

Results from 2012 antimicrobial susceptibility testing External Quality Assessment (EQA) exercise organised for EARS-Net participants

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Introduction

The United Kingdom National External Quality Assessment Service for Microbiology (UK NEQAS) provides external quality assessment (EQA) for antimicrobial susceptibility testing for the European Antimicrobial Resistance Surveillance Network (EARS-Net - formerly EARSS) laboratories. In 2012, the annual EQA exercise was the third distribution in collaboration with European Centre for Disease Prevention and Control (ECDC) but the eleventh in succession to EARS-Net laboratories.

Antimicrobial resistance is a major topic in the public health arena across Europe.

Methods

An analysis was carried out on the performance of participants in the EQA exercise. Participation was invited from 880 laboratories in 31 countries and results were returned by 807 (92%) laboratories. The organisms distributed were single isolates of *K. pneumoniae*, *E. coli*, *S. pneumoniae*, *E. faecalis*, *P. aeruginosa*, and *S. aureus*. Participants' results for identification and antimicrobial susceptibility testing were assessed.

Country information

Countries that participated in the EARS-Net 2012 EQA exercise:

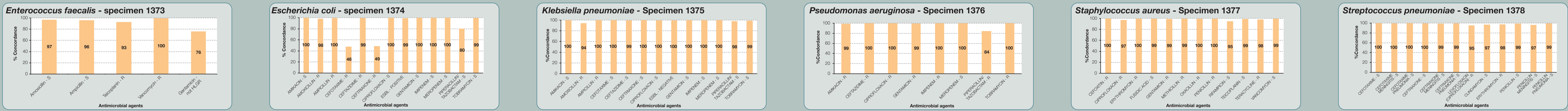
Austria	Estonia	Italy	Portugal
Belgium	Finland	Latvia	Romania
Bosnia & Herzegovina*	France	Lithuania	Slovenia
Bulgaria	Germany	Luxembourg	Spain
Croatia	Greece	Malta	Sweden
Cyprus	Hungary	Netherlands	Turkey
Czech Republic	Iceland	Norway	United Kingdom
Denmark	Ireland	Poland	

* Despite the best efforts of the country co-ordinator the despatch could not be cleared through airport customs

The objective of the EQA exercise was:

- to assess the ability of participating laboratories to identify antimicrobial resistance of clinical and public health importance
- to determine the accuracy of antimicrobial susceptibility test results reported by individual laboratories
- to assess the comparability of results between laboratories and countries and thus justify the pooling and comparison of routinely collected antimicrobial susceptibility test data across Europe
- education

Charts displaying participants' concordance with the intended result for each of the six specimens in the 2012 EQA panel.



Results

- The level of performance with these quality assessment specimens was generally high; concordance with the intended results was >95% for most agent-organism combinations
- Data are presented for some of the general findings and some of the discrepancies are highlighted.
- Where country specific data are shown this has been anonymised.

Results for identification were very good. The correct identification was reported by 99-100% of laboratories for all the organisms in the exercise. Chart 1 shows the method used by participants reporting the correct result.

Chart 1: EARS-Net 2012 - Correct Identification Results by Method

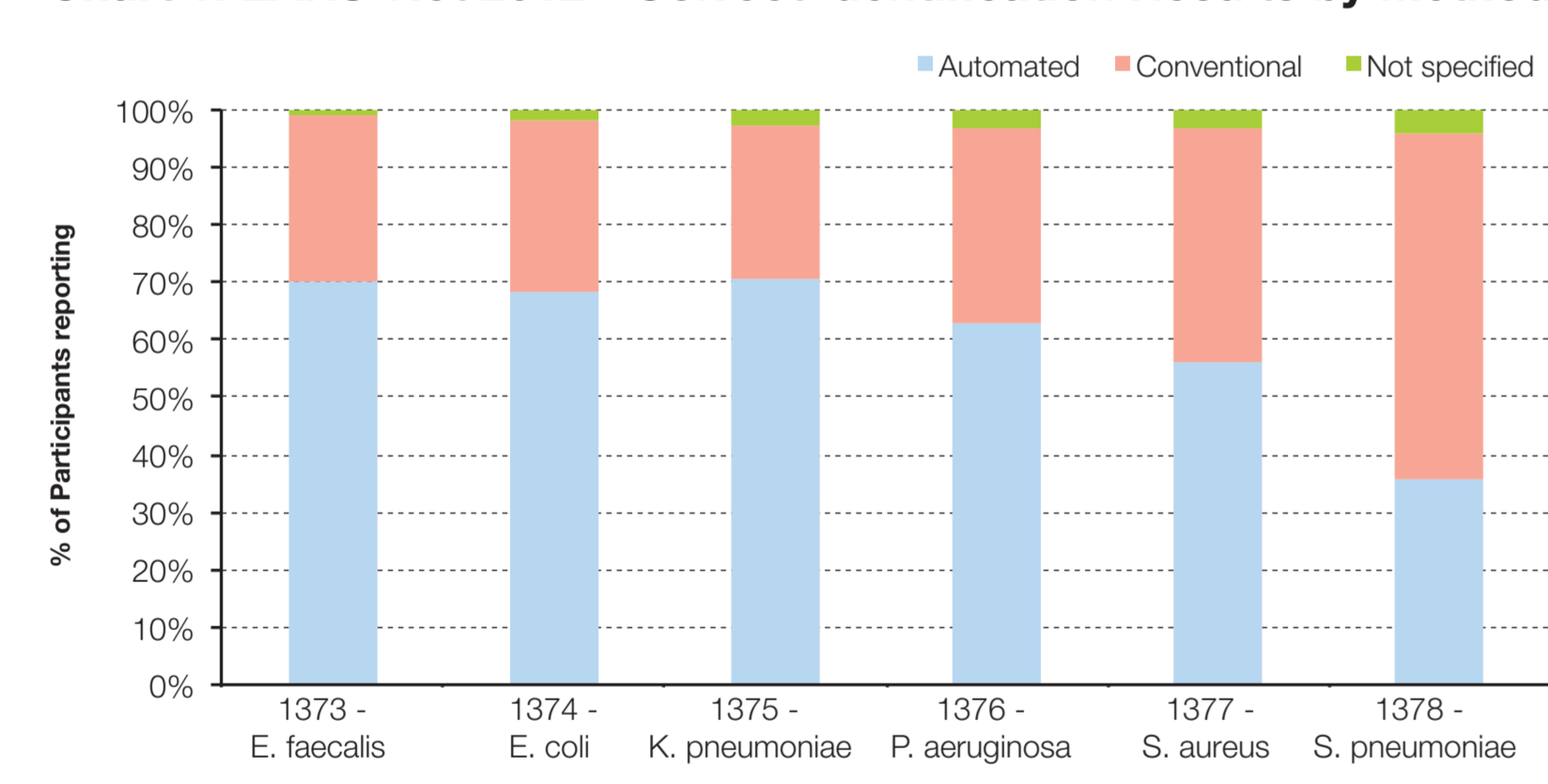
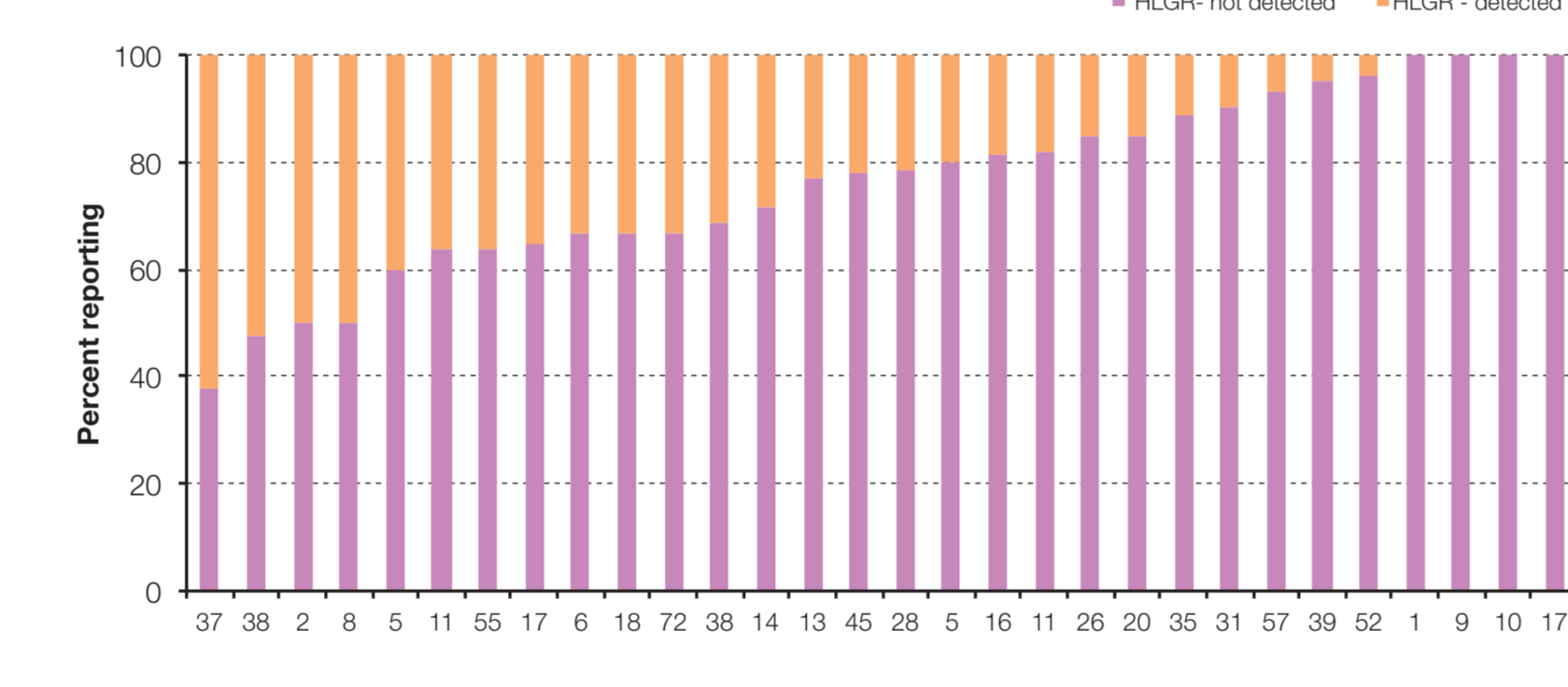


Chart 4
This organism is an *E. faecalis* with *vanA*-mediated glycopeptide resistance (resistant to vancomycin and teicoplanin). This organism was not high-level gentamicin resistant but 23.7% of participants incorrectly reported it high-level gentamicin resistant, very similar to error rates for an *E. faecium* without high-level gentamicin resistance in the 2011 EARS-Net EQA exercise.

Chart 4: *E. faecalis* [1373] - not high level gentamicin resistance (HLGR) Reporting by participants



Cefotaxime MICs were reported by 481 of 703 participants testing cefotaxime susceptibility, most using automated or gradient systems. Reported MICs were more variable than in reference tests, with 248 reporting cefotaxime MICs ≤1 mg/L (susceptible by EUCAST and CLSI breakpoints) and 225 reporting MICs >1 mg/L (intermediate or resistant by EUCAST and CLSI breakpoints). Among participants reporting cefotaxime MICs in the susceptible range 48.0% interpreted susceptible, 17.3% intermediate and 34.7% resistant, indicating that close to half of these laboratories were reporting "as found" (in line with current EUCAST and CLSI recommendations) and about half were probably editing susceptible results to intermediate or resistant, presumably because of the presence of an ESBL. Laboratories reporting cefotaxime MICs >1 mg/L would be expected to report intermediate or resistant and 96.5% reported either intermediate or resistant. Similar results were seen with ceftriaxone, for which MICs were reported by 136 of 376 participants testing ceftriaxone susceptibility. Sixty-five participants reported ceftriaxone MICs ≤1 mg/L (susceptible by EUCAST and CLSI breakpoints) and 70 reported MICs >1 mg/L (intermediate or resistant by EUCAST and CLSI breakpoints). Among participants reporting ceftriaxone MICs in the susceptible range 60.0% interpreted results as susceptible, 9.2% intermediate and 30.8% resistant. Among laboratories reporting ceftriaxone MICs >1 mg/L, 92.8% reported either intermediate or resistant.

Chart 8: Trends in antimicrobial susceptibility testing guidelines in EARS-Net

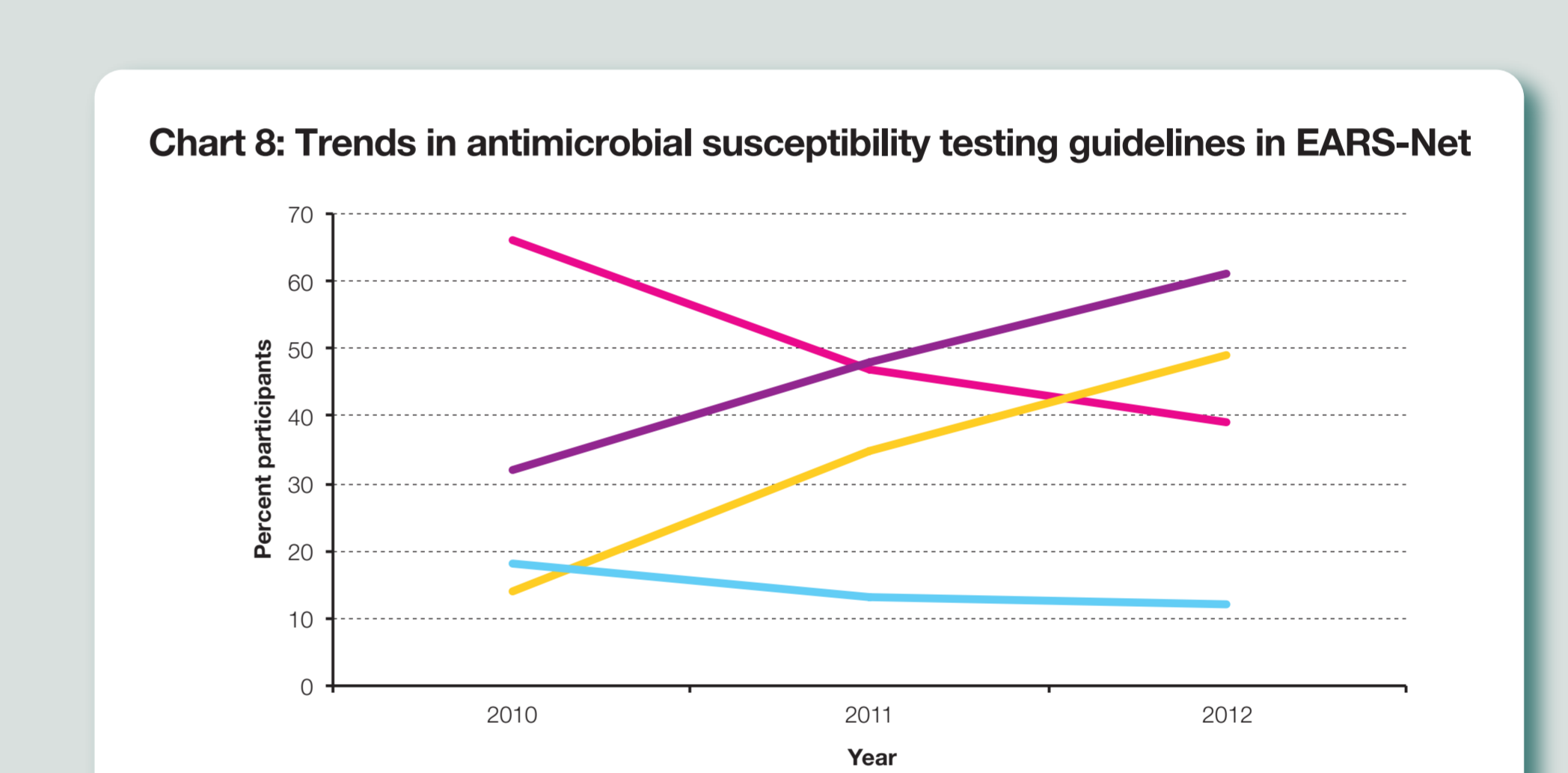


Chart 2 shows the antimicrobial susceptibility testing guidelines followed by the EARS-Net participants by country. Note that BSAC, DIN, NWGA, SFM and SRGA guidelines all follow EUCAST.

Chart 2: EARS-Net 2012 - Guidelines used by participants

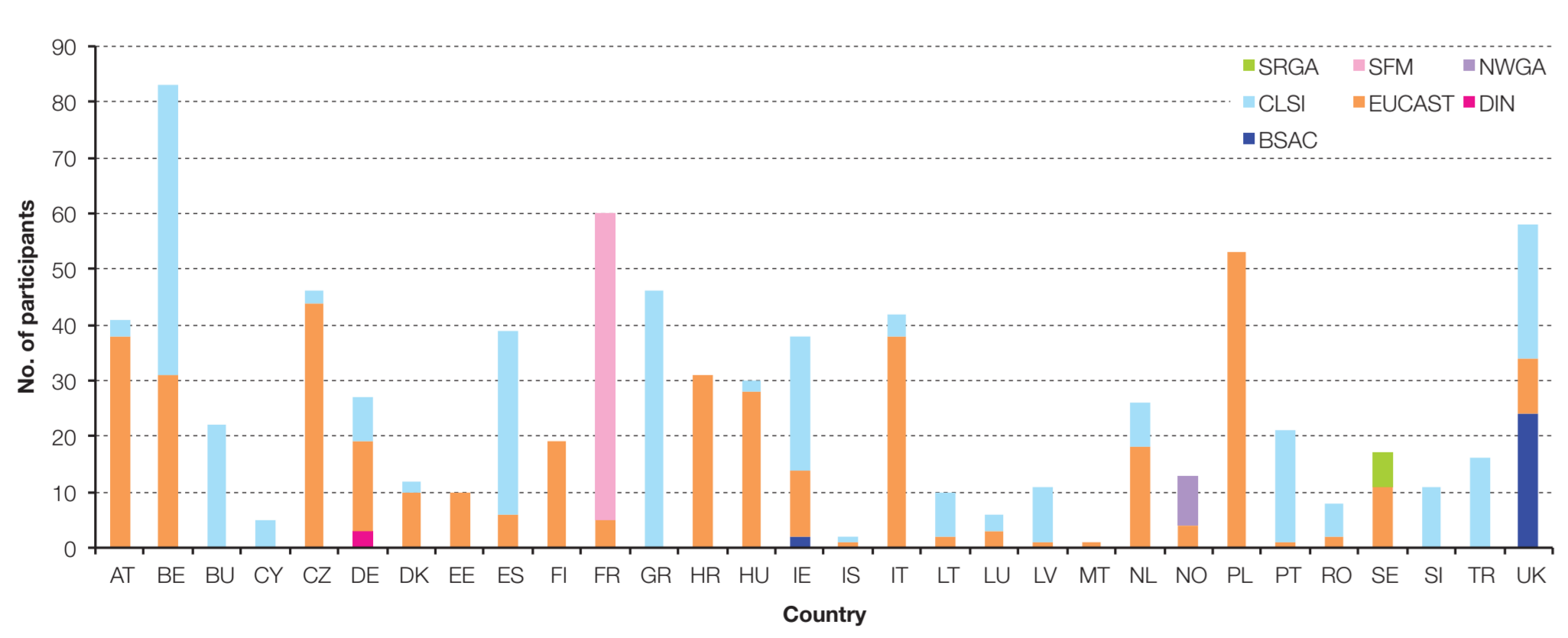


Chart 3 shows the methods used by participants related to guidelines followed. Automated (44%) and disk diffusion (34%) methods were most widely used.

Chart 3: Methods used

Guideline	Automated	Disk	Multiple	Others	Total	% guideline
BSAC	5	17	2	2	26	3.2
DIN	2	0	1	0	3	0.4
EUCAST	148	147	68	32	395	49.1
CLSI	177	79	29	26	311	38.6
NWGA	1	7	0	1	9	1.1
SFM	21	22	4	8	55	6.8
SRGA	0	4	2	0	6	0.8
Total	354	275	106	69	804	100
% method	44	34	13	9		100

Charts 5 and 6
This organism is an *E. coli* with a TEM-10 ESBL. As is often the case with borderline susceptibility, reporting of susceptibility categories was variable. For cefotaxime, 47.7% reported resistant, 25.0% intermediate and 27.3% susceptible, and for ceftriaxone, 48.7% reported resistant, 19.4% intermediate and 31.9% susceptible. While the majority of participants reported reduced susceptibility to cefotaxime and ceftriaxone, substantial minorities reported the isolate susceptible.

Chart 5: *E. coli* [1374] - ceftriaxone resistant Reporting by participants

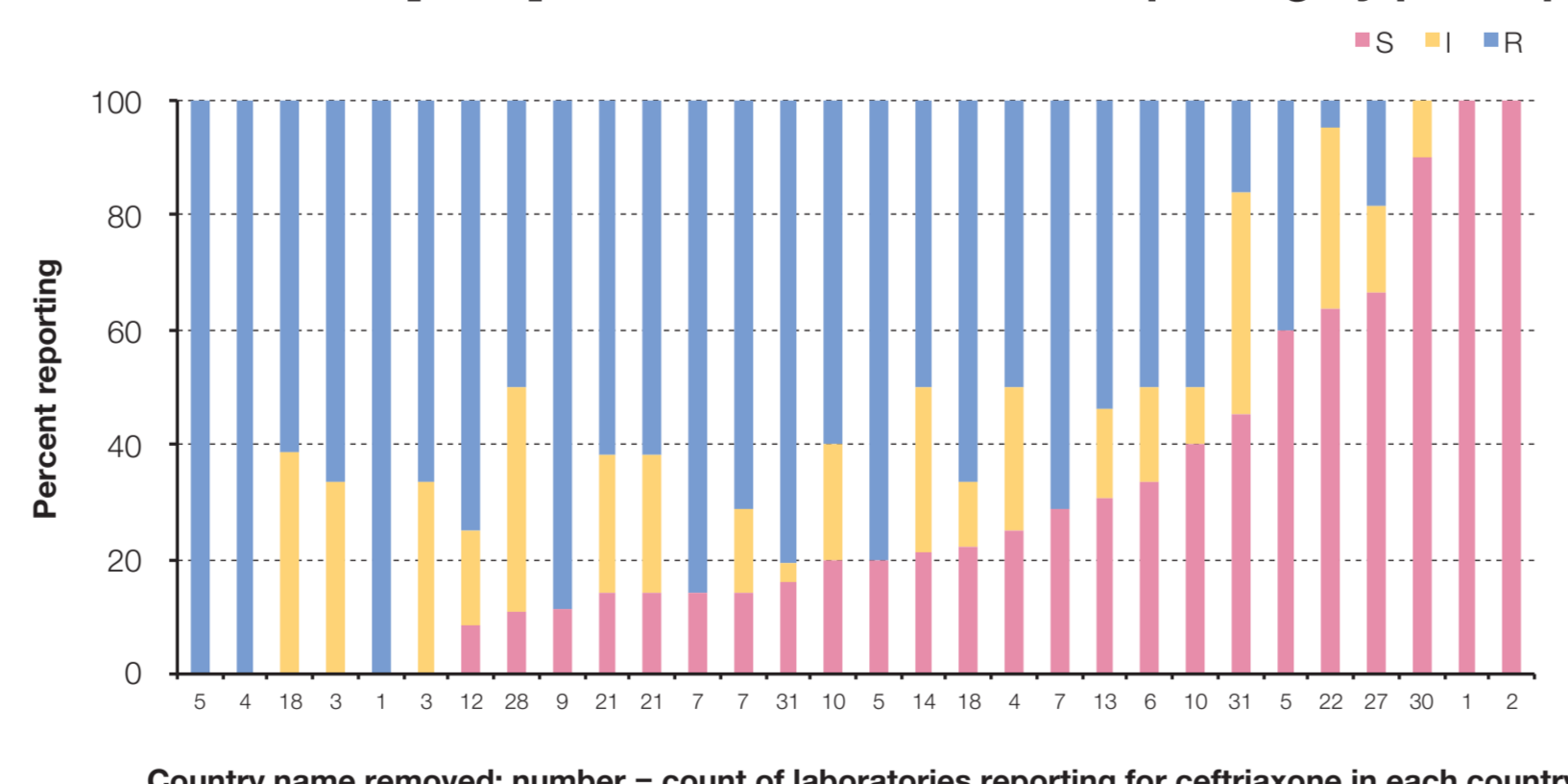


Chart 6: *E. coli* [1374] - cefotaxime resistant Reporting by participants

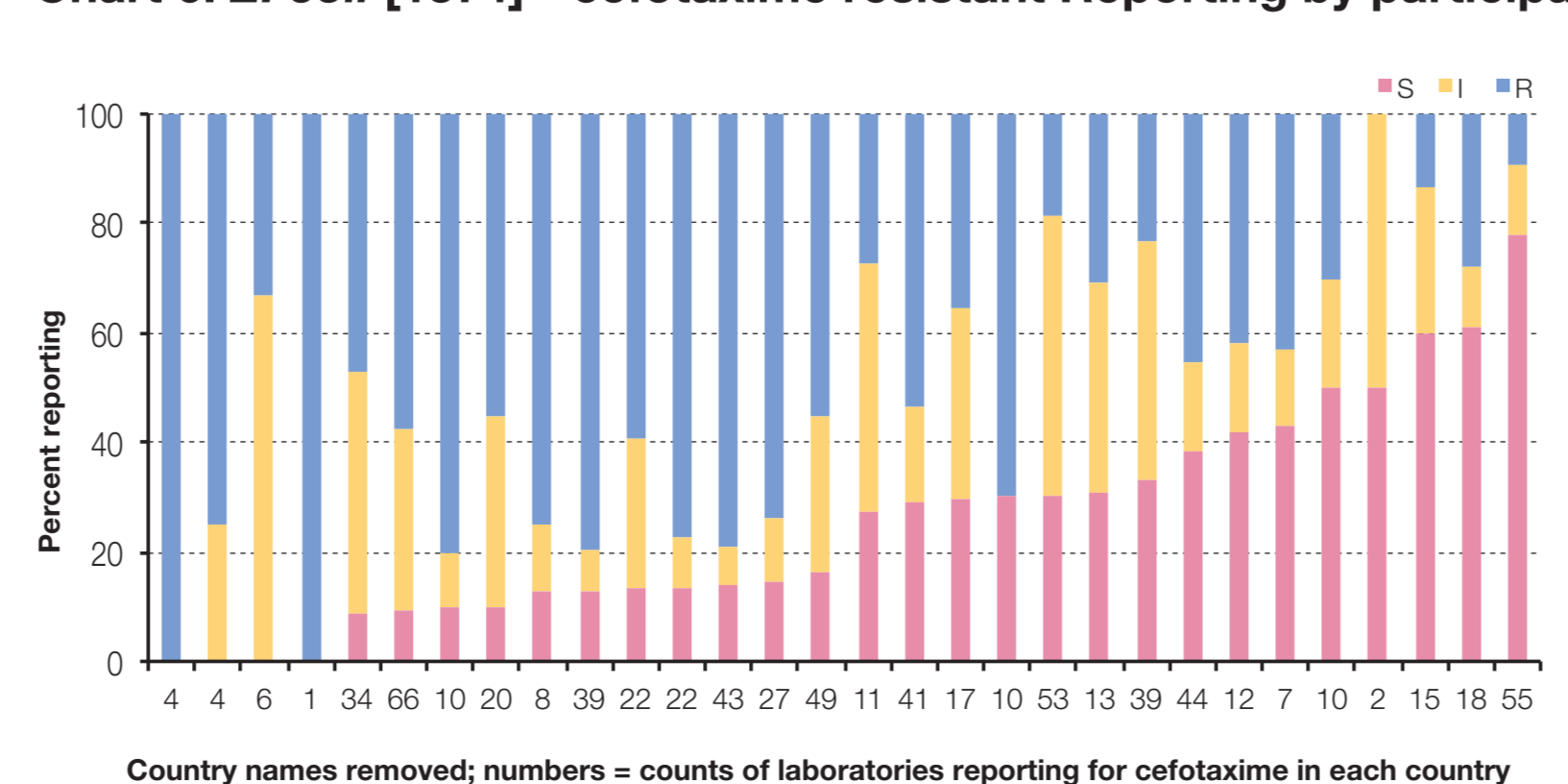
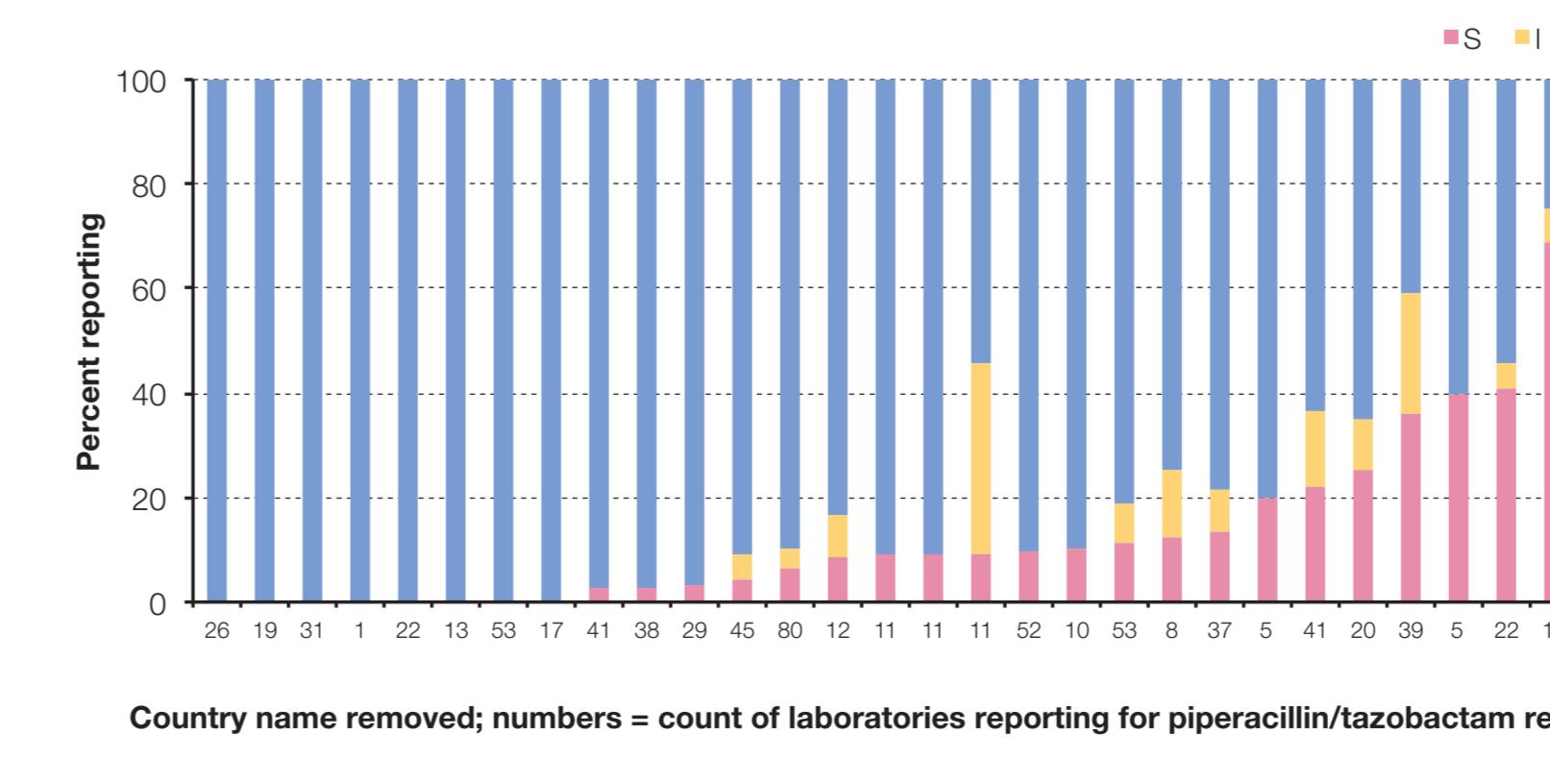


Chart 7
This organism is a *P. aeruginosa* resistant to all agents tested except piperacillin-tazobactam interpreted according to CLSI 2012 breakpoints (CLSI reduced the S breakpoint to S ≤16 mg/L in January 2013). Reference MICs for piperacillin-tazobactam ranged from 64 to ≥128 mg/L (concentration of tazobactam fixed at 4 mg/L), clearly resistant by EUCAST breakpoints (S ≤16, R >16 mg/L) but borderline by the much higher CLSI breakpoints (S ≤64, R ≥128 mg/L). Reports from participants were largely in line with breakpoints used, in that 95.3% of participants using EUCAST or EUCAST-related breakpoints reported resistant while only 66.7% of participants using CLSI breakpoints reported resistant.

Chart 7: *P. aeruginosa* [1376] - piperacillin/tazobactam resistant Reporting by participants



Conclusion

- Participant concordance for identification of the organisms was very good, as seen in previous years.
- Clear differences in reporting were seen where breakpoints for interpretation differ between guidelines.
- Variation in interpretation was seen with strain-antimicrobial agent combinations where MIC values were borderline.
- EQA is a valuable tool in the quality assurance of antimicrobial susceptibility testing and indicates the validity of comparing collated data between laboratories in resistance surveillance studies. In this exercise, concordance between participating laboratories was high for most organism-agent combinations, but some problem areas were highlighted.

Acknowledgements

We are grateful to all the EARS-Net participants for taking part and providing the data for this exercise. In particular we would like to thank the national co-ordinators for their contribution to delivery of the EQA. We also thank the following reference laboratories: EUCAST Laboratory for Antimicrobial Susceptibility Testing [Central Hospital, Växjö, Sweden] and BSAC Antimicrobial Susceptibility Testing Methods Development Centre [previously City Hospital, Birmingham, UK] for confirming susceptibilities of the organisms distributed. Finally we extend our gratitude to all the staff at UK NEQAS for their sterling work and dedication.

