Results from 2015 Antimicrobial Susceptibility Testing External Quality Assessment (EQA) Exercise Organised for EARS-Net Participants

M.Mutso[1], S.Seaton[1], M.Sahni[1], P.Shah[1], M.Patel[1], D.F.J.Brown[2], C.Walton[1]
[1]UK NEQAS, Public Health England, Colindale, UK, [2]Peterborough, UK

Introduction

The United Kingdom National External Quality Assessment Service (UK NEQAS) for Microbiology has provided external quality assessment (EQA) for antimicrobial susceptibility testing to the European Antimicrobial Resistance Surveillance Network (EARS-Net – formerly EARSS) since 2000. The aim is to assess and monitor the comparability of results between laboratories and countries and thus justify the pooling and comparison of routinely collected antimicrobial susceptibility test data across Europe.

Methods

An analysis was carried out on the performance of participants in the quality assessment exercise. Participation was invited from 974 laboratories in 30 countries and results were returned by 902 laboratories. The organisms distributed were: *Enterococcus faecalis, Klebsiella pneumoniae, Staphylococcus aureus, Streptococcus pneumoniae, Escherichia coli* and *Pseudomonas aeruginosa.* Participants' results for identification and antimicrobial susceptibility testing were collated and assessed.

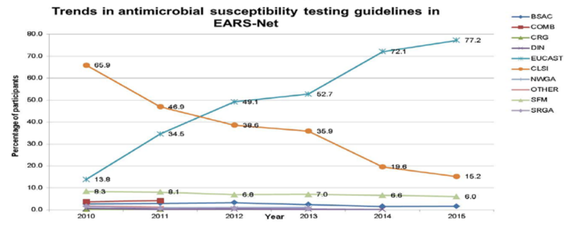
The objective of the EQA exercise:

- 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

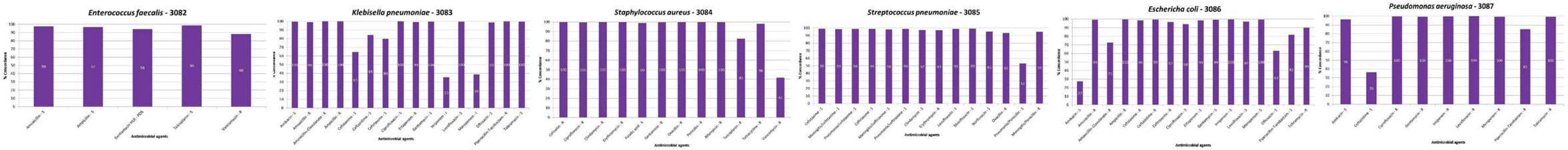
Results

With some notable exceptions the level of performance was high (overall concordance with the intended results ranged from 27% to 100%).

- Data are presented for some of the general findings and a few of the discrepancies are highlighted.



Charts displaying participants' concordance with the intended results for each of the six specimens in the 2015 EQA panel:



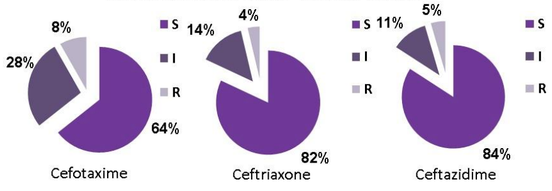
Results continued

Specimen 3083 - *Klebsiella pneumoniae*

This organism produces an OXA-48 carbapenamase conferring reduced susceptibility to carbapenems.

MICs of third generation of cephalosporins were within the susceptible category but were borderline, and this is reflected in the high discrepancy rates for these agents (Chart 1).

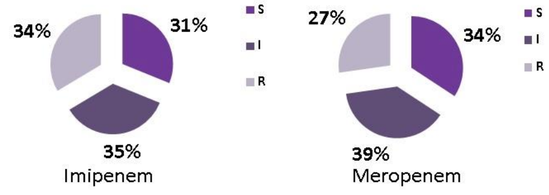
Chart 1: Susceptibility results for cefotaxime, ceftriaxone and ceftazidime



In the presence of OXA-48 the MICs of carbapenems are commonly raised, often resulting in resistance to ertapenem, while the effect on other carbapenems is less marked. A total of 99.2% of participants correctly reported the resistance to ertapenem, (MIC 8mg/L).

Susceptibility to imipenem (MIC 4-8 mg/L) was intermediate-resistant with EUCAST breakpoints and resistant with CLSI breakpoints. Susceptibility to meropenem (MIC 2-4 mg/L) was susceptible-intermediate with EUCAST breakpoints and intermediate-resistant with CLSI breakpoints. The differences in breakpoints and borderline susceptibility were reflected in the variable reporting, (Chart 2).

Chart 2: Susceptibility results for imipenem and meropenem



Specimen 3084 - *Staphylococcus aureus*

This organism exhibits low level resistance to vancomycin and teicoplanin (VISA). It is the same strain of VISA that was distributed in the EARS-Net EQA exercise in 2014 and there is little evidence of change in performance of participants (table 1).

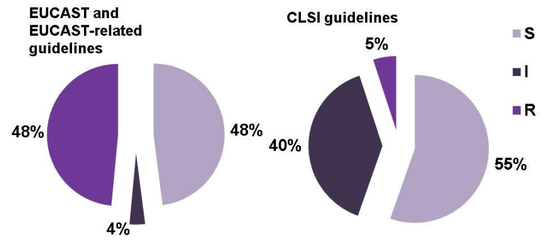
Table 1

	2014 (n=819)	2015 (n=877)
S	394 (48.1)	431 (49.2)
I	80 (9.8)	81 (9.2)
R	345 (42.1)	365 (41.6)

Isolates of *S. aureus* with vancomycin MICs of 4-8 mg/L were originally termed "vancomycin intermediate *S. aureus*" (VISA) because the level of resistance is low and is distinguishable from the high-level resistance displayed by *S. aureus* carrying the *mecA* gene (MICs >8 mg/L). While CLSI have maintained this distinction EUCAST does not have an intermediate category because VISA strains are clinically resistant.

Reports of susceptible were less frequent among 738 participants following EUCAST/EUCAST-related guidelines (48% susceptible) than among the 139 following CLSI guidelines (55.4% susceptible). In line with breakpoints, most non-susceptible reports with CLSI guidelines were in the intermediate category while with EUCAST guidelines most were in the resistant category (chart 3).

Chart 3: Susceptibility results for vancomycin



Conclusion

EQA is a valuable tool in the quality assurance of antimicrobial susceptibility testing in the diagnostic laboratory and demonstrates the validity of comparing collated data between laboratories. In this exercise overall concordance between participating laboratories was high except where there was borderline susceptibility or different guidelines used.

Acknowledgement

Thank you to all the EARS-Net participants for taking part, to national co-ordinators for their contribution in delivery of the EQA. Thank you to the reference laboratories: EUCAST Development Laboratory (EDL), Central Hospital, Växjö, Sweden and BSAC – Specialist Antimicrobial Chemotherapy Unit (SACU), Public Health Wales, Cardiff, UK for confirming susceptibilities of the organisms distributed. Finally our gratitude to all the staff at UK NEQAS for their sterling work.

AUSTRIA · BELGIUM · BULGARIA · CROATIA · CYPRUS · CZECH REPUBLIC · DENMARK · ESTONIA · FINLAND · FRANCE · GERMANY · GREECE · HUNGARY · ICELAND · IRELAND · ITALY · LATVIA · LITHUANIA · LUXEMBURG · MALTA · NETHERLANDS · NORWAY · POLAND · PORTUGAL · ROMANIA · SLOVAK REPUBLIC · SLOVENIA · SPAIN · SWEDEN · UNITED KINGDOM