

How do the Nordic labs perform in **External Quality Assessment:** **EARS-Net 2018**

NordicAST Workshop 2019

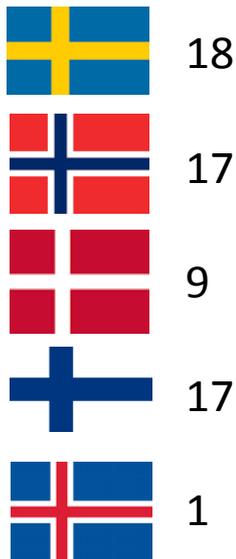
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Isolates

- 4920 *Enterococcus faecium*
- (4921 *Klebsiella pneumoniae*)
- 4922 *Escherichia coli*
- 4923 *Staphylococcus aureus*
- 4924 *Pseudomonas aeruginosa*
- 4925 *Streptococcus pneumoniae*

Labs



Most AST is unproblematic

- ...if your method is robust and QC:ed
- ...if your device is QC:ed, at both ends of the scale
- ...if your disks and gradient test are high quality
- ...if your MH medium is dependable
- ...if your staff properly trained



Specimen : 4920

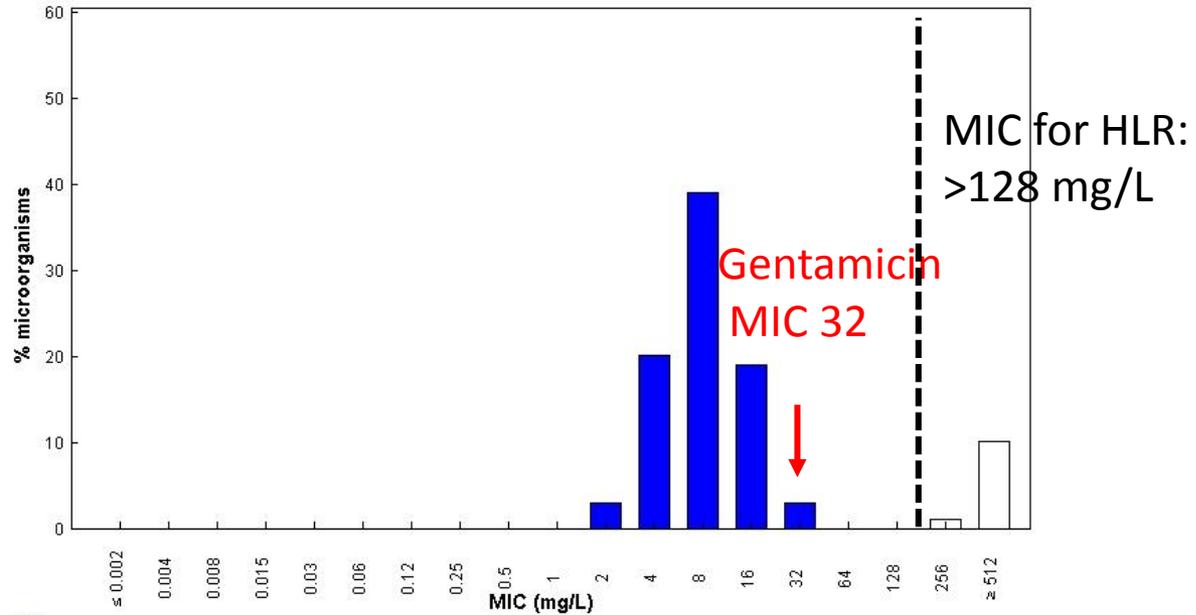
Enterococcus faecium

	MIC range * (mg/L)	EUCAST Result	EUCAST Breakpoints (mg/L)
Amoxicillin	-	R	S≤4 R>8
Ampicillin	>8	R	S≤4 R>8
Gentamicin-HLR	32	Neg	S≤128 R>128 No Genta HLR
Teicoplanin	>32	R	S≤2 R>2
Vancomycin	>32	R	S≤4 R>4 vanA phenotype

* MICs determined by the ISO reference method for MIC determinations by broth microdilution

Gentamicin / Enterococcus faecium
International MIC Distribution - Reference Database 2019-05-15

MIC distributions include collated data from multiple sources, geographical areas and time periods and can never be used to infer rates of resistance



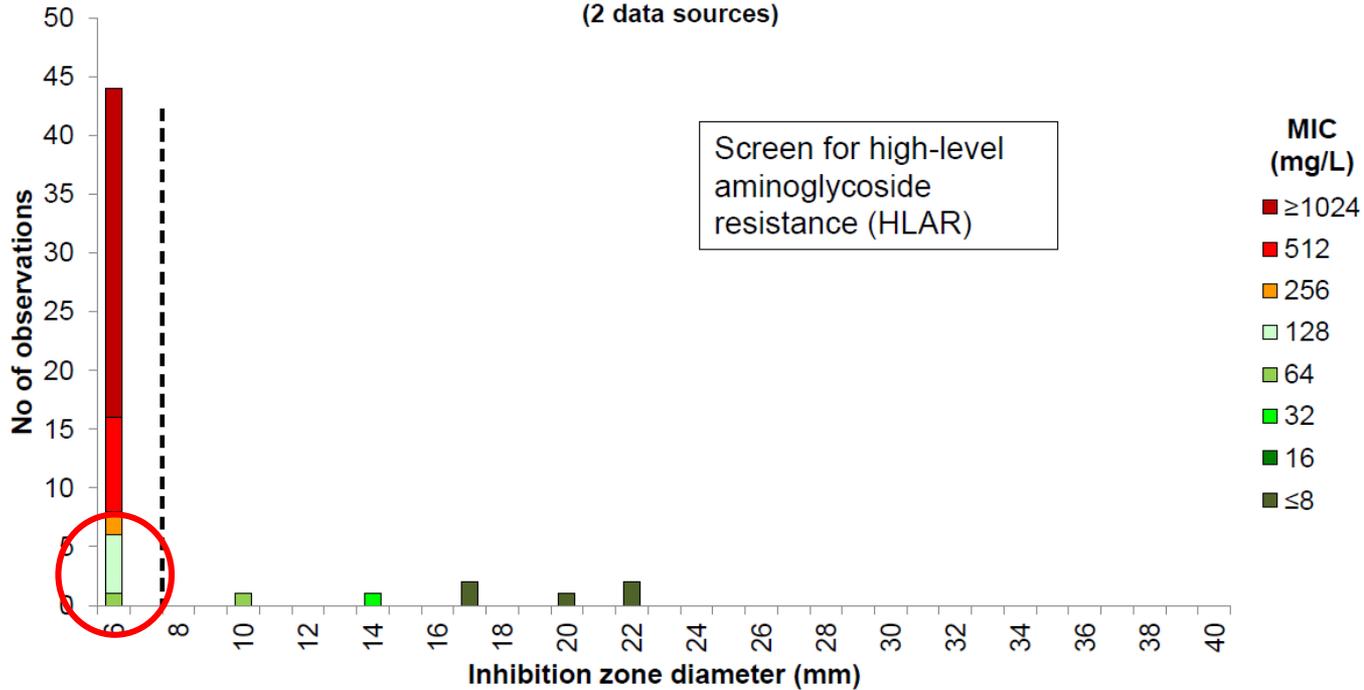
MIC
 Epidemiological cut-off (ECOFF): 32 mg/L
 Wildtype (WT) organisms: ≤ 32 mg/L

2972 observations (26 data sources)

	Gentamicin HLR		% concordance
	POS	NEG	
SE	3	13	81,3%
NO	2	14	87,5%
DK	2	6	75,0%
FI	4	11	73,3%
IS	0	1	100,0%
total (EUCAST)	306	372	54,9%

Gentamicin 30 µg vs. MIC *E. faecium*, 44 isolates (51 correlates)

(2 data sources)



Breakpoints	HLAR	ECOFF
MIC (screen)	>128 mg/L	32 mg/L
Zone diameter (screen)	<8 mm	

http://www.eucast.org/ast_of_bacteria/calibration_and_validation/

Guideline	Method	Number (%) participants responding	
		HLR positive	HLR negative
EUCAST	Automated	205 (75.6)	66 (24.4)
	Disk diffusion	61 (24.4)	189 (75.6)
	MIC	37 (25.0)	111 (75.0)
	Other	3	4
	Total	306 (45.3)	370 (54.7)

- Automated systems overreported HLR

- Reporting problem?

Specimen : 4922

Escherichia coli

	MIC range * (mg/L)	EUCAST Result	EUCAST Breakpoints (mg/L)	
Amikacin	≤ 4	S	S ≤ 8 R > 16	
Amoxicillin	> 32	R	S ≤ 8 R > 8	
Amoxicillin-clavulanic acid	8	S	S ≤ 8 R > 8	
Ampicillin	> 32	R	S ≤ 8 R > 8	
Cefotaxime	≤ 0.5	S	S ≤ 1 R > 2	
Ceftazidime	≤ 0.5	S	S ≤ 1 R > 4	
Ceftriaxone	0.12	S	S ≤ 1 R > 2	
Ciprofloxacin	> 2	R	S ≤ 0.25 R > 0.5	
Colistin	4	R	S ≤ 2 R > 2	<i>mcr-1</i>
Ertapenem	≤ 0.12	S	S ≤ 0.5 R > 1	
Gentamicin	≤ 0.5	S	S ≤ 2 R > 4	
Imipenem	≤ 0.5	S	S ≤ 2 R > 8	
Levofloxacin	-	R see pg.2	S ≤ 0.5 R > 1	
Meropenem	≤ 0.12	S	S ≤ 2 R > 8	
Ofloxacin	-	R see pg.2	S ≤ 0.25 R > 0.5	
Piperacillin-tazobactam	4	S	S ≤ 8 R > 16	
Tobramycin	≤ 2	S	S ≤ 2 R > 4	

Colistin

MIC 4 (S≤2; R>2)

mcr-1 positive

	Colistin			
	S	I	R	% concordance
SE	1	0	4	80,0%
NO	2	0	0	0,0%
DK	1	0	2	66,7%
FI	0	0	3	100,0%
IS	0	0	1	100,0%
total (EUCAST)	140	3	322	69,2%

“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).”

EUCAST BP table v9.0

- Only few Nordic labs reported colistin results
- Do it right: BMD, 2 QC strains

Specimen : 4923

Staphylococcus aureus

	MIC range * (mg/L)	EUCAST Result	EUCAST Breakpoints (mg/L)	
Cefoxitin	>64	R	S ≤ 4 R > 4	MRSA
Ciprofloxacin	≥ 128	R	S ≤ 1 R > 1	
Clindamycin	≥ 128	R	S ≤ 0.25 R > 0.5	
Erythromycin	≥ 128	R	S ≤ 1 R > 2	
Fusidic acid	0.06-0.12	S	S ≤ 1 R > 1	
Gentamicin	64	R	S ≤ 1 R > 1	
Linezolid	1-2	S	S ≤ 4 R > 4	
Oxacillin	-	R		
Penicillin	>64	R	S ≤ 0.125 R > 0.125	
Rifampicin	≥ 128	R	S ≤ 0.06 R > 0.5	
Teicoplanin	≤ 0.25-0.5	S	S ≤ 2 R > 2	
Tetracycline	≤ 0.12-0.25	S	S ≤ 1 R > 2	
Vancomycin	1	S	S ≤ 2 R > 2	

“There were no problems with susceptibility testing of this organism”

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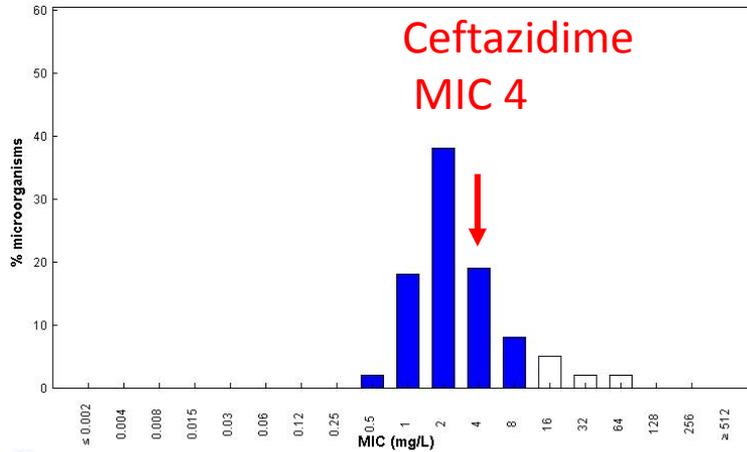
Specimen : 4924

Pseudomonas aeruginosa

	MIC range * (mg/L)	EUCAST Result	EUCAST Breakpoints (mg/L)
Amikacin	4	S	S \leq 8 R $>$ 16
Ceftazidime	4	S	S \leq 8 R $>$ 8
Ciprofloxacin	8-16	R	S \leq 0.5 R $>$ 0.5
Colistin	1-2	S	S \leq 2 R $>$ 2
Gentamicin	2	S	S \leq 4 R $>$ 4
Imipenem	16	R	S \leq 4 R $>$ 8
Levofloxacin	-	R see pg.2	S \leq 1 R $>$ 1
Meropenem	16	R	S \leq 2 R $>$ 8
Piperacillin-tazobactam	16	S	S \leq 16 R $>$ 16
Tobramycin	1	S	S \leq 4 R $>$ 4

Ceftazidime / *Pseudomonas aeruginosa*
International MIC Distribution - Reference Database 2019-05-16

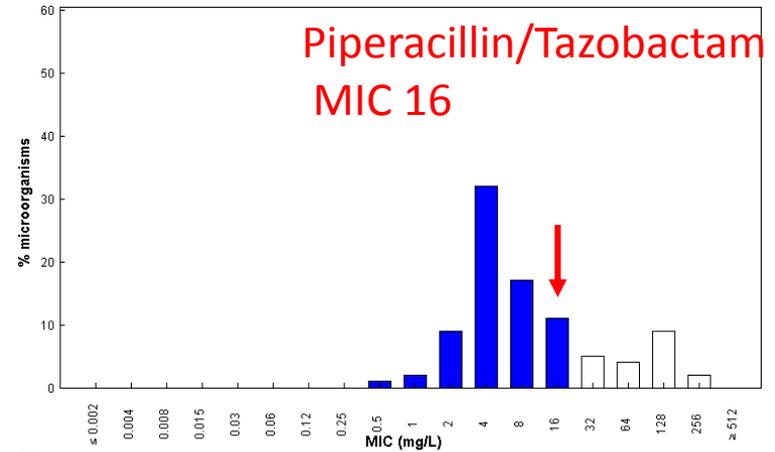
MIC distributions include collated data from multiple sources, geographical areas and time periods and can never be used to infer rates of resistance



MIC Epidemiological cut-off (ECOFF): 8 mg/L
Wildtype (WT) organisms: ≤ 8 mg/L
32276 observations (84 data sources)

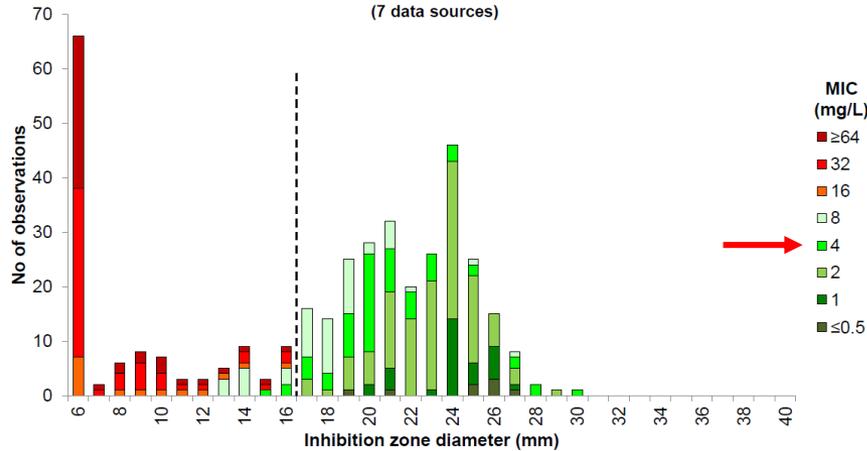
Piperacillin-tazobactam / *Pseudomonas aeruginosa*
International MIC Distribution - Reference Database 2019-05-16

MIC distributions include collated data from multiple sources, geographical areas and time periods and can never be used to infer rates of resistance



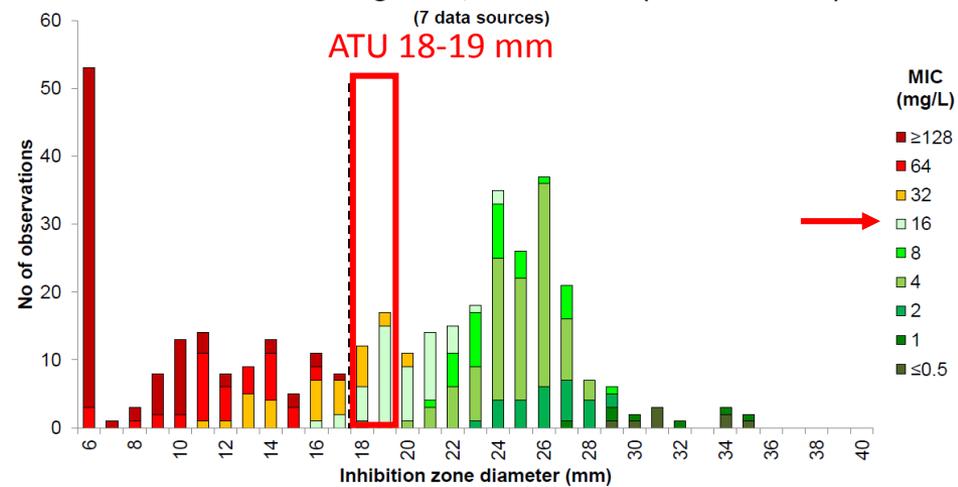
MIC Epidemiological cut-off (ECOFF): 16 mg/L
Wildtype (WT) organisms: ≤ 16 mg/L
31866 observations (71 data sources)

Ceftazidime 10 μ g vs. MIC
Pseudomonas aeruginosa, 249 isolates (380 correlates)
(7 data sources)



Breakpoints		ECOFF
MIC	S \le 8, R>8 mg/L	8 mg/L
Zone diameter	S \ge 17, R<17 mm	

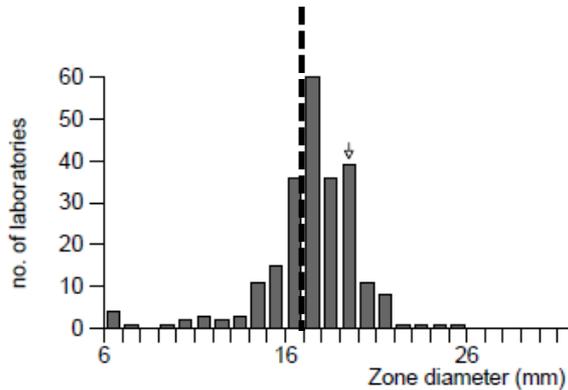
Piperacillin-tazobactam 30-6 μ g vs. MIC
Pseudomonas aeruginosa, 217 isolates (376 correlates)
(7 data sources)



Breakpoints		ECOFF
MIC	S \le 16, R>16 mg/L	16 mg/L
Zone diameter	S \ge 18, R<18 mm	

Ceftazidime

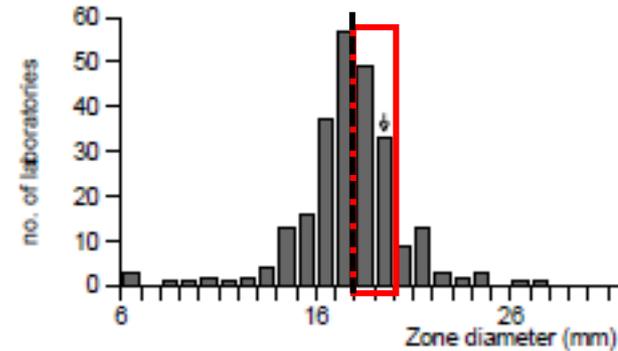
S \geq 17;R<17 mm



Piperacillin/Tazobactam

S \geq 18;R<18 mm

ATU 18-19 mm



	Ceftazidim				Piperacillin/Tazobactam			
	S	I	R	% concordance	S	I	R	% concordance
SE	15	0	3	83,3%	13	0	5	72,2%
NO	15	0	2	88,2%	11	0	6	64,7%
DK	5	0	3	62,5%	4	0	4	50,0%
FI	16	0	1	94,1%	13	0	4	76,5%
IS	1	0	0	100,0%	1	0	0	100,0%
total (EUCAST)	549	19	175	73,9%	343	4	392	46,4%

- Reproducibility issue for isolates at the breakpoint

Specimen : 4925

Streptococcus pneumoniae

	MIC range * (mg/L)	EUCAST Result	EUCAST Breakpoints (mg/L)
Cefotaxime	1	I	S ≤ 0.5 R > 2
Meningitis/cefotaxime	-	I	S ≤ 0.5 R > 2
Pneumonia/cefotaxime	-	I	S ≤ 0.5 R > 2
Ceftriaxone	1-2	I	S ≤ 0.5 R > 2
Meningitis/ceftriaxone	-	I	S ≤ 0.5 R > 2
Pneumonia/ceftriaxone	-	I	S ≤ 0.5 R > 2
Clindamycin	-	R see pg.2	S ≤ 0.5 R > 0.5
Erythromycin	≥ 128	R	S ≤ 0.25 R > 0.5
Levofloxacin	1	S	S ≤ 2 R > 2
Moxifloxacin	0.12	S	S ≤ 0.5 R > 0.5
Norfloxacin	-	S see pg.2	
Penicillin	4	R	S ≤ 0.06 R > 2
Meningitis/PEN	-	R	S ≤ 0.06 R > 0.06
Pneumonia/PEN	-	R	S ≤ 0.5 R > 2

	Benzylpenicillin/ meningitis				Benzylpenicillin/ pneumonia			
	S	I	R	% concordance	S	I	R	% concordance
SE	0	0	12	100,0%	1	11	0	91,7%
NO	0	0	17	100,0%	3	13	0	81,3%
DK	0	0	7	100,0%	2	4	1	71,4%
FI	0	1	16	94,1%	4	12	1	76,5%
IS	0	0	1	100,0%	0	1	0	100,0%
total (EUCAST)	5	7	661	98,2%	210	414	51	68,9%

- Reporting in meningitis is straightforward
Oxacillin 1 µg inh.zone <20 mm → R (no I-category)
- MIC testing and reporting in pneumonia is still problematic

	Cefotaxime				Ceftriaxone			
	S	I	R	% concordance	S	I	R	% concordance
SE	14	0	0	0,0%	4	0	0	0,0%
NO	9	8	0	47,1%	8	0	0	0,0%
DK	3	0	0	0,0%	8	0	0	0,0%
FI	2	0	0	0,0%	13	2	1	12,5%
IS	0	0	0		1	0	0	0,0%
total (EUCAST)	379	200	11	33,9%	360	152	9	29,2%

- Most labs fail to detect reduced susceptibility to 3rd generation cephalosporins
- EUCAST task: Meningitis breakpoints for cephalosporins

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NordicAST WS 2019

Remember:

