ATCC 700603.

Penicillins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	-	-		-	-	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Wild type Enterobacteriaceae are categorised as susceptible to aminopenicillins. Some countries prefer to categorise wild type isolates of <i>E. coli</i> and <i>P. mirabilis</i> as intermediate. When this is the case, use the MIC breakpoint S ≤ 0.5 mg/L and the corresponding zone diameter breakpoint S ≥ 50 mm.</p> <p>2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.</p> <p>3. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.</p> <p>4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.</p> <p>5. Breakpoints are pending applications to national regulatory authorities to license a high-dose regimen of 2 g x 3.</p> <p>6. Agar dilution is the reference method for mecillinam MIC determination.</p> <p>B. Ignore growth that may appear as a thin inner zone on some batches of Mueller-Hinton agars.</p> <p>C. Susceptibility inferred from ampicillin.</p> <p>D. Ignore isolated colonies within the inhibition zone for <i>E. coli</i>.</p>
Ampicillin	8 ¹	8	10	14 ^{A,B}	14 ^B	
Ampicillin-sulbactam	8 ^{1,2}	8 ²	10-10	14 ^{A,B}	14 ^B	
Amoxicillin	8 ¹	8	-	Note ^C	Note ^C	
Amoxicillin-clavulanic acid	8 ^{1,3}	8 ³	20-10	19 ^{A,B}	19 ^B	
Amoxicillin-clavulanic acid (uncomplicated UTI only)	32 ^{1,3}	32 ³	20-10	16 ^{A,B}	16 ^B	
Piperacillin	8	16	30	20	17	
Piperacillin-tazobactam	8 ⁴	16 ⁴	30-6	20	17	
Ticarcillin	8	16	75	23	23	
Ticarcillin-clavulanic acid	8 ³	16 ³	75-10	23	23	
Temocillin	Note ⁵	Note ⁵		Note ⁵	Note ⁵	
Phenoxymethylpenicillin	-	-		-	-	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only) <i>E. coli</i> , <i>Klebsiella</i> spp. and <i>P. mirabilis</i>	8 ⁶	8 ⁶	10	15 ^D	15 ^D	

Enterobacteriaceae

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Cephalosporins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. The cephalosporin breakpoints for Enterobacteriaceae will detect all clinically important resistance mechanisms (including ESBL and plasmid mediated AmpC). Some isolates that produce beta-lactamases are susceptible or intermediate to 3rd or 4th generation cephalosporins with these breakpoints and should be reported as tested, <i>i.e.</i> the presence or absence of an ESBL does not in itself influence the categorisation of susceptibility. ESBL detection and characterisation are recommended for public health and infection control purposes.</p> <p>2. The cefoxitin ECOFF (8 mg/L) has a high sensitivity but poor specificity for identification of AmpC-producing Enterobacteriaceae as this agent is also affected by permeability alterations and some carbapenemases. Classical non-AmpC producers are wild type, whereas plasmid AmpC producers or chromosomal AmpC hyperproducers are non-wild type.</p> <p>3. For susceptibility testing purposes, the concentration of avibactam is fixed at 4 mg/L.</p> <p>4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.</p> <p>5. Breakpoints are based on high dose therapy (1.5 g x 3).</p>
Cefadroxil (uncomplicated UTI only)	16	16	30	12	12	
Cefalexin (uncomplicated UTI only)	16	16	30	14	14	
Cefazolin	-	-		-	-	
Cefepime	1	4	30	27	21	
Cefixime (uncomplicated UTI only)	1	1	5	17	17	
Cefotaxime	1	2	5	20	17	
Cefoxitin (screen) ²	NA	NA	30	19	19	
Cefpodoxime (uncomplicated UTI only)	1	1	10	21	21	
Ceftaroline	0.5	0.5	5	23	23	
Ceftazidime	1	4	10	22	19	
Ceftazidime-avibactam	8 ³	8 ³	10-4	13	13	
Ceftibuten (UTI only)	1	1	30	23	23	
Ceftobiprole	0.25	0.25	5	23	23	
Ceftolozane-tazobactam	1 ⁴	1 ⁴	30-10	23	23	
Ceftriaxone	1	2	30	25	22	
Cefuroxime iv ⁵ , <i>E. coli</i> , <i>Klebsiella</i> spp. and <i>P. mirabilis</i>	8	8	30	19	19	
Cefuroxime oral (uncomplicated UTI only)	8	8	30	19	19	

Carbapenems ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doripenem	1	2	10	24	21	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. The carbapenem breakpoints for Enterobacteriaceae will detect all clinically important resistance mechanisms (including the majority of carbapenemases). Some isolates that produce carbapenemase are categorised as susceptible with these breakpoints and should be reported as tested, <i>i.e.</i> the presence or absence of a carbapenemase does not in itself influence the categorisation of susceptibility. Carbapenemase detection and characterisation are recommended for public health and infection control purposes.</p> <p>2. Low-level resistance is common in <i>Morganella</i> spp., <i>Proteus</i> spp. and <i>Providencia</i> spp.</p>
Ertapenem	0.5	1	10	25	22	
Imipenem ²	2	8	10	22	16	
Meropenem	2	8	10	22	16	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Aztreonam ¹	1	4	30	26	21	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. The aztreonam breakpoints for Enterobacteriaceae will detect clinically important resistance mechanisms (including ESBL). Some isolates that produce beta-lactamases are susceptible or intermediate to aztreonam with these breakpoints and should be reported as tested, <i>i.e.</i> the presence or absence of an ESBL does not in itself influence the categorisation of susceptibility. ESBL detection and characterisation are recommended for public health and infection control purposes.</p>

Enterobacteriaceae

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Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.25	0.5	5	26	24	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. There is clinical evidence for ciprofloxacin to indicate a poor response in systemic infections caused by <i>Salmonella</i> spp. with low-level ciprofloxacin resistance (MIC >0.06 mg/L). The available data relate mainly to <i>Salmonella</i> Typhi but there are also case reports of poor response with other <i>Salmonella</i> species.</p> <p>A. Tests with a ciprofloxacin 5 µg disk will not reliably detect low-level resistance in <i>Salmonella</i> spp. To screen for ciprofloxacin resistance in <i>Salmonella</i> spp., use the pefloxacin 5 µg disk. See Note B.</p> <p>B. Susceptibility of <i>Salmonella</i> spp. to ciprofloxacin can be inferred from pefloxacin disk diffusion susceptibility.</p>
Ciprofloxacin , <i>Salmonella</i> spp. ¹	0.06	0.06		Note ^A	Note ^A	
Pefloxacin (screen) , <i>Salmonella</i> spp. ¹	NA	NA	5	24 ^B	24 ^B	
Levofloxacin	0.5	1	5	23	19	
Moxifloxacin	0.25	0.25	5	22	22	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (uncomplicated UTI only)	0.5	1	10	22	19	
Ofloxacin	0.25	0.5	5	24	22	

Aminoglycosides ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	8	16	30	18	15	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. Aminoglycoside breakpoints are based on once-daily administration of high aminoglycoside dosages. Most often aminoglycosides are given in combination with beta-lactam agents.</p>
Gentamicin	2	4	10	17	14	
Netilmicin	2	4	10	15	12	
Tobramycin	2	4	10	17	14	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin	-	-		-	-	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p>
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

Enterobacteriaceae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin ¹	-	-		-	-	1. Azithromycin has been used in the treatment of infections with <i>Salmonella</i> Typhi (MIC ≤16 mg/L for wild type isolates) and <i>Shigella</i> spp.
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

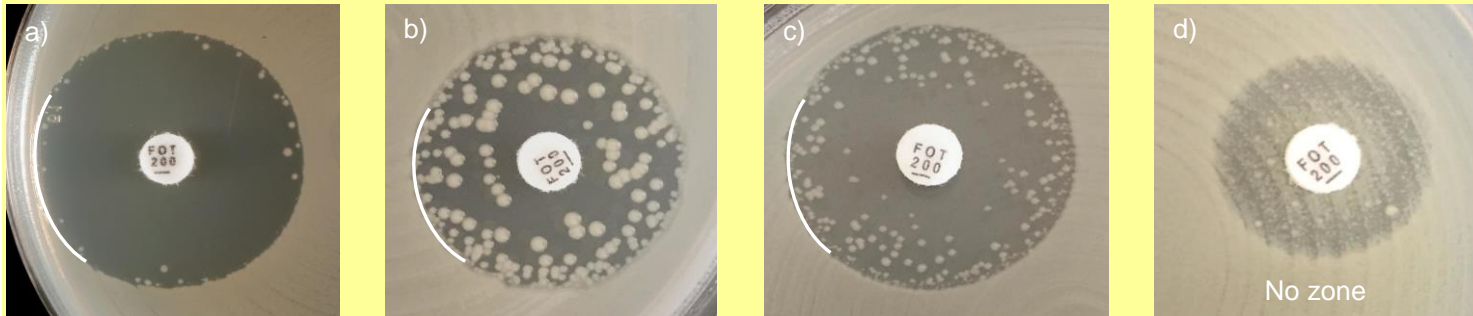
Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	1. Tigecycline has poor activity against <i>Morganella</i> spp., <i>Proteus</i> spp. and <i>Providencia</i> spp. 2. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	A. Zone diameter breakpoints validated for <i>E. coli</i> only. For other Enterobacteriaceae, use an MIC method.
Tigecycline ¹	1 ²	2 ²	15	18 ^A	15 ^A	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Linezolid	-	-		-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Tedizolid	-	-		-	-	

Enterobacteriaceae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Chloramphenicol	8	8	30	17	17	1. Quality control of colistin must be performed with both a susceptible QC strain (<i>E. coli</i> ATCC 25922 or <i>P. aeruginosa</i> ATCC 27853) and the colistin resistant <i>E. coli</i> NCTC 13846 (<i>mcr-1</i> positive). 2. Agar dilution is the reference method for fosfomycin. MICs must be determined in the presence of glucose-6-phosphate (25 mg/L in the medium). Follow the manufacturers' instructions for commercial systems. 3. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration. A. Use an MIC method. B. Fosfomycin 200 µg disks must contain 50 µg glucose-6-phosphate. C. Zone diameter breakpoints apply to <i>E. coli</i> only. For other Enterobacteriaceae, use an MIC method. D. Ignore isolated colonies within the inhibition zone (see pictures below).
Colistin ¹	2	2		Note ^A	Note ^A	
Daptomycin	-	-		-	-	
Fosfomycin iv	32 ²	32 ²	200 ^B	24 ^{C,D}	24 ^{C,D}	
Fosfomycin oral (uncomplicated UTI only)	32 ²	32 ²	200 ^B	24 ^{C,D}	24 ^{C,D}	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only), <i>E. coli</i>	64	64	100	11	11	
Nitroxoline (uncomplicated UTI only), <i>E. coli</i>	16	16	30	15	15	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	2	4	5	18	15	
Trimethoprim-sulfamethoxazole ³	2	4	1.25-23.75	14	11	



Examples of inhibition zones for *Escherichia coli* with fosfomycin.

a-c) Ignore all colonies and read the outer zone edge.

d) Record as no inhibition zone.

***Pseudomonas* spp.**

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light.
Quality control: *Pseudomonas aeruginosa* ATCC 27853. For control of the inhibitor component of beta-lactam inhibitor-combination disks, use either *Escherichia coli* ATCC 35218 or *Klebsiella pneumoniae* ATCC 700603.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	-	-		-	-	1. Breakpoints are based on high dose therapy (4 g x 4, with or without tazobactam). 2. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L. 3. Breakpoints are based on a dose of at least 3 g x 4, with or without clavulanic acid. 4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
Ampicillin	-	-		-	-	
Ampicillin-sulbactam	-	-		-	-	
Amoxicillin	-	-		-	-	
Amoxicillin-clavulanic acid	-	-		-	-	
Piperacillin ¹	16	16	30	18	18	
Piperacillin-tazobactam ¹	16 ²	16 ²	30-6	18	18	
Ticarcillin ³	16	16	75	18	18	
Ticarcillin-clavulanic acid ³	16 ⁴	16 ⁴	75-10	18	18	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	-	-		-	-	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

***Pseudomonas* spp.**

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	1. Breakpoints are based on high dose therapy (2 g x 3). 2. Breakpoints are based on high dose therapy (2 g x 3). 3. For susceptibility testing purposes, the concentration of avibactam is fixed at 4 mg/L. 4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime ¹	8	8	30	19	19	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime ²	8	8	10	17	17	
Ceftazidime-avibactam, <i>P. aeruginosa</i>	8 ³	8 ³	10-4	17	17	
Ceftibuten	-	-		-	-	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam, <i>P. aeruginosa</i>	4 ⁴	4 ⁴	30-10	IP	IP	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doripenem ¹	1	2	10	25	22	1. Breakpoints are based on high dose therapy (1 g administered over 4 h x 3). 2. Breakpoints are based on high dose therapy (1 g x 4).
Ertapenem	-	-		-	-	
Imipenem ²	4	8	10	20	17	
Meropenem	2	8	10	24	18	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Aztreonam	1	16	30	50	16	

***Pseudomonas* spp.**

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin ¹	0.5	0.5	5	26	26	1. Breakpoints are based on high dose therapy (0.75 g x 2 oral or 0.4 g x 3 iv). 2. Breakpoints are based on high dose therapy (0.5 g x 2 oral or 0.5 g x 2 iv).
Levofloxacin ²	1	1	5	22	22	
Moxifloxacin	-	-	-	-	-	
Nalidixic acid (screen)	NA	NA	-	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	-	-	-	
Ofloxacin	-	-	-	-	-	

Aminoglycosides ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	8	16	30	18	15	1. Aminoglycoside breakpoints are based on once-daily administration of high aminoglycoside dosages. Most often aminoglycosides are given in combination with beta-lactam agents.
Gentamicin	4	4	10	15	15	
Netilmicin	4	4	10	12	12	
Tobramycin	4	4	10	16	16	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin	-	-	-	-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Oritavancin	-	-	-	-	-	
Teicoplanin	-	-	-	-	-	
Telavancin	-	-	-	-	-	
Vancomycin	-	-	-	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin	-	-	-	-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Clarithromycin	-	-	-	-	-	
Erythromycin	-	-	-	-	-	
Roxithromycin	-	-	-	-	-	
Telithromycin	-	-	-	-	-	
	-	-	-	-	-	
Clindamycin	-	-	-	-	-	
Quinupristin-dalfopristin	-	-	-	-	-	

***Pseudomonas* spp.**

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	-	-	-	-	-	
Minocycline	-	-	-	-	-	
Tetracycline	-	-	-	-	-	
Tigecycline	-	-	-	-	-	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	-	-	-	-	-	
Tedizolid	-	-	-	-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-	-	-	-	
Colistin ¹	2	2	-	Note ^A	Note ^A	1. Quality control of colistin must be performed with both a susceptible QC strain (<i>E. coli</i> ATCC 25922 or <i>P. aeruginosa</i> ATCC 27853) and the colistin resistant <i>E. coli</i> NCTC 13846 (<i>mcr-1</i> positive).
Daptomycin	-	-	-	-	-	2. Infections caused by wild type isolates (ECOFF 128 mg/L) have been treated with combinations of fosfomycin and other agents.
Fosfomycin iv ²	-	-	-	-	-	A. Use an MIC method.
Fosfomycin oral ²	-	-	-	-	-	
Fusidic acid	-	-	-	-	-	
Metronidazole	-	-	-	-	-	
Mupirocin	-	-	-	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	-	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	-	-	-	
Rifampicin	-	-	-	-	-	
Spectinomycin	-	-	-	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	-	-	-	
Trimethoprim-sulfamethoxazole	-	-	-	-	-	

Stenotrophomonas maltophilia

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Trimethoprim-sulfamethoxazole is the only agent for which EUCAST breakpoints are currently available. For further information, see guidance document on www.eucast.org.

Disk diffusion (EUCAST standardised disk diffusion method)

Medium: Mueller-Hinton agar

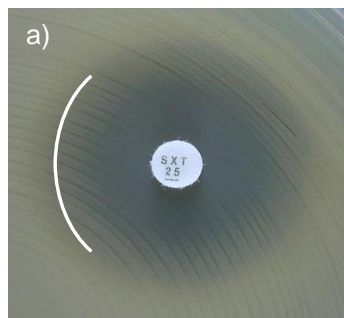
Inoculum: McFarland 0.5

Incubation: Air, 35±1°C, 18±2h

Reading: Read zone edges from the back of the plate against a dark background illuminated with reflected light (see below for specific instructions).

Quality control: *Escherichia coli* ATCC 25922

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Trimethoprim-sulfamethoxazole ^{1,2}	4	4	1.25-23.75	16 ^A	16 ^A	<p>1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.</p> <p>2. Breakpoints are based on high dose therapy, at least 0.24 g trimethoprim and 1.2 g sulfamethoxazole administered together twice daily.</p> <p><u>A. Isolates showing any sign of inhibition zone ≥ 16 mm should be reported susceptible and growth within the inhibition zone should be ignored. The density of growth within the zone may vary from a fine haze to substantial growth (see pictures below).</u></p>



Examples of inhibition zones for *Stenotrophomonas maltophilia* with trimethoprim-sulfamethoxazole.

a-c) An outer zone can be seen. Report susceptible if the zone diameter ≥ 16 mm.

d) Growth up to the disk **and** no sign of inhibition zone. Report resistant.

***Acinetobacter* spp.**

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light.
Quality control: *Pseudomonas aeruginosa* ATCC 27853.

Penicillins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzympenicillin	-	-		-	-	1. Susceptibility testing of <i>Acinetobacter</i> spp. to penicillins is unreliable. In most instances, <i>Acinetobacter</i> spp. are resistant to penicillins.
Ampicillin	-	-		-	-	
Ampicillin-sulbactam	IE	IE		IE	IE	
Amoxicillin	-	-		-	-	
Amoxicillin-clavulanic acid	-	-		-	-	
Piperacillin	IE	IE		IE	IE	
Piperacillin-tazobactam	IE	IE		IE	IE	
Ticarcillin	IE	IE		IE	IE	
Ticarcillin-clavulanic acid	IE	IE		IE	IE	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	-	-		-	-	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Acinetobacter spp.

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	-	-		-	-	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	-	-		-	-	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doripenem ¹	1	2	10	24	21	1. Breakpoints are based on high dose therapy (1 g administered over 4 h x 3).
Ertapenem	-	-		-	-	2. Breakpoints are based on high dose therapy (1 g x 4).
Imipenem ²	2	8	10	23	17	
Meropenem	2	8	10	21	15	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Acinetobacter spp.

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin ¹	1	1	5	21	21	1. Breakpoints are based on high dose therapy (0.75 g x 2 oral or 0.4 g x 3 iv).
Levofloxacin	0.5	1	5	23	20	
Moxifloxacin	-	-	-	-	-	
Nalidixic acid (screen)	NA	NA	-	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	-	-	-	
Ofloxacin	-	-	-	-	-	

Aminoglycosides ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	8	16	30	19	17	1. Aminoglycoside breakpoints are based on once-daily administration of high aminoglycoside dosages. Most often aminoglycosides are given in combination with beta-lactam agents.
Gentamicin	4	4	10	17	17	
Netilmicin	4	4	10	16	16	
Tobramycin	4	4	10	17	17	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin	-	-	-	-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Oritavancin	-	-	-	-	-	
Teicoplanin	-	-	-	-	-	
Telavancin	-	-	-	-	-	
Vancomycin	-	-	-	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin	-	-	-	-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Clarithromycin	-	-	-	-	-	
Erythromycin	-	-	-	-	-	
Roxithromycin	-	-	-	-	-	
Telithromycin	-	-	-	-	-	
	-	-	-	-	-	
Clindamycin	-	-	-	-	-	
Quinupristin-dalfopristin	-	-	-	-	-	

Acinetobacter spp.

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	
Minocycline	IE	IE		IE	IE	
Tetracycline	-	-		-	-	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	-	-		-	-	
Tedizolid	-	-		-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	
Colistin ¹	2	2		Note ^A	Note ^A	1. Quality control of colistin must be performed with both a susceptible QC strain (<i>E. coli</i> ATCC 25922 or <i>P. aeruginosa</i> ATCC 27853) and the colistin resistant <i>E. coli</i> NCTC 13846 (<i>mcr-1</i> positive).
Daptomycin	-	-		-	-	2. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Fosfomycin iv	-	-		-	-	A. Use an MIC method.
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole ²	2	4	1.25-23.75	14	11	

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light (except for benzylpenicillin and linezolid, see below).
Quality control: *Staphylococcus aureus* ATCC 29213

Penicillins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin , <i>S. aureus</i>	0.125 ¹	0.125 ¹	1 unit	26 ^{A,B}	26 ^{A,B}	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Most staphylococci are penicillinase producers, which are resistant to benzylpenicillin, phenoxymethylpenicillin, ampicillin, amoxicillin, piperacillin and ticarcillin. Isolates negative for penicillinase and susceptible to methicillin can be reported susceptible to these agents. Isolates positive for penicillinase and methicillin susceptible are susceptible to beta-lactamase inhibitor combinations and isoxazolylicins (oxacillin, cloxacillin, dicloxacillin and flucloxacillin). Methicillin resistant isolates are, with few exceptions, resistant to all beta-lactam agents.</p> <p>2/C. No currently available method can reliably detect penicillinase production in coagulase-negative staphylococci.</p> <p>3/D. Ampicillin susceptible <i>S. saprophyticus</i> are <i>mecA</i>-negative and susceptible to ampicillin, amoxicillin and piperacillin (without or with a beta-lactamase inhibitor).</p> <p>4. <i>S. aureus</i>, <i>S. lugdunensis</i> and <i>S. saprophyticus</i> with oxacillin MIC values >2 mg/L are mostly methicillin resistant due to the presence of the <i>mecA</i> or <i>mecC</i> gene. The corresponding oxacillin MIC for coagulase-negative staphylococci other than <i>S. saprophyticus</i> and <i>S. lugdunensis</i> is >0.25 mg/L.</p> <p>B. For <i>S. aureus</i>, disk diffusion is more reliable than MIC determination for detection of penicillinase producers, provided the zone diameter is measured AND the zone edge closely inspected (see pictures below). <u>Examine the zone edge with transmitted light (plate held up to light)</u>. If the zone diameter is <26 mm, then report resistant. If the zone diameter is ≥26 mm AND the zone edge is sharp, then report resistant. If not sharp, then report susceptible and if uncertain, then report resistant. Chromogenic cephalosporin-based beta-lactamase tests do not reliably detect staphylococcal penicillinase.</p>
Benzylpenicillin , <i>S. lugdunensis</i>	0.125 ¹	0.125 ¹	1 unit	26 ^A	26 ^A	
Benzylpenicillin , Coagulase-negative staphylococci	- ²	- ²		Note ^C	Note ^C	
Ampicillin , <i>S. saprophyticus</i>	Note ^{1,3}	Note ^{1,3}	2	18 ^{A,B}	18 ^{A,B}	
Ampicillin-sulbactam	Note ^{1,3}	Note ^{1,3}		Note ^{A,D}	Note ^{A,D}	
Amoxicillin	Note ^{1,3}	Note ^{1,3}		Note ^{A,D}	Note ^{A,D}	
Amoxicillin-clavulanic acid	Note ^{1,3}	Note ^{1,3}		Note ^{A,D}	Note ^{A,D}	
Piperacillin	Note ^{1,3}	Note ^{1,3}		Note ^{A,D}	Note ^{A,D}	
Piperacillin-tazobactam	Note ^{1,3}	Note ^{1,3}		Note ^{A,D}	Note ^{A,D}	
Ticarcillin	Note ¹	Note ¹		Note ^A	Note ^A	
Ticarcillin-clavulanic acid	Note ¹	Note ¹		Note ^A	Note ^A	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	Note ¹	Note ¹		Note ^A	Note ^A	
Oxacillin ⁴	Note ^{1,4}	Note ^{1,4}		Note ^A	Note ^A	
Cloxacillin	Note ¹	Note ¹		Note ^A	Note ^A	
Dicloxacillin	Note ¹	Note ¹		Note ^A	Note ^A	
Flucloxacillin	Note ¹	Note ¹		Note ^A	Note ^A	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Staphylococcus spp.

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Cephalosporins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Cefaclor ²	Note ¹	Note ¹		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Susceptibility of staphylococci to cephalosporins is inferred from the cefoxitin susceptibility except for cefixime, ceftazidime, ceftazidime-avibactam, ceftibuten and ceftolozane-tazobactam, which do not have breakpoints and should not be used for staphylococcal infections. Some methicillin-resistant <i>S. aureus</i> are susceptible to ceftaroline and ceftobiprole, see Notes 5/C and 6/D.</p> <p>2. Breakpoints are based on a minimum dose of 500 mg x 3.</p> <p>3. <i>S. aureus</i> and <i>S. lugdunensis</i> with cefoxitin MIC values >4 mg/L and <i>S. saprophyticus</i> with cefoxitin MIC values >8 mg/L are methicillin resistant, mostly due to the presence of the <i>mecA</i> or <i>mecC</i> gene. Disk diffusion reliably predicts methicillin resistance.</p> <p>4. For staphylococci other than <i>S. aureus</i>, <i>S. lugdunensis</i> and <i>S. saprophyticus</i>, the cefoxitin MIC is a poorer predictor of methicillin resistance than the disk diffusion test.</p> <p>5/C. Methicillin-susceptible isolates can be reported susceptible to ceftaroline without further testing.</p> <p>6/D. Methicillin-susceptible isolates can be reported susceptible to ceftobiprole without further testing.</p> <p>B. If coagulase-negative staphylococci are not identified to species level use zone diameter breakpoints S≥25, R<25 mm.</p> <p>E. Cefoxitin screen for methicillin resistance in <i>S. pseudintermedius</i> is less predictive of the presence of <i>mecA</i> than in other staphylococci. Use the oxacillin 1 µg disk with zone diameter breakpoints S≥20, R<20 mm to screen for methicillin resistance.</p>
Cefadroxil	Note ¹	Note ¹		Note ^A	Note ^A	
Cefalexin	Note ¹	Note ¹		Note ^A	Note ^A	
Cefazolin	Note ¹	Note ¹		Note ^A	Note ^A	
Cefepime	Note ¹	Note ¹		Note ^A	Note ^A	
Cefixime	-	-		-	-	
Cefotaxime	Note ¹	Note ¹		Note ^A	Note ^A	
Cefoxitin (screen), <i>S. aureus</i> and coagulase-negative staphylococci other than <i>S. epidermidis</i>	Note ^{3,4}	Note ^{3,4}	30	22 ^{A,B}	22 ^{A,B}	
Cefoxitin (screen), <i>S. epidermidis</i>	Note ⁴	Note ⁴	30	25 ^{A,B}	25 ^{A,B}	
Cefoxitin (screen), <i>S. pseudintermedius</i>	NA	NA	30	Note ^E	Note ^E	
Cefpodoxime	Note ¹	Note ¹		Note ^A	Note ^A	
Ceftaroline, <i>S. aureus</i>	1 ⁵	1 ⁵	5	20 ^C	20 ^C	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole, <i>S. aureus</i>	2 ^B	2 ^B	5	17 ^D	17 ^D	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	Note ¹	Note ¹		Note ^A	Note ^A	
Cefuroxime iv	Note ¹	Note ¹		Note ^A	Note ^A	
Cefuroxime oral	Note ¹	Note ¹		Note ^A	Note ^A	

Carbapenems ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doripenem	Note ¹	Note ¹		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Susceptibility of staphylococci to carbapenems is inferred from the cefoxitin susceptibility.</p>
Ertapenem	Note ¹	Note ¹		Note ^A	Note ^A	
Imipenem	Note ¹	Note ¹		Note ^A	Note ^A	
Meropenem	Note ¹	Note ¹		Note ^A	Note ^A	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p>

Staphylococcus spp.

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Fluoroquinolones ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin ² , <i>S. aureus</i>	1	1	5	21 ^A	21 ^A	1. For breakpoints for other fluoroquinolones (e.g. pefloxacin and enoxacin), refer to breakpoints set by national breakpoint committees. 2. Breakpoints are based on high dose therapy (oral dose of 0.75 g x 2, iv dose of 0.4 g x 3). 3. Breakpoints are based on high dose therapy (0.4 g x 2). A. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. See Note B. B. Isolates categorised as susceptible to norfloxacin can be reported susceptible to ciprofloxacin, levofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.
Ciprofloxacin ² , Coagulase-negative staphylococci	1	1	5	24 ^A	24 ^A	
Levofloxacin, <i>S. aureus</i>	1	1	5	22 ^A	22 ^A	
Levofloxacin, Coagulase-negative staphylococci	1	1	5	24 ^A	24 ^A	
Moxifloxacin, <i>S. aureus</i>	0.25	0.25	5	25 ^A	25 ^A	
Moxifloxacin, Coagulase-negative staphylococci	0.25	0.25	5	28 ^A	28 ^A	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	10	17 ^B	Note ^B	
Ofloxacin ³ , <i>S. aureus</i>	1	1	5	20 ^A	20 ^A	
Ofloxacin ³ , Coagulase-negative staphylococci	1	1	5	24 ^A	24 ^A	

Aminoglycosides ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin ² , <i>S. aureus</i>	8	16	30	18	16	1. Aminoglycoside breakpoints are based on once-daily administration. 2. Resistance to amikacin is most reliably determined by testing with kanamycin (MIC >8 mg/L). <u>The corresponding zone diameter for the kanamycin 30 µg disk is R<18 mm for <i>S. aureus</i> and R<22 mm for coagulase-negative staphylococci.</u>
Amikacin ² , Coagulase-negative staphylococci	8	16	30	22	19	
Gentamicin, <i>S. aureus</i>	1	1	10	18	18	
Gentamicin, Coagulase-negative staphylococci	1	1	10	22	22	
Netilmicin, <i>S. aureus</i>	1	1	10	18	18	
Netilmicin, Coagulase-negative staphylococci	1	1	10	22	22	
Tobramycin, <i>S. aureus</i>	1	1	10	18	18	
Tobramycin, Coagulase-negative staphylococci	1	1	10	22	22	

Staphylococcus spp.

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Glycopeptides and lipoglycopeptides ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin ²	0.125 ^{3,4}	0.125 ³		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. Glycopeptide MICs are method dependent and should be determined by broth microdilution (reference ISO 20776). <i>S. aureus</i> with vancomycin MIC values of 2 mg/L are on the border of the wild type distribution and there may be an impaired clinical response. The resistant breakpoint has been reduced to 2 mg/L to avoid reporting "GISA" isolates intermediate as serious infections with "GISA" isolates are not treatable with increased doses of vancomycin or teicoplanin.</p> <p>2. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.</p> <p>3. MICs must be determined in the presence of polysorbate-80 (0.002% in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems.</p> <p>4. <i>S. aureus</i> isolates susceptible to vancomycin can be reported susceptible to dalbavancin and oritavancin.</p> <p>5. MRSA isolates susceptible to vancomycin can be reported susceptible to telavancin.</p> <p>A. Disk diffusion is unreliable and cannot distinguish between wild type isolates and those with non-<i>vanA</i>-mediated glycopeptide resistance.</p>
Oritavancin, <i>S. aureus</i> ²	0.125 ^{3,4}	0.125 ³		Note ^A	Note ^A	
Teicoplanin, <i>S. aureus</i> ²	2	2		Note ^A	Note ^A	
Teicoplanin, Coagulase-negative staphylococci ²	4	4		Note ^A	Note ^A	
Telavancin, MRSA ²	0.125 ^{3,5}	0.125 ³		Note ^A	Note ^A	
Vancomycin, <i>S. aureus</i> ²	2	2		Note ^A	Note ^A	
Vancomycin, Coagulase-negative staphylococci ²	4	4		Note ^A	Note ^A	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin	1 ¹	2 ¹		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.</p> <p>2. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant and consider adding this comment to the report: "Clindamycin may still be used for short-term therapy of less serious skin and soft tissue infections as constitutive resistance is unlikely to develop during such therapy".</p> <p>B. Place the erythromycin and clindamycin disks 12-20 mm apart (edge to edge) and look for antagonism (the D phenomenon) to detect inducible clindamycin resistance.</p> <p>C. Isolates non-susceptible by disk diffusion should be confirmed by MIC testing.</p>
Clarithromycin	1 ¹	2 ¹		Note ^A	Note ^A	
Erythromycin	1 ¹	2 ¹	15	21 ^A	18 ^A	
Roxithromycin	1 ¹	2 ¹		Note ^A	Note ^A	
Telithromycin	IE	IE		IE	IE	
Clindamycin ²	0.25	0.5	2	22 ^B	19 ^B	
Quinupristin-dalfopristin	1	2	15	21	18 ^C	

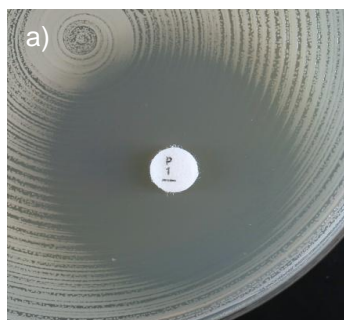
Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doxycycline	1 ¹	2 ¹		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.</p> <p>2. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.</p> <p>3. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.</p>
Minocycline	0.5 ¹	1 ¹	30	23 ^A	20 ^A	
Tetracycline	1 ¹	2 ¹	30	22 ^A	19 ^A	
Tigecycline ²	0.5 ³	0.5 ³	15	18	18	

Staphylococcus spp.

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Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Linezolid	4	4	10	21 ^A	21 ^A	1. Isolates susceptible to linezolid can be reported susceptible to tedizolid. A. Examine zone edges with transmitted light (plate held up to light). B. Isolates susceptible to linezolid can be reported susceptible to tedizolid. For isolates resistant to linezolid, perform an MIC test.
Tedizolid	0.5 ¹	0.5		Note ^B	Note ^B	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Chloramphenicol	8	8	30	18	18	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. 2. Daptomycin MICs must be determined in the presence of Ca ²⁺ (50 mg/L in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturers' instructions for commercial systems. 3. Fosfomycin MICs must be determined in the presence of glucose-6-phosphate (25 mg/L in the medium for broth and agar dilution methods). Follow the manufacturer's instructions for commercial systems. 4/B. Breakpoints relate to nasal decolonisation of <i>S. aureus</i> . Intermediate isolates are associated with short term suppression (useful preoperatively) but, unlike susceptible isolates, long term eradication rates are low. 4. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration. A. Use an MIC method.
Colistin	-	-		-	-	
Daptomycin ¹	1 ²	1 ²		Note ^A	Note ^A	
Fosfomycin iv	32 ³	32 ³		Note ^A	Note ^A	
Fosfomycin oral	-	-		-	-	
Fusidic acid	1	1	10	24	24	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only), <i>S. saprophyticus</i>	64	64	100	13	13	
Nitroxoline (uncomplicated UTI only), <i>S. saprophyticus</i>	IE	IE		IE	IE	
Rifampicin	0.06	0.5	5	26	23	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	2	4	5	17	14	
Trimethoprim-sulfamethoxazole ⁴	2	4	1.25-23.75	17	14	



Examples of inhibition zones for *Staphylococcus aureus* with benzylpenicillin.

- a) Fuzzy zone edge and zone diameter ≥ 26 mm. Report susceptible.
- b) Sharp zone edge and zone diameter ≥ 26 mm. Report resistant.

Enterococcus spp.

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In endocarditis, refer to national or international endocarditis guidelines for breakpoints for *Enterococcus* spp.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h (for glycopeptides 24h)
Reading: Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light (except for vancomycin, see below).
Quality control: *Enterococcus faecalis* ATCC 29212

Penicillins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylopenicillin	-	-		-	-	1. <i>E. faecium</i> resistant to penicillins can be considered resistant to all other beta-lactam agents including carbapenems. 2/A. Susceptibility to ampicillin, amoxicillin and piperacillin with and without beta-lactamase inhibitor can be inferred from ampicillin. 3. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
Ampicillin	4	8	2	10	8	
Ampicillin-sulbactam²	4 ³	8 ³		Note ^A	Note ^A	
Amoxicillin²	4	8		Note ^A	Note ^A	
Amoxicillin-clavulanic acid²	4 ⁴	8 ⁴		Note ^A	Note ^A	
Piperacillin²	Note ²	Note ²		Note ^A	Note ^A	
Piperacillin-tazobactam²	Note ²	Note ²		Note ^A	Note ^A	
Ticarcillin	-	-		-	-	
Ticarcillin-clavulanic acid	-	-		-	-	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	-	-		-	-	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Enterococcus spp.

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Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	-	-		-	-	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	-	-		-	-	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doripenem	-	-		-	-	
Ertapenem	-	-		-	-	
Imipenem	4	8	10	21	18	
Meropenem	-	-		-	-	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Enterococcus spp.

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Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Ciprofloxacin (uncomplicated UTI only)	4	4	5	15 ^A	15 ^A	A. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. See Note B. B. Susceptibility of ciprofloxacin and levofloxacin can be inferred from the norfloxacin susceptibility.
Levofloxacin (uncomplicated UTI only)	4	4	5	15 ^A	15 ^A	
Moxifloxacin	-	-	-	-	-	
Nalidixic acid (screen)	NA	NA	-	NA	NA	
Norfloxacin (screen)	NA	NA	10	12 ^B	12 ^B	
Ofloxacin	-	-	-	-	-	

Aminoglycosides ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Amikacin	Note ²	Note ²	-	Note ^A	Note ^A	1. Enterococci are intrinsically resistant to aminoglycosides and aminoglycoside monotherapy is ineffective. There is likely to be synergy between aminoglycosides and penicillins or glycopeptides against enterococci without acquired high-level resistance. All testing is therefore to distinguish between intrinsic and high-level acquired resistance. 2/A. Gentamicin can be used to screen for high-level aminoglycoside resistance (HLAR). Negative test: Isolates with gentamicin MIC ≤128 mg/L or a zone diameter ≥8 mm. The isolate is wild type for gentamicin and low-level intrinsic resistant. For other aminoglycosides, this may not be the case. Synergy with penicillins or glycopeptides can be expected if the isolate is susceptible to the penicillin or glycopeptide. Positive test: Isolates with gentamicin MIC >128 mg/L or a zone diameter <8 mm. The isolate is high-level resistant to gentamicin and other aminoglycosides, except streptomycin which must be tested separately if required (see note 3/B). There will be no synergy with penicillins or glycopeptides. 3/B. Isolates with high-level gentamicin resistance may not be high-level resistant to streptomycin. Negative test: Isolates with streptomycin MIC ≤512 mg/L or a zone diameter ≥14 mm. The isolate is wild type for streptomycin and low-level intrinsic resistant. Synergy with penicillins or glycopeptides can be expected if the isolate is susceptible to the penicillin or glycopeptide. Positive test: Isolates with streptomycin MIC >512 mg/L or a zone diameter <14 mm. The isolate is high-level resistant to streptomycin. There will be no synergy with penicillins or glycopeptides.
Gentamicin (test for high-level aminoglycoside resistance)	Note ²	Note ²	30	Note ^A	Note ^A	
Netilmicin	Note ²	Note ²	-	Note ^A	Note ^A	
Streptomycin (test for high-level streptomycin resistance)	Note ³	Note ³	300	Note ^B	Note ^B	
Tobramycin	Note ²	Note ²	-	Note ^A	Note ^A	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Dalbavancin	IE	IE	-	IE	IE	A. Vancomycin susceptible enterococci exhibit sharp zone edges and do not exhibit colonies in the inhibition zone. Examine zone edges with transmitted light (plate held up to light). If the zone edge is fuzzy, colonies grow within the zone or if you are uncertain, then perform confirmatory testing with PCR or report resistant (see pictures below) even if the zone diameter is ≥ 12 mm. Isolates must not be reported susceptible before 24 h incubation.
Oritavancin	IE	IE	-	IE	IE	
Teicoplanin	2	2	30	16	16	
Telavancin	IE	IE	-	IE	IE	
Vancomycin	4	4	5	12 ^A	12 ^A	

Enterococcus spp.

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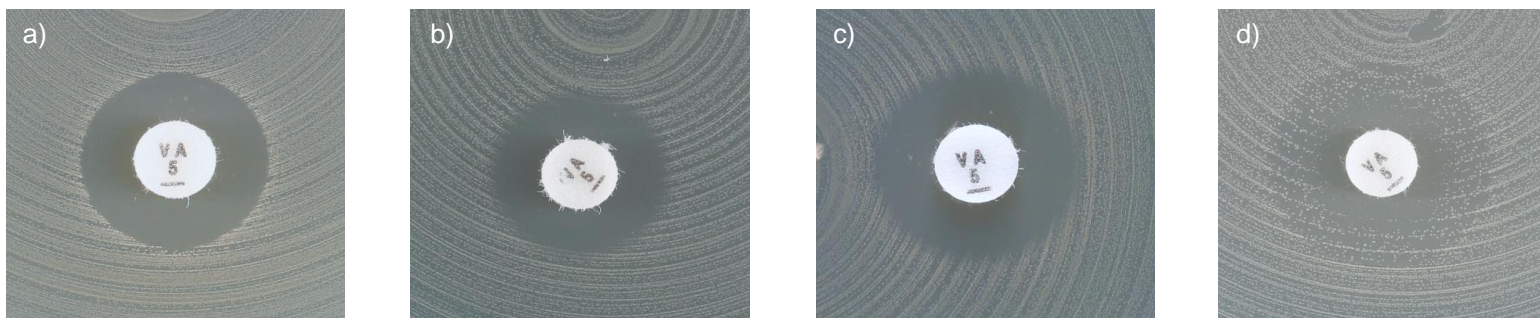
Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Azithromycin	-	-		-	-	
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
				-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin, <i>E. faecium</i>	1	4	15	22	20	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. 2 For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline ¹	0.25 ²	0.5 ²	15	18	15	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	4	4	10	19	19	
Tedizolid	IE	IE		IE	IE	

Enterococcus spp.

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	1. For more information, see http://www.eucast.org/guidance_documents/ . 2/A. The activity of trimethoprim and trimethoprim-sulfamethoxazole is uncertain against enterococci, hence the wild type population is categorised as intermediate. 3. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin ¹	IE	IE		IE	IE	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only), <i>E. faecalis</i>	64	64	100	15	15	
Nitroxoline (uncomplicated UTI only)	IE	IE		IE	IE	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	0.03 ²	1	5	50 ^A	21	
Trimethoprim-sulfamethoxazole ³	0.03 ²	1	1.25-23.75	50 ^A	21	



Examples of inhibition zones for *Enterococcus* spp. with vancomycin.

a) Sharp zone edge **and** zone diameter ≥ 12 mm. Report susceptible.

b-d) Fuzzy zone edge or colonies within zone. Perform confirmatory testing with PCR or report resistant even if the zone diameter ≥ 12 mm.

Streptococcus groups A, B, C and G

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Streptococcus pneumoniae* ATCC 49619

Penicillins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin²	0.25	0.25	1 unit	18	18	1/A. The susceptibility of streptococcus groups A, B, C and G to penicillins is inferred from the benzylpenicillin susceptibility with the exception of phenoxymethylpenicillin and isoxazolylpenicillins for streptococcus group B. 2. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. 3. Streptococcus groups A, B, C and G do not produce beta-lactamase. The addition of a beta-lactamase inhibitor does not add clinical benefit.
Ampicillin	Note ¹	Note ¹		Note ^A	Note ^A	
Ampicillin-sulbactam³	Note ¹	Note ¹		Note ^A	Note ^A	
Amoxicillin	Note ¹	Note ¹		Note ^A	Note ^A	
Amoxicillin-clavulanic acid³	Note ¹	Note ¹		Note ^A	Note ^A	
Piperacillin	Note ¹	Note ¹		Note ^A	Note ^A	
Piperacillin-tazobactam³	Note ¹	Note ¹		Note ^A	Note ^A	
Ticarcillin	-	-		-	-	
Ticarcillin-clavulanic acid	-	-		-	-	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin Streptococcus groups A, C and G	Note ¹	Note ¹		Note ^A	Note ^A	
Oxacillin Streptococcus groups A, C and G	NA	NA		NA	NA	
Cloxacillin Streptococcus groups A, C and G	Note ¹	Note ¹		Note ^A	Note ^A	
Dicloxacillin Streptococcus groups A, C and G	Note ¹	Note ¹		Note ^A	Note ^A	
Flucloxacillin Streptococcus groups A, C and G	Note ¹	Note ¹		Note ^A	Note ^A	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Streptococcus groups A, B, C and G

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Cefaclor	Note ¹	Note ¹		Note ^A	Note ^A	1/A. The susceptibility of streptococcus groups A, B, C and G to cephalosporins is inferred from the benzylpenicillin susceptibility.
Cefadroxil	Note ¹	Note ¹		Note ^A	Note ^A	
Cefalexin	Note ¹	Note ¹		Note ^A	Note ^A	
Cefazolin	Note ¹	Note ¹		Note ^A	Note ^A	
Cefepime	Note ¹	Note ¹		Note ^A	Note ^A	
Cefixime	-	-		-	-	
Cefotaxime	Note ¹	Note ¹		Note ^A	Note ^A	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	Note ¹	Note ¹		Note ^A	Note ^A	
Ceftaroline	Note ¹	Note ¹		Note ^A	Note ^A	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	Note ¹	Note ¹		Note ^A	Note ^A	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam	IE	IE		IE	IE	
Ceftriaxone	Note ¹	Note ¹		Note ^A	Note ^A	
Cefuroxime iv	Note ¹	Note ¹		Note ^A	Note ^A	
Cefuroxime oral	Note ¹	Note ¹		Note ^A	Note ^A	

Carbapenems ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doripenem	Note ¹	Note ¹		Note ^A	Note ^A	1/A. The susceptibility of streptococcus groups A, B, C and G to carbapenems is inferred from the benzylpenicillin susceptibility.
Ertapenem	Note ¹	Note ¹		Note ^A	Note ^A	
Imipenem	Note ¹	Note ¹		Note ^A	Note ^A	
Meropenem	Note ¹	Note ¹		Note ^A	Note ^A	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Streptococcus groups A, B, C and G

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	-	-		-	-	A. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. See Note B. B. Isolates categorised as susceptible to norfloxacin can be reported susceptible to levofloxacin and moxifloxacin. Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.
Levofloxacin	2	2	5	17 ^A	17 ^A	
Moxifloxacin	0.5	0.5	5	19 ^A	19 ^A	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	10	12 ^B	Note ^B	
Ofloxacin	-	-		-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	-	-		-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Gentamicin	-	-		-	-	
Netilmicin	-	-		-	-	
Tobramycin	-	-		-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin ¹	0.125 ^{2,3}	0.125 ²		Note ^A	Note ^A	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. 2. MICs must be determined in the presence of polysorbate-80 (0.002% in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems. 3. Isolates susceptible to vancomycin can be reported susceptible to dalbavancin and oritavancin.
Oritavancin ¹	0.25 ^{2,3}	0.25 ²		Note ^A	Note ^A	
Teicoplanin ¹	2	2	30	15	15	
Telavancin	IE	IE		IE	IE	
Vancomycin ¹	2	2	5	13	13	

A. Disk diffusion criteria have not been defined and an MIC method should be used.

Streptococcus groups A, B, C and G

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin	0.25 ¹	0.5 ¹		Note ^A	Note ^A	1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin. 2. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant and consider adding this comment to the report: "Clindamycin may still be used for short-term therapy of less serious skin and soft tissue infections as constitutive resistance is unlikely to develop during such therapy". The clinical importance of inducible clindamycin resistance in combination treatment of severe <i>S. pyogenes</i> infections is not known.
Clarithromycin	0.25 ¹	0.5 ¹		Note ^A	Note ^A	
Erythromycin	0.25 ¹	0.5 ¹	15	21 ^A	18 ^A	
Roxithromycin	0.5 ¹	1 ¹		Note ^A	Note ^A	
Telithromycin	0.25	0.5	15	20	17	
Clindamycin ²	0.5	0.5	2	17 ^B	17 ^B	B. Place the erythromycin and clindamycin disks 12-16 mm apart (edge to edge) and look for antagonism (the D phenomenon) to detect inducible clindamycin resistance.
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doxycycline	1 ¹	2 ¹		Note ^A	Note ^A	1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required. 2. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. 3. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Minocycline	0.5 ¹	1 ¹	30	23 ^A	20 ^A	
Tetracycline	1 ¹	2 ¹	30	23 ^A	20 ^A	
Tigecycline ²	0.25 ³	0.5 ³	15	19	16	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Linezolid ¹	2	4	10	19	16	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. 2. Isolates susceptible to linezolid can be reported susceptible to tedizolid.
Tedizolid ¹	0.5 ²	0.5		Note ^A	Note ^A	
						A. Isolates susceptible to linezolid can be reported susceptible to tedizolid. For isolates resistant to linezolid, perform an MIC test.

Streptococcus groups A, B, C and G

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Chloramphenicol	8	8	30	19	19	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.</p> <p>2. Daptomycin MICs must be determined in the presence of Ca²⁺ (50 mg/L in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems.</p> <p>3. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.</p> <p>A. Use an MIC method.</p>
Colistin	-	-		-	-	
Daptomycin ¹	1 ²	1 ²		Note ^A	Note ^A	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	IE	IE		IE	IE	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only), <i>S. agalactiae</i> (group B streptococci)	64	64	100	15	15	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	0.06	0.5	5	21	15	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only), <i>S. agalactiae</i> (group B streptococci)	2	2	5	IP	IP	
Trimethoprim-sulfamethoxazole ³	1	2	1.25-23.75	18	15	

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5 from blood agar or McFarland 1.0 from chocolate agar
Incubation: 5% CO₂, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Streptococcus pneumoniae* ATCC 49619

Penicillins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin (infections other than meningitis)²	0.06 ¹	2 ¹		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. Breakpoints for penicillins other than benzylpenicillin relate only to non-meningitis isolates. Isolates fully susceptible to beta-lactam agents for which clinical breakpoints are listed (including those with "Note").</p> <p>2. In pneumonia, when a dose of 1.2 g x 4 is used, isolates with MIC ≤0.5 mg/L should be regarded as susceptible. In pneumonia, when a dose of 2.4 g x 4 or 1.2 g x 6 is used, isolates with MIC ≤1 mg/L should be regarded as susceptible. In pneumonia, when a dose of 2.4 g x 6 is used, isolates with MIC ≤2 mg/L should be regarded as susceptible.</p> <p>3. For isolates categorised as intermediate to ampicillin avoid oral treatment with ampicillin, amoxicillin or amoxicillin-clavulanic acid.</p> <p>4/B. Susceptibility inferred from the MIC of ampicillin.</p> <p>A. Screen for beta-lactam resistance with the oxacillin 1 µg disk, see Note C.</p> <p>C. For interpretation of the oxacillin disk screen, see flow chart below.</p> <p>For oxacillin non-susceptible isolates, always determine the MIC of benzylpenicillin.</p>
Benzylpenicillin (meningitis)	0.06 ¹	0.06 ¹		Note ^A	Note ^A	
Ampicillin	0.5 ^{1,3}	2 ^{1,3}		Note ^{A,B}	Note ^{A,B}	
Ampicillin-sulbactam	Note ^{1,4}	Note ^{1,4}		Note ^{A,B}	Note ^{A,B}	
Amoxicillin	Note ^{1,3,4}	Note ^{1,3,4}		Note ^{A,B}	Note ^{A,B}	
Amoxicillin-clavulanic acid	Note ^{1,3,4}	Note ^{1,3,4}		Note ^{A,B}	Note ^{A,B}	
Piperacillin	Note ^{1,4}	Note ^{1,4}		Note ^{A,B}	Note ^{A,B}	
Piperacillin-tazobactam	Note ^{1,4}	Note ^{1,4}		Note ^{A,B}	Note ^{A,B}	
Ticarcillin	-	-		-	-	
Ticarcillin-clavulanic acid	-	-		-	-	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	Note ¹	Note ¹		Note ^A	Note ^A	
Oxacillin (screen)	NA	NA	1	20 ^C	Note ^C	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Streptococcus pneumoniae

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Cefaclor	0.03	0.5	30	50	28	A. Screen for beta-lactam resistance with the oxacillin 1 µg disk. See Note C on penicillins and flow chart below.
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	1	2		Note ^A	Note ^A	
Cefixime	-	-		-	-	
Cefotaxime	0.5	2		Note ^A	Note ^A	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	0.25	0.5		Note ^A	Note ^A	
Ceftaroline	0.25	0.25		Note ^A	Note ^A	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	0.5	0.5		Note ^A	Note ^A	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	0.5	2		Note ^A	Note ^A	
Cefuroxime iv	0.5	1		Note ^A	Note ^A	
Cefuroxime oral	0.25	0.5		Note ^A	Note ^A	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doripenem ¹	1	1		Note ^A	Note ^A	1. Not for meningitis (meropenem is the only carbapenem used for meningitis). 2. Meropenem is the only carbapenem used for meningitis.
Ertapenem ¹	0.5	0.5		Note ^A	Note ^A	
Imipenem ¹	2	2		Note ^A	Note ^A	A. Screen for beta-lactam resistance with the oxacillin 1 µg disk. See Note C on penicillins and flow chart below. B. For use in meningitis determine the meropenem MIC.
Meropenem ¹ (infections other than meningitis)	2	2		Note ^A	Note ^A	
Meropenem ² (meningitis)	0.25	1		Note ^{A,B}	Note ^{A,B}	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Streptococcus pneumoniae

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Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	-	-	-	-	-	1. Wild type <i>S. pneumoniae</i> are not considered susceptible to ciprofloxacin and are therefore categorised as intermediate. 1. Breakpoints are based on high dose therapy (0.5 g x 2). 3. Wild type <i>S. pneumoniae</i> are not considered susceptible to ofloxacin and are therefore categorised as intermediate. A. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. See Note B. B. Isolates categorised as susceptible to norfloxacin can be reported susceptible to levofloxacin and moxifloxacin. -and- intermediate to ciprofloxacin and ofloxacin. Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.
Levofloxacin ¹	2	2	5	16 ^A	16 ^A	
Moxifloxacin	0.5	0.5	5	22 ^A	22 ^A	
Nalidixic acid (screen)	NA	NA	-	NA	NA	
Norfloxacin (screen)	NA	NA	10	11 ^B	Note ^B	
Ofloxacin	-	-	-	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	-	-	-	-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Gentamicin	-	-	-	-	-	
Netilmicin	-	-	-	-	-	
Tobramycin	-	-	-	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin	IE	IE	-	IE	IE	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Oritavancin	IE	IE	-	IE	IE	
Teicoplanin ¹	2	2	30	17	17	
Telavancin	IE	IE	-	IE	IE	
Vancomycin ¹	2	2	5	16	16	

Streptococcus pneumoniae

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Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin	0.25 ¹	0.5 ¹		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.</p> <p>2. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant.</p> <p>B. Place the erythromycin and clindamycin disks 12-16 mm apart (edge to edge) and look for antagonism (the D phenomenon) to detect inducible clindamycin resistance.</p>
Clarithromycin	0.25 ¹	0.5 ¹		Note ^A	Note ^A	
Erythromycin	0.25 ¹	0.5 ¹	15	22 ^A	19 ^A	
Roxithromycin	0.5 ¹	1 ¹		Note ^A	Note ^A	
Telithromycin	0.25	0.5	15	23	20	
Clindamycin ²	0.5	0.5	2	19 ^B	19 ^B	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doxycycline	1 ¹	2 ¹		Note ^A	Note ^A	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.</p>
Minocycline	0.5 ¹	1 ¹	30	24 ^A	21 ^A	
Tetracycline	1 ¹	2 ¹	30	25 ^A	22 ^A	
Tigecycline	IE	IE		IE	IE	

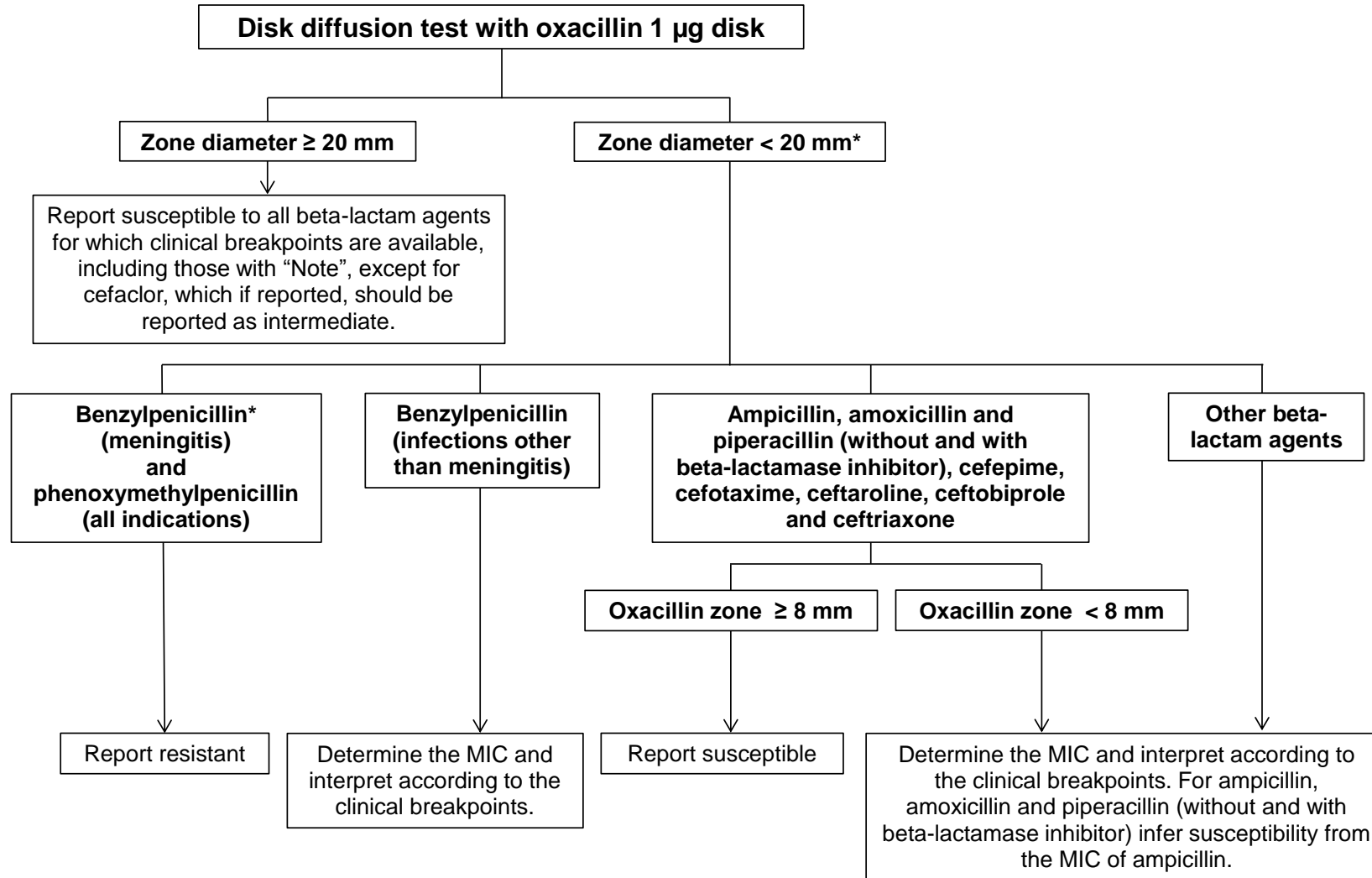
Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Linezolid	2	4	10	22	19	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p>
Tedizolid	IE	IE		IE	IE	

Streptococcus pneumoniae

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Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Chloramphenicol	8	8	30	21	21	1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin	IE	IE		IE	IE	
Fosfomycin iv	IE	IE		IE	IE	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	0.06	0.5	5	22	17	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole ¹	1	2	1.25-23.75	18	15	

Screening for beta-lactam resistance in *S. pneumoniae*



*Always determine the MIC of benzylpenicillin. Do not delay reporting resistant in meningitis.

Viridans group streptococci

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In endocarditis, refer to national or international endocarditis guidelines for breakpoints for viridans group streptococci.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Streptococcus pneumoniae* ATCC 49619

This group of bacteria includes many species, which can be grouped as follows:

S. anginosus group: *S. anginosus*, *S. constellatus*, *S. intermedius*

S. mitis group: *S. australis*, *S. cristatus*, *S. infantis*, *S. mitis*, *S. oligofermentans*, *S. oralis*, *S. peroris*, *S. pseudopneumoniae*, *S. sinensis*

S. sanguinis group: *S. sanguinis*, *S. parasanguinis*, *S. gordonii*

S. bovis group: *S. equinus*, *S. gallolyticus* (*S. bovis*), *S. infantarius*

S. salivarius group: *S. salivarius*, *S. vestibularis*, *S. thermophilus*

S. mutans group: *S. mutans*, *S. sobrinus*

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	0.25	2	1 unit	18	12	1/B. For isolates susceptible to benzylpenicillin, susceptibility can be inferred from benzylpenicillin or ampicillin. For isolates resistant to benzylpenicillin, susceptibility is inferred from ampicillin.
Benzylpenicillin (screen)	NA	NA	1 unit	18 ^A	Note ^A	
Ampicillin	0.5	2	2	21	15	A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. Isolates categorised as susceptible can be reported susceptible to beta-lactam agents for which clinical breakpoints are listed (including those with "Note"). Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.
Ampicillin-sulbactam	Note ¹	Note ¹		Note ^{A,B}	Note ^{A,B}	
Amoxicillin	0.5	2		Note ^{A,B}	Note ^{A,B}	
Amoxicillin-clavulanic acid	Note ¹	Note ¹		Note ^{A,B}	Note ^{A,B}	
Piperacillin	Note ¹	Note ¹		Note ^{A,B}	Note ^{A,B}	
Piperacillin-tazobactam	Note ¹	Note ¹		Note ^{A,B}	Note ^{A,B}	
Ticarcillin	IE	IE		IE	IE	
Ticarcillin-clavulanic acid	IE	IE		IE	IE	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	IE	IE		IE	IE	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Viridans group streptococci

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. See Note A on penicillins.
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	0.5	0.5	30	IP	IP	
Cefepime	0.5	0.5	30	25 ^A	25 ^A	
Cefixime	-	-		-	-	
Cefotaxime	0.5	0.5	5	23 ^A	23 ^A	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftolozane-tazobactam, <i>S. anginosus</i> group	IE	IE		IE	IE	
Ceftriaxone	0.5	0.5	30	27 ^A	27 ^A	
Cefuroxime iv	0.5	0.5	30	26 ^A	26 ^A	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doripenem	1	1		Note ^A	Note ^A	A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. See Note A on penicillins.
Ertapenem	0.5	0.5		Note ^A	Note ^A	
Imipenem	2	2		Note ^A	Note ^A	
Meropenem	2	2		Note ^A	Note ^A	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Viridans group streptococci

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	-	-		-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Levofloxacin	IE	IE		IE	IE	
Moxifloxacin	IE	IE		IE	IE	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-		-	-	
Ofloxacin	-	-		-	-	

Aminoglycosides ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	Note ²	Note ²		-	-	<p>1. Viridans group streptococci are intrinsically resistant to aminoglycosides and aminoglycoside monotherapy is ineffective. There is likely to be synergy between aminoglycosides and penicillins or glycopeptides against streptococci without acquired high-level resistance. All testing is therefore to distinguish between intrinsic and high-level acquired resistance.</p> <p>2. Gentamicin can be used to screen for high-level aminoglycoside resistance (HLAR).</p> <p>Negative test: Isolates with gentamicin MIC ≤128 mg/L. The isolate is wild type for gentamicin and low-level intrinsic resistant. For other aminoglycosides, this may not be the case. Synergy with penicillins or glycopeptides can be expected if the isolate is susceptible to the penicillin or glycopeptide.</p> <p>Positive test: Isolates with gentamicin MIC >128 mg/L. The isolate is high-level resistant to gentamicin and other aminoglycosides except streptomycin. There will be no synergy with penicillins or glycopeptides.</p>
Gentamicin	Note ²	Note ²		-	-	
Netilmicin	Note ²	Note ²		-	-	
Tobramycin	Note ²	Note ²		-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin, <i>S. anginosus</i> group ¹	0.125 ^{2,3}	0.125 ²		Note ^A	Note ^A	<p>1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.</p> <p>2. MICs must be determined in the presence of polysorbate-80 (0.002% in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems.</p> <p>3. Isolates susceptible to vancomycin can be reported susceptible to dalbavancin and oritavancin.</p> <p>A. Disk diffusion criteria have not been defined and an MIC method should be used.</p>
Oritavancin, <i>S. anginosus</i> group ¹	0.25 ^{2,3}	0.25 ²		Note ^A	Note ^A	
Teicoplanin ¹	2	2	30	16	16	
Telavancin	IE	IE		IE	IE	
Vancomycin ¹	2	2	5	15	15	

Viridans group streptococci

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin	IE	IE		IE	IE	1. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant. A. Place the erythromycin and clindamycin disks 12-16 mm apart (edge to edge) and look for antagonism (the D phenomenon) to detect inducible clindamycin resistance.
Clarithromycin	IE	IE		IE	IE	
Erythromycin	IE	IE	15	IE	IE	
Roxithromycin	IE	IE		IE	IE	
Telithromycin	IE	IE		IE	IE	
Clindamycin ¹	0.5	0.5	2	19 ^A	19 ^A	
Quinupristin-dalfopristin	IE	IE		IE	IE	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Linezolid	-	-		-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method. A. Perform an MIC test.
Tedizolid, <i>S. anginosus</i> group	0.25	0.25		Note ^A	Note ^A	

Viridans group streptococci

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	
Colistin	-	-		-	-	
Daptomycin	-	-		-	-	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole	-	-		-	-	

Haemophilus influenzae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

EUCAST breakpoints have been defined for *H. influenzae* only. Clinical data for other *Haemophilus* species are scarce. MIC distributions for *H. parainfluenzae* are similar to those for *H. influenzae*. In the absence of specific breakpoints, the *H. influenzae* MIC breakpoints can be applied to *H. parainfluenzae*.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Haemophilus influenzae* ATCC 49766. For control of the inhibitor component of beta-lactam inhibitor-combination disks, use *Staphylococcus aureus* ATCC 29213.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	IE	IE		IE	IE	<p>Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.</p> <p>1. Breakpoints are based on intravenous administration. For penicillins without inhibitors, breakpoints apply to beta-lactamase-negative isolates only. For penicillins without inhibitors, beta-lactamase positive isolates should be reported resistant.</p> <p>2. Beta-lactamase positive isolates can be reported resistant to ampicillin, amoxicillin and piperacillin without inhibitors. Tests based on a chromogenic cephalosporin can be used to detect the beta-lactamase.</p> <p>3. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.</p> <p>4/B. Susceptibility can be inferred from amoxicillin-clavulanic acid.</p> <p>5. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.</p> <p>6/D. Susceptibility inferred from ampicillin or amoxicillin.</p> <p>A. Benzylpenicillin 1 unit can be used to screen for, but not to distinguish between, beta-lactamase producing isolates and isolates with PBP mutations. For interpretation of the benzylpenicillin disk screen, see flow chart below.</p> <p>C. Susceptibility can be inferred from ampicillin.</p>
Benzylpenicillin (screen)	NA	NA	1 unit	12 ^A	Note ^A	
Ampicillin ^{1,2}	1	1	2	16 ^A	16 ^A	
Ampicillin-sulbactam ¹	1 ^{3,4}	1 ^{3,4}	10-10	Note ^{A,B}	Note ^{A,B}	
Amoxicillin ^{1,2}	2	2		Note ^{A,C}	Note ^{A,C}	
Amoxicillin-clavulanic acid ¹	2 ⁵	2 ⁵	2-1	15 ^A	15 ^A	
Piperacillin ^{1,2}	Note ⁶	Note ⁶		Note ^{A,D}	Note ^{A,D}	
Piperacillin-tazobactam ¹	Note ⁴	Note ⁴		Note ^{A,B}	Note ^{A,B}	
Ticarcillin	IE	IE		IE	IE	
Ticarcillin-clavulanic acid	IE	IE		IE	IE	
Temocillin	IE	IE		IE	IE	
Phenoxymethylpenicillin	IE	IE		IE	IE	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Haemophilus influenzae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance. See Note A on penicillins and flow chart below.
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	0.25	0.25	30	28 ^A	28 ^A	
Cefixime	0.125	0.125	5	26 ^A	26 ^A	
Cefotaxime	0.125	0.125	5	27 ^A	27 ^A	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	0.25	0.5	10	26 ^A	23 ^A	
Ceftaroline	0.03	0.03		Note ^A	Note ^A	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	1	1	30	25 ^A	25 ^A	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam	IE	IE		IE	IE	
Ceftriaxone	0.125	0.125	30	31 ^A	31 ^A	
Cefuroxime iv	1	2	30	26 ^A	25 ^A	
Cefuroxime oral	0.125	1	30	50	26	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doripenem ¹	1	1	10	20 ^A	20 ^A	1. Not for meningitis (meropenem is the only carbapenem used for meningitis). 2. Meropenem is the only carbapenem used for meningitis.
Ertapenem ¹	0.5	0.5	10	20 ^A	20 ^A	
Imipenem ¹	2	2	10	20 ^A	20 ^A	A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance. See Note A on penicillins and flow chart below. B. For use in meningitis determine the meropenem MIC value.
Meropenem ¹ (infections other than meningitis)	2	2	10	20 ^A	20 ^A	
Meropenem ² (meningitis)	0.25	1		Note ^B	Note ^B	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Aztreonam	IE	IE		IE	IE	

Haemophilus influenzae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.06	0.06	5	30 ^A	30 ^A	4. Low-level fluoroquinolone resistance (ciprofloxacin MICs of 0.125-0.5 mg/L) may occur but there is no evidence that this resistance is of clinical importance in respiratory tract infections with <i>H. influenzae</i> . A. The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. See Note B. B. Isolates categorised as susceptible to nalidixic acid can be reported susceptible to ciprofloxacin, levofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.
Levofloxacin	0.06	0.06	5	30 ^A	30 ^A	
Moxifloxacin	0.125	0.125	5	28 ^A	28 ^A	
Nalidixic acid (screen)	NA	NA	30	23 ^B	Note ^B	
Norfloxacin (uncomplicated UTI only)	-	-	-	-	-	
Ofloxacin	0.06	0.06	5	30 ^A	30 ^A	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	IE	IE		IE	IE	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Gentamicin	IE	IE		IE	IE	
Netilmicin	IE	IE		IE	IE	
Tobramycin	IE	IE		IE	IE	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Dalbavancin	-	-		-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

Macrolides ¹ , lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Azithromycin	0.125 ²	4 ²		Note ^A	Note ^A	1. Correlation between macrolide MICs and clinical outcome is weak for <i>H. influenzae</i> . Therefore, breakpoints for macrolides and related antibiotics have been set to categorise wild type <i>H. influenzae</i> as intermediate. 2/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.
Clarithromycin	1 ²	32 ²		Note ^A	Note ^A	
Erythromycin	0.5	16	15	50	10	
Roxithromycin	1 ²	16 ²		Note ^A	Note ^A	
Telithromycin	0.125	8	15	50	12	
	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Haemophilus influenzae

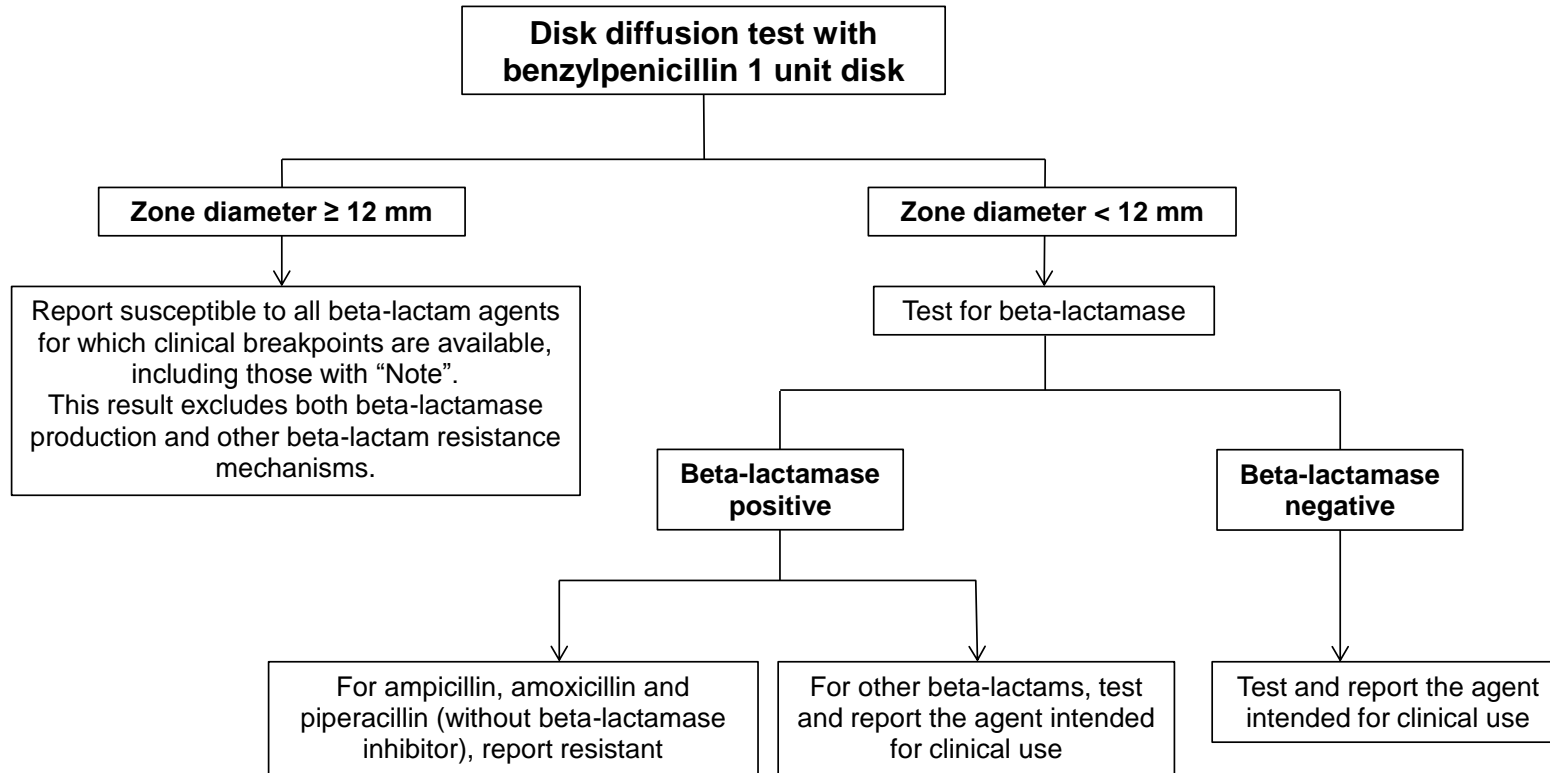
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Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Doxycycline	1 ¹	2 ¹		Note ^A	Note ^A	1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.
Minocycline	1 ¹	2 ¹	30	24 ^A	21 ^A	
Tetracycline	1 ¹	2 ¹	30	25 ^A	22 ^A	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Linezolid	-	-		-	-	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Tedizolid	-	-		-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Chloramphenicol	2	2	30	28	28	1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin	-	-		-	-	
Fosfomycin iv	IE	IE		IE	IE	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin (for prophylaxis only)	1	1	5	18	18	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole ¹	0.5	1	1.25-23.75	23	20	

Screening for beta-lactam resistance in *H. influenzae*



Moraxella catarrhalis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Haemophilus influenzae* ATCC 49766. For control of the inhibitor component of beta-lactam inhibitor-combination disks, use *Staphylococcus aureus* ATCC 29213.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	-	-		-	-	1. Most <i>M. catarrhalis</i> produce beta-lactamase, although beta-lactamase production is slow and may give weak results with <i>in vitro</i> tests. Beta-lactamase producers should be reported resistant to penicillins and aminopenicillins without inhibitors. 2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 3/A. Susceptibility can be inferred from amoxicillin-clavulanic acid. 4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
Ampicillin	1	1		-	-	
Ampicillin-sulbactam	1 ^{2,3}	1 ^{2,3}		Note ^A	Note ^A	
Amoxicillin	1	1		-	-	
Amoxicillin-clavulanic acid	1 ⁴	1 ⁴	2-1	19	19	
Piperacillin	1	1		-	-	
Piperacillin-tazobactam	Note ³	Note ³		Note ^A	Note ^A	
Ticarcillin	IE	IE		IE	IE	
Ticarcillin-clavulanic acid	IE	IE		IE	IE	
Temocillin	IE	IE		IE	IE	
Phenoxymethylpenicillin	-	-		-	-	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Moraxella catarrhalis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	4	4	30	20	20	
Cefixime	0.5	1	5	21	18	
Cefotaxime	1	2	5	20	17	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	IP	IP	10	IP	IP	
Ceftaroline	IE	IE		IE	IE	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	IE	IE		IE	IE	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam	IE	IE		IE	IE	
Ceftriaxone	1	2	30	24	21	
Cefuroxime iv	4	8	30	21	18	
Cefuroxime oral	0.125	4	30	50	21	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doripenem ¹	1	1	10	30	30	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Ertapenem ¹	0.5	0.5	10	29	29	
Imipenem ¹	2	2	10	29	29	
Meropenem ¹	2	2	10	33	33	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Aztreonam	IE	IE		IE	IE	

Moraxella catarrhalis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.5	0.5	5	26 ^A	26 ^A	A. The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. See Note B. B. Isolates categorised as susceptible to nalidixic acid can be reported susceptible to ciprofloxacin, levofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.
Levofloxacin	1	1	5	26 ^A	26 ^A	
Moxifloxacin	0.5	0.5	5	23 ^A	23 ^A	
Nalidixic acid (screen)	NA	NA	30	23 ^B	Note ^B	
Norfloxacin (uncomplicated UTI only)	-	-	-	-	-	
Ofloxacin	0.5	0.5	5	25 ^A	25 ^A	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Amikacin	IE	IE		IE	IE	
Gentamicin	IE	IE		IE	IE	
Netilmicin	IE	IE		IE	IE	
Tobramycin	IE	IE		IE	IE	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Dalbavancin	-	-		-	-	
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Azithromycin	0.25 ¹	0.5 ¹		Note ^A	Note ^A	1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.
Clarithromycin	0.25 ¹	0.5 ¹		Note ^A	Note ^A	
Erythromycin	0.25	0.5	15	23 ^A	20 ^A	
Roxithromycin	0.5 ¹	1 ¹		Note ^A	Note ^A	
Telithromycin	0.25	0.5	15	23	20	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Moraxella catarrhalis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	1 ¹	2 ¹		Note ^A	Note ^A	1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.
Minocycline	1 ¹	2 ¹	30	25 ^A	22 ^A	
Tetracycline	1 ¹	2 ¹	30	28 ^A	25 ^A	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	-	-		-	-	
Tedizolid	-	-		-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Chloramphenicol	2 ¹	2 ¹	30	30 ^A	30 ^A	1/A. Breakpoints relate to topical use only. 2. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin	-	-		-	-	
Fosfomycin iv	IE	IE		IE	IE	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin						
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole ²	0.5	1	1.25-23.75	18	15	

Neisseria gonorrhoeae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion criteria for antimicrobial susceptibility testing of *Neisseria gonorrhoeae* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions. Laboratories with few isolates are encouraged to refer these to a reference laboratory for testing.

Penicillins ¹	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Benzylpenicillin	0.06 ¹	1	1. Always test for beta-lactamase. If positive, report resistant to benzylpenicillin, ampicillin and amoxicillin. <u>Tests based on a chromogenic cephalosporin can be used to detect the beta-lactamase.</u> The susceptibility of beta-lactamase negative isolates to ampicillin and amoxicillin can be inferred from benzylpenicillin.
Ampicillin ¹	Note ¹	Note ¹	
Ampicillin-sulbactam	IE	IE	
Amoxicillin ¹	Note ¹	Note ¹	
Amoxicillin-clavulanic acid	Note ¹	Note ¹	
Piperacillin	-	-	
Piperacillin-tazobactam	-	-	
Ticarcillin	-	-	
Ticarcillin-clavulanic acid	-	-	
Temocillin	IE	IE	
Phenoxymethylpenicillin	-	-	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Neisseria gonorrhoeae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	0.125	0.125	
Cefotaxime	0.125	0.125	
Cefoxitin	-	-	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	-	-	
Ceftriaxone	0.125	0.125	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	IE	IE	
Ertapenem	IE	IE	
Imipenem	IE	IE	
Meropenem	IE	IE	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	IE	IE	

Neisseria gonorrhoeae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Ciprofloxacin	0.03	0.06	
Levofloxacin	IE	IE	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	0.125	0.25	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Dalbavancin	-	-	
Oritavancin	-	-	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin ¹	0.25	0.5	1. Breakpoints are based on a 2 g-single dose in monotherapy.
Clarithromycin	-	-	
Erythromycin	-	-	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	-	-	
Quinupristin-dalfopristin	-	-	

Neisseria gonorrhoeae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	IE	IE	1. Isolates susceptible to tetracycline are also susceptible to minocycline, but some isolates resistant to tetracycline may be susceptible to minocycline.
Minocycline	IE	IE	
Tetracycline	0.5	1	
Tigecycline	IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Chloramphenicol	-	-	
Colistin	-	-	
Daptomycin	-	-	
Fosfomicin iv	-	-	
Fosfomicin oral	-	-	
Fusidic acid	-	-	
Metronidazole	-	-	
Mupirocin	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	64	64	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

Neisseria meningitidis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion criteria for antimicrobial susceptibility testing of *Neisseria meningitidis* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

Penicillins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Benzylpenicillin	0.06	0.25	
Ampicillin	0.125	1	
Ampicillin-sulbactam	IE	IE	
Amoxicillin	0.125	1	
Amoxicillin-clavulanic acid	-	-	
Piperacillin	-	-	
Piperacillin-tazobactam	-	-	
Ticarcillin	-	-	
Ticarcillin-clavulanic acid	-	-	
Temocillin	-	-	
Phenoxymethylpenicillin	-	-	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Neisseria meningitidis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime ¹	0.125	0.125	
Cefoxitin	-	-	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	-	-	
Ceftriaxone ¹	0.125	0.125	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	IE	IE	1. Breakpoints relate to meningitis only.
Ertapenem	-	-	1. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Imipenem	-	-	
Meropenem ¹ (meningitis)	0.25	0.25	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	-	-	

Neisseria meningitidis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Ciprofloxacin	0.03 ¹	0.03 ¹	1. Breakpoints apply only to use in the prophylaxis of meningococcal disease.
Levofloxacin	IE	IE	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	IE	IE	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	
	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Dalbavancin	-	-	
Oritavancin	-	-	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	
	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	-	-	
Roxithromycin	-	-	
Telithromycin	-	-	
	-	-	
Clindamycin	-	-	
Quinupristin-dalfopristin	-	-	
	-	-	
	-	-	

Neisseria meningitidis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	-	-	1. Tetracycline can be used to predict susceptibility to minocycline for prophylaxis against <i>N. meningitidis</i> infections.
Minocycline	1 ¹	2 ¹	
Tetracycline	1 ¹	2 ¹	
Tigecycline	IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Chloramphenicol	2	4	1. For prophylaxis of meningitis only (refer to national guidelines).
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Metronidazole	-	-	
Mupirocin	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin ¹	0.25	0.25	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

Gram-positive anaerobes
except *Clostridium difficile*

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion criteria for antimicrobial susceptibility testing of anaerobes have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

This group of bacteria includes many genera. The most frequently isolated Gram-positive anaerobes are: *Clostridium*, *Actinomyces*, *Propionibacterium*, *Bifidobacterium*, *Eggerthella*, *Eubacterium*, *Lactobacillus* and anaerobic gram-positive cocci. Anaerobes are most frequently defined by no growth on culture plates incubated in a CO₂ enriched atmosphere, but many Gram-positive, non-spore forming rods such as *Actinomyces* spp., many *P. acnes* and some *Bifidobacterium* spp. can grow on incubation in CO₂ and may be tolerant enough to grow poorly in air, but are still considered as anaerobic bacteria. Several species of *Clostridium*, including *C. carnis*, *C. histolyticum* and *C. tertium*, can grow but not sporulate in air. For all these species, susceptibility testing should be performed in anaerobic environment.

Penicillins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Benzylpenicillin ¹	0.25	0.5	1. Susceptibility to ampicillin, amoxicillin, piperacillin and ticarcillin can be inferred from susceptibility to benzylpenicillin. 2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 3. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L. 4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Ampicillin ¹	4	8	
Ampicillin-sulbactam	4 ²	8 ²	
Amoxicillin ¹	4	8	
Amoxicillin-clavulanic acid	4 ³	8 ³	
Piperacillin ¹	8	16	
Piperacillin-tazobactam	8 ⁴	16 ⁴	
Ticarcillin ¹	8	16	
Ticarcillin-clavulanic acid	8 ³	16 ³	
Temocillin	-	-	
Phenoxymethylpenicillin	IE	IE	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Gram-positive anaerobes
except *Clostridium difficile*

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime	-	-	
Cefoxitin	IE	IE	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	IE	IE	
Ceftriaxone	-	-	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	1	1	
Ertapenem	1	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	-	-	

Gram-positive anaerobes
except *Clostridium difficile*

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Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Ciprofloxacin	-	-	
Levofloxacin	-	-	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Dalbavancin	IE	IE	
Oritavancin	IE	IE	
Teicoplanin	IE	IE	
Telavancin	IE	IE	
Vancomycin	2	2	

Gram-positive anaerobes
except *Clostridium difficile*

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	IE	IE	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	4	4	
Quinupristin-dalfopristin	-	-	

Tetracyclines ¹	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	Note ¹	Note ¹	1. For anaerobic bacteria there is clinical evidence of activity in mixed intra-abdominal infections, but no correlation between MIC values, PK/PD data and clinical outcome. Therefore no breakpoints for susceptibility testing are given.
Minocycline	Note ¹	Note ¹	
Tetracycline	Note ¹	Note ¹	
Tigecycline	Note ¹	Note ¹	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Gram-positive anaerobes
except *Clostridium difficile*

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Chloramphenicol	8	8	
Colistin	-	-	
Daptomycin	-	-	
Fosfomicin iv	-	-	
Fosfomicin oral	-	-	
Fusidic acid	-	-	
Metronidazole	4	4	
Mupirocin	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

Clostridium difficile

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion criteria for antimicrobial susceptibility testing of *Clostridium difficile* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Moxifloxacin	1	1	1. Not used clinically. May be tested for epidemiological purposes only (ECOFF 4 mg/L).

Glycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Vancomycin	2 ¹	2 ¹	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Tigecycline	1,2	1,2	1. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use. 2. Not used clinically. May be tested for epidemiological purposes only (ECOFF 0.25 mg/L).

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Daptomycin	1,2	1,2	1. Daptomycin MICs must be determined in the presence of Ca ²⁺ (50 mg/L in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturers' instructions for commercial systems. 2. Not used clinically. May be tested for epidemiological purposes only (ECOFF 4 mg/L). 3. Not used clinically. May be tested for epidemiological purposes only (ECOFF 2 mg/L). 4. Fidaxomicin breakpoints and ECOFF have not been set because the available data show major variation in MIC distribution between studies. 5. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility. 6. Not used clinically. May be tested for epidemiological purposes only (ECOFF 0.004 mg/L).
Fusidic acid	3	3	
Fidaxomicin	IE ⁴	IE ⁴	
Metronidazole	2 ⁵	2 ⁵	
Rifampicin	6	6	

Gram-negative anaerobes

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion criteria for antimicrobial susceptibility testing of anaerobes have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

This group of bacteria includes many genera. The most frequently isolated Gram-negative anaerobes are *Bacteroides*, *Prevotella*, *Porphyromonas*, *Fusobacterium*, *Bilophila* and *Mobiluncus*. Anaerobes are most frequently defined by no growth on culture plates incubated in a CO₂ enriched atmosphere. For all these species, susceptibility testing should be performed in anaerobic environment.

Penicillins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Benzylpenicillin ¹	0.25	0.5	<ol style="list-style-type: none"> 1. Susceptibility to ampicillin, amoxicillin, piperacillin and ticarcillin can be inferred from susceptibility to benzylpenicillin. 2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 3. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L. 4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Ampicillin ¹	0.5	2	
Ampicillin-sulbactam	4 ²	8 ²	
Amoxicillin ¹	0.5	2	
Amoxicillin-clavulanic acid	4 ³	8 ³	
Piperacillin ¹	16	16	
Piperacillin-tazobactam	8 ⁴	16 ⁴	
Ticarcillin ¹	16	16	
Ticarcillin-clavulanic acid	8 ³	16 ³	
Temocillin	-	-	
Phenoxymethylpenicillin	IE	IE	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Gram-negative anaerobes

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime	-	-	
Cefoxitin	IE	IE	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	IE	IE	
Ceftriaxone	-	-	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	1	1	
Ertapenem	1	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	-	-	

Gram-negative anaerobes

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Ciprofloxacin	-	-	
Levofloxacin	-	-	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Dalbavancin	-	-	
Oritavancin	-	-	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	IE	IE	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	4	4	
Quinupristin-dalfopristin	-	-	

Gram-negative anaerobes

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines ¹	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	Note ¹	Note ¹	1. For anaerobic bacteria there is clinical evidence of activity in mixed intra-abdominal infections, but no correlation between MIC values, PK/PD data and clinical outcome. Therefore no breakpoints for susceptibility testing are given.
Minocycline	Note ¹	Note ¹	
Tetracycline	Note ¹	Note ¹	
Tigecycline	Note ¹	Note ¹	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Chloramphenicol	8	8	
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Metronidazole	4	4	
Mupirocin	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

Helicobacter pylori

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion criteria for antimicrobial susceptibility testing of *Helicobacter pylori* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

Penicillins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amoxicillin	0.125 ¹	0.125 ¹	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Levofloxacin	1 ¹	1 ¹	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.

Macrolides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Clarithromycin	0.25 ¹	0.5 ¹	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Tetracycline	1 ¹	1 ¹	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Metronidazole	8 ¹	8 ¹	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.
Rifampicin	1 ¹	1 ¹	

Listeria monocytogenes

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Streptococcus pneumoniae* ATCC 49619

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	1	1	1 unit	13	13	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ampicillin	1	1	2	16	16	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Meropenem	0.25	0.25	10	26	26	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

Macrolides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Erythromycin	1	1	15	25	25	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Trimethoprim-sulfamethoxazole ¹	0.06	0.06	1.25-23.75	29	29	1. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.

Pasteurella multocida

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Haemophilus influenzae* ATCC 49766. For control of the inhibitor component of beta-lactam inhibitor-combination disks, use *Staphylococcus aureus* ATCC 29213.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
	0.5	0.5	1 unit	17	17	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method. 1. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L. A. Infer susceptibility from benzylpenicillin susceptibility.
Benzylpenicillin				Note ^A	Note ^A	
Ampicillin	1	1		Note ^A	Note ^A	
Amoxicillin	1	1		Note ^A	Note ^A	
Amoxicillin-clavulanic acid	1 ¹	1 ¹	2-1	15	15	

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
	0.03	0.03	5	26	26	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefotaxime						

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
	0.06	0.06	5	27 ^A	27 ^A	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method. A. The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. See Note B. B. Isolates categorised as susceptible to nalidixic acid can be reported susceptible to ciprofloxacin and levofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.
Ciprofloxacin				27 ^A	27 ^A	
Levofloxacin	0.06	0.06	5	27 ^A	27 ^A	
Nalidixic acid (screen)	NA	NA	30	23 ^B	Note ^B	

Pasteurella multocida

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	1	1		Note ^A	Note ^A	A. Susceptibility inferred from tetracycline screen test.
Tetracycline (screen)	NA	NA	30	24 ^A	24 ^A	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Trimethoprim-sulfamethoxazole ¹	0.25	0.25	1.25-23.75	23	23	1. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F). The MH-F plates should be dried prior to inoculation to reduce swarming (at 20-25°C overnight or at 35°C, with the lid removed, for 15 min).
Inoculum: McFarland 0.5
Incubation: Microaerobic environment, 41±1°C, 24h. Isolates with insufficient growth after 24h incubation are reincubated immediately and inhibition zones read after a total of 40-48h incubation.
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Campylobacter jejuni* ATCC 33560

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.5	0.5	5	26	26	

Macrolides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Azithromycin	Note ¹	Note ¹		Note ^A	Note ^A	1/A. Erythromycin can be used to determine susceptibility to azithromycin and clarithromycin.
Clarithromycin	Note ¹	Note ¹		Note ^A	Note ^A	
Erythromycin, <i>C. jejuni</i>	4 ¹	4 ¹	15	20 ^A	20 ^A	
Erythromycin, <i>C. coli</i>	8 ¹	8 ¹	15	24 ^A	24 ^A	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	Note ¹	Note ¹		Note ^A	Note ^A	1/A. Tetracycline can be used to determine susceptibility to doxycycline.
Tetracycline	2 ¹	2 ¹	30	30 ^A	30 ^A	

Corynebacterium spp.

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-44h incubation.
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Streptococcus pneumoniae* ATCC 49619

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	0.125	0.125	1 unit	29	29	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	1	1	5	25	25	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Moxifloxacin	0.5	0.5	5	25	25	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Gentamicin	1	1	10	23	23	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Vancomycin	2	2	5	17	17	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

Corynebacterium spp.

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Lincosamides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Clindamycin	0.5	0.5	2	20	20	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Tetracycline	2	2	30	24	24	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	2	2	10	25	25	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Rifampicin	0.06	0.5	5	30	25	

Aerococcus sanguinicola* and *urinae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)
Inoculum: McFarland 0.5
Incubation: 5% CO₂, 35±1°C, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-44h incubation.
Reading: Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.
Quality control: *Streptococcus pneumoniae* ATCC 49619

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	0.125	0.125	1 unit	21	21	1/A. Infer susceptibility from ampicillin susceptibility.
Ampicillin	0.25	0.25	2	26	26	
Amoxicillin	Note ¹	Note ¹		Note ^A	Note ^A	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Meropenem	0.25	0.25	10	31	31	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin (uncomplicated UTI only)	2	2	5	21 ^A	21 ^A	1. Susceptibility can be inferred from ciprofloxacin susceptibility. A. Susceptibility can be inferred from norfloxacin susceptibility. See Note C. B. Susceptibility can be inferred from ciprofloxacin or norfloxacin susceptibility. See Note C. C. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance.
Levofloxacin (uncomplicated UTI only)	2 ¹	2 ¹	5	Note ^B	Note ^B	
Norfloxacin (screen)	NA	NA	10	17 ^C	17 ^C	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Vancomycin	1	1	5	16	16	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

Aerococcus sanguinicola* and *urinae

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Nitrofurantoin (uncomplicated UTI only)	16	16	100	16	16	
Rifampicin	0.125	0.125	5	25	25	

Disk diffusion (EUCAST standardised disk diffusion method)**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)**Inoculum:** McFarland 0.5**Incubation:** 5% CO₂, 35±1°C, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-44h incubation.**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.**Quality control:** *Haemophilus influenzae* ATCC 49766.

Penicillins ¹	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Benzylpenicillin	0.03	0.03	1 unit	25	25	1. Beta-lactamase positive isolates can be reported resistant to ampicillin and amoxicillin without inhibitors. Tests based on a chromogenic cephalosporin can be used to detect the beta-lactamase. Beta-lactam resistance mechanisms other than beta-lactamase production have not yet been described for <i>K. kingae</i> . 2. Susceptibility can be inferred from benzylpenicillin susceptibility. 3/B. The intrinsic activity of clavulanic acid in <i>K. kingae</i> is such that the organism is inhibited by ≤2 mg/L clavulanic acid. Therefore no MIC breakpoints for amoxicillin-clavulanic acid can be given. A. Infer susceptibility from benzylpenicillin susceptibility.
Ampicillin	0.06 ²	0.06 ²		Note ^A	Note ^A	
Amoxicillin	0.125 ²	0.125 ²		Note ^A	Note ^A	
Amoxicillin-clavulanic acid	Note ³	Note ³		Note ^B	Note ^B	
Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Cefotaxime	0.125	0.125	5	27	27	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ceftriaxone	0.06	0.06	30	30	30	
Cefuroxime iv	0.5	0.5	30	29	29	
Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Meropenem	0.03	0.03	10	30	30	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.06	0.06	5	28	28	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Levofloxacin	0.125	0.125	5	28	28	

Macrolides and lincosamides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Azithromycin	0.25 ¹	0.25 ¹		Note ^A	Note ^A	1. Susceptibility can be inferred from erythromycin susceptibility. A. Infer susceptibility from erythromycin susceptibility.
Clarithromycin	0.5 ¹	0.5 ¹		Note ^A	Note ^A	
Erythromycin	0.5	0.5	15	20	20	
Clindamycin	-	-		-	-	
Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	0.5 ¹	0.5 ¹		Note ^A	Note ^A	1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline, but some resistant to tetracycline may be susceptible to doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.
Tetracycline	0.5	0.5	30	28	28	
Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Rifampicin	0.5	0.5	5	20	20	1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Trimethoprim-sulfamethoxazole ¹	0.25	0.25	1.25-23.75	28	28	

Mycobacterium tuberculosis

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Listed breakpoints have been set in parallel with marketing authorisation by EMA. Breakpoints for other agents have not yet been established.

Recommended methods for antimicrobial susceptibility testing of mycobacteria are currently under discussion.

	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Delamanid	0.06	0.06	
Bedaquiline	0.25	0.25	

ECOFFs and systemic clinical breakpoints for antimicrobial agents that are used topically

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

In the absence of clinical data on outcome related to MIC of infecting organisms EUCAST does not find it possible to reach a consensus that resolves the conflicting opinions on these two alternative proposals (for details see guidance document):

1. Use ECOFFs for all agents when used topically.
2. Use clinical breakpoints when available and ECOFFs when there are no clinical breakpoints.

For information, the table presents systemic clinical breakpoints and ECOFFs for agents that are used both systemically and topically, and ECOFFs for agents that are used topically only (note that the mupirocin breakpoints are the exception).

Organisms		Gentamicin ³	Ciprofloxacin ³	Levofloxacin ³	Ofloxacin ³	Chloramphenicol ³	Colistin ³ (for Polymyxin B)	Fusidic acid ³	Neomycin (framycetin)	Bacitracin	Mupirocin	Retapamulin
Enterobacteriaceae	ECOFF ^{1,2}	2	0.125	0.25	0.5	16	2	-	8	-	-	-
	Systemic clinical breakpoint ¹	2/4	0.25/0.5	0.5/1	0.25/0.5	8/8	2/2	-	-	-	-	-
<i>P. aeruginosa</i>	ECOFF ¹	8	0.5	2	2	-	4	-	ND	-	-	-
	Systemic clinical breakpoint ¹	4/4	0.5/0.5	1/1	-	-	2/2	-	-	-	-	-
<i>Acinetobacter</i> spp.	ECOFF ^{1,2}	4	1	0.5	1	-	2	-	ND	-	-	-
	Systemic clinical breakpoint ¹	4/4	1/1	0.5/1	-	-	2/2	-	-	-	-	-
<i>S. aureus</i>	ECOFF ¹	2	1	1	1	16	-	0.5	1	ND	1 ⁴	0.5
	Systemic clinical breakpoint ¹	1/1	1/1	1/1	1/1	8/8	-	1/1	-	-	-	-
<i>S. pneumoniae</i>	ECOFF ¹	-	2	2	4	8	-	32	ND	ND	-	-
	Systemic clinical breakpoint ¹	-	-	2/2	-	8/8	-	-	-	-	-	-
Streptococcus A, B, C and G	ECOFF ^{1,2}	-	2	2	4	8	-	32	ND	ND	0.5	0.125
	Systemic clinical breakpoint ¹	-	-	2/2	-	8/8	-	IE	-	-	-	-
<i>H. influenzae</i>	ECOFF ¹	4	0.06	0.06	0.125	1	-	ND	ND	-	-	-
	Systemic clinical breakpoint ¹	IE	0.06/0.06	0.06/0.06	0.06/0.06	2/2	-	-	-	-	-	-
<i>Moraxella</i> spp.	ECOFF ^{1,2}	0.25	0.125	0.125	0.25	2	-	ND	ND	-	-	-
	Systemic clinical breakpoint ¹	IE	0.5/0.5	1/1	0.5/0.5	2/2	-	-	-	-	-	-

Notes

¹ ECOFFs and systemic clinical breakpoints in mg/L.

² This ECOFF is representative of ECOFFs for the most relevant species.

³ Agents also available for systemic use.

⁴ Breakpoints for nasal decontamination S≤1, R>256 mg/L (S≥30, R<18 mm for the mupirocin 200 µg disks). Intermediate isolates are associated with short term suppression (useful preoperatively) but, unlike susceptible isolates, long term eradication rates are low.

ND = No ECOFF defined on EUCAST MIC distribution website.

PK/PD (Non-species related) breakpoints

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

These breakpoints are used only when there are no species-specific breakpoints or other recommendations (a dash or a note) in the species-specific tables.

Penicillins	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Benzympenicillin	0.25	2	1. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 2. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L. 3. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Ampicillin	2	8	
Ampicillin-sulbactam	2 ¹	8 ¹	
Amoxicillin	2	8	
Amoxicillin-clavulanic acid	2 ²	8 ²	
Piperacillin	4	16	
Piperacillin-tazobactam	4 ³	16 ³	
Ticarcillin	8	16	
Ticarcillin-clavulanic acid	8 ²	16 ²	
Temocillin	IE	IE	
Phenoxymethylpenicillin	IE	IE	
Oxacillin	IE	IE	
Cloxacillin	IE	IE	
Dicloxacillin	IE	IE	
Flucloxacillin	IE	IE	
Mecillinam	IE	IE	

PK/PD (Non-species related) breakpoints

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Cefaclor	IE	IE	1. Based on PK/PD target for Gram-negative organisms. 2. Breakpoints are based on ceftolozane data. 3. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L. 4. For susceptibility testing purposes, the concentration of avibactam is fixed at 4 mg/L.
Cefadroxil	IE	IE	
Cefalexin	IE	IE	
Cefazolin	1	2	
Cefepime	4	8	
Cefixime	IE	IE	
Cefotaxime	1	2	
Cefoxitin	IE	IE	
Cefpodoxime	IE	IE	
Ceftaroline	0.5 ¹	0.5 ¹	
Ceftazidime	4	8	
Ceftazidime-avibactam	8 ⁴	8 ⁴	
Ceftibuten	IE	IE	
Ceftobiprole	4	4	
Ceftolozane-tazobactam	4 ^{2,3}	4 ^{2,3}	
Ceftriaxone	1	2	
Cefuroxime iv	4	8	
Cefuroxime oral	IE	IE	

Carbapenems	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Doripenem	1	2	
Ertapenem	0.5	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Aztreonam	4	8	

PK/PD (Non-species related) breakpoints

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Ciprofloxacin	0.25	0.5	
Levofloxacin	0.5	1	
Moxifloxacin	0.25	0.25	
Nalidixic acid (screen)	IE	IE	
Norfloxacin	IE	IE	
Ofloxacin	0.25	0.5	

Aminoglycosides	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Amikacin	IE	IE	
Gentamicin	IE	IE	
Netilmicin	IE	IE	
Tobramycin	IE	IE	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Dalbavancin	0.25 ¹	0.25 ¹	1. For broth microdilution MIC determination, the medium must be supplemented with polysorbate-80 to a final concentration of 0.002%. 2. PK/PD breakpoints are based on <i>S. aureus</i> . For <i>S. pyogenes</i> there is uncertainty regarding the PK/PD target. For broth microdilution MIC determination, the medium must be supplemented with polysorbate-80 to a final concentration of 0.002%.
Oritavancin	0.125 ^{1,2}	0.125 ^{1,2}	
Teicoplanin	IE	IE	
Telavancin	IE	IE	
Vancomycin	IE	IE	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Azithromycin	IE	IE	
Clarithromycin	IE	IE	
Erythromycin	IE	IE	
Roxithromycin	IE	IE	
Telithromycin	IE	IE	
Clindamycin	IE	IE	
Quinupristin-dalfopristin	IE	IE	

PK/PD (Non-species related) breakpoints

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Doxycycline	IE	IE	1. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Minocycline	IE	IE	
Tetracycline	IE	IE	
Tigecycline	0.25 ¹	0.5 ¹	

Oxazolidinones	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Linezolid	2	4	
Tedizolid	IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Chloramphenicol	IE	IE	
Colistin	IE	IE	
Daptomycin	IE	IE	
Fosfomicin iv	IE	IE	
Fosfomicin oral	IE	IE	
Fusidic acid	IE	IE	
Metronidazole	IE	IE	
Mupirocin			
Nitrofurantoin	IE	IE	
Nitroxoline	IE	IE	
Rifampicin	IE	IE	
Spectinomycin	IE	IE	
Trimethoprim	IE	IE	
Trimethoprim-sulfamethoxazole	IE	IE	

Dosages

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

EUCAST breakpoints are based on the following dosages (see section 8 in Rationale Documents).

Penicillins	Standard dose	High dose
Benzylpenicillin	0.6 g x 4 iv	2.4 g x 6 iv
Ampicillin	0.5-1 g x 3-4 iv	1-2 g x 4-6 iv
Ampicillin-sulbactam	3 g x 3 iv	4 g x 3 iv
Amoxicillin	0.5 g x 3 iv Oral dosage under discussion	2 g x 6 iv Oral dosage under discussion
Amoxicillin-clavulanic acid	(1 g amoxicillin + 0.2 g clavulanic acid) x 3 iv Oral dosage under discussion	(2 g amoxicillin + 0.2 g clavulanic acid) x 3 iv Oral dosage under discussion
Piperacillin	4 g x 3 iv	4 g x 4 iv
Piperacillin-tazobactam	(4 g piperacillin + 0.5 g tazobactam) x 3 iv	(4 g piperacillin + 0.5 g tazobactam) x 4 iv
Ticarcillin	3 g x 4 iv	3 g x 6 iv
Ticarcillin-clavulanic acid	(3 g ticarcillin + 0.1 g clavulanic acid) x 4 iv	(3 g ticarcillin + 0.1 g clavulanic acid) x 6 iv
Temocillin		
Phenoxymethylpenicillin	0.5-2 g x 3-4	None
Oxacillin	Clinical breakpoints not available	Clinical breakpoints not available
Cloxacillin	0.5 g x 4 oral or 1 g x 4 iv	1 g x 4 oral or 2 g x 6 iv
Dicloxacillin	0.5-1 g x 4 oral or 1 g x 4 iv	2 g x 4 oral or 2 g x 6 iv
Flucloxacillin	1 g x 3 oral or 2 g x 4 iv	1 g x 4 oral or 2 g x 6 iv
Mecillinam	0.2-0.4 g x 3 oral	None

Dosages

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Cephalosporins	Standard dose	High dose
Cefaclor	0.25-1 g x 3 oral	None
Cefadroxil	0.5-1 g x 2 oral	None
Cefalexin	0.25-1 g x 2-3 oral	None
Cefazolin	1-2 g x 3	None
Cefepime	2 g x 2 iv	2 g x 3 iv
Cefixime	0.2-0.4 g x 2 (0.4 g as single dose for <i>Neisseria gonorrhoeae</i>)	None
Cefotaxime	1 g x 3 iv	2 g x 3 iv
Cefoxitin	Clinical breakpoints not available	Clinical breakpoints not available
Cefpodoxime	0.1-0.2 g x 2 oral	None
Ceftaroline	0.6 g x 2 iv over 1 hour	0.6 g x 3 iv over 2 hours
Ceftazidime	1 g x 3 iv	2 g x 3 iv
Ceftazidime-avibactam	(2 g ceftazidime + 0.5 g avibactam) x 3 over 2 hours	
Ceftibuten	0.4 g x 1 oral	None
Ceftobiprole	0.5 g x 3 iv over 2 hours	None
Ceftolozane-tazobactam	(1 g ceftolozane + 0.5 g tazobactam) x 3 iv over 1 hour	None
Ceftriaxone	1 g x 1 iv	2 g x 1 iv
Cefuroxime iv	0.75 g x 3 iv	1.5 g x 3 iv
Cefuroxime oral	0.25-0.5 g x 2 oral	None

Carbapenems	Standard dose	High dose
Doripenem	0.5 g x 3 iv over 1 hour	1 g x 3 iv over 4 hours
Ertapenem	1 g x 1 iv over 30 minutes	None
Imipenem	0.5 g x 4 iv over 30 minutes	1 g x 4 iv over 30 minutes
Meropenem	1 g x 3 iv over 30 minutes	2 g x 3 iv over 30 minutes

Monobactams	Standard dose	High dose
Aztreonam	1 g x 3 iv	2 g x 4 iv

Dosages

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Fluoroquinolones	Standard dose	High dose
Ciprofloxacin	0.5 g x 2 oral or 0.4 g x 2 iv	0.75 g x 2 oral or 0.4 g x 3 iv
Levofloxacin	0.5 g x 1 oral or 0.5 g x 1 iv	0.5 g x 2 oral or 0.5 g x 2 iv
Moxifloxacin	0.4 g x 1 oral or 0.4 g x 1 iv	None
Nalidixic acid	Laboratory test reagent only	Laboratory test reagent only
Norfloxacin	0.4 g x 2 oral	None
Ofloxacin	0.2 g x 2 oral or 0.2 g x 2 iv	0.4 g x 2 oral or 0.4 g x 2 iv

Aminoglycosides	Standard dose	High dose
Amikacin	20 mg/kg x 1 iv	30 mg/kg x 1 iv
Gentamicin	5 mg/kg x 1 iv	7 mg/kg x 1 iv
Netilmicin	5 mg/kg x 1 iv	7 mg/kg x 1 iv
Tobramycin	5 mg/kg x 1 iv	7 mg/kg x 1 iv

Glycopeptides and lipoglycopeptides	Standard dose	High dose
Dalbavancin	1 g x 1 iv over 30 minutes on day 1 If needed, 0.5 g x 1 iv over 30 minutes on day 8	None
Oritavancin	1.2 g x 1 (single dose) iv over 3 hours	None
Teicoplanin	0.4 g x 1 iv	0.8 g x 1 iv or 0.4 g x 2 iv
Telavancin	10 mg/kg x 1 iv over 1 hour	None
Vancomycin	0.5 g x 4 iv or 1 g x 2 iv or 2 g x 1 by continuous infusion	None

Macrolides, lincosamides and streptogramins	Standard dose	High dose
Azithromycin	0.5 g x 1 oral or 0.5 g x 1 iv (2 g as single dose for <i>Neisseria gonorrhoeae</i>)	None
Clarithromycin	0.25 g x 2 oral	0.5 g x 2 oral
Erythromycin	0.5 g x 2-4 oral or 0.5 g x 2-4 iv	1 g x 4 oral or 1 g x 4 iv
Roxithromycin	0.15 g x 2 oral	None
Telithromycin	0.8 g x 1 oral	None
Clindamycin	0.3 g x 2 oral or 0.6 g x 3 iv	0.3 g x 4 oral or 1.2 g x 2 iv
Quinupristin-dalfopristin	7.5 mg/kg x 2	7.5 mg/kg x 3

Dosages

EUCAST Clinical Breakpoint Tables v. 7.1, valid from 2017-03-10

Tetracyclines	Standard dose	High dose
Doxycycline	0.1 g x 1 oral	0.2 g x 1 oral
Minocycline	0.1 g x 2 oral	None
Tetracycline	0.25 g x 4 oral	0.5 g x 4 oral
Tigecycline	0.1 g loading dose followed by 50 mg x 2 iv	None

Oxazolidinones	Standard dose	High dose
Linezolid	0.6 g x 2 oral or 0.6 g x 2 iv	None
Tedizolid	0.2 g x 1 oral	None

Miscellaneous agents	Standard dose	High dose
Chloramphenicol	1 g x 4 oral or 1 g x 4 iv	2 g x 4 oral or 2 g x 4 iv
Colistin	3 MU x 3 iv with a loading dose of 9 MU	None
Daptomycin	0.25 g x 1 iv	0.5 g x 1 iv
Fosfomycin iv	4 g x 3 iv	8 g x 3 iv
Fosfomycin oral	3 g x 1 oral as a single dose	None
Fusidic acid	0.5 g x 2 oral or 0.5 g x 2 iv	0.5 g x 3 oral or 0.5 g x 3 iv
Metronidazole	0.4 g x 3 oral or 0.4 g x 3 iv	0.5 g x 3 oral or 0.5 g x 3 iv
Mupirocin		
Nitrofurantoin	50 mg x 3 oral	0.1 g x 4 oral
Nitroxoline	0.25 g x 3	None
Rifampicin	0.6 g x 1 oral or 0.6 g x 1 iv	0.6 g x 2 oral or 0.6 g x 2 iv
Spectinomycin	2 g x 1 im	None
Trimethoprim	0.16 g x 2 oral	None
Trimethoprim-sulfamethoxazole	(0.16 g trimethoprim + 0.8 g sulfa) x 2 oral or (0.16 g trimethoprim + 0.8 g sulfa) x 2 iv	(0.24 g trimethoprim + 1.2 g sulfa) x 2 oral or (0.24 g trimethoprim + 1.2 g sulfa) x 2 iv