



SGM • SSM

Swiss Society for Microbiology Annual Congress 2026

📍 Montreux, Switzerland



National survey on antimicrobial susceptibility practices in Swiss clinical microbiology laboratories

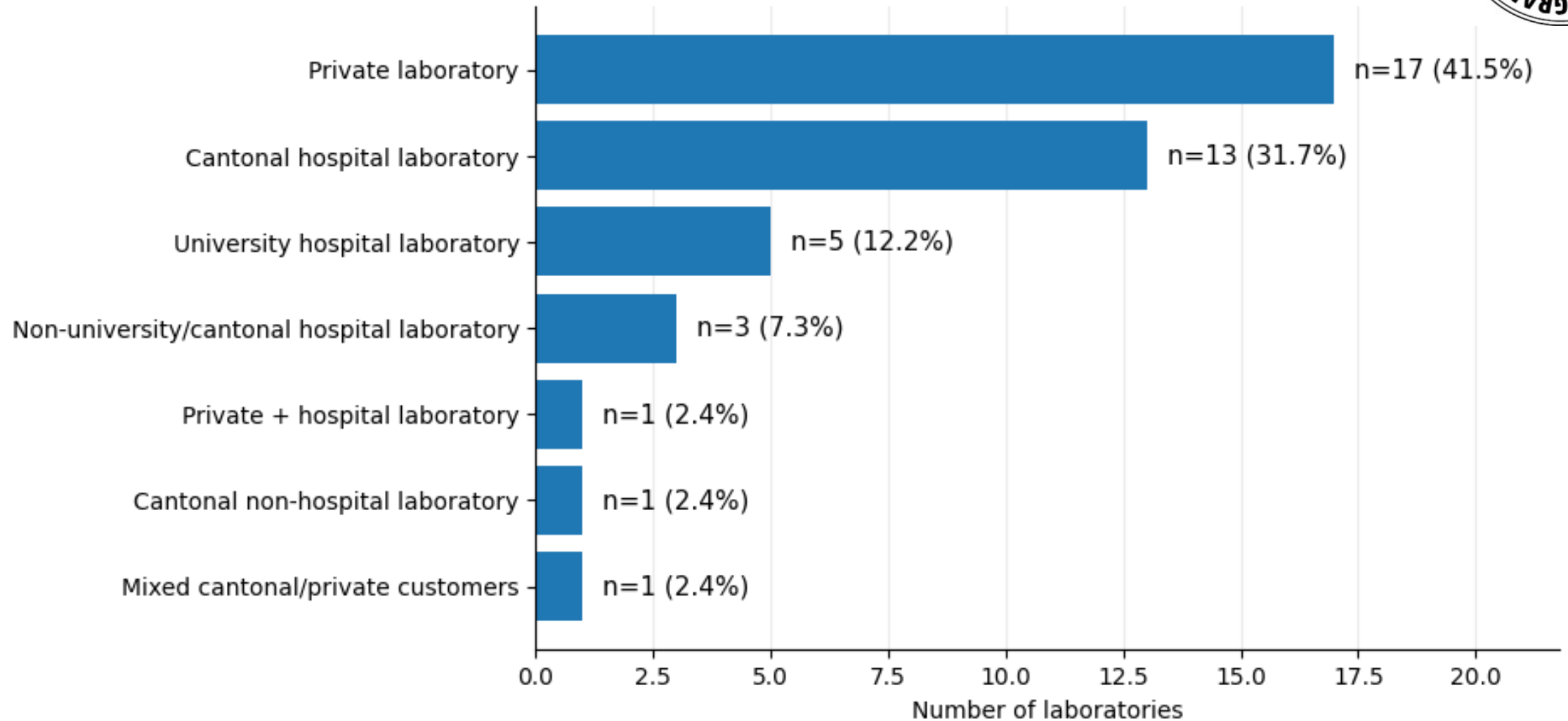


26.08.2026

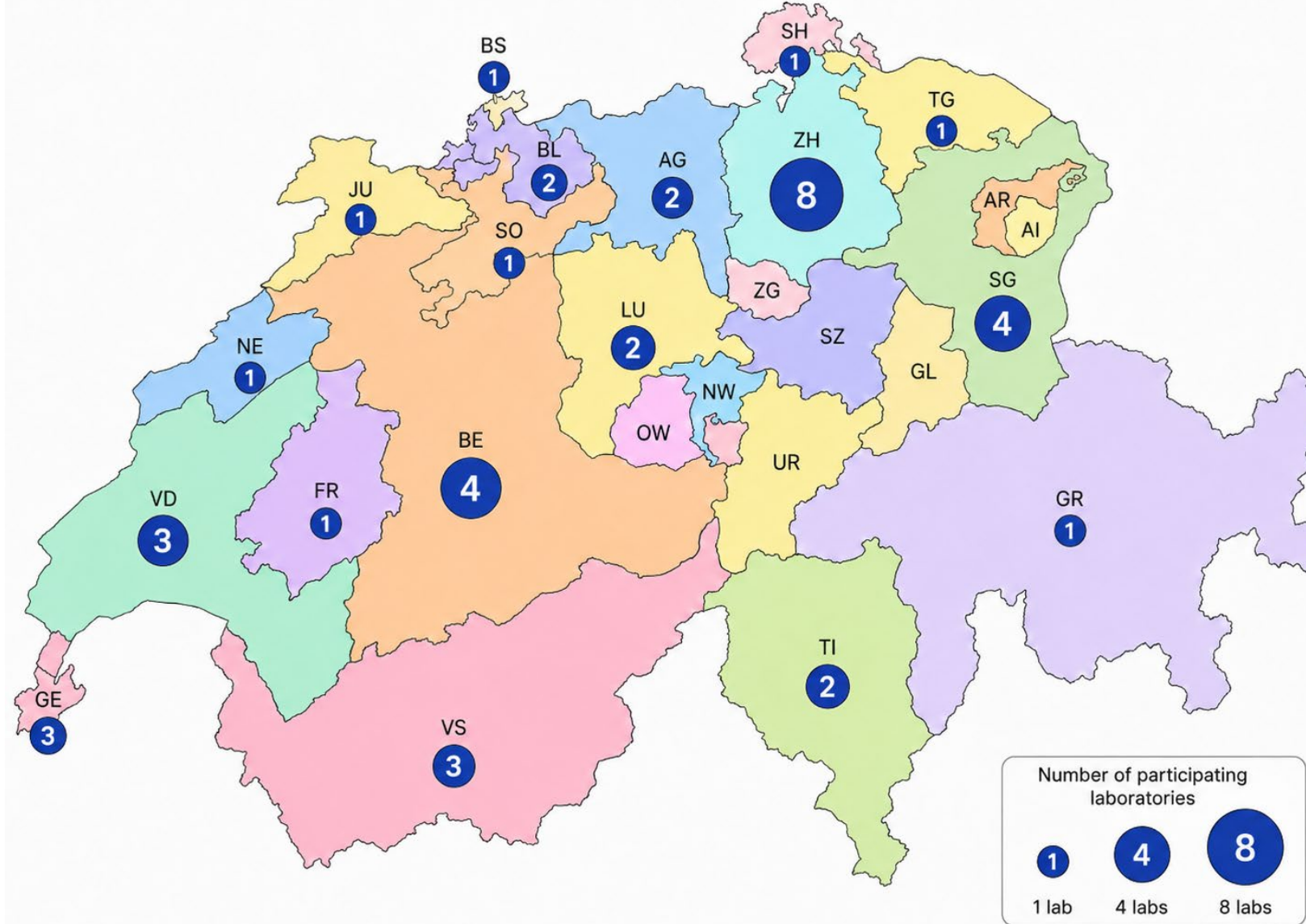


PD Dr. sc. Stefano Mancini

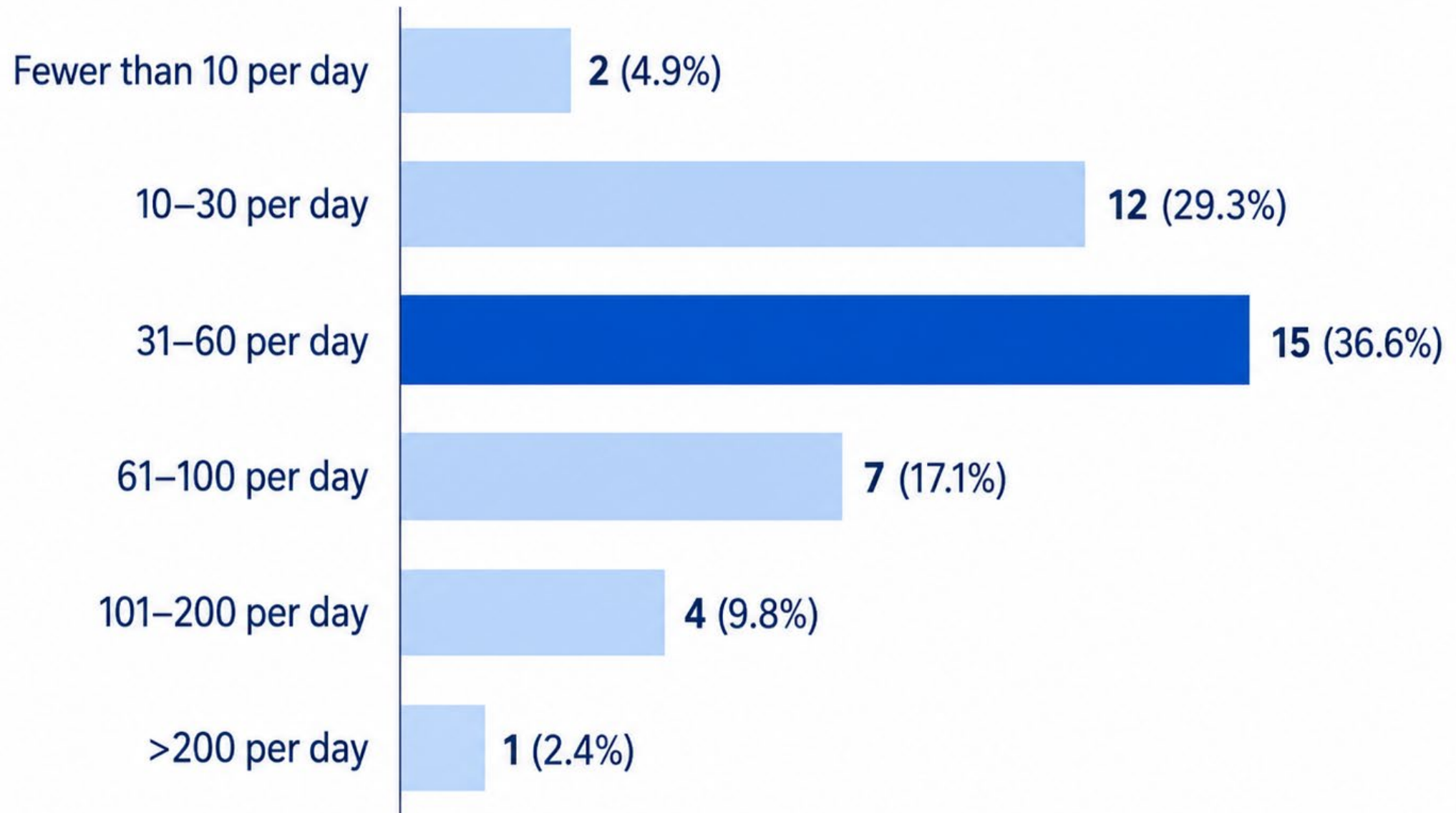
Number of participating laboratories: 41



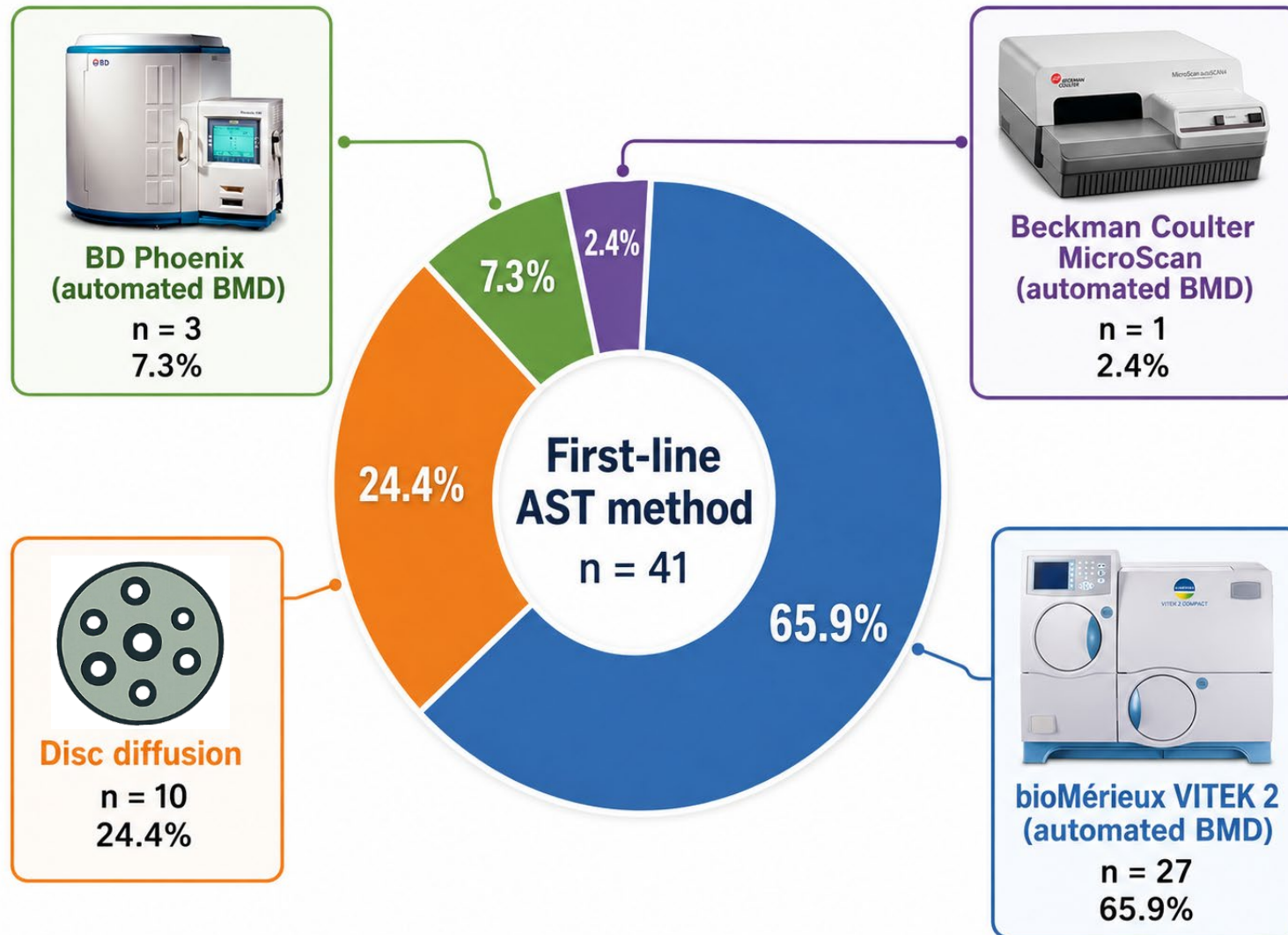
Location of the participating laboratories



Average number of antibiograms per working day

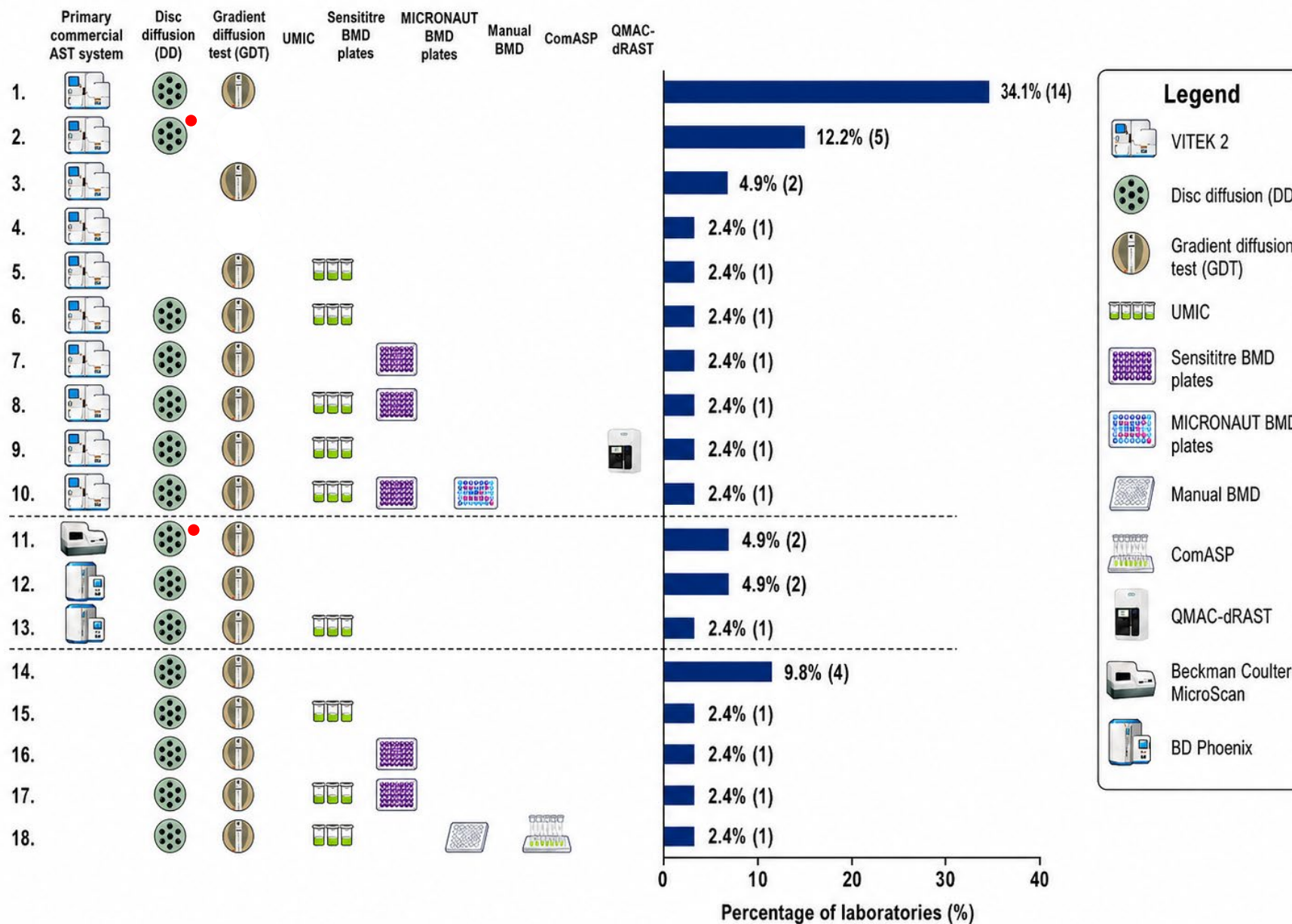


First-line AST method



BMD = Broth microdilution

AST methods used in the laboratories



• In one case DD was considered the primary AST method

Reporting of AST results (MIC only, n=34)



Only categorical interpretation (S/I/R)

20 laboratories (58.8%)

Antibiotic	Result
Ceftriaxone	S
Piperacillin/tazobactam	I
Ciprofloxacin	R
Meropenem	S

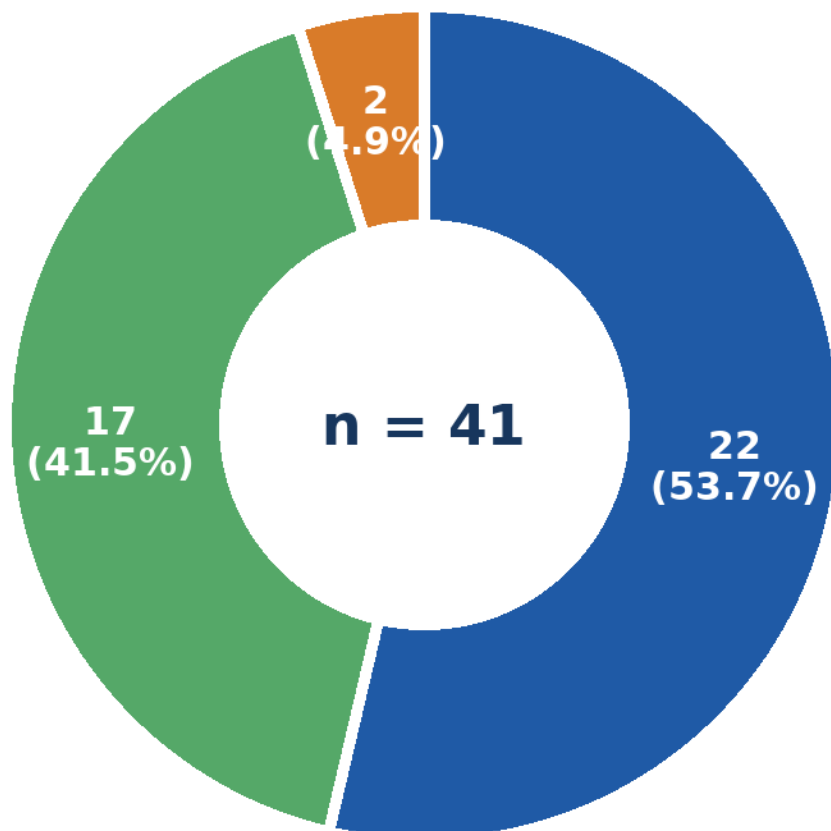


Both MIC values and categorical interpretation

14 laboratories (41.2%)

Antibiotic	MIC (mg/L)	Result
Ceftriaxone	0.5	S
Piperacillin/tazobactam	16	I
Ciprofloxacin	>2	R
Meropenem	0.25	S

Interpretation of AST results



 **EUCAST** European Committee on Antimicrobial Susceptibility Testing



**EUCAST primarily;
CLSI breakpoints when no
EUCAST breakpoint is available**

22 laboratories (53.7%)

 **EUCAST** European Committee on Antimicrobial Susceptibility Testing

EUCAST only

17 laboratories (41.5%)

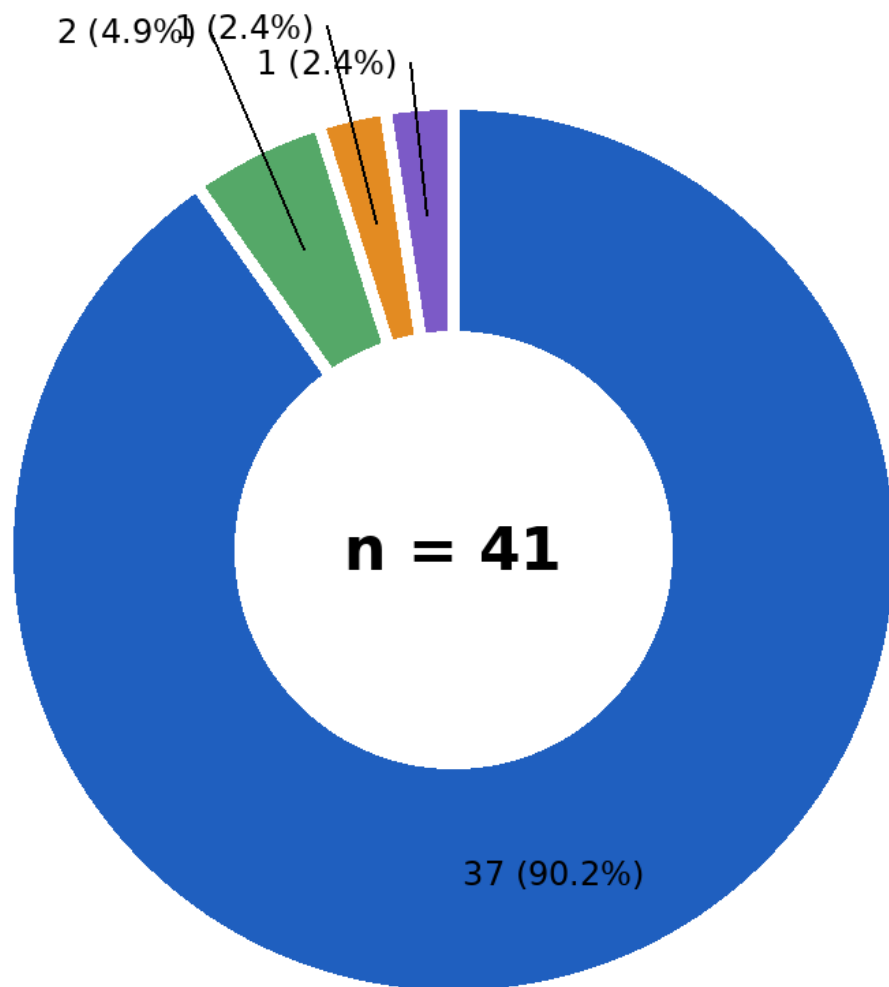
 **EUCAST** European Committee on Antimicrobial Susceptibility Testing



**EUCAST primarily;
CA-SFM breakpoints when no
EUCAST breakpoint is available**

2 laboratories (4.9%)

Reporting of the category I 'Susceptible by increased exposure'



I — Susceptible, increased exposure

EUCAST terminology

37 laboratories (90.2%)



S*

2 laboratories (4.9%)



SDD — susceptible-dose dependent (CLSI)

1 laboratory (2.4%)



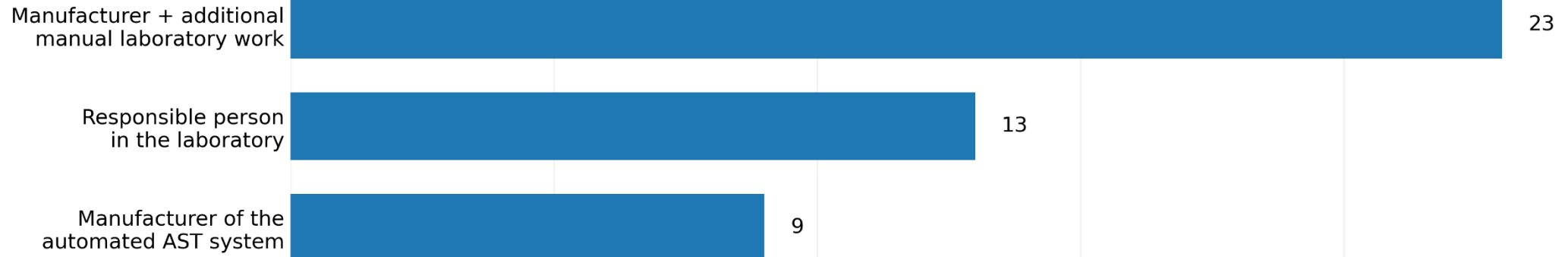
D — Empfindlich bei erhöhter Dosierung

1 laboratory (2.4%)

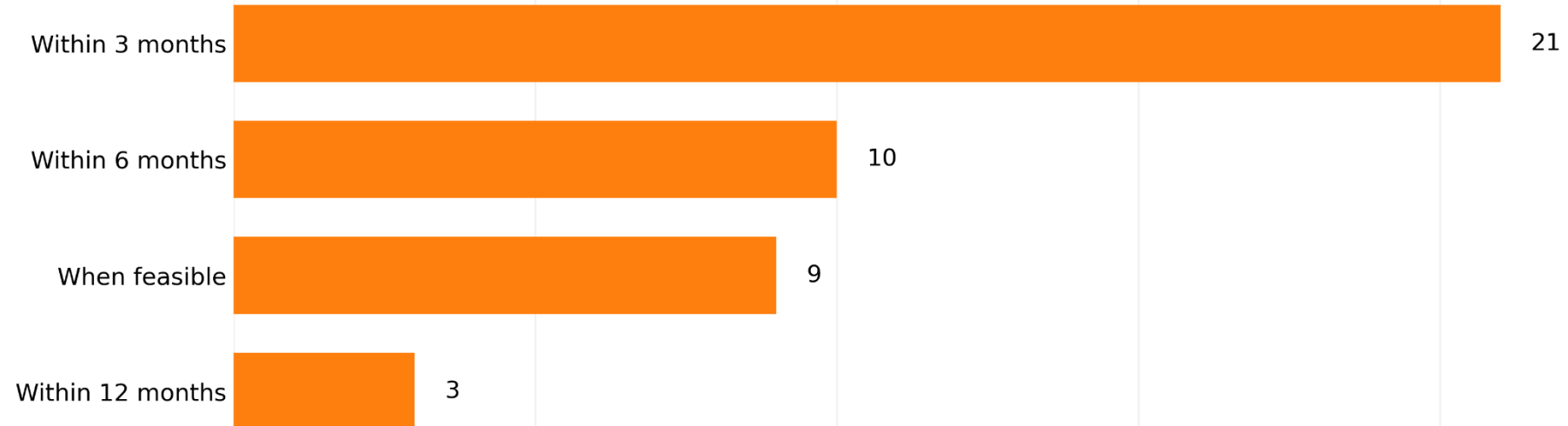
Implementation of the EUCAST updates



How EUCAST updates are implemented



When EUCAST updates are implemented



ESBL screening (AmpC-non producers)



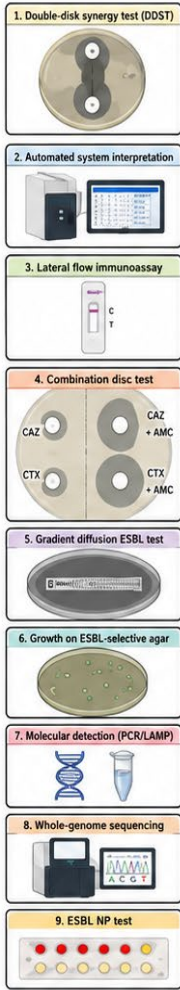
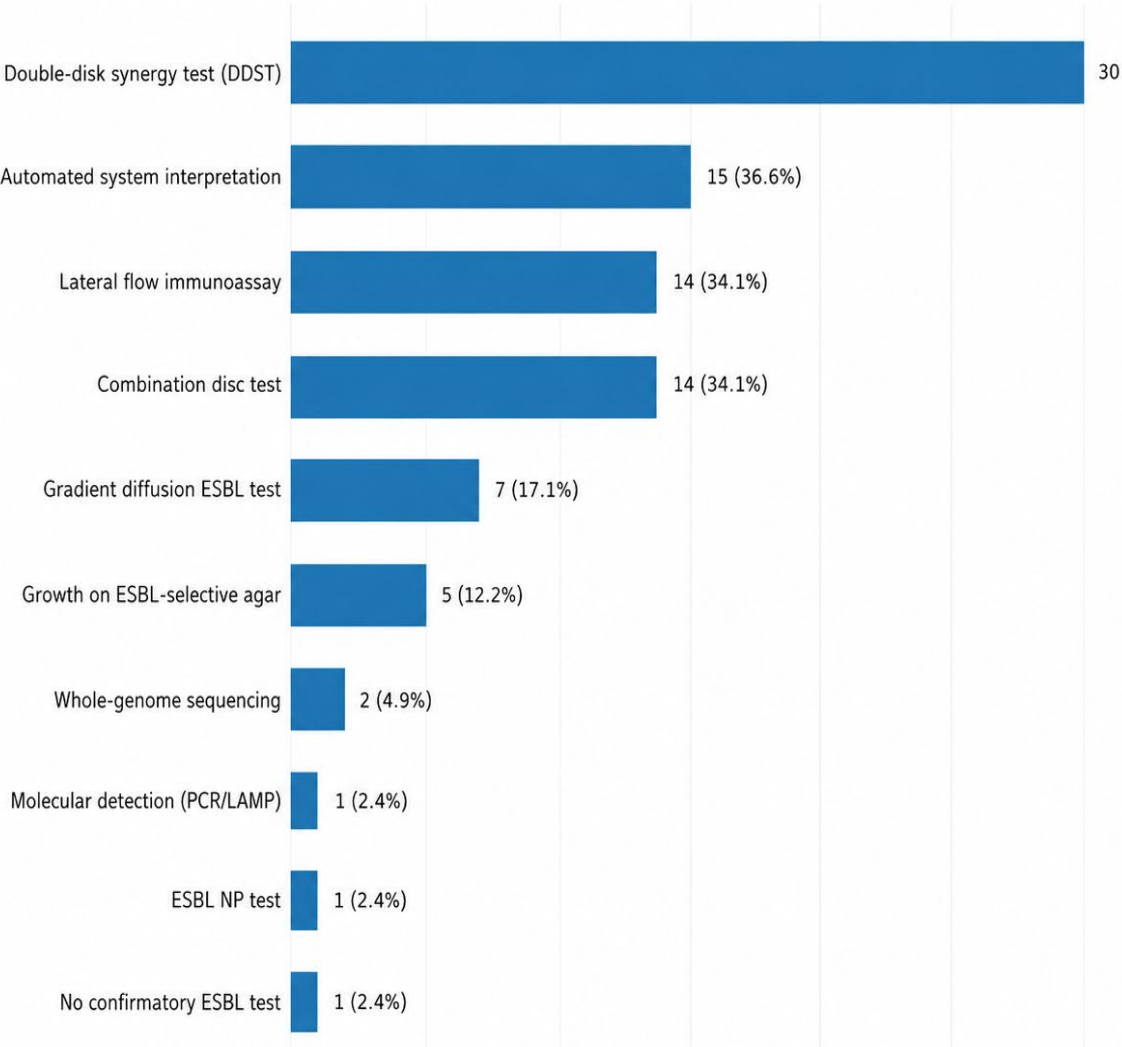
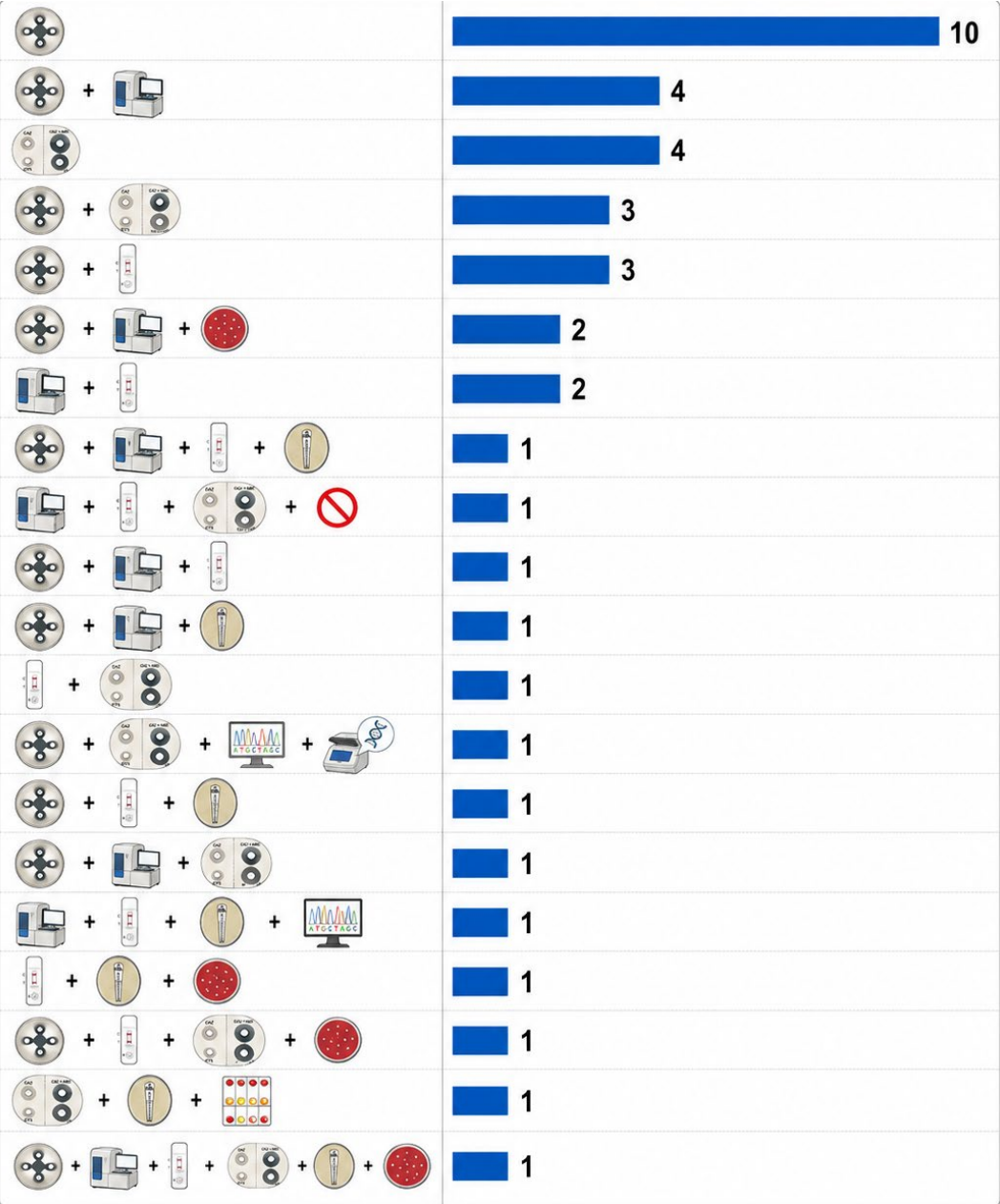
Automated system	EUCAST MIC-based	EUCAST DD-based	Any 3GC non-susceptible	Any 3/4GC non-susceptible	Synergy with clavulanic acid	Other	Laboratories
●							8
●	●	●					6
	●						5
●		●					5
		●					4
●	●						4
				●			2
			●				2
					●		2
	●				●		1
●	●	●				●	1
							1

ESBL screening (AmpC-producers)



Same as without intrinsic AmpC	Automated system	FEP non- susceptibility	Synergy AMC-3/4GC	CRO resistance	Aminoglycoside resistance	Laboratories
●						15
	●					7
		●				6
	●	●				5
●	●					4
			●			1
		●			●	1
●	●	●				1
●		●		●	●	1

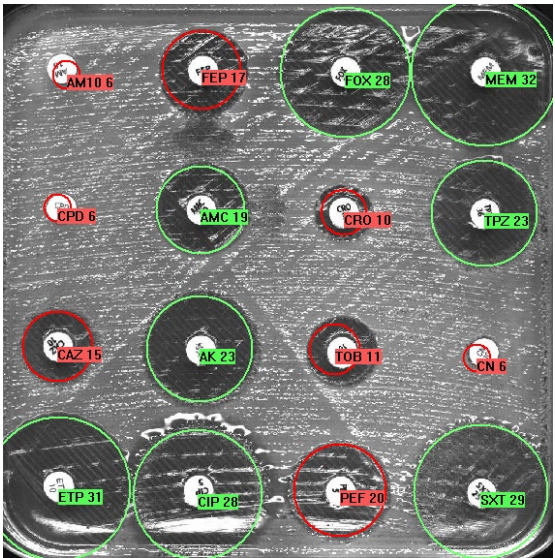
ESBL confirmatory testing



Reporting of ESBL-producing Enterobacterales

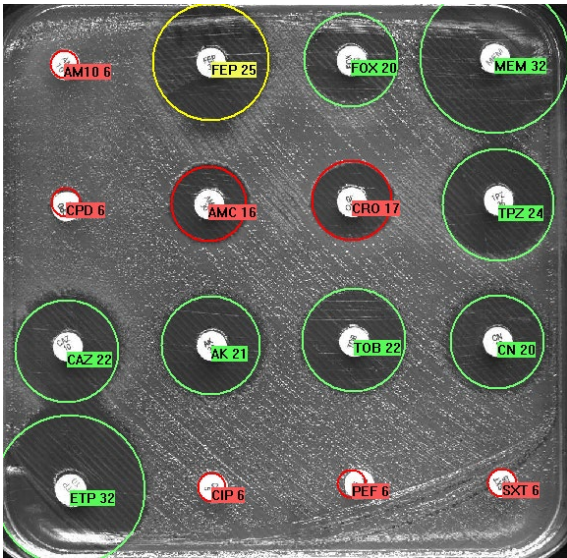


E. coli



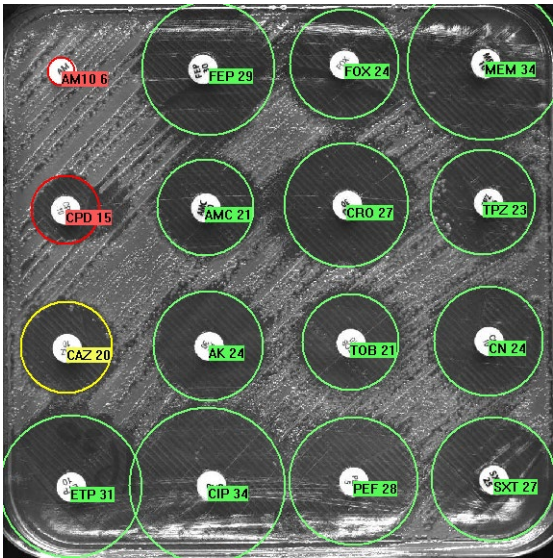
ATB	Klinische Kategorie
Ampicillin	R
Amoxi-Clav	S
Pip-Tazo	S
Ceftriaxon	R
Ceftazidim	R
Cefepim	R
Ertapenem	S
Meropenem	S

E. coli



ATB	Klinische Kategorie
Ampicillin	R
Amoxi-Clav	R
Pip-Tazo	S
Ceftriaxon	R
Ceftazidim	S
Cefepim	I
Ertapenem	S
Meropenem	S

E. coli

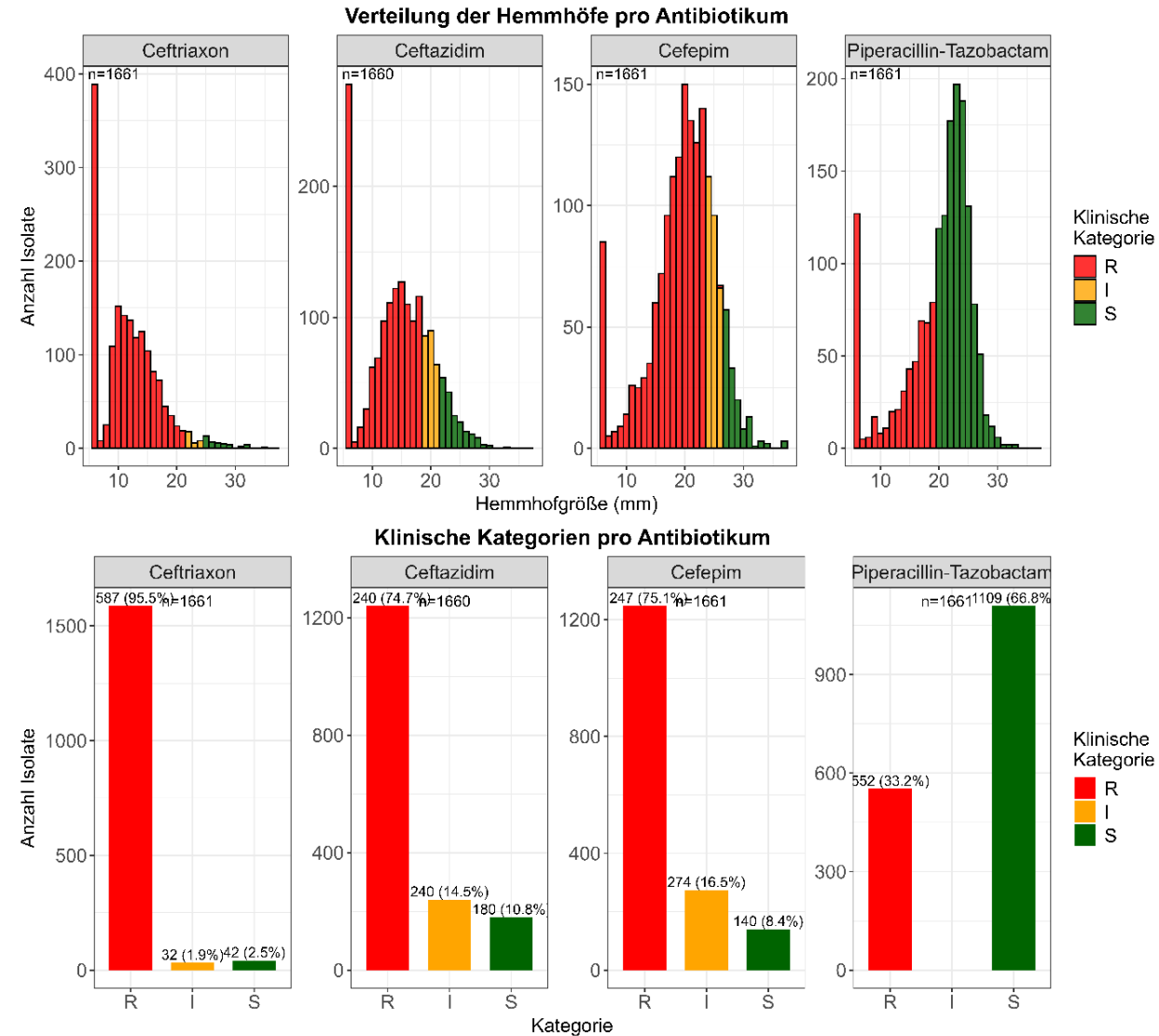


ATB	Klinische Kategorie
Ampicillin	R
Amoxi-Clav	S
Pip-Tazo	S
Ceftriaxon	S
Ceftazidim	I
Cefepim	S
Ertapenem	S
Meropenem	S

Reporting of ESBL-producing Enterobacterales



AST Results at the IMM — First Isolate per Patient, 01.01.2020–31.12.2024



Reporting of ESBL-producing Enterobacterales



Rule No.	Organisms	Indicator Agent*	Agents affected*	Rule	Remarks	Grade	References
6	<i>E. coli</i> , <i>Klebsiella</i> spp. (except <i>K. aerogenes</i>), <i>Raoultella</i> spp.	cefotaxime, ceftriaxone, ceftazidime, cefepime,	piperacillin-tazobactam, amoxicillin-clavulanic acid	IF resistant to any 3rd generation (cefotaxime, ceftriaxone, ceftazidime) or 4th generation (cefepime) cephalosporin AND susceptible to piperacillin-tazobactam or amoxicillin-clavulanic acid, THEN report as tested.	This phenotype is most often caused by ESBL production. ESBL producers sometimes test as susceptible to beta-lactam/ beta-lactamase-inhibitor combinations. The use of these combinations in infections caused by ESBL-producers has historically been a matter of controversy. A number of studies have shown that they may be safe provided appropriate dosing is used. One publication indicates that carbapenem therapy may be superior to piperacillin-tazobactam, as measured by 30-day mortality and primarily in patients with terminal cancer	A	Retamar, López-Cerero, Muniain, Pascual, & Rodríguez-Baño, 2013; Rodríguez-Baño, Cisneros, Gudiol, & Martínez, 2014; Ofer-Friedman et al., 2015; Tamma et al., 2015; Gutiérrez-Gutiérrez et al., 2016; Harris et al., 2018;
7	<i>E. coli</i> , <i>Klebsiella</i> spp. (except <i>K. aerogenes</i>), <i>Raoultella</i> spp.	cefotaxime, ceftriaxone, ceftazidime, cefepime,	cefotaxime, ceftriaxone, ceftazidime, cefepime	IF resistant to any 3rd generation (cefotaxime, ceftriaxone, ceftazidime) or 4th generation (cefepime) cephalosporin and susceptible to another 3 rd or 4 th generation cephalosporin THEN report each as tested and enclose a warning on uncertain therapeutic outcome for infections other than urinary tract infections.	This phenotype is most often caused by ESBL production. Available evidence indicates that the cephalosporin phenotype predicts treatment outcome, although there is still a paucity of clinical data outside the urinary tract.	A	Thauvin-Eliopoulos, Tripodi, Moellering, & Eliopoulos, 1997; Bin et al., 2006; Chopra et al., 2012; Lee et al., 2013; Lee et al., 2015

https://www.eucast.org/fileadmin/src/media/PDFs/EUCAST_files/Expert_Rules/2024/ExpertRules_V3.3_20240630_Enterobacterales.pdf

Reporting of ESBL-producing Enterobacterales



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Research

JAMA | Original Investigation

Effect of Piperacillin-Tazobactam vs Meropenem on 30-Day Mortality for Patients With *E coli* or *Klebsiella pneumoniae* Bloodstream Infection and Ceftriaxone Resistance A Randomized Clinical Trial

Patrick N. A. Harris, MBBS; Paul A. Tambyah, MD; David C. Lye, MBBS; Yin Mo, MBBS; Tau H. Lee, MBBS; Mesut Yilmaz, MD; Thamer H. Alenazi, MD; Yaseen Arabi, MD; Marco Falcone, MD; Matteo Bassetti, MD, PhD; Elda Righi, MD, PhD; Benjamin A. Rogers, MBBS, PhD; Souha Kanj, MD; Hasan Bhalily, MBBS; Jon Iredell, MBBS, PhD; Marc Mendelson, MBBS, PhD; Tom H. Boyles, MD; David Looke, MBBS; Spiros Miyakis, MD, PhD; Genevieve Walls, MB, ChB; Mohammed Al Khamis, MD; Ahmed Zikri, PharmD; Amy Crowe, MBBS; Paul Ingram, MBBS; Nick Daneman, MD; Paul Griffin, MBBS; Eugene Athan, MBBS, MPH, PhD; Penelope Lorenc, RN; Peter Baker, PhD; Leah Roberts, BSc; Scott A. Beatson, PhD; Anton Y. Peleg, MBBS, PhD; Tiffany Harris-Brown, RN, MPH; David L. Paterson, MBBS, PhD; for the MERINO Trial Investigators and the Australasian Society for Infectious Disease Clinical Research Network (ASID-CRN)

Key Points

Question Can piperacillin-tazobactam be used as carbapenem-sparing therapy in patients with bloodstream infections caused by ceftriaxone-resistant *Escherichia coli* or *Klebsiella pneumoniae*?

Findings In this noninferiority randomized clinical trial that included 391 patients with *E coli* or *K pneumoniae* bloodstream infection and ceftriaxone resistance, the 30-day mortality rate for patients treated with piperacillin-tazobactam compared with meropenem was 12.3% vs 3.7%, respectively. The difference did not meet the noninferiority margin of 5%.

Meaning These findings do not support piperacillin-tazobactam compared with meropenem for these infections.

Reporting of ESBL-producing Enterobacterales

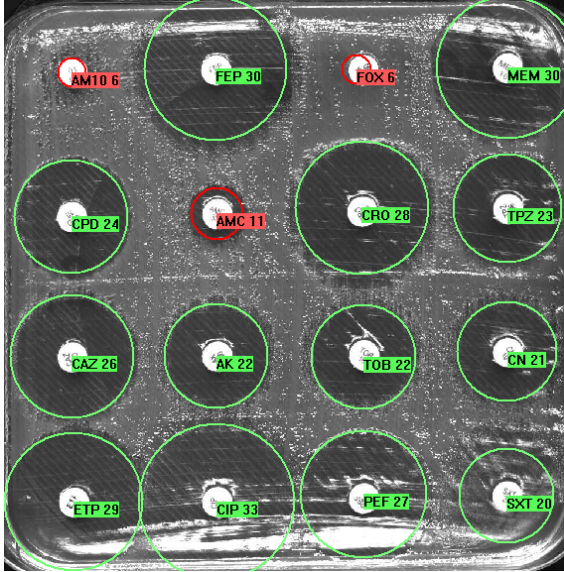


Reporting strategy	Antibiotics affected	Laboratories
Discouraging comment	3/4GC	8
	AMC	1
	3/4GC + AMC	1
	3/4GC + AMC + TZP	13
Suppress AST result	3/4GC	1
	3/4GC + AMC	2
	3/4GC + AMC + TZP	3
Modify to resistant	AMC + TZP	1
	3/4GC + AMC	1
	3/4GC + AMC + TZP	2
Mixed strategies	Comment 3/4GC + modify 3/4GC	1
	Suppress 3/4GC + modify AMC	1
	Modify 3/4GC + suppress AMC	1
	Suppress 3/4GC + AMC + comment TZP	1
	Comment 3/4GC + modify AMC	1
No modification/comment		3

3/4GC: third- and fourth-generation cephalosporins | AMC: amoxicillin-clavulanic acid | TZP: piperacillin-tazobactam

Reporting of the intrinsic AmpC-producing-Enterobacterales

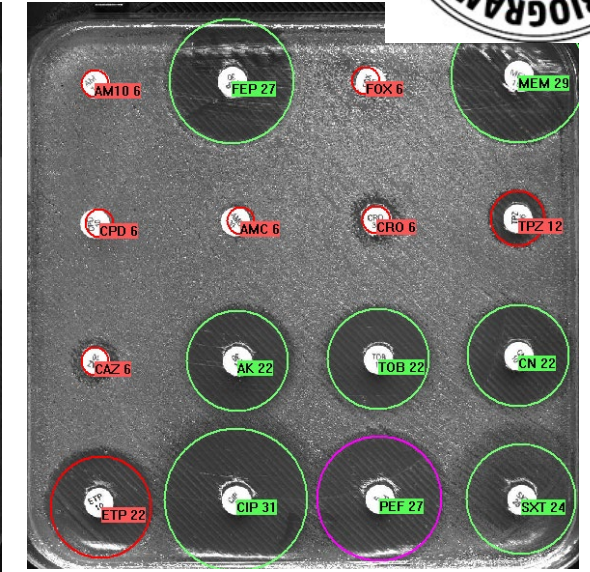
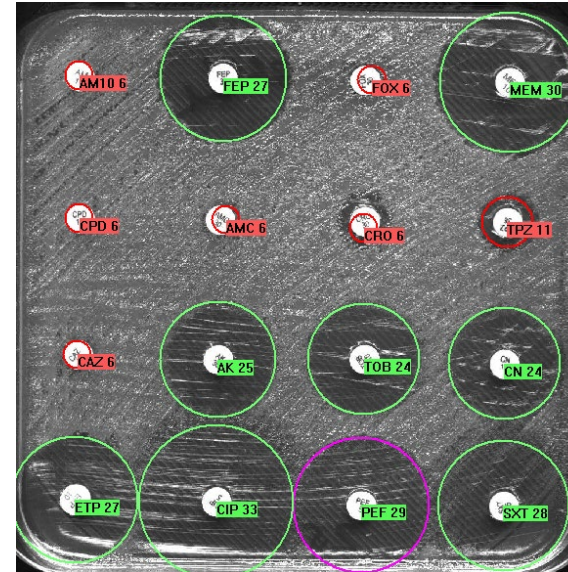
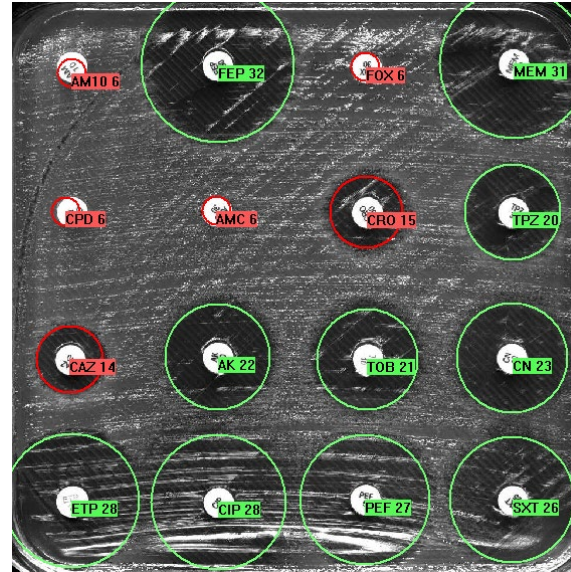
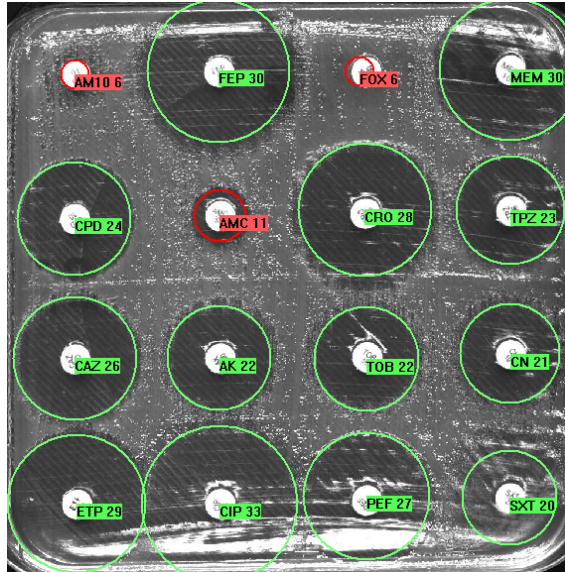
Enterobacter cloacae



ATB	Klinische Kategorie
Ampi	R
Amoxi-Clav	R
Pip-Tazo	S
Ceftriaxon	S
Ceftazidim	S
Cefepim	S
Ertapenem	S
Meropenem	S

Reporting of the intrinsic AmpC-producing-Enterobacterales

Enterobacter cloacae



ATB	Klinische Kategorie
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ATB	Klinische Kategorie
Ampi	R
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Pip-Tazo	R
Ceftriaxon	R
Ceftazidim	R
Cefepim	S
Ertapenem	R
Meropenem	S

AM/AMC → CPD → CAZ/CRO → TPZ → FEP → ETP (+Porin defects) → MEM

Reporting of the intrinsic AmpC-producing-Enterobacterales



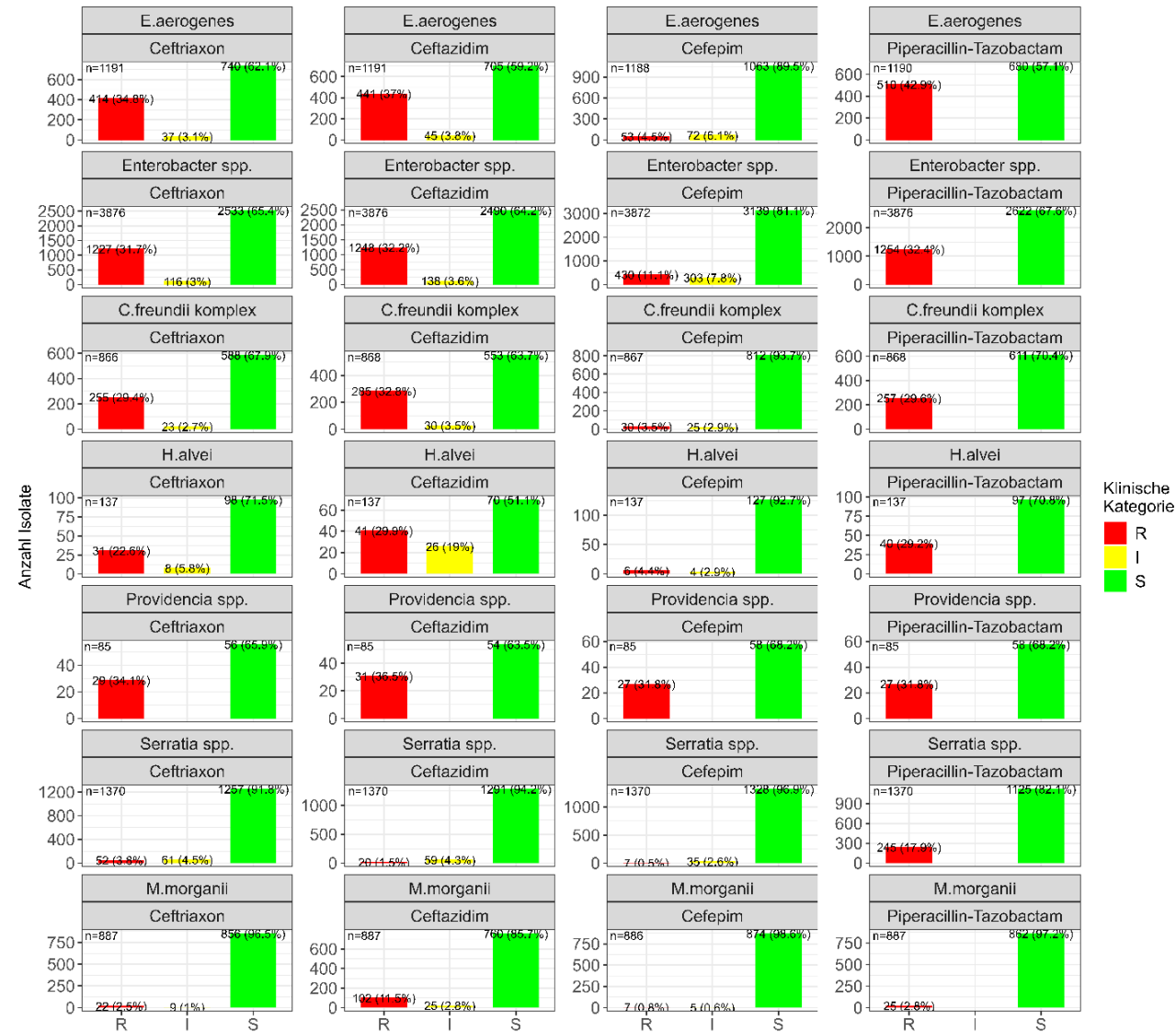
EUCAST Expert Rules v 3.3 on Enterobacterales

Rule No.	Organisms	Indicator Agent*	Agents affected*	Rule	Remarks	Grade	References
Beta-Lactams							
3	<i>Enterobacter</i> spp., <i>K. aerogenes</i> , <i>Citrobacter freundii</i> †, <i>Hafnia alvei</i>	cefotaxime, ceftriaxone, ceftazidime	cefotaxime, ceftriaxone, ceftazidime, piperacillin±tazobactam	IF susceptible in vitro to cefotaxime, ceftriaxone, ceftazidime, or piperacillin±tazobactam THEN EITHER add a note that monotherapy with cefotaxime, ceftriaxone, ceftazidime or piperacillin±tazobactam as well as combination therapy of these agents with an aminoglycoside should be discouraged owing to risk of selecting resistance, OR suppress the susceptibility testing results for these agents	Selection of AmpC de-repressed cephalosporin-resistant mutants may occur during therapy. The risk is relatively high in <i>Enterobacter</i> spp, <i>K. aerogenes</i> and <i>C. freundii</i> and low in <i>M. morgani</i> and <i>S. macescens</i> . For <i>Hafnia alvei</i> in-vitro mutation rates are similar to <i>Enterobacter</i> spp. or <i>C. freundii</i> . The use of a 3rd generation cephalosporin in combination with an aminoglycoside may also lead to failure by selection of resistant mutants. The combination with a quinolone, however, has found to be protective, although the clinical utility of this combination is not known The selection risk is absent or much diminished for cefepime	A	Sanders & Sanders, 1988; Choi et al., 2008; Harris & Ferguson, 2012; Kohlmann, Bähr, & Gatermann, 2018 Maillard et al 2023
4	<i>Serratia</i> spp., <i>Morganella morganii</i> , <i>Providencia</i> spp	cefotaxime, ceftriaxone, ceftazidime	cefotaxime, ceftriaxone and ceftazidime	IF susceptible to cefotaxime, ceftriaxone or ceftazidime, THEN note that monotherapy with cefotaxime, ceftriaxone or ceftazidime may infrequently select resistant mutants		A	Sanders & Sanders, 1988; Choi et al., 2008; Harris & Ferguson, 2012; Kohlmann, Bähr, & Gatermann, 2018

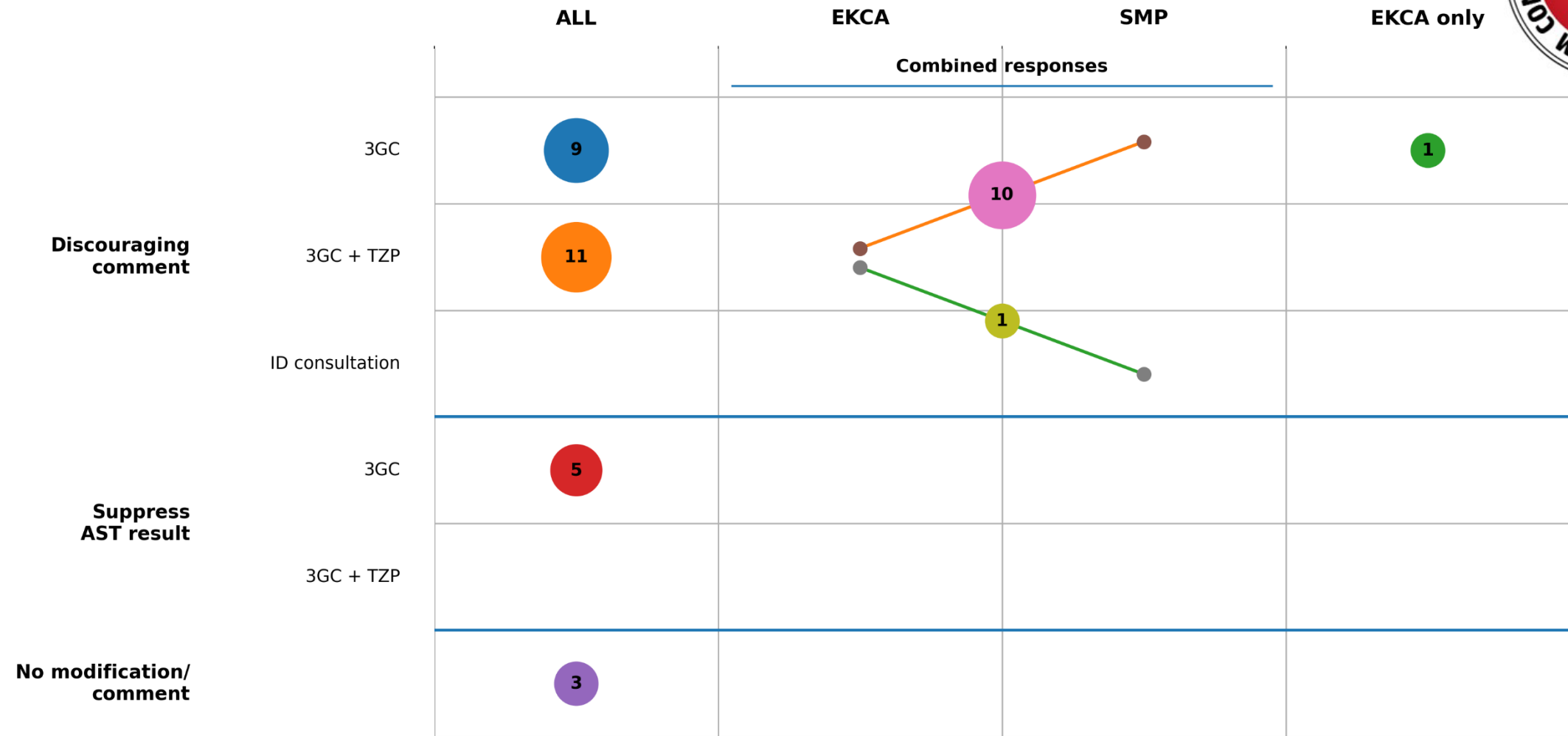
https://www.eucast.org/fileadmin/src/media/PDFs/EUCAST_files/Expert_Rules/2024/ExpertRules_V3.3_20240630_Enterobacterales.pdf

Reporting of the intrinsic AmpC-producing-Enterobacterales

AST Results at the IMM — All Clinical Isolates, 01.01.2020–31.12.2024

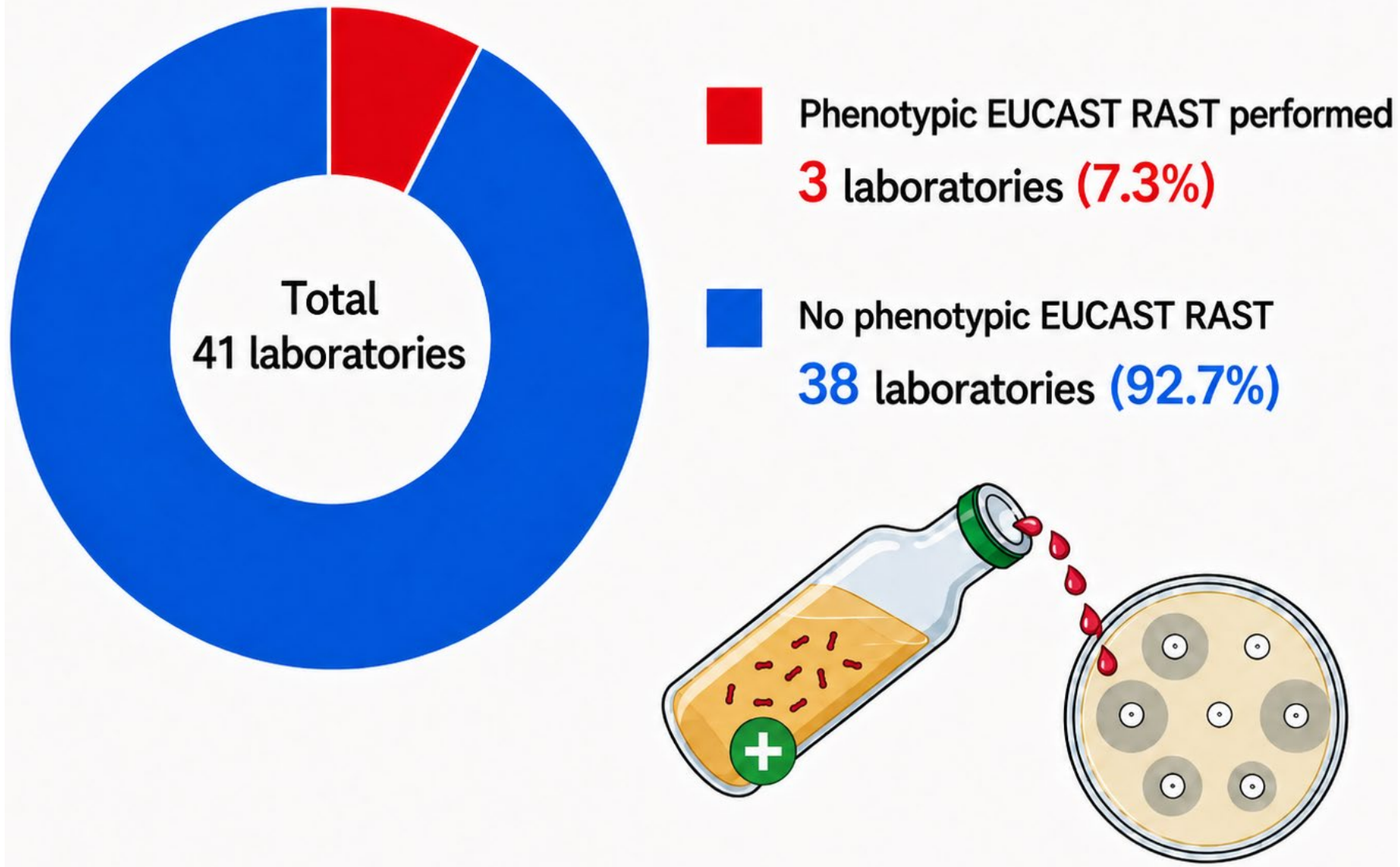


Reporting of the intrinsic AmpC-producing-Enterobacterales

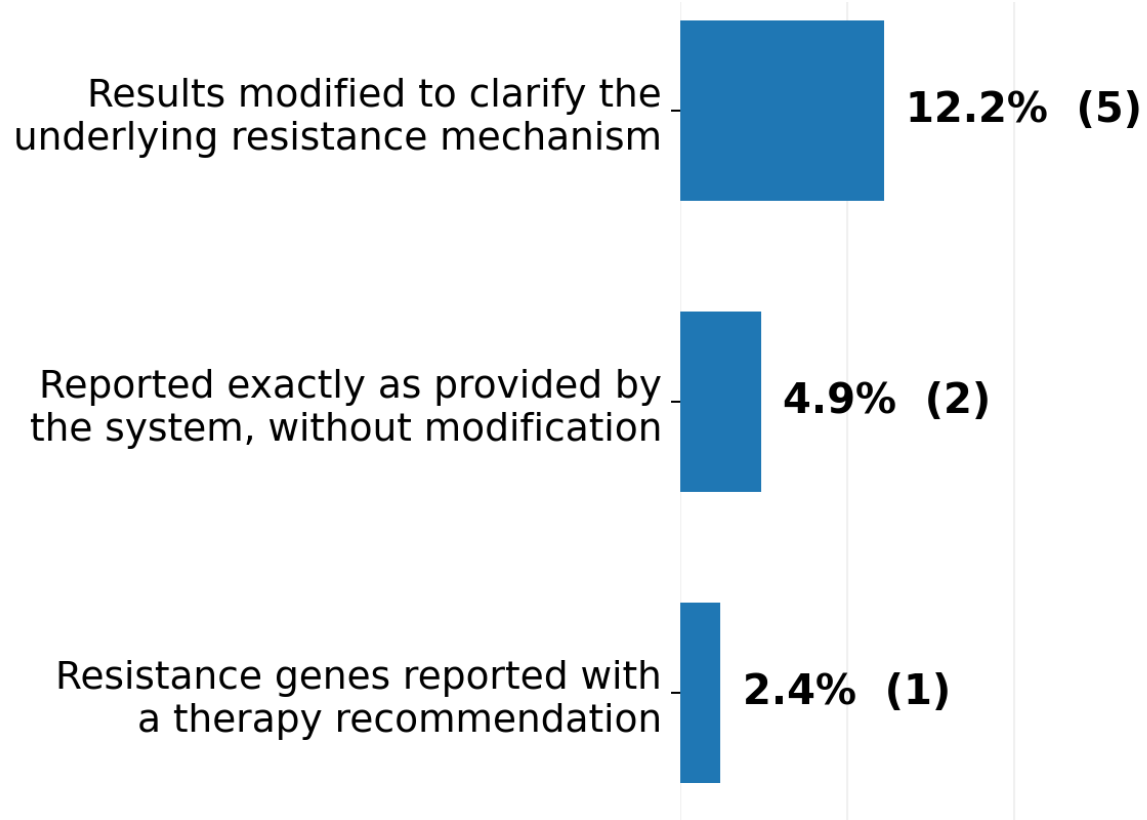


EKCA: Enterobacter spp., Klebsiella aerogenes, Citrobacter freundii and Hafnia alvei | SMP: Serratia spp., Morganella morganii and Providencia spp.
3GC: third-generation cephalosporins | TZP: piperacillin-tazobactam

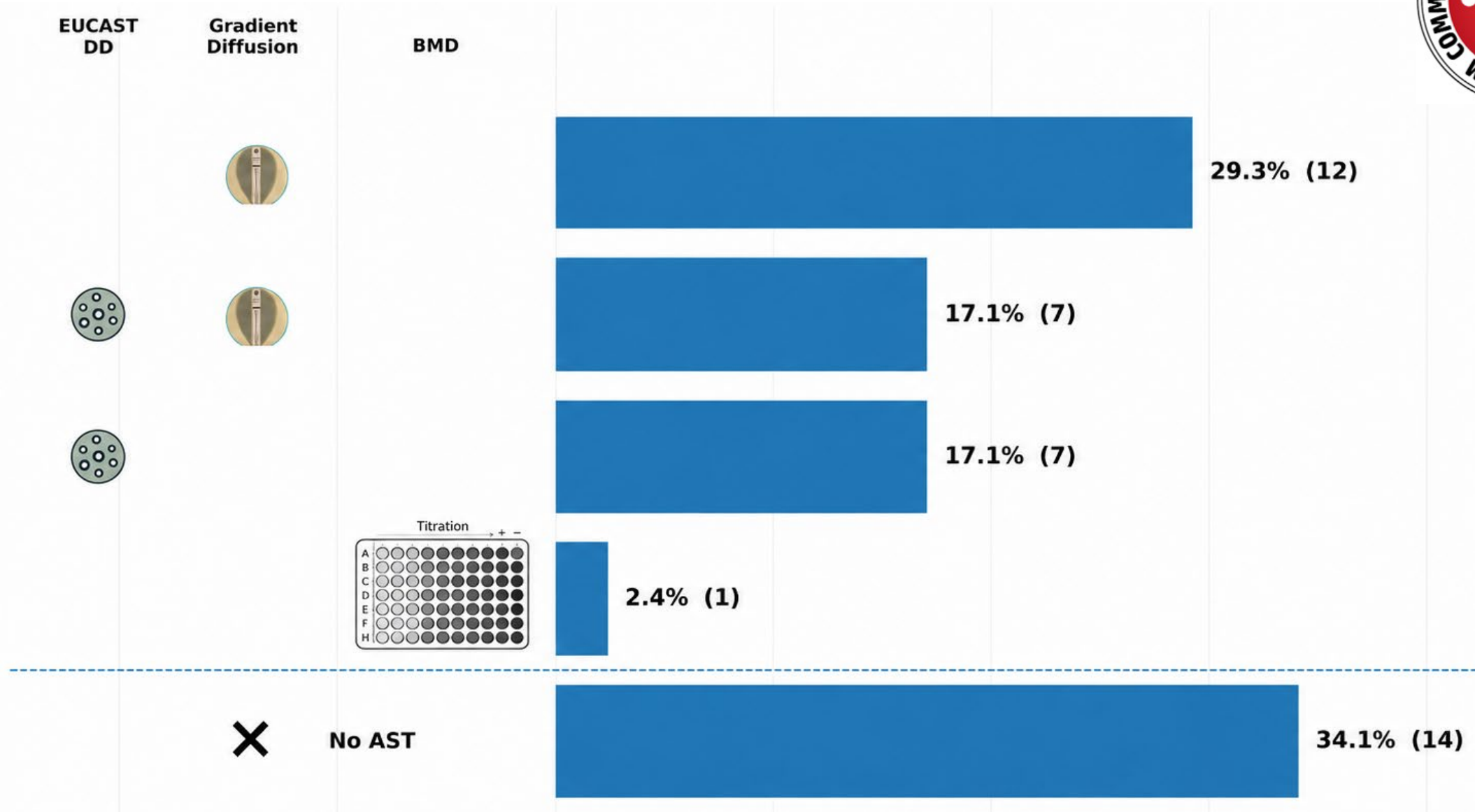
EUCAST Rapid Antimicrobial Susceptibility Testing (RAST) from positive blood cultures



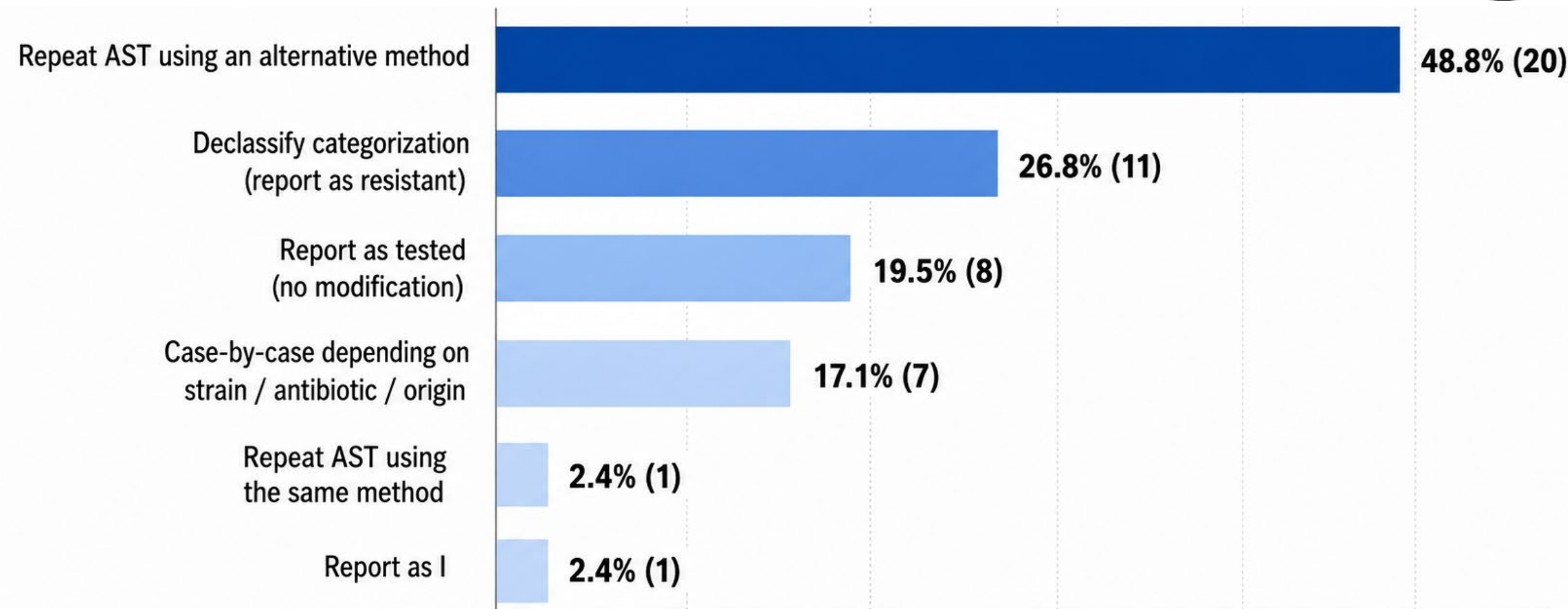
Reporting of resistance genes detected from positive blood cultures (n=8)



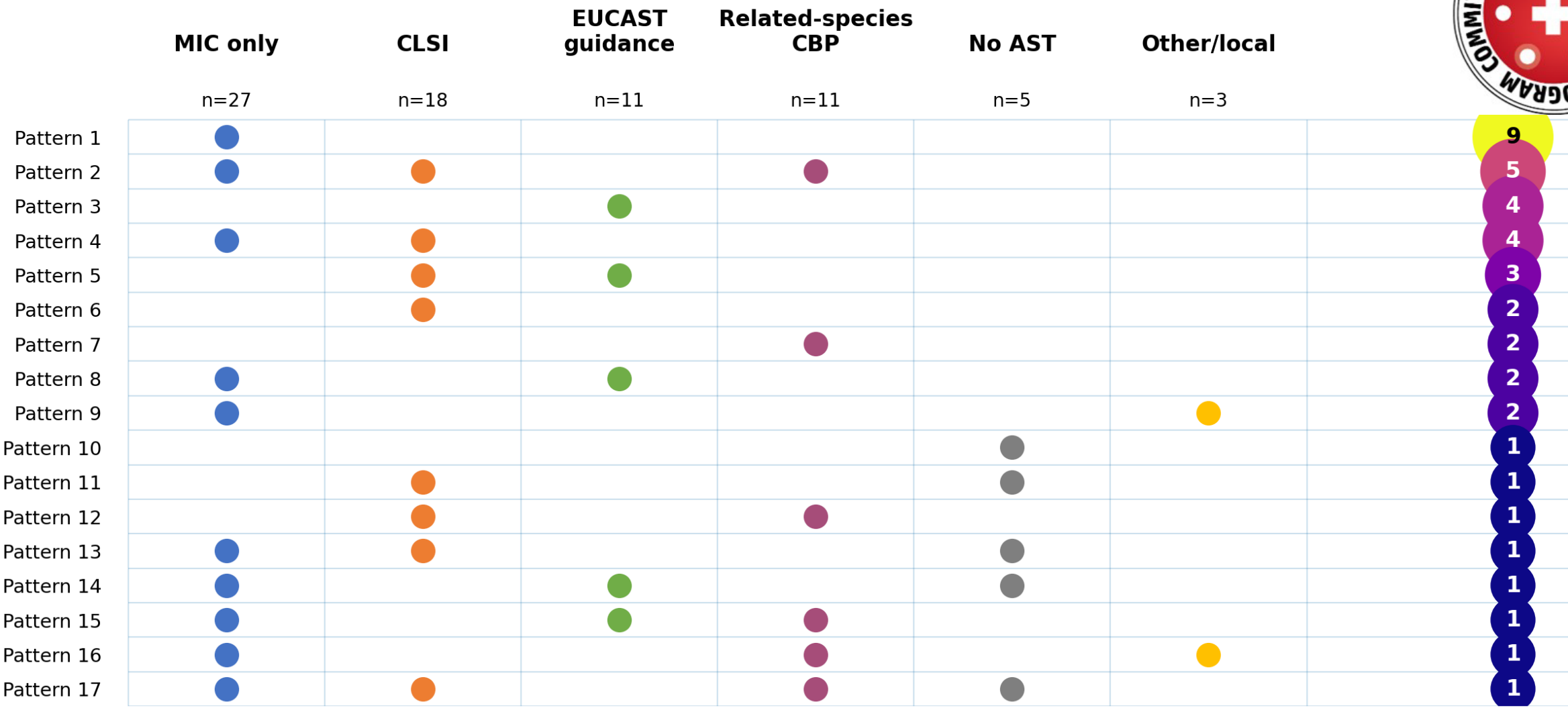
AST for anaerobic bacteria



Handling with the Area of Technical Uncertainty (ATU)



When there are no EUCAST CBPs



● MIC without interpretation
● CLSI CBPs

● EUCAST no-breakpoint guidance
● EUCAST related-species CBP

● No AST
● Other/local approach

Conclusions



- Swiss laboratories show broad adherence to EUCAST recommendations
- Variability remains in AST methodological practices and managing special situations (ATU, lack of EUCAST CBPs)
- High variability persists in AST reporting of ESBL/AmpC-producing Enterobacterales
- These findings support future national harmonization efforts and guideline development

When EUCAST takes inspiration from SAC ...

