



Stichting  
Wergroep  
Antibioticabeleid




# Veranderingen in EUCAST 2022

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24-01-2022  
WAMM






Stichting  
Wergroep  
Antibioticabeleid






## Inhoud presentatie

- Doseringstabel
- Antibacteriële middelen
  - “BP in Brackets”
  - Aparte screeningsbreekpunten
  - DD voor anaeroben
  - Nieuwe breekpunten
- Antifungale middelen

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## Doseringen

- Opmerking geplaatst “The high exposure dosing regimen pertains to the severity of the infection or drug exposure at the site of infection”
  - Oxacilline
  - Cloxacilline
  - Dicloxacilline
  - Flucloxacilline
  - Clindamycine
- Rifampicine: hoge dosering is verwijderd (alleen 600mg 1dd)

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## “breakpoints in brackets”

- Onderscheid tussen isolaten met en zonder fenotypisch detecteerbaar resistentie mechanisme.
- Gebaseerd op ECOFF
- Indien meerdere species in 1 groep, dan ‘best fit’ ECOFF.
- Geen klinisch bewijs dat monotherapie effectief is
- Meestal gegeven in combinatie met ander antibioticum

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## “breakpoints in brackets”

Groep	Antibioticum
Enterobacterales	Colistine
Pseudomonas	Colistine
Acinetobacter	Colistine
Stafylokokken	Aminoglycosiden
Bacteroides	clindamycine
<i>Reeds in tabel 2021</i>	
Enterobacterales	Amikacine, tobramycine en gentamicine
Pseudomonas	Amikacine en tobramycine

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## Aparte screeningsbreekpunten



- Screeningstest gebruikt 1 antibioticum om resistentie tegen een of middelen van dezelfde klasse te voorspellen.
- Vaak gevoeliger en/of robuster dan het testen van een individueel middel
- Minder testen nodig

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## Algemene interpretatie



- Negative screening test:
  - MIC below or equal to or zone diameter above or equal to the susceptible breakpoint for the screening agent. No resistance mechanisms to the antimicrobial class detected.
- Positive screening test:
  - MIC above or zone diameter below the resistant breakpoint for the screening agent. Resistance mechanisms to the antimicrobial class detected.

Instructies om te handelen bij individuele testen staat bij de 'Note' van de betreffende test.

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## Aparte screeningsbreekpunten

groep	Screening
Stafylokokken	Erytromycine
Stafylokokken	Tetracycline
Streptokokken A,B,C,G	Tetracycline
Pneumokokken	Tetracycline
<i>Burkholderia pseudomallei</i>	Tetracycline

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## Voorbeeld screeningsbreekpunt

**Staphylococcus spp.**  
Expert Rules and Intrinsic Resistance Tables

Macrolides, lincosamides and streptogramins	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Azithromycin	2 <sup>1</sup>	2 <sup>1</sup>			Note <sup>A</sup>	Note <sup>A</sup>	
Clarithromycin	1 <sup>1</sup>	2 <sup>1</sup>			Note <sup>A</sup>	Note <sup>A</sup>	
Erythromycin	1	2		15	21	18	
Erythromycin (screen only)	1 <sup>1</sup>	1 <sup>1</sup>		15	21 <sup>A</sup>	21 <sup>A</sup>	




**Getallen anders!!**

- 1/A. Erythromycin can be used to screen for macrolide resistance in staphylococci. Isolates categorised as **screen negative** can be reported **susceptible to azithromycin, clarithromycin and roxithromycin**. Isolates categorised as **screen positive** should be **tested for susceptibility to individual agents or reported resistant**.

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## Disk diffusie voor anaeroben

- Gedetailleerde info: seminar van de EUCAST van 9 december 2021 (beschikbaar via EUCAST website)
- Project loopt nog
- Nu informatie beschikbaar over 5 species en een beperkt aantal antibiotica
- In de loop van 2022 volgen voor deze species meer antibiotica
- Daarna andere species en andere incubatietijden

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## Momenteel beschikbaar

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### Species and antimicrobial agents

- 5 commonly isolated anaerobic bacteria
  - *Bacteroides* spp.
  - *Prevotella* spp.
  - *Fusobacterium necrophorum*
  - *Clostridium perfringens*
  - *Cutibacterium acnes*
- Clinically relevant antimicrobial agents
  - Benzylpenicillin 1 unit
  - Piperacillin-tazobactam 30-6 µg
  - Meropenem 10 µg
  - Vancomycin 5 µg
  - Clindamycin 2 µg
  - Metronidazole 5 µg

Dia van EUCAST seminar 9-12-2021



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## De methode in het kort

### Disk diffusion methodology

- **Medium:** Fastidious Anaerobe Agar (FAA) with 5% mechanically defibrinated horse blood
  - Agar depth  $4.0 \pm 0.5$  mm
  - Plates must be dried prior to inoculation
- **Inoculum:** McF 1.0 (overnight culture from non-selective media)
- **Incubation:** Anaerobic environment  
35-37°C for 16-20 h

Dia van EUCAST seminar 9-12-2021



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## Methode (2)


### Streaking of plates and application of disks

- For *Bacteroides* spp., remove excess fluid by turning the swab against the inside of the tube to avoid over-inoculation.
- Spread the inoculum evenly over the entire agar surface, ensuring that there are no gaps between streaks.
  - This is particularly important for *Cutibacterium acnes*, which grows with small colonies and poor contrast to the FAA media.
- Limit the number of disks on each plate to allow good growth and to avoid overlapping of zones.

Dia van EUCAST seminar 9-12-2021

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## Hulp bij het aflezen van de zones

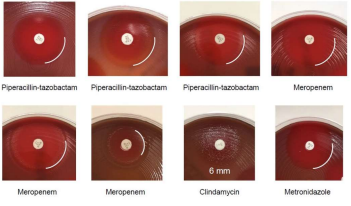
 **EUCAST** EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING  
European Society of Clinical Microbiology and Infectious Diseases

### Reading guide

EUCAST disk diffusion for selected rapidly growing anaerobic bacteria on Fastidious Anaerobe Agar (FAA)

Version 1.0  
September 2021

### *Bacteroides* spp.




Piperacillin-tazobactam    Piperacillin-tazobactam    Piperacillin-tazobactam    Meropenem

Meropenem    Meropenem    Clindamycin    Metronidazole

6 mm


### *Fusobacterium necrophorum*



Benzylpenicillin    Benzylpenicillin    Piperacillin-tazobactam    Piperacillin-tazobactam

Meropenem    Clindamycin    Metronidazole    Metronidazole



### *Clostridium perfringens*



Benzylpenicillin    Benzylpenicillin    Piperacillin-tazobactam    Piperacillin-tazobactam

Meropenem    Vancomycin    Clindamycin    Metronidazole

Dia van EUCAST seminar 9-12-2021

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## Voorbeeld uit breekpuntentabel 2022

**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

**MIC determination (agar dilution)**  
Medium: Fastidious Anaerobe Agar (FAA)  
Inoculum: 10<sup>7</sup> CFU spot  
Incubation: Anaerobic environment, 35-37°C, 48h  
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent where a noticeable difference is seen in visible growth between the test and control plate.  
Quality control: *Bacteroides fragilis* ATCC 25285 and *Clostridium perfringens* ATCC 13124.  
*Clostridium perfringens*: For control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.  
*Clostridium perfringens* DSM 25589 with a metronidazole 5 µg disk to monitor the anaerobic atmosphere.



**Disk diffusion (EUCAST standardised disk diffusion method)**  
Medium: Fastidious Anaerobe Agar (FAA). The plates should be dried prior to inoculation (at 20-25°C overnight or at 35°C, with the lid removed, for 15 min).  
Inoculum: McFarland 1.0  
Incubation: Anaerobic environment, 35-37°C, 18±2h  
Reading: Unless otherwise stated, read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light. See pictures below and the EUCAST Reading Guide for disk diffusion of anaerobic bacteria for further information.  
Quality control: *Bacteroides fragilis* ATCC 25285 and *Clostridium perfringens* ATCC 13124. For control of the inhibitor component of beta-lactam inhibitor combination disks, see EUCAST QC Tables.  
*Clostridium perfringens* DSM 25589 with a metronidazole 5 µg disk to monitor the anaerobic atmosphere.

**Bacteroides spp.**

Antimicrobial agent	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Notes
	S ≤	R >	ATU		S ≤	R <	ATU	
Piperacillin-tazobactam	8 <sup>1</sup>	8 <sup>1</sup>		38-6	20	20		Notes 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 tazobactam is fixed at 4 mg/L. 2A. The meropenem zone diameter breakpoint will detect all cfaA gene mediated carbapenem resistance in <i>Bacteroides fragilis</i> . Some isolates with an MIC of 1 mg/L may harbour the cfaA gene. 3/B. For information on how to use breakpoints in brackets, see <a href="https://www.eucast.org/eucastguidancedocuments/">https://www.eucast.org/eucastguidancedocuments/</a> . C. Examine zones carefully for colonies within zones. Colonies should be taken into account when reading.
Piperacillin-tazobactam, β-lactamase resistant	IE	IE			IE	IE		
Meropenem	1 <sup>1</sup>	1 <sup>1</sup>		10	28 <sup>1</sup>	28 <sup>1</sup>		
Clindamycin	(8) <sup>1</sup>	(4) <sup>1</sup>		2	(10) <sup>1,2</sup>	(10) <sup>1,2</sup>		
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	
Benzylpenicillin	0.5	0.5		1 unit	20	20		Notes 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 tazobactam is fixed at 4 mg/L. A. Examine zones carefully for colonies within zones. Colonies should be taken into account when reading.
Piperacillin-tazobactam	0.5 <sup>1</sup>	0.5 <sup>1</sup>		38-6	26	26		
Meropenem	0.25	0.25		10	34	34		
Clindamycin	0.25	0.25		2	31 <sup>1</sup>	31 <sup>1</sup>		
Metronidazole	4	4		5	22	22		

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## Nieuwe breekpunten



- Meropenem/vaborbactam DD
  - Enterobacterales
  - Pseudomonas
- Meropenem-non-meningitis: apart breekpunt voor *Pseudomonas non-aeruginosa*
- *S aureus* en Delafloxacin: apart breekpunt voor CAP en een ander voor huidinfecties
- *Vibrio spp*
- PK/PD breakpoint: temocilline toegevoegd (en oritavancin verwijderd)
- anaeroben



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## Andere veranderingen

- Waarden in verschillende breekpunten
- Tekstuele veranderingen
- Schema's pneumokokken en haemophilus


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## Voorbeeld bij pneumokokken


Penicillins <sup>1</sup>	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Benzympenicillin (indications other than meningitis) <sup>2</sup>	0.06	2			Note <sup>A</sup>	Note <sup>A</sup>	
Benzympenicillin (meningitis)	0.06	0.06			Note <sup>A</sup>	Note <sup>A</sup>	
Ampicillin (indications other than meningitis)	0.5	1		2	22	19	
Rifampicin	0.125	0.125		5	22	22	

Oud: 2 Oud: 16


Oud: 0.5 Oud: 17



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## Stafylokokken

Penicillins <sup>1</sup>	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Benzylicillin, <i>S. aureus</i>	0.125 <sup>1</sup>	0.125 <sup>1</sup>		1 unit	26 <sup>A,B</sup>	26 <sup>A,B</sup>	
Benzylicillin, <i>S. lugdunensis</i>	0.125	0.125		1 unit	26	26	
Benzylicillin, other staphylococci	Note <sup>2</sup>	Note <sup>2</sup>			Note <sup>C</sup>	Note <sup>C</sup>	
Ampicillin, <i>S. saprophyticus</i>	Note <sup>2,3</sup>	Note <sup>2,3</sup>		2	18 <sup>D</sup>	18 <sup>D</sup>	
Ampicillin-sulbactam	Note <sup>1,2,3</sup>	Note <sup>1,2,3</sup>			Note <sup>A,C,D</sup>	Note <sup>A,C,D</sup>	
Amoxicillin	Note <sup>1,2,3</sup>	Note <sup>1,2,3</sup>			Note <sup>A,C,D</sup>	Note <sup>A,C,D</sup>	
Amoxicillin-clavulanic acid	Note <sup>1,2,3</sup>	Note <sup>1,2,3</sup>			Note <sup>A,C,D</sup>	Note <sup>A,C,D</sup>	
Piperacillin	Note <sup>1,2,3</sup>	Note <sup>1,2,3</sup>			Note <sup>A,C,D</sup>	Note <sup>A,C,D</sup>	
Piperacillin-tazobactam	Note <sup>1,2,3</sup>	Note <sup>1,2,3</sup>			Note <sup>A,C,D</sup>	Note <sup>A,C,D</sup>	
Ticarcillin	Note <sup>1,2</sup>	Note <sup>1,2</sup>			Note <sup>A,C</sup>	Note <sup>A,C</sup>	
Ticarcillin-clavulanic acid	Note <sup>1,2</sup>	Note <sup>1,2</sup>			Note <sup>A,C</sup>	Note <sup>A,C</sup>	
Temocillin	-	-		-	-	-	
Phenoxymethylpenicillin, <i>S. aureus</i>	Note <sup>1</sup>	Note <sup>1</sup>			Note <sup>A</sup>	Note <sup>A</sup>	
Phenoxymethylpenicillin, Coagulase-negative staphylococci	- <sup>2</sup>	- <sup>2</sup>			Note <sup>C</sup>	Note <sup>C</sup>	
Oxacillin (screen only), <i>S. pseudintermedius</i> , <i>S. schleiferi</i> and <i>S. coagulans</i>	NA	NA		1	20 <sup>F</sup>	20 <sup>F</sup>	


Oxacilline screening: *S. coagulans* toegevoegd

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


Cefoxitin screening: *S. lugdunensis* toegevoegd aan *S. epidermidis*



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## Neisseria meningitidis

Penicillins <sup>1</sup>	MIC breakpoints (mg/L)		
	S ≤	R >	ATU
Benzylicillin (all indications)	0.25	0.25	

All indications

Cefotaxime (all indications) <sup>1</sup>	0.125	0.125	
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All indications

Ceftriaxone (all indications including prophylaxis) <sup>1</sup>	0.125	0.125	
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All indications including prophylaxis

Meropenem (indications other than meningitis)	Note <sup>2</sup>	Note <sup>2</sup>
Meropenem (all indications) <sup>1,2</sup>	0.25	0.25

All indications: eerder stond er dat je voor ernstige infecties het meningitis breekpunt kon gebruiken

Ciprofloxacin (prophylaxis only)	0.03	0.03	0.03
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Prophylaxis only stond eerder als opmerking onder note

Minocycline (prophylaxis only)	1 <sup>1</sup>	1 <sup>1</sup>	
Tetracycline (screen only)	2 <sup>1</sup>	2 <sup>1</sup>	

Idem  
Screeningsbreekpunt

Rifampicin (prophylaxis only)	0.25	0.25	
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Prophylaxis only stond eerder als opmerking onder note

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## Oude 2021 schema Pneumokokken

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

Expert Rules and Intrinsic Resistance Tables

An MIC breakpoint of  $\leq 0.061$  mg/L is an arbitrary, "off scale" breakpoint (corresponding to a zone diameter breakpoint of " $\geq 20$  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).

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

Oxacillin 1 µg disk test or benzylpenicillin MIC

See the EUCAST warning on the use of benzylpenicillin gradient tests at <http://www.eucast.org/warnings/>.

Oxacillin zone diameter  $\geq 20$  mm or benzylpenicillin MIC  $\leq 0.06$  mg/L  
Excludes all beta-lactam resistance mechanisms

Oxacillin zone diameter  $< 20$  mm or benzylpenicillin MIC  $> 0.06$  mg/L  
Beta-lactam resistance mechanism detected

Report susceptible (S) to any beta-lactam agents for which clinical breakpoints are available, including those with "Note", except for cefaclor, which if reported, should be reported "susceptible, increased exposure" (I)

Report resistant (R)

Determine the MIC and interpret according to the clinical breakpoints

Report susceptible (S)

Determine the MIC and interpret according to the clinical breakpoints

Report susceptible (S)

Report susceptible (S)

Determine the MIC and interpret according to the clinical breakpoints

For intravenous ampicillin, amoxicillin and piperacillin (without and with inhibitor), infer susceptibility from ampicillin

For oral amoxicillin (without and with inhibitor), see breakpoint recommendations

For cefepime, cefotaxime, ceftaroline, ceftibiprole and ceftazidime, determine the MIC and interpret according to the clinical breakpoints

\* In meningitis confirm by determining the MIC for the agent considered for clinical use.

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## Nieuwe schema pneumokokken

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

Expert Rules and Intrinsic Resistance Tables

**Streptococcus pneumoniae: Flow chart based on the oxacillin screen test for beta-lactam resistance mechanisms to reduce the number of specific tests for beta-lactam agents**

See the EUCAST warning on the use of benzylpenicillin gradient tests at <http://www.eucast.org/warnings/>.

Oxacillin 1 µg zone diameter  $\geq 20$  mm (or benzylpenicillin MIC  $\leq 0.06$  mg/L)

Mechanism: excludes all beta-lactam resistance mechanisms

Report susceptible (S) to beta-lactam agents for which clinical breakpoints are available, including those with "Note", and those with meningitis breakpoints. Exception: Cefaclor is reported "susceptible, increased exposure" (I).

No further testing required.

Oxacillin 1 µg zone diameter  $< 20$  mm (or benzylpenicillin MIC  $> 0.06$  mg/L)

Mechanism: beta-lactam resistance detected

Report: resistant (R) to benzylpenicillin (meningitis) and phenoxymethylpenicillin (all indications). For benzylpenicillin (indications other than meningitis), perform and interpret MIC according to breakpoints.

For other beta-lactam agents, see below.

Oxacillin 1 µg zone diameter 9-19 mm

Report susceptible (S) without further testing to: ampicillin, amoxicillin and piperacillin (without and with beta-lactamase inhibitor), cefepime, cefotaxime, ceftaroline, ceftibiprole, ceftazidime, imipenem and meropenem.

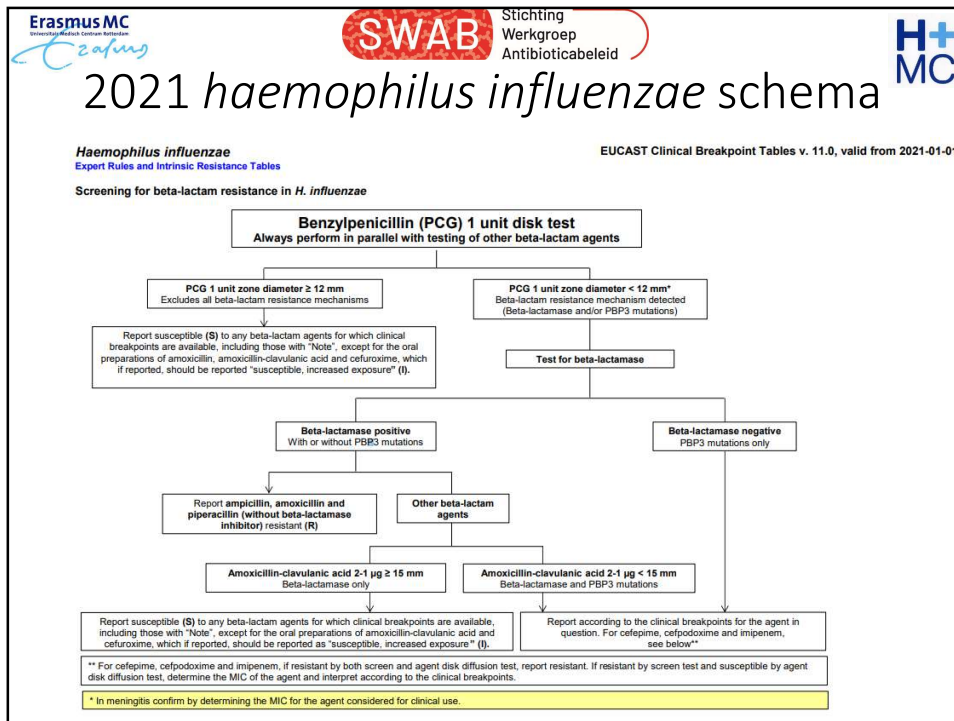
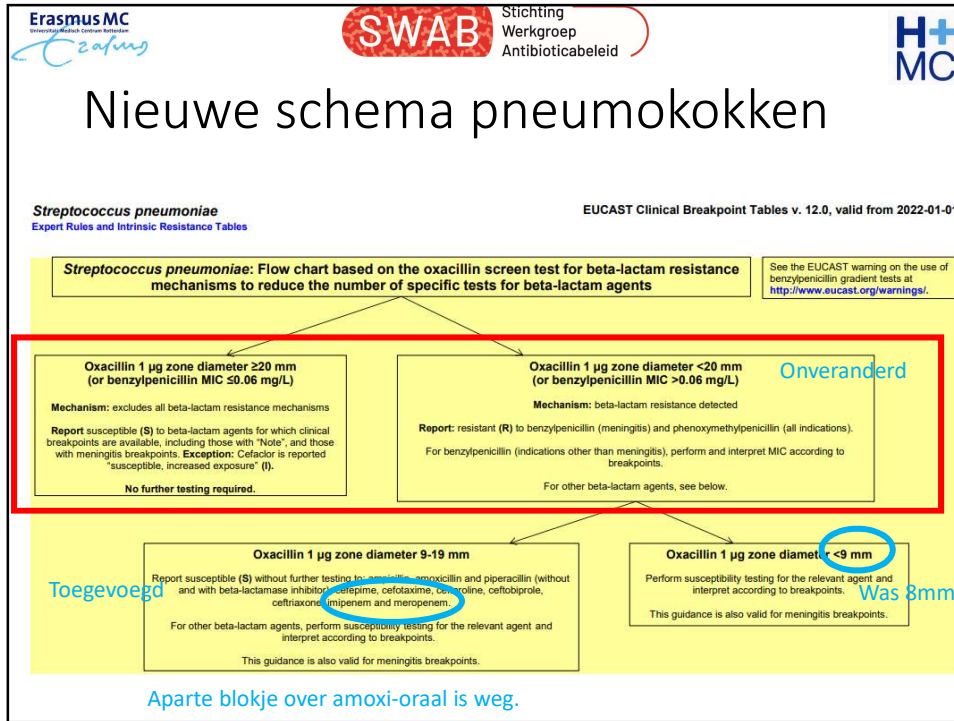
For other beta-lactam agents, perform susceptibility testing for the relevant agent and interpret according to breakpoints.

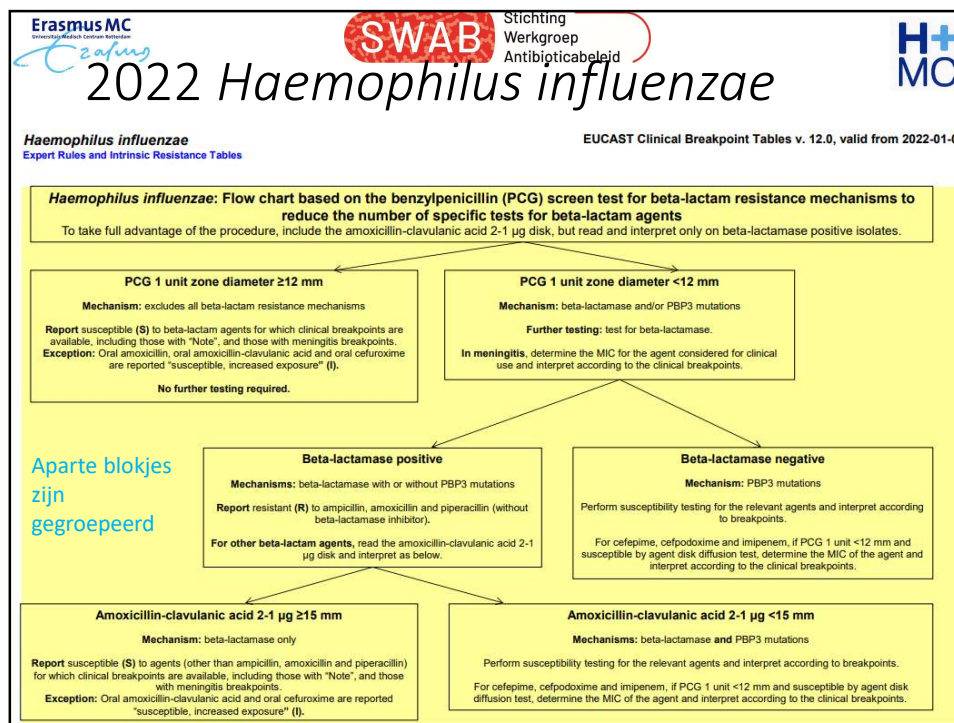
This guidance is also valid for meningitis breakpoints.

Oxacillin 1 µg zone diameter  $< 9$  mm

Perform susceptibility testing for the relevant agent and interpret according to breakpoints.

This guidance is also valid for meningitis breakpoints.





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## Antifungale middelen

- Opbouw van de tabel is veranderd
- Geen veranderde waarden in de breekpunten
- Aantal andere ECOFF waarden

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## Nieuwe opbouw van de tabel

Version 3.0, valid from 2022-01-18

Species	Drug	Clinical Breakpoints (mg/L)					Recommendation for area of technical uncertainty (ATU) results
		ECOFF (mg/L)	WT S	S ≤	I	R >	
<i>C. albicans</i>	Amphotericin B	1	1			1	
	Anidulafungin	0.03	0.03			0.03	
	Micafungin	0.016	0.016			0.016	0.03
	Fluconazole	0.5	2	4		4	
	Itraconazole	0.03	0.06			0.06	
	Posaconazole	0.06	0.06			0.06	
	Voriconazole	0.03	0.06	0.125-0.25		0.25	
<i>C. dubliniensis</i>	Amphotericin B	0.25	1			1	
	Anidulafungin	ND					
	Micafungin	ND					
	Fluconazole	(0.5) <sup>a</sup>	2	4		4	
	Itraconazole	0.06	0.06			0.06	
	Posaconazole	0.06	0.06			0.06	
	Voriconazole	0.03	0.06	0.125-0.25		0.25	
<i>C. glabrata</i>	Amphotericin B	1	1			1	
	Anidulafungin	0.06	0.06			0.06	
	Micafungin	0.03	0.03			0.03	
	Fluconazole	16	0.001	≤16		16	
	Itraconazole	2	ND			ND	
	Posaconazole	1	ND			ND	
	Voriconazole	1	ND			ND	
<i>C. krusei</i>	Amphotericin B	1	1			1	
	Anidulafungin	0.06	0.06			0.06	
	Micafungin	0.25	ND			ND	
	Fluconazole	128	ND			ND	
	Itraconazole	1	ND			ND	
	Posaconazole	0.5	ND			ND	
	Voriconazole	1	ND			ND	

If S to anidulafungin, report as S and add the following comment: Isolates susceptible to anidulafungin with micafungin MIC of 0.03 mg/L do not harbour an *fkx* mutation conferring resistance to the echinocandins.  
If not S to anidulafungin, report as R and refer to reference laboratory for *fkx* sequencing and confirmation of MICs.

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## Conclusie

- Grootste veranderingen antibacteriële middelen tabel:
  - Aantal antibiotica heeft breekpunten tussen haakjes
  - Aparte screeningsbreekpunten met eigen waarden
  - Nieuwe methode anaerobe disk diffusie
- Kleine aanpassingen in de waarden en in het pneumokokken schema