

# What is new in the breakpoint table v11.0?

*NordicAST Online Seminar No.4: February 9th 2021 (13:00-14:30)*

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Nordic Committee on Antimicrobial Susceptibility Testing

# Today's agenda

- Changes in the breakpoint table v11.0 (approx. 40 min.)
  - General changes, notes, dosages, pk/pd bp, topical agents
  - Microbe-specific changes
- Questions
  - Use the chat function for questions 😊

# What does the NordicAST table give you in addition to the EUCAST table?

- Contact persons in your country
  - All comments in Nordic languages with more readable bp table layout
  - Flow charts for detection of resistance mechanisms included in table
  - **Adaption** to Nordic countries
    - Relevant agents
      - Not in the table: piperacillin, ticarcillin +/-clavulanic acid, cefoxitin and cefpodoxime (apart from for screening purposes), delafloxacin, eravacycline, nitroxoline, doripenem
      - Not in the table: Agents with dash ("-"), some agents with "IE"
    - Epidemiology of resistance
    - What to send to reference laboratories
- No contradiction / exception from EUCAST breakpoints**

# General changes

- Explanation added for "off scale breakpoints" ( $S \leq 0.001$  mg/L,  $S \geq 50$  mm) in relevant tables

Et MIC-brytningspunkt  $S \leq 0.001$  mg/L og tilsvarende sonebrytningspunkt " $S \geq 50$  mm" er et vilkårlig valgt brytningspunkt utenfor måleområdet som benyttes når isolater uten resistensmekanismer skal rapporteres "I" og ikke "S". Brytningspunktene forhindrer at enkelte isolater feilaktig tolkes som "S".

En MIC-brytpunkt  $S \leq 0.001$  mg/L och motsvarande zonbrytpunkt " $S \geq 50$  mm" är en medvetet vald brytpunkt utanför mätområdet som används när isolat utan resistensmekanismer ska rapporteras "I" och inte "S". Brytpunkten förhindrar att enstaka isolat av misstag tolkas som "S".

MIC-rajat " $S \leq 0.001$  mg/l" ja sitä vastaava kiekkoraja " $S \geq 50$  mm" ovat tarkoituksellisesti mitta-alueen ulkopuolelta valitut tulkintarajat, jotka luokittelevat ns. villin tyypin mikrobikannat (, joilla ei ole fenotyyppisesti havaittavia resistenssimekanismeja ko. mikrobilääkettä kohtaan) herkkyystulkintaluokkaan "Herkkä, Iso annostus (I)". Näitä mikrobi-mikrobilääkeyhdistelmiä ei tule ikinä tulkita luokkaan "Herkkä, Standardi annostus (S)".

- Links:
  - MIC and zone diameter breakpoints are linked to the search page of the new EUCAST database for MIC and zone diameter distributions.
- New agents
  - Lefamulin
  - Cefiderocol

# Meningitis breakpoints

- EUCAST consultation "Meningitis breakpoints - proposed EUCAST revisions", October 2020
- Limited PKPD-data for CNS infections
- No I-category for meningitis!

# Specific meningitis breakpoints

Distinct from breakpoints for indications other than meningitis

***Enterobacterales***: cefotaxime, ceftriaxone, meropenem

***Pseudomonas spp.***: meropenem

***Acinetobacter spp.***: meropenem

***S. agalactiae* (gr. B strep.)**: benzylpenicillin

***Streptococcus pneumoniae***: benzylpenicillin, ampicillin, amoxicillin i.v., cefotaxime, ceftriaxone, meropenem

***Haemophilus influenzae***: ampicillin: IE, amoxicillin: IE, meropenem

***Neisseria meningitidis***: ampicillin: IE, amoxicillin: IE, meropenem

***Listeria monocytogenes***: benzylpenicillin: IE

# New beta-lactamase inhibitor comment\*:

Ampi-sulbactam, amox-clavulanic acid, imip-relebactam, merop-vaborbactam

- “The addition of a beta-lactamase inhibitor does not add clinical benefit.”
  - *Enterococcus*
  - *Streptococcus* A,B,C,D
  - *Streptococcus pneumoniae*
  - Viridans group streptococci

\* **Not** applied to **piperacillin-tazobactam** in the NordicAST-table since piperacillin is only available as an inhibitor-combination in the Nordic countries

# New beta-lactamase inhibitor comment: Imipenem-relebactam/meropenem-vaborbactam

- **“The beta-lactamases produced by the organism either do not modify the parent carbapenem or are not affected by the inhibitor. Therefore the addition of the beta-lactamase inhibitor does not add clinical benefit.”**
  - *Acinetobacter* spp.
  - *Haemophilus influenzae*
  - *Moraxella catarrhalis*
  - *Neisseria meningitidis*
  - Anaerobes (Gram-pos and Gram-neg)

# Dosages

	Normaldose	Høydose	Spesielle situasjoner
<b>Piperacillin-tazobactam</b>	(4 g piperacillin + 500 mg tazobaktam) x 4 i.v. eller x 3 ved forlenget 4-timers infusjon	(4 g piperacillin + 500 mg tazobaktam) x 4 i.v. ved forlenget 3-timers infusjon	En lavere dosering, (4 g piperacillin + 0.5 g tazobactam) x 3 iv, er adekvat for noen typer infeksjoner, f.eks. komplisert UVI, intraabdominale infeksjoner og diabetiske fotinfeksjoner, men ikke for infeksjoner forårsaket av isolater som er resistente mot 3. generasjons cefalosporiner.
<b>Temocillin</b>	2 g x 2 i.v.	2 g x 3 i.v.	2 g x 2 iv dosen har blitt benyttet for behandling av ukomplisert UVI forårsaket av bakterier med resistensmekanismer mot betalaktamer.
<b>Cefaclor</b>	250-500 mg x 3 p.o. avhengig av art og/eller infeksjonstype	1 g x 3 p.o.	<b>Staphylococcus spp.:</b> Minimumsdose 500 mg x 3 p.o.
<b>Cefiderocol</b>	2 g x 3 (3 h infusjon)	Mangler	
<b>Cefixime</b>	200-400 mg p.o. x 2	Mangler	<b>Ukomplisert gonoré:</b> 400 mg p.o. som engangsdose
<b>Ceftriaxone</b>	2 g x 1 i.v.	2 g x 2 i.v. eller 4 g x 1 i.v.	<b>Meningitt:</b> 2 g x 2 i.v. eller 4 g x 1 i.v. <b>S. aureus:</b> kun høydose <b>Ukomplisert gonoré:</b> 500 mg - 1 g i.m. som engangsdose
<b>Azithromycin</b>	500 mg x 1 p.o. eller i.v.	Mangler	<b>Ukomplisert gonoré:</b> 2 g p.o. som engangsdose
<b>Clarithromycin</b>	250 mg x 2 p.o.	500 mg x 2 p.o.	I noen land er klaritromycin tilgjengelig som intravenøs administrasjon (500 mg x 2), i praksis kun for behandling av pneumoni.
<b>Chloramphenicol</b>	1 g x 4 p.o. eller i.v.	2 g x 4 p.o. eller i.v.	Ved behandling av meningitt med kloramfenikol, må alltid i.v. høydose benyttes.
<b>Daptomycin (cSSTI* without concurrent S. aureus bacteraemia)</b>	4 mg/kg x 1 i.v.	Mangler	
<b>Daptomycin (cSSTI* with concurrent S. aureus bacteraemia; right-sided infective endocarditis due to S. aureus)</b>	6 mg/kg x 1 i.v.	Mangler	<b>For bakteremi eller endokarditt forårsaket av enterokokker, se EUCAST guidance document.</b>
<b>Fidaxomicin</b>	200 mg x 2 p.o.	Mangler	
<b>Lefamulin</b>	150 mg x 2 i.v. eller 600 mg x 2 p.o.	Mangler	

\* cSSTI = complicated skin and skin structure infection

# PKPD-breakpoints

	MIC breakpoints		Kommentarer
	S ≤	R >	
Piperacillin-tazobactam	8	16	MIC-bestemmelse utføres med fast konsentrasjon av tazobaktam (4 mg/L).
Cefiderocol	2	2	MIC-bestemmelse med mikrobuljongfortynning må utføres i jernjustert Mueller-Hinton buljong, og spesifikke avlesningsinstruksjoner må følges. For nærmere instruksjoner, se <b>EUCAST guidance document</b> .
Fosfomycin p.o.	8	8	
Lefamulin	0.25	0.25	

***Enterobacterales, Pseudomonas spp,  
Acinetobacter spp, S. maltophilia***

**WHAT'S NEW?**

# New breakpoints for these groups

- New breakpoints for all: **Cefiderocol**
- New zone breakpoints for all except *S.maltophilia*:
  - Imipenem-relebactam,
  - Specific meningitis breakpoints: Meropenem
- New breakpoints for *Enterobacterales* only:
  - Temocillin
  - Specific meningitis breakpoints: cefotaxime, ceftriaxone

# New breakpoints: Cefiderocol

Species	Breakpoints	Disk diffusion
<i>Enterobacterales</i>	2/2	22/22
<i>P. aeruginosa</i>	2/2	22/22
<i>Acinetobacter</i> spp.	IE (2/2)	IE (17/17)
<i>S. maltophilia</i>	IE (2/2)	IE (20/20)

- See Guidance document for BMD on EUCAST website

# New breakpoints- Cefiderocol

- Enterobacterales:*

Cephalosporins	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Kommentarer
	S ≤	R >	ATU		S ≥	R <	ATU	
Cefiderocol	2	2		30	22	22	18-22	MIC-bestämning med buljongspädningsmetoden måste utföras i järnjusterad Mueller-Hintonbuljong och särskilda avläsningsinstruktioner ska användas. För detaljer se <b>EUCAST guidance document</b>

- P. aeruginosa:*

Cefiderocol, <i>P. aeruginosa</i>	2	2		30	22	22	14-22	MIC-bestämning med buljongspädningsmetoden måste utföras i järnjusterad Mueller-Hintonbuljong och särskilda avläsningsinstruktioner ska användas. För detaljer se <b>EUCAST guidance document</b>
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- Acinetobacter spp:*

Cefiderocol	IE	IE			Note	Note		En zondiameter ≥17 mm för 30 µg lappen motsvarar ett MIC-värde under PK-PD-brytpunkten S ≤ 2 mg/L. MIC-bestämning med buljongspädningsmetoden måste utföras i järnjusterad Mueller-Hintonbuljong och särskilda avläsningsinstruktioner ska användas. För detaljer se <b>EUCAST guidance document</b>
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- Stenotrophomonas maltophilia:*

Cefiderocol	IE	IE			Note	Note		En zondiameter ≥20 mm för 30 µg lappen motsvarar ett MIC-värde under PK-PD-brytpunkten S ≤ 2 mg/L. MIC-bestämning med buljongspädningsmetoden måste utföras i järnjusterad Mueller-Hintonbuljong och särskilda avläsningsinstruktioner ska användas. För detaljer se <b>EUCAST guidance document</b>
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# Enterobacterales- New breakpoints for Temocillin

Penicillins	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Kommentarer
	S ≤	R >	ATU		S ≥	R <	ATU	
<b>Temocillin</b> (infections originating from the urinary tract), <i>E. coli</i> , <i>Klebsiella</i> spp. (except <i>K. aerogenes</i> ) and <i>P. mirabilis</i>	0.001	16		30	50	17		Vildtypen kategoriseras som "I – Känslig vid ökad exponering", se tabell "Dosering". Bortse från isolerade kolonier i hämningszonen.

- For UTI including pyelonephritis and urosepsis
- For *E. coli*, *Klebsiella* spp (not *K. aerogenes*) *P. mirabilis*
- WT categorized as I
- Ignore isolated colonies within inhibition zone (compare mecillinam)
- For background see EUCAST general consultation from December 2019

# Enterobacterales - Revised breakpoints for Piperacillin-tazobactam

- 2020 v 10.0

Penicillins	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Piperacillin-tazobactam	8	16	16	30-6	20	17	17-19

- 2021 v 11.0

Penicillins	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)		
	S ≤	R >	ATU		S ≥	R <	ATU
Piperacillin-tazobactam	8	8	16	30-6	20	20	19

- See EUCAST consultation 2020 for more background information

# Enterobacterales- Revised breakpoints for fosfomicin

- 2020 v 10.0

Miscellaneous agents	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Kommentarer
	S ≤	R >	ATU		S ≥	R <	ATU	
Fosfomicin i.v.	32	32		200	24	24		Fosfomicin 200 µg lappar måste innehålla 50 µg glukos-6-fosfat. Bortse från isolerade kolonier i hämningszonen (se bilder nedan). Zonbrytpunkterna gäller endast <i>E. coli</i> . För andra <i>Enterobacterales</i> , använd MIC-metod. Använd tillsats av 25 mg/L glukos-6-fosfat vid MIC-bestämning. Följ tillverkarens rekommendationer för kommersiella metoder. Agarspädning är referensmetod för MIC-bestämning av fosfomicin.
Fosfomicin p.o. (uncomplicated UTI only)	32	32		200	24	24		

- 2021 v 11.0

Miscellaneous agents	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Kommentarer
	S ≤	R >	ATU		S ≥	R <	ATU	
Fosfomicin i.v.	32	32		200	21	21		Zonbrytpunkterna gäller endast <i>E. coli</i> . För andra <i>Enterobacterales</i> , använd MIC-metod. Fosfomicin 200 µg lappar måste innehålla 50 µg glukos-6-fosfat. Bortse från isolerade kolonier i hämningszonen (se bilder nedan). Använd tillsats av 25 mg/L glukos-6-fosfat vid MIC-bestämning. Följ tillverkarens rekommendationer för kommersiella metoder. Agarspädning är referensmetod för MIC-bestämning av fosfomicin.
Fosfomicin oral (uncomplicated UTI only), <i>E. coli</i>	8	8		200	24	24		Fosfomicin 200 µg lappar måste innehålla 50 µg glukos-6-fosfat. Bortse från isolerade kolonier i hämningszonen (se bilder nedan). Använd tillsats av 25 mg/L glukos-6-fosfat vid MIC-bestämning. Följ tillverkarens rekommendationer för kommersiella metoder. Agarspädning är referensmetod för MIC-bestämning av fosfomicin.

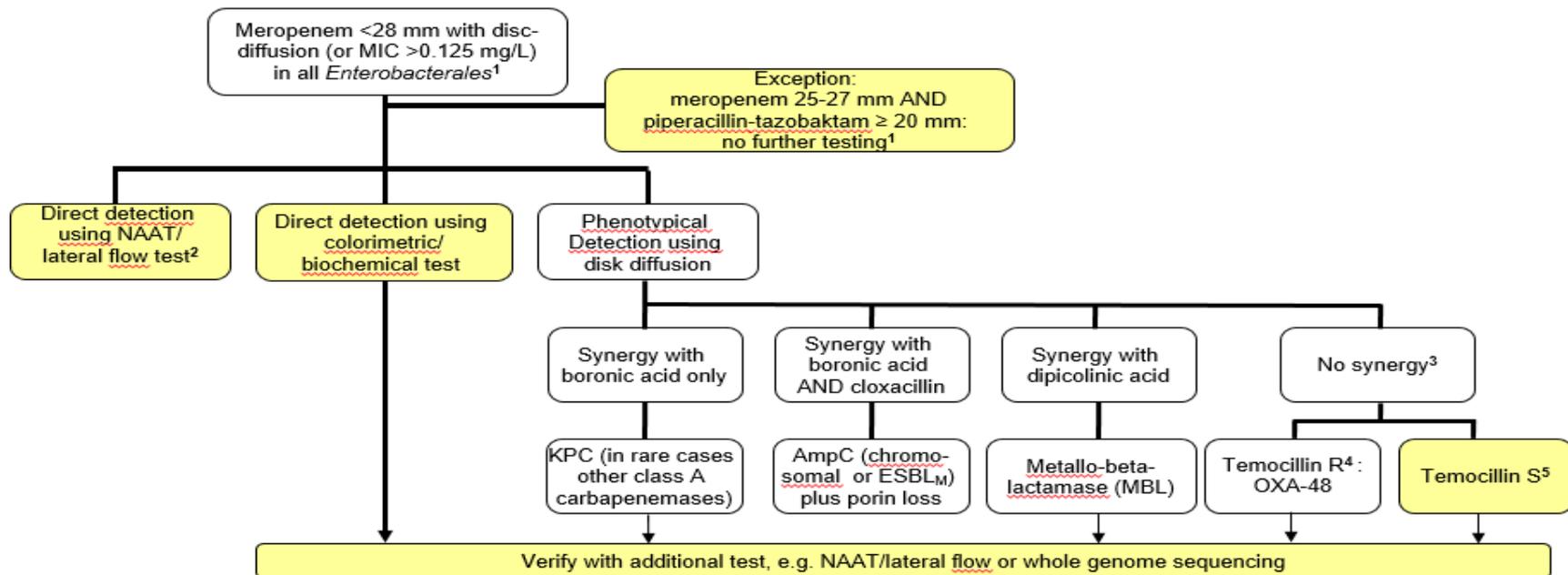
- See EUCAST consultation 2020 for more background information

# *Enterobacterales*- other changes

- Small revised breakpoints for tobramycin, imipenem.
- New ATU: ceftolozane-tazobactam (zone)
- **New algorithm for detection of ESBL-carba in *Enterobacterales* (CPE)**
- Azithromycin for *Salmonella/Shigella* spp: New comment and ECOFF breakpoint for disc diffusion (15ug disc)

Det saknas brytpunkter för azitromycin och *Enterobacterales*. Azitromycin har dock använts för att behandla infektioner orsakade av *Salmonella* och *Shigella* spp tillhörande vildtypen (motsvarar azitromycin MIC  $\leq 16$  mg/L respektive zon diameter  $\geq 12$  mm för 15 $\mu$ g lappen.)

# Algorithm for detection of carbapenemases



<sup>1</sup> For laboratories using disk diffusion there is no added value in determining meropenem MIC regarding carbapenemase detection.

<sup>2</sup> NAAT (nucleic acid amplification test, e.g. PCR, LAMP)/lateral flow test should include the most common carbapenemases (OXA-48, NDM, VIM and KPC). If the test is negative, but the isolate is still suspected to be carbapenemase producing (e.g. due to laboratory or epidemiological reasons), consider additional testing for rarer carbapenemases (e.g. IMP, IMI, GES) or whole genome sequencing.

<sup>3</sup> In rare cases highly resistant isolates with no synergy may harbor more than one carbapenemase.

<sup>4</sup> High levels of resistance to temocillin (>128 mg/L, zone <12 mm) may indicate OXA-48. OXA-48 producing isolates are also resistant to piperacillin-tazobactam and amoxicillin-clavulanic acid.

<sup>5</sup> Some new OXA-48 variants (e.g. OXA-244) do not cause resistance to temocillin. A phenotypical test using disc diffusion is not available to detect these variants and susceptibility to temocillin can not be used to rule out carbapenemase production

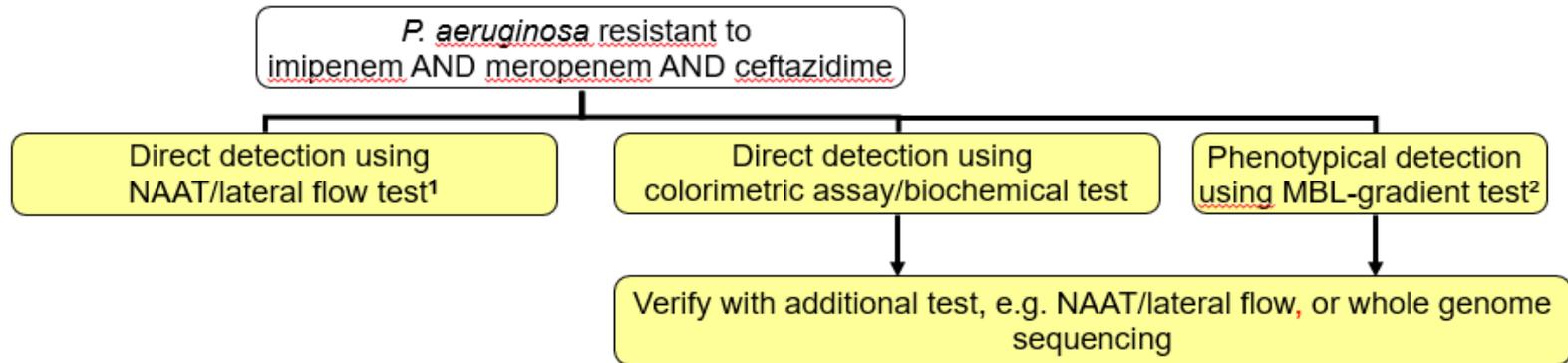
# New algorithm for detection of ESBL-carba in *Enterobacterales*

- Key points: Not all OXA-48 are temocillin R anymore.
  - You can not rule out carbapenemase production with phenotypical test alone. Use another method
  - Is your screening method for all ESBL-carba good enough? What is in your screening-agar?
  - New explanatory method document on the website this week.

# *Pseudomonas aeruginosa*

- New breakpoints: see slide in the beginning
- Small revision of breakpoints: ceftolozane-tazobactam
- Updated algorithm for detection of carbapenemases in *P. aeruginosa*.

## ALGORITHM FOR CARBAPENEMASE DETECTION



<sup>1</sup>NAAT (nucleic acid amplification test, e.g. PCR, LAMP)/lateral flow test should include the most common carbapenemases (NDM, VIM og IMP). If the test is negative, but the isolate is still suspected to be carbapenemase producing (e.g. due to laboratory or epidemiological reasons), consider additional testing for rarer carbapenemases or whole genome sequencing.

<sup>2</sup> Disk diffusion with ceftolozane-tazobactam can be used as an additional test to rule out MBL. MBL-producing isolates are always R.

# ***Acinetobacter spp* and *S. maltophilia***

- No more changes than the one described at the beginning.

# NEW KID ON THE BLOCK: *ACHROMOBACTER XYLOSOXIDANS*

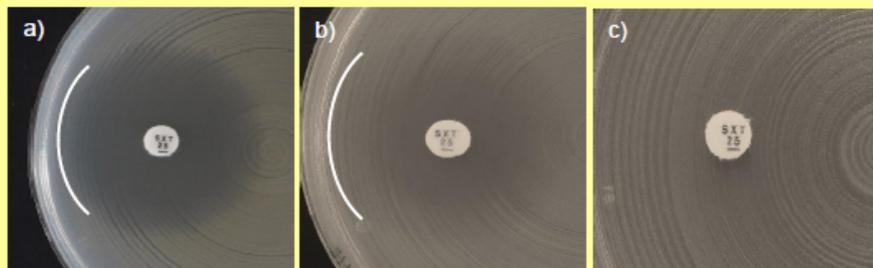
MIC determination (broth microdilution according to ISO standard 20776-1)  
**Medium:** Mueller-Hinton broth  
**Inoculum:**  $5 \times 10^8$  CFU/mL  
**Incubation:** Sealed panels, air,  $35 \pm 1^\circ\text{C}$ , 18±2h  
**Reading:** Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.  
**Quality control:** *Pseudomonas aeruginosa* ATCC 27853. For agents not covered by this strain, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)  
**Medium:** Mueller-Hinton agar  
**Inoculum:** McFarland 0.5  
**Incubation:** Air,  $35 \pm 1^\circ\text{C}$ , 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:** *Pseudomonas aeruginosa* ATCC 27853. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Kommentarer
	S ≤	R >	ATU		S ≥	R <	ATU	
Piperacillin-tazobactam	4	4		30-6	26	26		MIC-bestämnin utförs med fast koncentration av tazobaktam (4 mg/L).

Carbapenems	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Kommentarer
	S ≤	R >	ATU		S ≥	R <	ATU	
Meropenem	1	4		10	26	20		

Miscellaneous agents	MIC breakpoints (mg/L)			Disk content (µg)	Zone diameter breakpoints (mm)			Kommentarer
	S ≤	R >	ATU		S ≥	R <	ATU	
Trimethoprim-sulfamethoxazole	0.125	0.125		1.25-23.75	26	26		Trimetoprim-sulfametoxazol i ratio 1:19. MIC-brytpunkten uttrycks som trimetoprimkoncentrationen. Isolat med förekomst av någon typ av hämningsson ska rapporteras enligt brytpunkterna och växt i hämningssonen ska ignoreras. Inväxten i hämningssonen kan variera från tunn hinna till kraftigare växt (se bilder nedan).



Exempel på hämningssoner för *Achromobacter xylosoxidans* och trimetoprim-sulfametoxazol.

a-b) Synlig yttre zon. Läs den yttre zondiametern och rapportera enligt brytpunkterna.

c) Växt ända fram till lappen och ingen synlig yttre zon. Rapportera resistent.

***Staphylococcus* spp, *Enterococcus* spp,  
*Streptococcus* gr A,B,C,G, *S. pneumoniae*,  
Viridans group streptococci**

**WHAT'S NEW?**

# *Staphylococcus* spp.

- **Taxonomy information updated, but: Caveat 09-02-2021:**
  - For coagulase-positive species other than *S. aureus* (*S. argenteus*, *S. schweizeri*, *S. intermedius*, *S. pseudintermedius* and *S. coagulans*) there is limited information on the performance of breakpoints for most agents. Where such information exists, specific breakpoints are provided.
  - For *S. argenteus*, breakpoints for *S. aureus* can be used without caveats.
  - For *S. coagulans*, the oxacillin disk and criteria listed for *S. pseudintermedius* and *S. schleiferi* should be used.
- For *S. pseudintermedius* and *S. schleiferi* (and *S. coagulans*) oxacillin is used in stead of cefoxitin to screen for methicillin resistance. Unchanged from last version, but now clarified with new row “Oxacillin (screen only), *S. pseudintermedius* and *S. schleiferi*” and revised comments.
- **Lefamulin** breakpoint added

# *Enterococcus* spp.

- **Moxifloxacin** ECOFF (MIC 1 mg/L) is given, as the agent is used for oral endocarditis treatment. Note: report “wild type” or “devoid of resistance mechanisms”
- **Lefamulin** ECOFF is given for *E. faecium*

# *Streptococcus* groups A, B, C and G

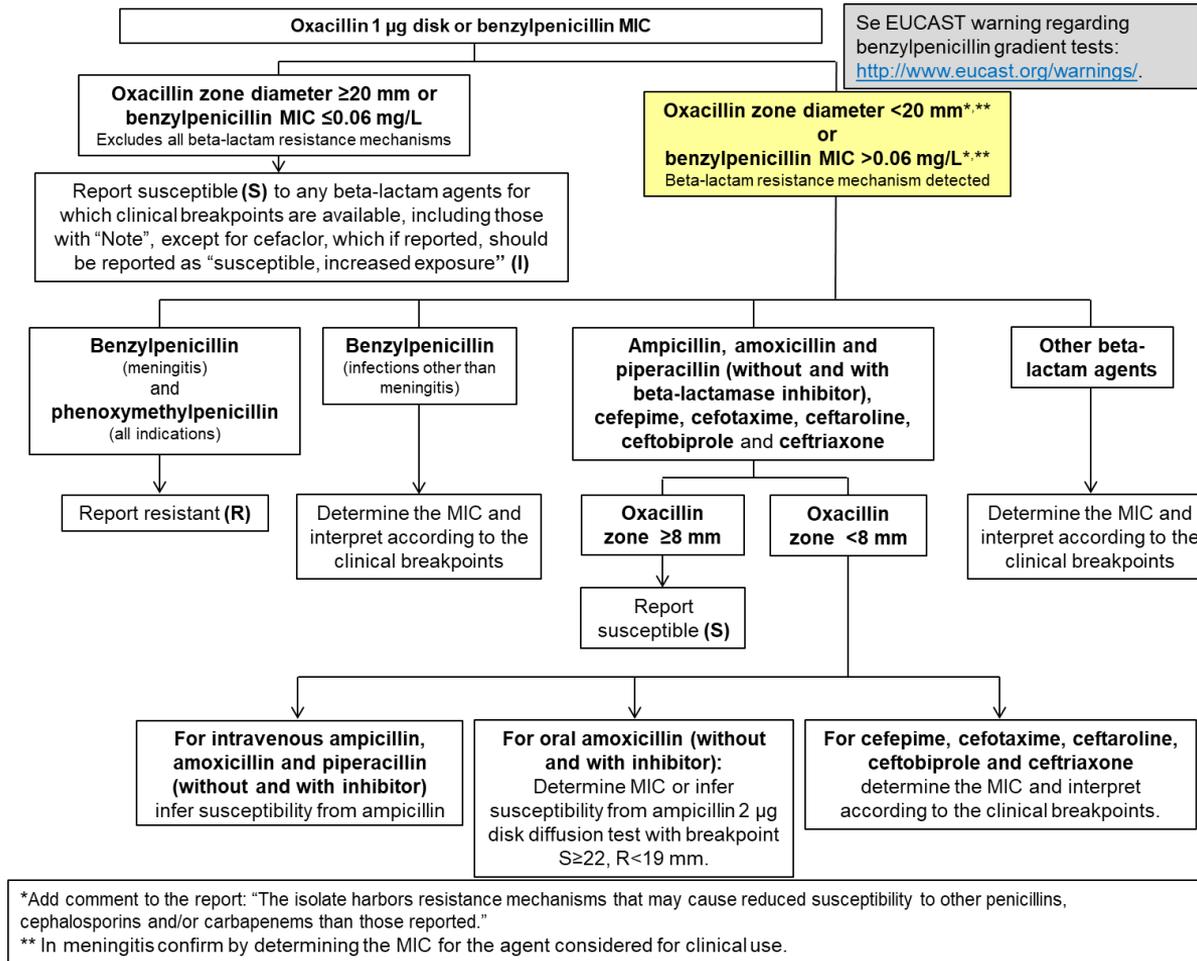
- General betalactams comment:

Benzylopenicillin 1 unit kan benyttes som screeningmiddel for å oppdage lavgradig betalaktamresistens (sone < 23 mm for gruppe A, C og G og sone < 19 mm for gruppe B).

# *Streptococcus pneumoniae*

- **Oxacillin MIC screening breakpoint** removed
- **Lefamulin** breakpoint added
- Clarification for **meningitis isolates**: If Oxacillin zone < 20mm OR benzylpenicillin MIC > 0,06 mg/L, perform MIC testing for agent considered for clinical use

# ALGORITHM FOR DETECTION OF BETALACTAM RESISTANCE



# Viridans group streptococci

- **Screening for betalactam resistance with benzylpenicillin (disk diffusion or MIC):**
  - new benzylpenicillin MIC screening breakpoint
  - revised general betalactam comments and aminopenicillin and piperacillin-tazobactam notes
- **Moxifloxacin** ECOFF (MIC 0,5 mg/L) and **Rifampicin** ECOFF (MIC 0,125 mg/L) are given, as these agents are used for oral endocarditis treatment. Note: report “wild type” or “devoid of resistance mechanisms”
- **Linezolid** breakpoint changed from “-” to “IE”
- **Tedizolid, S. anginosus group:** MIC breakpoint changed from 0,25 mg/L to 0,5 mg/L

***H. influenzae, Moraxella catarrhalis, N. meningitidis,  
Anaerobes, Campylobacter jejuni/coli, Listeria monocytogenes,  
Corynebacterium spp and more***

**WHATS NEW?**

# *Haemophilus influenzae:*

- **New breakpoints:**

- Cefotlozane-tazobactam zone diameter (including new zone diameter ATU)
- Revised: Imipenem-relabactam and meropenem varobactam: from IE to note

- **New comments:**

- Cefotaxime/ceftriaxone: «Breakpoints also apply to meningitis»
- Lefamulin added

- **Flow chart - betalactams: only 1 addition 😊**

- New sentence at the bottom of chart): \* **In meningitis confirm by determining the MIC for the agent considered for clinical use.**

**(Note! This applies only if the isolate has a PcG zone < 12 mm not otherwise)**

# *Moraxella catarrhalis:*

- Chloramphenicol: «Note» - see topical agents

# *Neisseria meningitidis:*

- Meropenem (indications other than meningitis):
  - Note: «The meningitis breakpoint can be used to categorise meropenem for other serious infections»

# Gram-positive anaerobes:

- New comment to the penicillins:
  - «Aminopenicillin breakpoints in Gram-positive anaerobic bacteria are based on intravenous administration.»

# ***Campylobacter, Corynebacterium:***

- *Campylobacter jejuni* & *C. coli*
  - **Revised breakpoint**  
Ciprofloxacin: Wild-type «I»
- *Corynebacterium* spp.
  - **Revised breakpoints**  
Ciprofloxacin: Wild-type «I»  
Gentamicin: from «-» to «IE»

# *Bacillus* spp:

- New sheet!
- Clinical breakpoints for:
  - Carbapenems (**imipenem**, **meropenem**)
  - Fluoroquinolones (**ciproflox**, **levoflox**, **norflox**)
  - Glycopeptides (**vancomycin**)
  - Macrolides/lincosamides (**erythromycin**, **clindamycin**)
  - Oxazolidinones (**linezolid**)

# Topical agents

Revised screening cut-off values (zone diameters)

- *P. aeruginosa*: tobramycin, ciprofloxacin
- *M. catarrhalis*: chloramphenicol

# Any questions?

