XLIX CONGRESSO NAZIONALE AMCLI

26 febbraio - 1 marzo 2022 | Palacongressi Rimini

Test di sensibilità agli antibiotici con i metodi ed i breakpoint EUCAST: cos'è cambiato?

CRITERI INTERPRETATIVI EUCAST 2022

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Regione Lombardia
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XLIX CONGRESSO NAZIONALE AMCLI

26 febbraio - 1 marzo 2022 | Palacongressi Rimini

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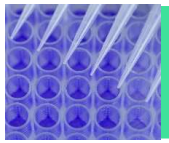
EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING

European Society of Clinical Microbiology and Infectious Diseases

Nuovi set di breakpoint

Breakpoint e dosaggi



Breakpoint e metodi

Breakpoint e specie

Introduzione di nuovi set di breakpoint

Content

2011

- Notes
- Changes
- Enterobacteriaceae
- *Pseudomonas* spp.
- *Acinetobacter* spp.
- *Staphylococcus* spp.
- *Enterococcus* spp.
- *Streptococcus* Groups A, B, C and G
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- *Haemophilus influenzae*
- *Moraxella catarrhalis*
- *Neisseria gonorrhoeae*
- *Neisseria meningitidis*
- Gram-positive anaerobes
- Gram-negative anaerobes
- Miscellaneous
- Non-species related breakpoints

2012

- Gram-positive anaerobes
- *Clostridium difficile*
- Gram-negative anaerobes
- *Helicobacter pylori*
- *Listeria monocytogenes*
- Non-species related breakpoints

2013

- *Listeria monocytogenes*
- *Pasteurella multocida*
- *Campylobacter jejuni* and *coli*
- PK/PD (Non-species related) breakpoints

2014

- *Corynebacterium* spp.

2015

- *Mycobacterium tuberculosis*
- PK/PD (Non-species related) breakpoints
- Expert Rules
- Detection of Resistance Mechanisms
- Breakpoints for topical use of antimicrobial agents

2016

- Dosages

2017

- *Aerococcus sanguinicola* and *urinae*
- *Kingella kingae*
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2018

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2019

- *Clostridioides difficile*

2021

- *Achromobacter xylosoxidans*
- *Bacillus* spp.

2022

- Anaerobic bacteria
- *Vibrio* spp.

Anaerobic bacteria

EUCAST Clinical Breakpoint Tables v. 12.0, valid from 2022-01-01

For species not listed below, see EUCAST Guidance Document on how to test and interpret results when there are no breakpoints
Expert Rules and Intrinsic Resistance Tables

Bacteroides spp.

Antimicrobial agent	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Notes
	S ≤	R >	ATU		S ≥	R <	ATU	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Piperacillin-tazobactam	8[1]	8[1]		30-6	20	20		**1.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Piperacillin-tazobactam, *B. thetaiotaomicron*	IE	IE			IE	IE		**2/A.** The meropenem zone diameter breakpoint will detect all *cfiA* gene mediated carbapenem resistance in *Bacteroides fragilis*. Some isolates with an MIC of 1 mg/L may harbour the *cfiA* gene.
Meropenem	1[2]	1[2]		10	28[A]	28[A]		**3/B.** For information on how to use breakpoints in brackets, see https://www.eucast.org/eucastguidancedocuments/.
Clindamycin	(4)[3]	(4)[3]		2	(10)[B,C]	(10)[B,C]		**C.** Examine zones carefully for colonies within zones. Colonies should be taken into account when reading.
Metronidazole	4	4		5	25	25		

Prevotella spp.

Antimicrobial agent	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Notes
	S ≤	R >	ATU		S ≥	R <	ATU	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin	0.5	0.5		1 unit	20	20		**1.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Piperacillin-tazobactam	0.5[1]	0.5[1]		30-6	26	26		**A.** Examine zones carefully for colonies within zones. Colonies should be taken into account when reading.
Meropenem	0.25	0.25		10	34	34		
Clindamycin	0.25	0.25		2	31[A]	31[A]		
Metronidazole	4	4		5	22	22		

Fusobacterium necrophorum

Antimicrobial agent	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Notes
	S ≤	R >	ATU		S ≥	R <	ATU	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin	0.06	0.06		1 unit	25	25		**1.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Piperacillin-tazobactam	0.5[1]	0.5[1]		30-6	32	32		**A.** Examine zones carefully for colonies within zones. Colonies should be taken into account when reading.
Meropenem	0.03	0.03		10	35	35		
Clindamycin	0.25	0.25		2	30[A]	30[A]		
Metronidazole	0.5	0.5		5	30	30		

Anaerobic bacteria

EUCAST Clinical Breakpoint Tables v. 12.0, valid from 2022-01-01

For species not listed below, see EUCAST Guidance Document on how to test and interpret results when there are no breakpoints
Expert Rules and Intrinsic Resistance Tables

Clostridium perfringens

Antimicrobial agent	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >	ATU		S ≥	R <	ATU	
Benzylpenicillin	0.5	0.5		1 unit	15	15		**1.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Piperacillin-tazobactam	0.5[1]	0.5[1]		30-6	24	24		**A.** Examine zones carefully for colonies within zones. Colonies should be taken into account when reading.
Meropenem	0.125	0.125		10	25	25		
Vancomycin	2	2		5	12	12		
Clindamycin	0.25	0.25		2	19[A]	19[A]		
Metronidazole	4	4		5	16	16		

Cutibacterium acnes

Antimicrobial agent	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >	ATU		S ≥	R <	ATU	
Benzylpenicillin	0.06	0.06		1 unit	24	24		**1.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Piperacillin-tazobactam	0.25[1]	0.25[1]		30-6	27	27		**A.** Examine zones carefully for colonies within zones. Colonies should be taken into account when reading.
Meropenem	0.125	0.125		10	28	28		
Vancomycin	2	2		5	22	22		
Clindamycin	0.25	0.25		2	26[A]	26[A]		

Anaerobic bacteria **EUCAST Clinical Breakpoint Tables v. 12.0, valid from 2022-01-01**

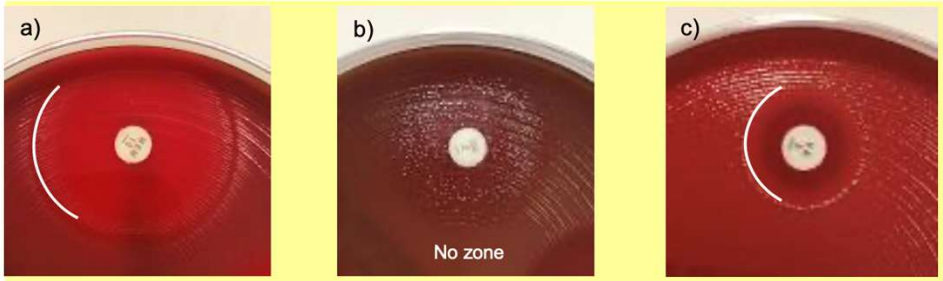
For species not listed below, see EUCAST Guidance Document on how to test and interpret results when there are no breakpoints

Expert Rules and Intrinsic Resistance Tables

Determinazione MIC (agar diluizione)
Terreno: Fastidious Anaerobe Agar (FAA)
Inoculo: 10^5 CFU/spot
Incubazione: Ambiente anaerobico, 35-37°C, 48h
Lettura: Se non diversamente specificato, leggere la MIC alla concentrazione più bassa dell'agente in cui si osserva una notevole differenza nella crescita visibile tra la piastra del test e quella di controllo.
Controllo qualità: *Bacteroides fragilis* ATCC 25285 e *Clostridium perfringens* ATCC 13124.
Clostridium perfringens DSM 25589 con un disco di metronidazolo da 5 µg per monitorare l'atmosfera anaerobica

Diffusione da disco (metodo di diffusione del disco standardizzato EUCAST)
Terreno: Fastidious Anaerobe Agar **(FAA).** Le piastre devono essere asciugate prima dell'inoculazione (a 20-25°C durante la notte o a 35°C, con il coperchio rimosso, per 15 min).
Inoculo: McFarland 1.0
Incubazione: Ambiente anaerobico, 35-37°C, 18±2h

Lettura: Se non diversamente specificato, leggere i bordi dell'alone di inibizione nel punto in cui non è presente alcuna crescita vista dalla parte anteriore della piastra con il coperchio rimosso e con luce riflessa.
Controllo qualità: *Bacteroides fragilis* ATCC 25285 e *Clostridium perfringens* ATCC 13124.
Clostridium perfringens DSM 25589 con un disco metronidazolo da 5 µg per monitorare l'atmosfera



Enterobatteri e penicilline negli anni: *2011*

Enterobacteriaceae

EUCAST Clinical Brea

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
						1. For aminopenicillin breakpoints, the resistant breakpoint of >8 mg/L ensu mechanisms are reported resistant. The wide range of dosages, and intravu affect therapeutic efficacy. The unspecified susceptible breakpoint enables *mirabilis* as either susceptible or intermediate to the aminopenicillins deper whether the infection is systemic or affects the urinary tract only.
Benzylpenicillin	-	-		-	-	
Ampicillin	Note[1]	8	10	Note[A]	14	A. Enterobacteriaceae may be categorized as either susceptible or interme common practice to categorize wild type Enterobacteriaceae as susceptible categorize the wild type as intermediate use S ≥50 mm, R <14 mm.
Ampicillin-sulbactam[2]	Note[1]	8	10-10	Note[A]	14	2. For susceptibility testing purposes, the concentration of sulbactam is fixe
Amoxicillin	Note[1]	8	-	Note[B]	Note[B]	B. Susceptibility inferred from ampicillin.
Amoxicillin-clavulanate[3]	Note[1]	8	20-10	Note[C]	17	3. For susceptibility testing purposes, the concentration of clavulanate is fix C. Enterobacteriaceae may be categorized as either susceptible or interme common practice to categorize wild type Enterobacteriaceae as susceptible categorize the wild type as intermediate use S ≥50 mm, R <17 mm.
Piperacillin	8	16	30	18	15	
Piperacillin-tazobactam[4]	8	16	30-6	18	15	4. For susceptibility testing purposes, the concentration of tazobactam is fix
Ticarcillin	8	16	75	23	22	
Ticarcillin-clavulanate[3]	8	16	75-10	23	22	
Phenoxymethylpenicillin	-	-		-	-	

EUCAST EUROPEAN ON ANTIMIC SUSCEPTIBI

Enterobatteri e penicilline negli anni: *2012*

Enterobacteriaceae

EUCAST Clinical Breakpoint Ta

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 bac
illuminated with reflected light.
Quality control: *Escherichia coli* ATCC 25922

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Benzylpenicillin	-	-		-	-	
Ampicillin	8[1]	8	10	14[A,B]	14[B]	**1/A.** Wild type Enterobacteriaceae are categorised as susceptible to aminopenicil Some countries prefer to categorise wild type isolates of *E. coli* and *P. mirabilis* MIC breakpoint S ≤ 0.5 mg/L and the corresponding zone diameter breakpoint S **B.** Ignore growth that may appear as a thin inner zone on some batches of Muelle
Ampicillin-sulbactam	8[1,2]	8[2]	10-10	14[A,B]	14[B]	**2.** For susceptibility testing purposes, the concentration of sulbactam is fixed at 4
Amoxicillin	8[1]	8	-	Note[C]	Note[C]	**C.** Susceptibility inferred from ampicillin.
Amoxicillin-clavulanate	8[1,3]	8[3]	20-10	17[A,B]	17[B]	**3.** For susceptibility testing purposes, the concentration of clavulanate is fixed at
Piperacillin	8	16	30	18	15	
Piperacillin-tazobactam	8[4]	16[4]	30-6	20	17	**4.** For susceptibility testing purposes, the concentration of tazobactam is fixed at
Ticarcillin	8	16	75	23	23	
Ticarcillin-clavulanate	8[3]	16[3]	75-10	23	23	
Phenoxymethylpenicillin	-	-		-	-	

EUCAST EUROPEAN ON ANTIMIC SUSCEPTIBI

Enterobatteri e penicilline negli anni: *2014*

Enterobacteriaceae

EUCAST Clinical Breakpoint Ta

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 bacl illuminated with reflected light.
Quality control: *Escherichia coli* ATCC 25922

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Benzylpenicillin	-	-		-	-	
Ampicillin	8[1]	8	10	14[A,B]	14[B]	**1/A.** Wild type Enterobacteriaceae are categorised as susceptible to aminopenicil Some countries prefer to categorise wild type isolates of *E. coli* and *P. mirabilis* MIC breakpoint S ≤ 0.5 mg/L and the corresponding zone diameter breakpoint S **B.** Ignore growth that may appear as a thin inner zone on some batches of Muelle
Ampicillin-sulbactam	8[1,2]	8[2]	10-10	14[A,B]	14[B]	**2.** For susceptibility testing purposes, the concentration of sulbactam is fixed at 4
Amoxicillin	8[1]	8	-	Note[C]	Note[C]	**C.** Susceptibility inferred from ampicillin.
Amoxicillin-clavulanate	8[1,3]	8[3]	20-10	19[A,B]	19[B]	**3.** For susceptibility testing purposes, the concentration of clavulanate is fixed at
Amoxicillin-clavulanate (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	**4.** For susceptibility testing purposes, the concentration of tazobactam is fixed at
Ticarcillin	8	16	75	23	23	
Ticarcillin-clavulanate	8[3]	16[3]	75-10	23	23	
Phenoxymethylpenicillin	-	-		-	-	

EUCAST EUROPEAN ON ANTIMIC SUSCEPTIBI

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2015

2016

2017

Enterobatteri e penicilline negli anni: *2019*

Enterobacterales*

Expert Rules and Intrinsic Resistance Tables

EUCAST Clinical Breakpoint Tables v. 9.0, valid from 2019-01-01

MIC determination (broth microdilution according to ISO standard 20776-1 except for mecillinam and fosfomycin where agar dilution is used)
Medium: Mueller-Hinton broth
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1°C, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Escherichia coli* ATCC 25922. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h
Reading: Unless otherwise stated, 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 agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

*** Recent taxonomic studies have narrowed the definition of the family Enterobacteriaceae. Some previous members of this family are now included in other families within the Order Enterobacterales. Breakpoints in this table apply to all members of the Enterobacterales.**

Penicillins[1]	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Benzylpenicillin	-	-			-	-	
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]	19-20
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]	16	30-6	20	17	17-19
Ticarcillin	8	16		75	23	20	
Ticarcillin-clavulanic acid	8[3]	16[3]		75-10	23	20	
Temocillin	Note[5]	Note[5]			Note[5]	Note[5]	
Phenoxymethylpenicillin	-	-			-	-	
Oxacillin	-	-			-	-	
Cloxacillin	-	-			-	-	
Dicloxacillin	-	-			-	-	
Flucloxacillin	-	-			-	-	
Mecillinam (uncomplicated UTI only) *E. coli, Klebsiella* spp. (except *K. aerogenes*), *Raoultella* spp. and *P. mirabilis*	8[6]	8[6]		10	15[D]	15[D]	

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1/A. Wild type Enterobacterales are categorised as susceptible to aminopenicillins.
Some countries prefer to categorise wild-type isolates of *E. coli* and *P. mirabilis* as "Susceptible, increased exposure". When this is the case, use the MIC breakpoint S ≤ 0.5 mg/L and the corresponding zone diameter breakpoint S ≥ 50 mm.
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.
5. Breakpoints still under consideration.
6. Agar dilution is the reference method for mecillinam MIC determination.

B. Ignore growth that may appear as a thin inner zone on some batches of Mueller-Hinton agars.
C. Susceptibility inferred from ampicillin.
D. Ignore isolated colonies within the inhibition zone for *E. coli*.

EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING

European Society of Clinical Microbiology and Infectious Diseases

Enterobatteri e penicilline negli anni: *2020*

***Enterobacterales* ***

Expert Rules and Intrinsic Resistance Tables

EUCAST Clinical Breakpoint Tables v. 10.0, valid from 2020-01-01

For several agents, in v. 10.0 of the breakpoint tables, EUCAST has introduced breakpoints which categorise wild-type organisms (organisms without phenotypically detectable acquired resistance mechanisms to the agent) as "Susceptible, increased exposure (I)" instead of "Susceptible, standard dosing regimen (S)". In v. 9.0, these are listed as agent[HE] to emphasize the need for high exposure (HE). Following efforts to explain and inform colleagues in clinical microbiology, colleagues involved in treatment and in forming antimicrobial policies and stewardship, laboratories are encouraged to implement the new standard as soon as possible but no later than at the end of 2020. During the transition, it is possible to continue to use breakpoints in table v. 9.0 for breakpoints highlighted in light green in v. 10.0.

MIC determination (broth microdilution according to ISO standard 20776-1 except for mecillinam and fosfomycin where agar dilution is used)
Medium: Mueller-Hinton broth
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1°C, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Escherichia coli* ATCC 25922. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h
Reading: Unless otherwise stated, 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 agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

*** Recent taxonomic studies have narrowed the definition of the family Enterobacteriaceae. Some previous members of this family are now included in other families within the Order *Enterobacterales*. Breakpoints in this table apply to all members of the *Enterobacterales*.**

Penicillins[1]	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Benzylpenicillin	-	-			-	-	
Ampicillin[1]	8	8		10	14[A]	14[A]	
Ampicillin-sulbactam[1]	8[2]	8[2]		10-10	14[A]	14[A]	
Amoxicillin[1]	8	8		-	Note[B]	Note[B]	
Amoxicillin-clavulanic acid[1]	8[3]	8[3]		20-10	19[A]	19[A]	19-20
Amoxicillin-clavulanic acid (uncomplicated UTI only)	32[3]	32[3]		20-10	16[A]	16[A]	
Piperacillin	8	16		30	20	17	
Piperacillin-tazobactam	8[4]	16[4]	16	30-6	20	17	17-19
Ticarcillin	8	16		75	23	20	
Ticarcillin-clavulanic acid	8[3]	16[3]		75-10	23	20	
Temocillin	Note[5]	Note[5]			Note[C]	Note[C]	
Phenoxymethylpenicillin	-	-			-	-	
Oxacillin	-	-			-	-	
Cloxacillin	-	-			-	-	
Dicloxacillin	-	-			-	-	
Flucloxacillin	-	-			-	-	
Mecillinam oral (uncomplicated UTI only), *E. coli*, *Citrobacter* spp., *Klebsiella* spp., *Raoultella* spp., *Enterobacter* spp. and *P. mirabilis*	8[6]	8[6]		10	15[D]	15[D]	

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

~~1/A. Wild type Enterobacterales are categorised as susceptible to aminopenicillins.~~
~~Some countries prefer to categorise wild-type isolates of *E. coli* and *P. mirabilis* as "Susceptible, increased exposure". When this is the case, use the MIC breakpoint S ≤ 0.5 mg/L and the corresponding zone diameter breakpoint S ≥ 50 mm.~~
1. Aminopenicillin breakpoints in *Enterobacterales* are based on intravenous administration. Breakpoints for oral administration are relevant for uncomplicated urinary tract infections only. Breakpoints for other infections are under review.

Nota 1. I breakpoint delle aminopenicilline sono basati sulla somministrazione iv.
Sono validi per la somministrazione orale solo per le infezioni delle vie urinarie.
Breakpoint per altre indicazioni sono in revisione.

EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING
European Society of Clinical Microbiology and Infectious Diseases

Enterobatteri e penicilline negli anni: *2021*

***Enterobacterales* ***

Expert Rules and Intrinsic Resistance Tables

EUCAST Clinical Breakpoint Tables v. 11.0, valid from 2021-01-01

An MIC breakpoint of S ≤ 0.001 mg/L is an arbitrary, "off scale" breakpoint (corresponding to a zone diameter breakpoint of "S ≥ 50 mm") which categorises wild-type organisms (organisms without phenotypically detectable resistance mechanisms to the agent) as "Susceptible, increased exposure" (I). For these organism-agent combinations, never report "Susceptible, standard dosing regimen" (S).

MIC determination (broth microdilution according to ISO standard 20776-1 except for mecillinam and fosfomycin where agar dilution is used)
Medium: Mueller-Hinton broth (for cefiderocol, see http://www.eucast.org/guidance_documents/)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Escherichia coli* ATCC 25922. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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 agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

*** Recent taxonomic studies have narrowed the definition of the family Enterobacteriaceae. Some previous members of this family are now included in other families within the Order *Enterobacterales*. Breakpoints in this table apply to all members of the *Enterobacterales*.**

Penicillins[1]	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Benzylpenicillin	-	-			-	-	
Ampicillin[1]	8	8		10	14[A]	14[A]	
Ampicillin-sulbactam[1]	8[2]	8[2]		10-10	14[A]	14[A]	
Amoxicillin[1]	8	8		-	Note[B]	Note[B]	
Amoxicillin-clavulanic acid[1]	8[3]	8[3]		20-10	19[A]	19[A]	19-20
Amoxicillin-clavulanic acid (uncomplicated UTI only)	32[3]	32[3]		20-10	16[A]	16[A]	
Piperacillin	8	8		30	20	20	
Piperacillin-tazobactam	8[4]	8[4]	16	30-6	20	20	19
Ticarcillin	8	16		75	23	20	
Ticarcillin-clavulanic acid	8[3]	16[3]		75-10	23	20	
Temocillin (infections originating from the urinary tract), *E. coli*, *Klebsiella* spp. (except *K. aerogenes*) and *P. mirabilis*	0.001	16		30	50[C]	17[C]	
Phenoxymethylpenicillin	-	-			-	-	
Oxacillin	-	-			-	-	
Cloxacillin	-	-			-	-	
Dicloxacillin	-	-			-	-	
Flucloxacillin	-	-			-	-	
Mecillinam oral (pivmecillinam) (uncomplicated UTI only), *E. coli*, *Citrobacter* spp., *Klebsiella* spp., *Raoultella* spp., *Enterobacter* spp. and *P. mirabilis*	8[5]	8[5]		10	15[C]	15[C]	

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. Aminopenicillin breakpoints in *Enterobacterales* are based on intravenous administration. For oral administration the breakpoints are relevant for urinary tract infections only. Breakpoints for other infections are under review.
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.
~~**5/C.** Breakpoints still under consideration.~~
5. Agar dilution is the reference method for mecillinam MIC determination.

A. Ignore growth that may appear as a thin inner zone on some batches of Mueller-Hinton agars.
B. Susceptibility inferred from ampicillin.
C. Ignore isolated colonies within the inhibition zone.

EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING
European Society of Clinical Microbiology and Infectious Diseases

Frequently Asked Questions: FAQ

Dosages

EUCAST Clinical Breakpoint Tables v. 12.0, valid from 2022-01-01

Penicillins	Standard dosage	High dosage	Uncomplicated UTI	Special situations
Piperacillin-tazobactam	(4 g piperacillin + 0.5 g tazobactam) x 4 iv 30-minute infusion or x 3 iv by extended 4-hour infusion	(4 g piperacillin + 0.5 g tazobactam) x 4 iv by extended 3-hour infusion		A lower dosage of (4 g piperacillin + 0.5 g tazobactam) x 3 iv, 30-minute infusion, is adequate for some infections such as complicated UTI, intraabdominal infections and diabetic foot infections, but not for infections caused by isolates resistant to third-generation cephalosporins.

I BP per *Enterobacterales* e piperacillina-tazobactam sono stati cambiati nel 2021, perché è stata rimossa la categoria «I»?

Per riuscire a coprire isolati con MIC 16 mg/L occorrerebbe un dosaggio di 4 g x 4 con un tempo di infusione esteso

Pratica non ben stabilita

Incertezza sull'outcome clinico per questo livello di MIC

Problema dell' incertezza tecnica (ATU) per questo valore di MIC

Table 2: Target attainment artes for piperacillin-tazobactam 4.5 g x 3 and 4.5 g x 4 iv [4], based on PK described by Felton et al. [5]

MIC (mg/L)	Target attainment rate at *f*T>MIC of 50%		
	4 g x 3 iv 4h infusion	4 g x 4 30' infusion	4 g x 4 iv 3h infusion
64	9	9.5	18
32	44	38	67
16	93	76	99
8	100	95	100
4	100	99	100
≤ 2	100	100	100

Piperacillin-tazobactam, beakpoint for Enterobacterales. **General Consultation 10 july – 18 september 2020**

Enterobatteri e penicilline negli anni: *2022*

***Enterobacterales* ***

Expert Rules and Intrinsic Resistance Tables

EUCAST Clinical Breakpoint Tables v. 12.0, valid from 2022-01-01

An MIC breakpoint of S ≤ 0.001 mg/L is an arbitrary, "off scale" breakpoint (corresponding to a zone diameter breakpoint of "S ≥ 50 mm") which categorises wild-type organisms (organisms without phenotypically detectable resistance mechanisms to the agent) as "Susceptible, increased exposure" (I). For these organism-agent combinations, never report "Susceptible, standard dosing regimen" (S).

MIC determination (broth microdilution according to ISO standard 20776-1 except for mecillinam and fosfomycin where agar dilution is used)
Medium: Mueller-Hinton broth (for cefiderocol, see https://www.eucast.org/eucastguidancedocuments/)
Inoculum: $5x10^6$ CFU/mL
Incubation: Sealed panels, air, 35±1°C, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth. See "EUCAST Reading Guide for broth microdilution" for further information.
Quality control: *Escherichia coli* ATCC 25922. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1°C, 18±2h
Reading: Unless otherwise stated, read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light. See "EUCAST Reading Guide for disk diffusion" for further information.
Quality control: *Escherichia coli* ATCC 25922. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

*** Recent taxonomic studies have narrowed the definition of the family Enterobacteriaceae. Some previous members of this family are now included in other families within the Order *Enterobacterales*. Breakpoints in this table apply to all members of the *Enterobacterales*.**

Penicillins[1]	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Benzylpenicillin	-	-			-	-	
Ampicillin[1]	8	8		10	14[A]	14[A]	
Ampicillin-sulbactam[1]	8[2]	8[2]		10-10	14[A]	14[A]	
Amoxicillin[1]	8	8		-	Note[B]	Note[B]	
Amoxicillin-clavulanic acid[1]	8[3]	8[3]		20-10	19[A]	19[A]	19-20
Amoxicillin-clavulanic acid (uncomplicated UTI only)	32[3]	32[3]		20-10	16[A]	16[A]	
Piperacillin	8	8		30	20	20	
Piperacillin-tazobactam	8[4]	8[4]	16	30-6	20	20	19
Ticarcillin	8	16		75	23	20	
Ticarcillin-clavulanic acid	8[3]	16[3]		75-10	23	20	
Temocillin (infections originating from the urinary tract), *E. coli, Klebsiella* spp. (except *K. aerogenes*) and *P. mirabilis*	0.001	16		30	50[C]	17[C]	
Phenoxymethylpenicillin	-	-			-	-	
Oxacillin	-	-			-	-	
Cloxacillin	-	-			-	-	
Dicloxacillin	-	-			-	-	
Flucloxacillin	-	-			-	-	
Mecillinam oral (pivmecillinam) (uncomplicated UTI only), *E. coli, Citrobacter* spp. *Klebsiella* spp., *Raoultella* spp., *Enterobacter* spp. and *P. mirabilis*	8[5]	8[5]		10	15[C]	15[C]	

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. Aminopenicillin breakpoints in *Enterobacterales* are based on intravenous administration. For oral administration the breakpoints are relevant for urinary tract infections only. Breakpoints for other infections are under review.
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.

I breakpoint delle aminopenicilline sono basati sulla somministrazione iv. Sono validi per la somministrazione orale solo per le infezioni delle vie urinarie. Breakpoint per altre indicazioni sono in revisione.

EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING

European Society of Clinical Microbiology and Infectious Diseases

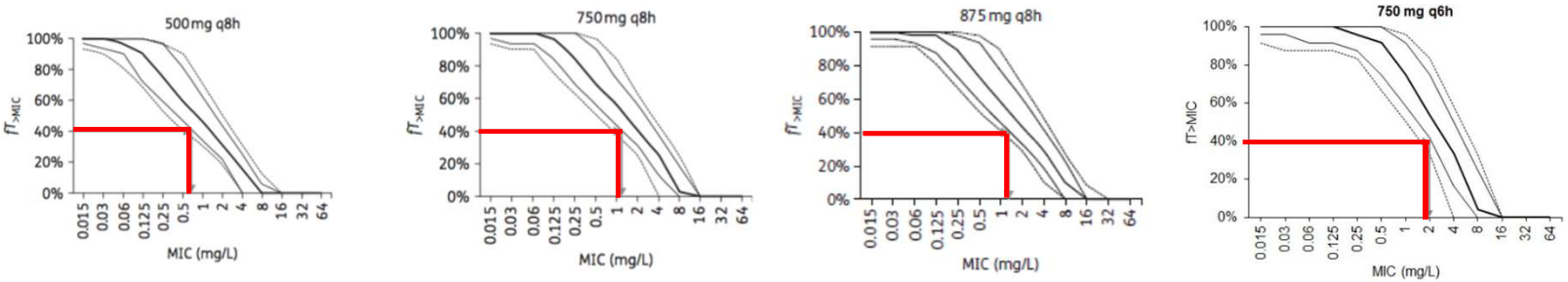
Enterobatteri e penicilline negli anni: *CONSULTATION*

November 30, 2021 to January 14, 2022

Amoxicillina orale ± ac. clavulanico

Per raggiungere un obiettivo del 40% fT>MIC, i pazienti infettati da isolati con MIC ≤0,5 mg/L dovrebbero essere trattati con un regime posologico di 500 mg x 3 mentre i pazienti infettati da isolati con MIC ≤1 mg/L necessitano di un dosaggio di 750 mg x 3.

Figure 1: Monte Carlo simulations for different oral doses of amoxicillin [3]



Enterobatteri e penicilline negli anni: *CONSULTATION*

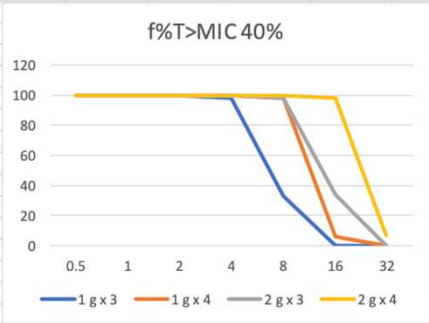
November 30, 2021 to January 14, 2022

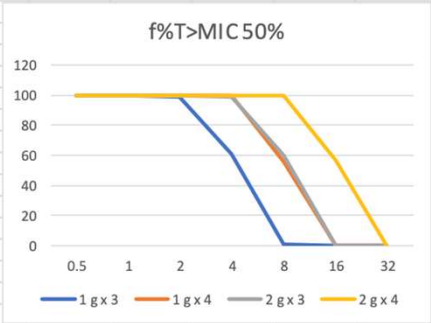
f%T>MIC 40%

	1 g x 3	1 g x 4	2 g x 3	2 g x 4
0.5	100	100	100	100
1	100	100	100	100
2	100	100	100	100
4	98	100	100	100
8	33	98	98	100
16	0	6	34	98
32	0	0	0	7

f%T>MIC 50%

	1 g x 3	1 g x 4	2 g x 3	2 g x 4
0.5	100	100	100	100
1	100	100	100	100
2	99	100	100	100
4	61	100	99	100
8	1	56	60	100
16	0	0	0	57
32	0	0	0	0





Amoxicillina iv ± ac. clavulanico

Per questa simulazione sono stati utilizzati **4 diversi regimi** di dosaggio e due bersagli fT>MIC del 40 e del 50%.

Per l'obiettivo del 40%, tre dei regimi (**1 g x 4**, **2 g x 3** e **2 g x 4**) erano adeguati a coprire il **WT di *E. coli***.

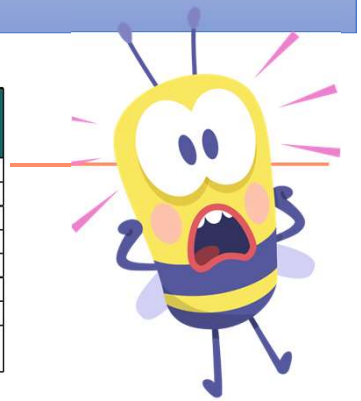
Per l'obiettivo del 50%, solo il regime di dosaggio **2 g x 4** era adeguato.

Enterobatteri e penicilline negli anni: *CONSULTATION*

November 30, 2021 to January 14, 2022

Currently Agreed Dosages

Aminopenicillin	Route of administration	Standard dosage	High dosage	Uncomplicated UTI	Meningitis
Ampicillin	iv	2 g x 3	2 g x 4		2 g x 6
Ampicillin	oral	Not listed	Not listed		
Ampicillin-sulbactam	iv	(2 g + 1 g) x 3	(2 g + 1 g) x 4		
Ampicillin-sulbactam	oral	Not listed	Not listed		
Amoxicillin	iv	1 g x 3-4	2 g x 6		2 g x 6
Amoxicillin	oral	0.5 g x 3	0.75-1 g x 3	0.5 g x 3	
Amoxicillin-clavulanic acid	iv	1 g + 0.2 g x 3-4	(2 g + 0.2 g) x 3		
Amoxicillin-clavulanic acid	oral	(0.5 g + 0.125 g) x 3	(0.875 g+ 0.125 g) x 3	(0.5 g + 0.125 g) x 3	



Note 1/A: Breakpoints tra parentesi distinguono gli isolati senza e con meccanismo di resistenza fenotipicamente rilevabile.

Mancano evidenze cliniche per il loro uso in monoterapia, ma per un'indicazione specifica o in combinazione con un altro agente o la loro misura serve ad escludere isolati con meccanismi di resistenza.

Questi antibiotici possono essere refertati R (resistente) ma S e I dovrebbero essere evitati nei referti.

Penicillin	MIC breakpoints (mg/l)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Ampicillin iv	8	8		**10**	14	14	
Ampicillin-sulbactam iv	8	8		**10-10**	14	14	
Amoxicillin[1]	8	8		-	Note[B]	Note[B]	
Amoxicillin-clavulanic acid[1]	8[3]	8[3]		**20-10**	19[A]	19[A]	19-20
Amoxicillin-clavulanic acid oral, (uncomplicated UTI only)	32	32		**20-10**	16	16	

Dosages

EUCAST Clinical Breakpoint Tables v. 12.0, valid from 2022-01-01

Cephalosporins	Standard dosage	High dosage	Uncomplicated UTI	Special situations
Cefaclor	0.25-0.5 g x 3 oral depending on species and/or infection type	1 g x 3 oral		***Staphylococcus* spp.:** Minimum dose 0.5 g x 3 oral
Cefadroxil	0.5-1 g x 2 oral	None	0.5-1 g x 2 oral	
Cefalexin	0.25-1 g x 2-3 oral	None	0.25-1 g x 2-3 oral	
Cefazolin	1 g x 3 iv	2 g x 3 iv		
Cefepime	1 g x 3 iv or 2 g x 2 iv	2 g x 3 iv		
Cefiderocol	2 g x 3 iv over 3 hours	None		
Cefixime	0.2-0.4 g x 2 oral	None	0.2-0.4 g x 2 oral	**Uncomplicated gonorrhoea:** 0.4 g oral as a single dose
Cefotaxime	1 g x 3 iv	2 g x 3 iv		**Meningitis:** 2 g x 4 iv ***S. aureus:*** High dose only
Cefpodoxime	0.1-0.2 g x 2 oral	None	0.1-0.2 g x 2 oral	
Ceftaroline	0.6 g x 2 iv over 1 hour	0.6 g x 3 iv over 2 hours		***S. aureus* in complicated skin and skin structure infections:** There is some PK-PD evidence to suggest that isolates with MICs of 4 mg/L could be treated with high dose.
Ceftazidime	1 g x 3 iv	2 g x 3 iv or 1 g x 6 iv		
Ceftazidime-avibactam	(2 g ceftazidime + 0.5 g avibactam) x 3 iv over 2 hours			
Ceftibuten	0.4 g x 1 oral	None		
Ceftobiprole	0.5 g x 3 iv over 2 hours	None		
Ceftolozane-tazobactam (intra-abdominal infections and UTI)	(1 g ceftolozane + 0.5 g tazobactam) x 3 iv over 1 hour	None		
Ceftolozane-tazobactam (hospital acquired pneumonia, including ventilator associated pneumonia)	(2 g ceftolozane + 1 g tazobactam) x 3 iv over 1 hour	None		
Ceftriaxone	2 g x 1 iv	2 g x 2 iv or 4 g x 1 iv		**Meningitis:** 2 g x 2 iv or 4 g x 1 iv ***S. aureus:*** High dose only **Uncomplicated gonorrhoea:** 0.5-1 g im as a single dose
Cefuroxime iv	0.75 g x 3 iv	1.5 g x 3 iv		
Cefuroxime oral	0.25 g x 2 oral	0.5 g x 2 oral	0.25 g x 2 oral	

Enterobacterales *

Expert Rules and Intrinsic Resistance Tables

Cephalosporins[1]	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Ceftazidime	1	4		10	22	19	
Ceftazidime-avibactam	8[5]	8[5]		10-4	13	13	

Frequently Asked Questions: FAQ

✓Perché i BP di ceftazidime-avibactam sono + alti di quelli di ceftazidime da solo?

- **Ceftazidime**
  - Dosaggio standard 1 g x 3/die (in 30 min)
  - Dosaggio elevato 2 g x 3/die (in 30 min)
- **Ceftazidime-avibactam**
  - 2.5 g x 3/die (in 2 ore)

Enterobatteri e fosfomicina: *questione di metodo*

Enterobacteriaceae — **EUCAST Clinical Breakpoint Table v. 1.3 2011-01-05**

2011

Miscellaneous agents	MIC breakpoint (mg/L) S ≤	MIC breakpoint (mg/L) R >	Disk content (µg)	Zone diameter breakpoint (mm) S ≥	Zone diameter breakpoint (mm) R <	Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
Chloramphenicol	8	8	30	17	17	
Colistin	2	2		Note[A]	Note[A]	A. Use an MIC method.
Daptomycin	-	-		-	-	
Fosfomycin iv	32	32		-	-	
Fosfomycin-trometamol (uncomplicated UTI only)	32	32		-	-	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	64[1]	64[1]	100	11[B]	11[B]	1/B. Breakpoints relate to *E. coli* only.
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	2	4	5			
Trimethoprim-sulfamethoxazole (co-trimoxazole)[2]	2	4	1.35-23.			2. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.

2014

2013

Miscellaneous agents	MIC breakpoint (mg/L) S ≤	MIC breakpoint (mg/L) R >	Disk content (µg)	Zone diameter breakpoint (mm) S ≥	Zone diameter breakpoint (mm) R <	Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
Chloramphenicol	8	8	30	17	17	
Colistin	2	2		Note[A]	Note[A]	A. Use an MIC method.
Daptomycin	-	-		-	-	
Fosfomycin iv	32	32		IP	IP	
Fosfomycin oral (uncomplicated UTI only)	32	32		IP	IP	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	64[1]	64[1]	100	11[B]	11[B]	1/B. Breakpoints apply to *E. coli* only.
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	

2015

1. For fosfomycin MIC determination, the medium must be supplemented with glucose-6-phosphate to a final concentration of 25 mg/L.

Enterobatteri e fosfomicina: *questione di metodo*

ISO 20776-1:2006(E)

Antimicrobial	Bacteria	Remarks
Daptomycin	All	Medium shall be supplemented to a final concentration of 50 mg/l Ca^{++}.
Fosfomycin	All	Broth microdilution may not give reliable results. Agar dilution should be used as the reference method[5][9]. The test agar should be supplemented with 25 mg/l glucose-6-phosphate.
Glycopeptides	All	The MIC should be read after 24 h incubation to give more consistent and reliable results.
	Staphylococcus aureus	Broth microdilution does not reliably detect heterogeneously resistant glycopeptide intermediate *S. aureus*.
Glycylcyclines Tigecycline	All	Freshly prepared (< 12 h) test medium shall be used.
Lincosamides	All	The MIC may not predict clinical utility if the strain is able to produce an inducible methylase (MLS_B resistance).
Sulphonamides and Trimethoprim	All	The MIC should be read at the lowest concentration that inhibits approximately 80 % of growth as compared with the growth control well.

Enterobatteri e fosfomicina: *questione di metodo*

Enterobacteriaceae

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

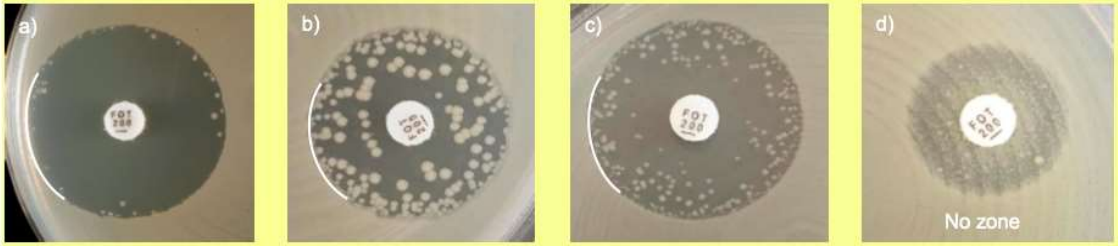
Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Chloramphenicol	8	8	30	17	17
Colistin[1]	2	2		Note[A]	Note[A]
Daptomycin	-	-		-	-
Fosfomycin iv	32[2]	32[2]	200[B]	24[C,D]	24[C,D]
Fosfomycin oral (uncomplicated UTI only)	32[2]	32[2]	200[B]	24[C,D]	24[C,D]
Fusidic acid	-	-		-	-
Metronidazole	-	-		-	-
Mupirocin					
Nitrofurantoin (uncomplicated UTI only), *E. coli*	64	64	100	11	11
Nitroxoline (uncomplicated UTI only), *E. coli*	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

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

2017

1. Quality control of colistin must be performed with both a susceptible QC strain (*E. coli* ATCC 25922 or *P. aeruginosa* ATCC 27853) and the colistin-resistant *E. coli* NCTC 13846 (mcr-1-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 *E. coli* only. For other Enterobacteriaceae, use an MIC method.
D. Ignore isolated colonies within the inhibition zone (**see pictures below**).



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.

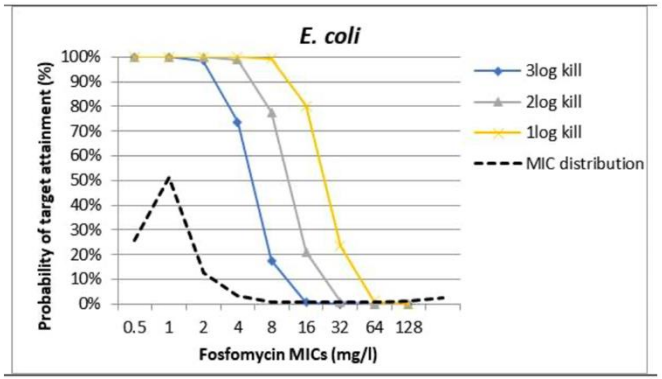
Ignorare le colonie all'interno dell'alone di inibizione e leggere la crescita più esterna.

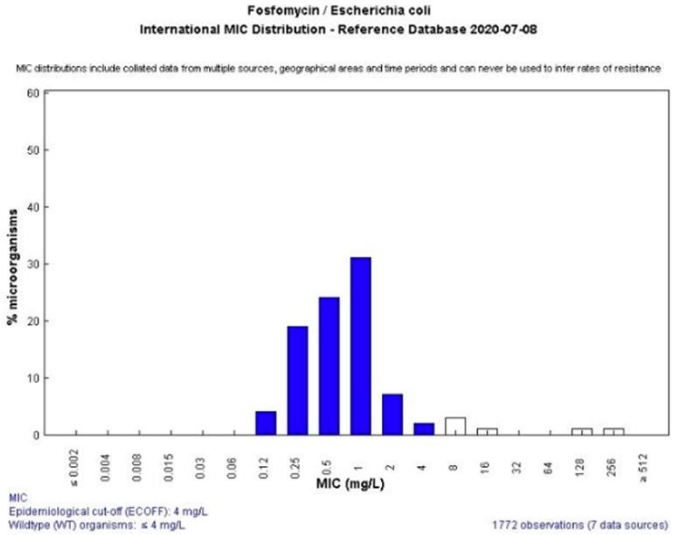
2. Agar dilution is the reference method for fosfomycin. MICs must be determined in the presence of glucose-6-phosphate (25 mg/L in the medium). Follow the manufacturers' instructions for commercial systems.

Enterobatteri e fosfomicina: *questione di metodo*

EUCAST General Consultation on Fosfomycin oral (trometamol) breakpoints for *Enterobacterales*

Consultation period 2 November 2020 – 30 November 2020





Enterobacterales*

EUCAST Clinical Breakpoint Tables v. 11.0, valid from 2021-01-01

2021

Miscellaneous agents	MIC breakpoints (mg/L)			Disk content	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU	(µg)	S ≥	R <	ATU
Chloramphenicol	8	8		30	17	17	
Colistin[1]	2	2			Note[A]	Note[A]	
Daptomycin	-	-			-	-	
Fosfomycin iv	32[2]	32[2]		200[B]	21[C,D]	21[C,D]	
Fosfomycin oral (uncomplicated UTI only), *E. coli*	8[2]	8[2]		200[B]	24[D]	24[D]	
Fusidic acid	-	-			-	-	
Lefamulin	-	-			-	-	
Metronidazole	-	-			-	-	

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. Colistin MIC determination should be performed with broth microdilution. Quality control must be performed with both a susceptible QC strain (*E. coli* ATCC 25922 or *P. aeruginosa* ATCC 27853) and the colistin resistant *E. coli* NCTC 13846 (*mcr-1* 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 (broth microdilution only).
B. Fosfomycin 200 µg disks must contain 50 µg glucose-6-phosphate.
C. Zone diameter breakpoints apply to *E. coli* only. For other *Enterobacterales*, use an MIC method.
D. Ignore isolated colonies within the inhibition zone (**see pictures below**).

Stafilococchi e beta-lattamici: *questione di specie*

***Staphylococcus* spp.**

EUCAST Clinical Breakpoint Table v. 1.3 2011-01-05

2011

Penicillins[1]	MIC breakpoint (mg/L) S ≤	MIC breakpoint (mg/L) R >	Disk content (µg)	Zone diameter breakpoint (mm) S ≥	Zone diameter breakpoint (mm) R <	Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
Oxacillin[2]	Note[1,2]	Note[1,2]		Note[A]	Note[A]	2. *S. aureus* and *S. lugdunensis* with oxacillin MIC values >2 mg/L are mostly methicillin resistant due to the presence of the *mecA* gene. The corresponding oxacillin MIC for coagulase-negative staphylococci is >0.25 mg/L.
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)	-	-		-	-	

2013

Cefoxitin (screen), *S. aureus, S. lugdunensis* and *S. saprophyticus*	Note[3]	Note[3]	30	22[A]	22[A]	3. *S. aureus* and *S. lugdunensis* with cefoxitin MIC values >4 mg/L are methicillin resistant, mostly due to the presence of the *mecA* gene. Disk diffusion reliably predicts methicillin resistance.
Cefoxitin (screen), Coagulase-negative staphylococci	Note[4]	Note[4]	30	25[A]	25[A]	4. For coagulase-negative staphylococi other than *S. lugdunensis* the cefoxitin MIC is a poorer predictor of methicillin resistance than the disk diffusion test.

2014

Cephalosporins[1]	MIC breakpoint (mg/L) S ≤	MIC breakpoint (mg/L) R >	Disk content (µg)	Zone diameter breakpoint (mm) S ≥	Zone diameter breakpoint (mm) R <
Cefoxitin (screen), Coagulase negative staphylococci other than *S. lugdunensis* and *S. saprophyticus*	Note[4]	Note[4]	30	25[A]	25[A]
Cefoxitin (screen), *S. pseudintermedius*	Note[4]	Note[4]	30	35[A]	35[A]

EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING

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Stafilococchi e beta-lattamici: *questione di specie*

Staphylococcus spp.

2021

Penicillins[1]	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Oxacillin (screen only), *S. pseudintermedius* and *S. schleiferi*	NA	NA		1	20[E]	20[E]	
Oxacillin[4], other staphylococci	Note[1,4]	Note[1,4]			Note[A]	Note[A]	

2022

Oxacillin (screen only), *S. pseudintermedius, S. schleiferi* and *S. coagulans*	NA	NA		1	20[E]	20[E]	

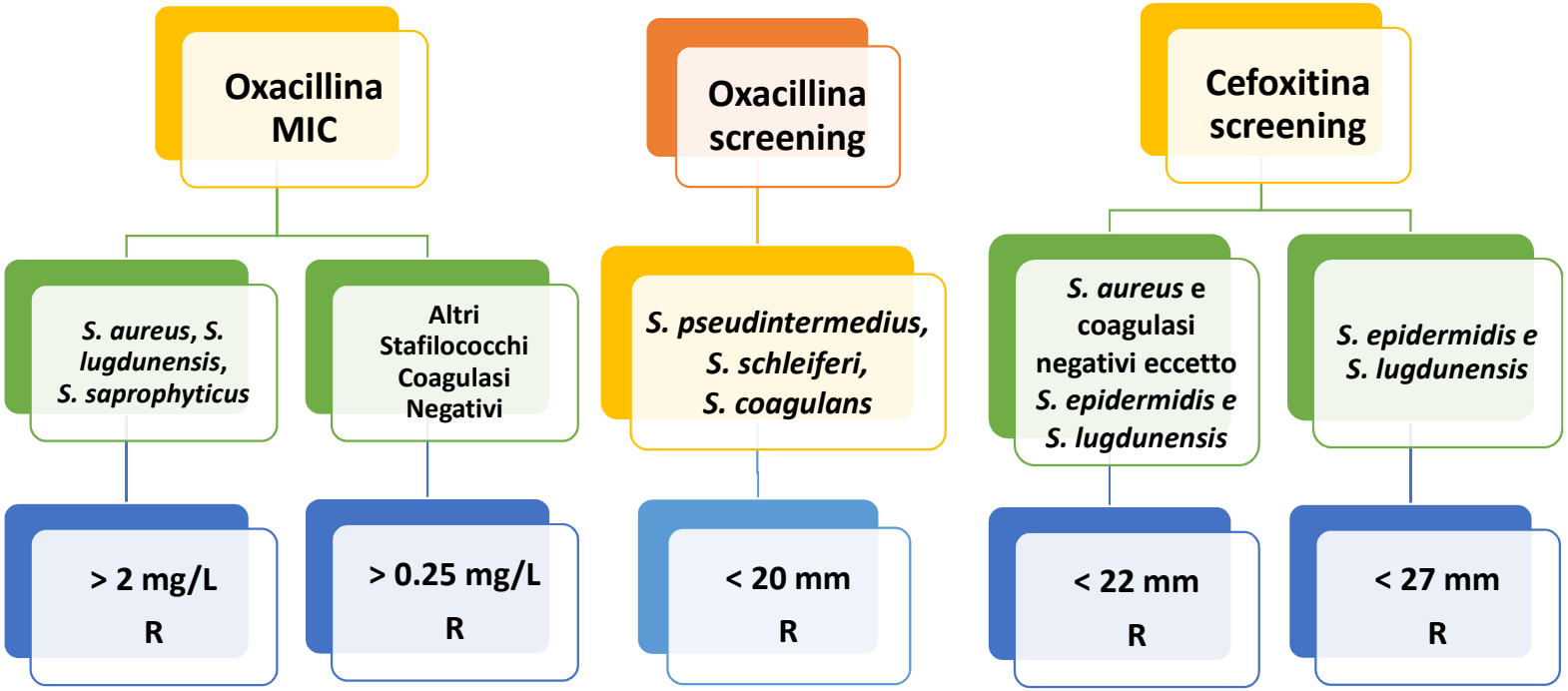
Nota E. For screening for methicillin resistance in *S. pseudintermedius* and *S. schleiferi.* **2021**

Nota E. For screening for methicillin resistance in *S. pseudintermedius, S. schleiferi and S. coagulans.* **2022**

2022

Cephalosporins[1]	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Cefoxitin (screen only), *S. aureus* and coagulase-negative staphylococci except *S. epidermidis* and *S. lugdunensis*	Note[3,4]	Note[3,4]		30	22[A,B]	22[A,B]	
Cefoxitin (screen only), *S. epidermidis* and *S.lugdunensis*	Note[4]	Note[4]		30	27[A,B]	27[A,B]	27
Cefoxitin (screen only), *S. pseudintermedius, S. schleiferi* and *S. coagulans*	Note[5]	Note[5]			Note[C]	Note[C]	

Stafilococchi e beta-lattamici: *questione di specie*



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Test di sensibilità agli antibiotici con i metodi ed i breakpoint EUCAST: cos'è cambiato?

CRITERI INTERPRETATIVI EUCAST 2022

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