Susceptibility testing methods used in Europe

Does it make a difference?

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Susceptibility testing methods used in Europe. Does it make a difference?

- Sources of information
- Guidelines used
- Methods used
- Performance in NEQAS related to guidelines and methods

Participants in EARSS (2007) and UK NEQAS (2005) networks

	EARSS	NEQAS
Austria	36	43
Belgium	98	4
Bulgaria	26	0
Croatia	27	3
Czech Republic	50	0
Finland	14	24
France	57	0
Germany	22	2
Greece	46	11
Hungary	26	0
Ireland	44	41
Italy	50	111
Netherlands	25	19
Poland	74	0
Portugal	24	54
Romania	37	28
Spain	42	0
Sweden	22	26
Switzerland	0	22
United Kingdom	59	286
Other (13)	110	39

Guidelines used by participants in UK NEQAS 2007 and EARSS 2003

Guideline	NEQAS, No. (%) labs	EARSS, No. (%) labs
CLSI (NCCLS)	368 (53.7)	460 (62.4)
BSAC	203 (29.6)	25 (3.4)
SRGA	33 (4.8)	25 (3.4)
NWGA	4 (0.6)	0
CRG	5 (0.7)	5 (0.7)
CZECH	0	8 (1.1)
DIN	0	8 (1.1)
FIRE	0	2 (0.3)
MENSURA	0	3 (0.4)
CA-SFM	2 (0.3)	22 (3.0)
Others / >1 / no data	71 (10.3)	179 (24.3)
TOTAL	686	737

Methods used by participants in UK NEQAS 2007

Method	No. labs(%)
Disc diffusion	417 (60.8)
Automated	222 (32.4)
MIC	22 (3.2)
Breakpoint	22 (3.2)
Other/not stated	3 (0.1)

Methods used by participants in UK NEQAS 2007

Method	CLSI n (%)	BSAC n (%)	SRGA n (%)
Disc diffusion	150 (41)	175 (86)	26 (79)
Automated	199 (54)	14 (7)	2 (6)
MIC	6 (2)	6 (3)	5 (15)
Breakpoint	12 (3)	6 (3)	0 (0)
Other/not stated	1 (1)	2 (1)	0 (0)

Do laboratories in Europe comply with recommendations in guidelines claimed to be used?

- Intermediate results in BSAC method for organism/antimicrobial combinations where there is no intermediate category (UK NEQAS)
  - Ceftazidime intermediate *E. coli* (before "I" introduced)
  - Tetracycline intermediate *S. aureus*
- Interpretations with agents not included in CLSI guidelines (UK NEQAS)
  - Fusidic acid with *S. aureus* (234 laboratories)
  - Mupirocin with *S. aureus* (108 laboratories)
- Failure to detect resistance when clearly demonstrated in UK NEQAS reference tests
  - MRSA

Performance related to guidelines

Susceptibility testing of *E. coli* specimen 8508 to ampicillin (MIC 4-8 mg/L)

Method	Breakpoints	S n (%)	I n (%)	R n (%)
BSAC	S≤8 R>16	173 (91)	3 (2)	13(7)
CLSI	S≤8 R>16	325(90)	23 (6)	13 (4)
SRGA	S≤1 R>8	3 (14)	17 (77)	2 (9)

Susceptibility testing of *Neisseria gonorrhoeae* specimen 8482 to ciprofloxacin (MIC 0.5 mg/L)

Method	Breakpoints	S n (%)	I n (%)	R n (%)
BSAC	S≤0.03 R>0.06	14 (8)	4 (2)	166 (90)
CLSI	S≤0.06 R>0.5	73(26)	117 (41)	93 (33)
SRGA	S≤0.03 R>0.06	2 (7)	0 (0)	28 (93)

Changes in breakpoints may affect reporting

S aureus 7240, Ciprofloxacin MIC 0.5 mg/L

Method	Breakpoints	S	I	R
BSAC	S≤1 R>1	167	0	1
CLSI	S≤1 R>2	334	5	4
SRGA	S≤0.06 R>2	3	19	0

S aureus 7876, Ciprofloxacin MIC 0.25 mg/L

Method	Breakpoints	S	I	R
BSAC	S≤1 R>1	176	0	1
CLSI	S≤1 R>2	350	0	0
SRGA	S≤1 R>1	23	2	1

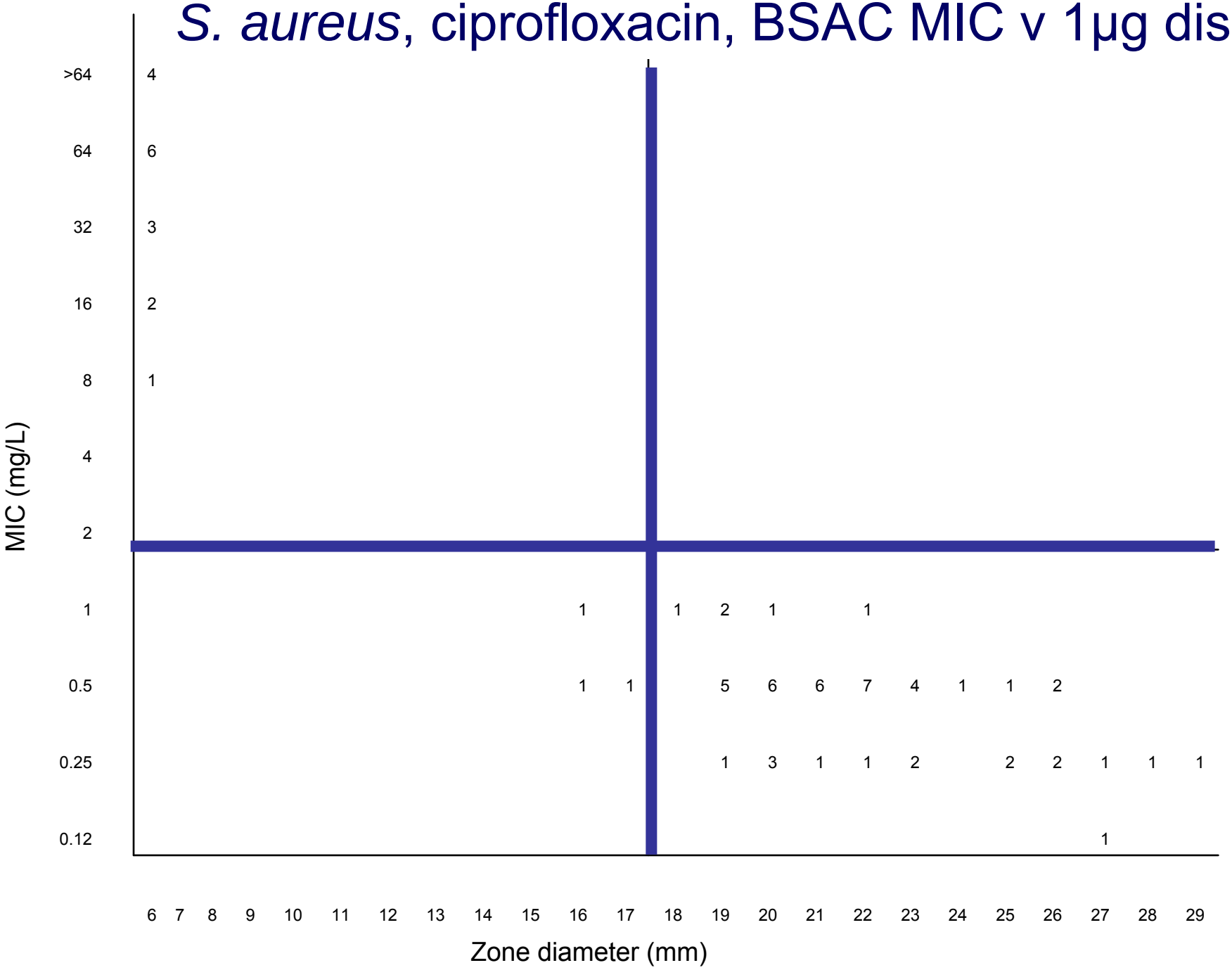
EUCAST breakpoints S≤1 R>1 mg/L

Performance related to methods

Susceptibility testing of *S. aureus* specimen 8578 to ciprofloxacin (MIC 1 mg/L)

Method	Breakpoints	S n (%)	I n (%)	R n (%)
BSAC	S≤1 R>1	97 (53)	3 (2)	83(45)
CLSI	S≤1 R>2	328(93)	20 (6)	4 (1)
SRGA	S≤1 R>1	19 (90)	1 (5)	1 (5)

S. aureus, ciprofloxacin, BSAC MIC v 1µg disc



Detection of oxacillin/cefoxitin resistance in *mecA* positive *S aureus*

Organism	Oxacillin MIC (mg/L)	Oxacillin		Cefoxitin	
		n	%R	n	%R
7240	16->128	535	81	48	98
8248	64->128	609	94.9	162	99.4
7538	128->128	614	99	77	99
7597	>128	590	96	77	99
7659	>128	647	99.5	85	100
7703	>128	626	98.7	106	96.2

Reporting penicillinase-hyperproducers

S aureus 7876, Dist 2020

Oxacillin MIC 0.5-1 mg/L, *mecA*-ve, Susceptible

Guideline	Oxacillin		Cefoxitin	
	n	%S	n	%S
All	619	88	120	100

Reporting *S. epidermidis* (specimen 7156) with reduced susceptibility to teicoplanin (MIC 8-16 mg/L)

Method	Breakpoints (mg/L)	S n (%)	I n (%)	R n (%)
BSAC	S≤4 R>4	84 (53)	8 (5)	67 (42)
CLSI	S≤8 R>16	105 (31)	141 (42)	92 (27)
SRGA	S≤4 R>4	11 (50)	2 (9)	9 (41)

Methods used for testing *S. epidermidis* (specimen 7156) with reduced susceptibility to teicoplanin (MIC 8-16 mg/L)

Method	S n (%)	I n (%)	R n (%)
Disc	148 (60)	47 (19)	52 (21)
Automated	31 (19)	70 (43)	62 (38)
MIC	9 (11)	23 (27)	52 (62)
Breakpoint	2 (11)	4 (21)	13 (68)

NEQAS reports for enterococci with VanB glycopeptide resistance

E. faecium 7826

Vancomycin MIC 8-16 mg/L, I/R

Method	Breakpoints (mg/L)	S n (%)	I n (%)	R n (%)
BSAC	S≤4 R>8	84 (42)	8 (4)	108 (54)
CLSI	S≤4 R>16	40 (10)	52 (14)	288 (76)
SRGA	S≤4 R>8	14 (38)	0	23 (62)

NEQAS reports for enterococci with VanB glycopeptide resistance

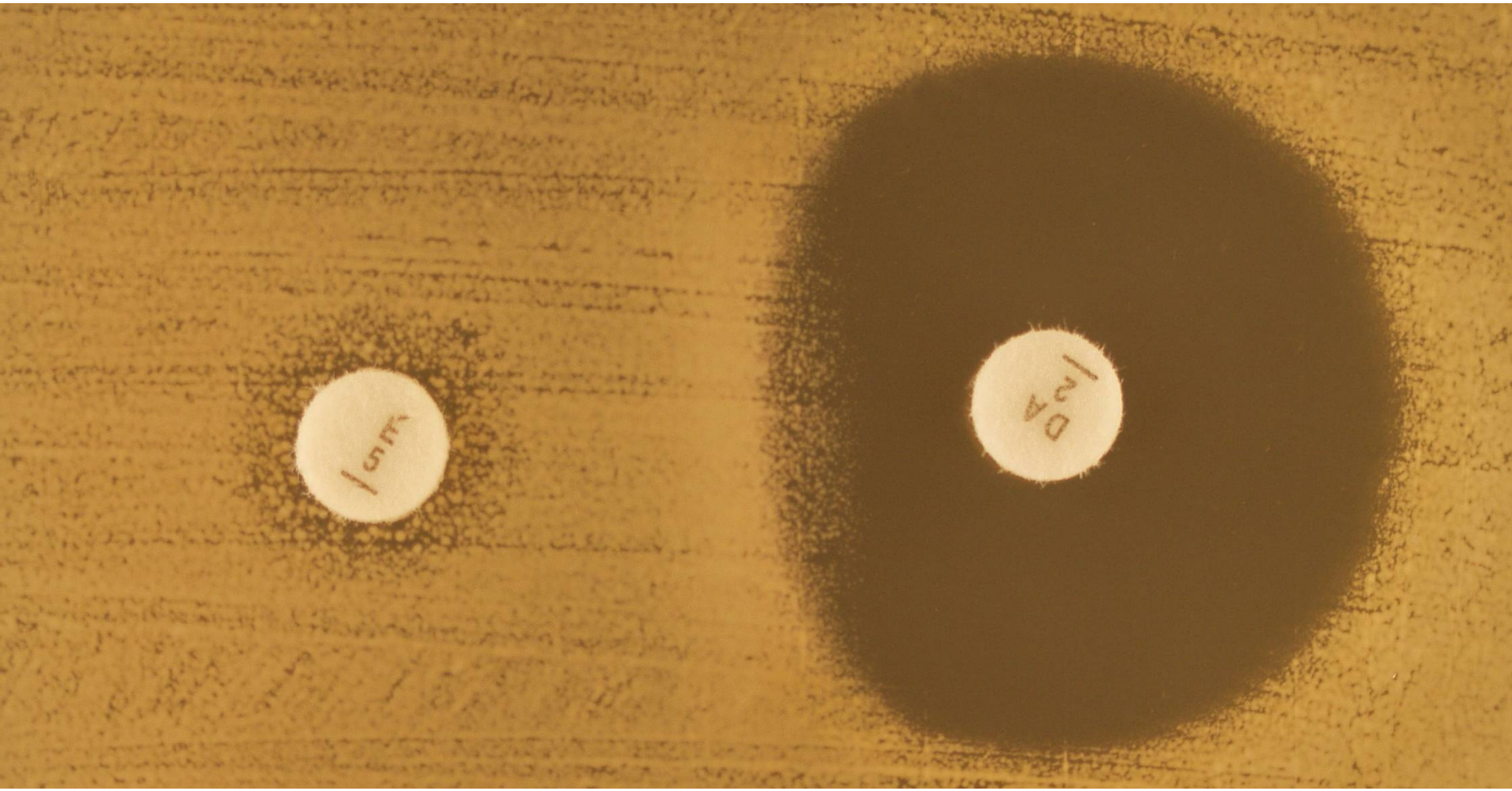
E. faecium 7826

Vancomycin MIC 8-16 mg/L, I/R

Method	S n (%)	I n (%)	R n (%)
Disc	122 (37)	37 (11)	173 (52)
Automated	8 (4)	12 (6)	188 (90)
MIC	7 (13)	9 (17)	38 (70)
Breakpoint	3 (13)	2 (8)	19 (79)

Application of expert rules

S. aureus with dissociated resistance to clindamycin



BSAC “Use with caution (if at all)”

CLSI “Presumed resistant, but may be effective in some patients”

Interpretation of results for *S. aureus* specimen 8452 with clindamycin (dissociated resistance)

Test result → Reported result	Automated system, n (%)	Disc diffusion, n (%)
S→S	107 (65)	129 (41)
S→I	2 (1)	3 (1)
S→R	48 (29)	128 (41)
I→I	0	3 (1)
I→R	0	1 (1)
R→R	9 (5)	49 (15)

Susceptibility testing guidelines and methods used in Europe

- No comprehensive data and available data not entirely representative
- National guidelines largely followed in own countries, otherwise CLSI guidelines most widely used
- Disc diffusion methods most widely used but depends on the guidelines followed. Automated methods used in half of laboratories with CLSI
- Compliance with guidelines and methods unknown but some evidence that methods are not always strictly followed
- With some tests difference in performance by laboratories in UK NEQAS can be associated with breakpoint guidelines or methods