Results from the 2016 Antimicrobial Susceptibility Testing External Quality Assessment (EQA) Exercise Organised for EARS-Net Participants

S. Seaton[1], M. Mutso[1], M. Sahni[1], P. Shah[1], E. J. Fagan[1], A. Thomas[1], M. Morshed[1], M. Sadigh[1], P. R. Chadwick[1], S. Rughooputh[1]

EARS-Net participating laboratories, [1]UK NEQAS, Public Health England, Colindale, UK

Introduction

The United Kingdom National External Quality Assessment Service (UK NEQAS) for Microbiology has provided annual external quality assessment (EQA) for antimicrobial susceptibility testing to the EARS-Net (formerly EARSS) for the past 16 year (since 2000). The objective 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.

Material/Methods

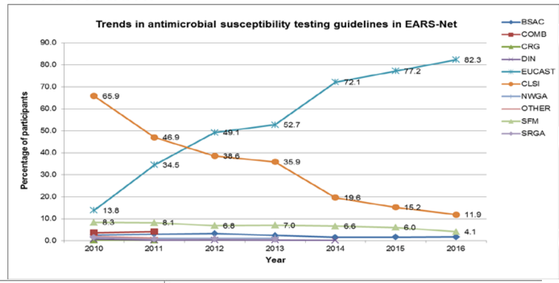
An analysis was carried out on the performance of participants in the EQA exercise. Participation was invited from 970 laboratories in 30 countries and results were returned by 900 laboratories. The organisms distributed were: *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Staphylococcus aureus, Acinetobacter baumannii* complex and *Streptococcus pneumoniae*. Participants' results for identification and antimicrobial susceptibility testing were collated and assessed.

The objective of the EQA exercise

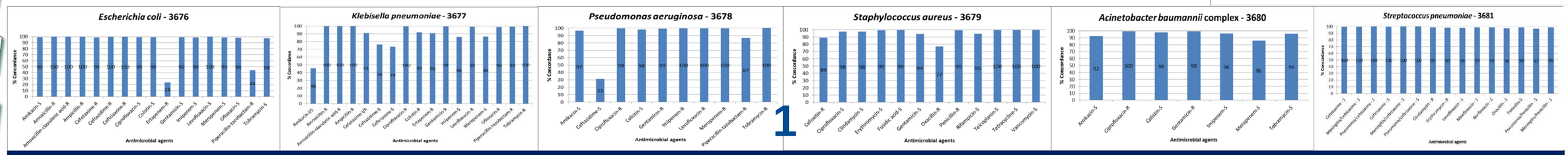
- to assess the ability of participating laboratories to identify antimicrobial resistance of clinical and public health importance
- to determine the accuracy of antimicrobial susceptibility test results reported by individual laboratories
- to assess the comparability of results between laboratories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

Results

Performance with these quality assessment specimens was good for most organism agent combinations but there was a wide range of concordance with the intended results (23.9-100%) depending on the combination.



Charts displaying participants' concordance with the intended results for each of the six specimens in the 2016 EQA panel:



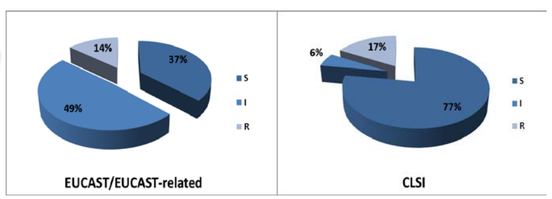
Results continued

Specimen 3676

This specimen contained an *Escherichia coli* with an acquired AmpC β -lactamase enzyme (BIL-1) conferring resistance to all reference β-lactam agents except imipenem and meropenem. An excellent concordance of results was seen for all antimicrobial agents except ertapenem and piperacillin-tazobactam.

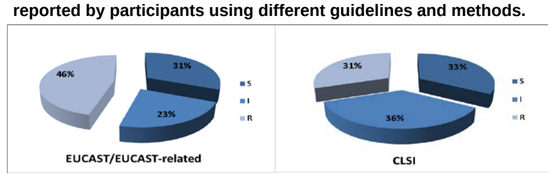
Reduced susceptibility to ertapenem is not uncommon among isolates expressing AmpC, although the MICs are not commonly raised sufficiently to be designated resistant, as seen with this organism. The differences in reporting of ertapenem results by 729 participants is illustrated in chart 1.

Chart 1: Susceptibility of *E. coli* 3676 to ertapenem reported by participants using different guidelines and methods.



Participants using a disk diffusion or MIC method to test ertapenem were more likely to report reduced susceptibility than those using automated systems. The organism was resistant to piperacillin-tazobactam (MIC ≥128 mg/L) by both EUCAST and CLSI breakpoints. The 854 participants reporting piperacillin-tazobactam susceptibility reported variable results, chart 2. Participants using automated systems or MIC methods were more likely to report reduced susceptibility than those using disk diffusion methods.

Chart 2: Susceptibility *of E. coli* 3676 to piperacillin-tazobactam reported by participants using different guidelines and methods.



Specimen 3678

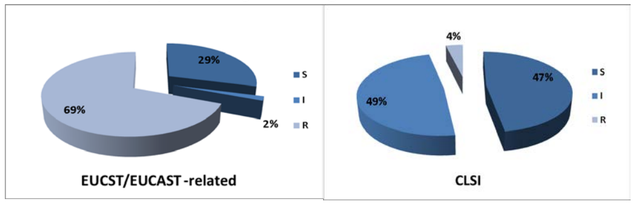
This specimen contained a strain of *Pseudomonas aeruginosa* resistant to ciprofloxacin, gentamicin, tobramycin, carbapenems, and piperacillin-tazobactam. A good concordance of results was obtained for all agents except ceftazidime.

The carbapenem resistance in this isolate is likely to be mediated by porin loss/efflux as no known carbapenemase enzyme is present.

The ceftazidime MIC (8 mg/L) was susceptible by both EUCAST and CLSI breakpoints. The 891 participants reported variable results, chart 3. Participants using CLSI methodology were more likely to report ceftazidime as susceptible (or intermediate) than participants using EUCAST or EUCAST-related method.

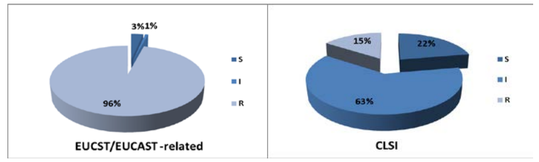
The organism was resistant and intermediate to piperacillin-tazobactam by EUCAST and CLSI breakpoints respectively. Although there was good overall concordance for these agents, participants using EUCAST or EUCAST-related methods were more likely to report piperacillin-tazobactam as resistant than participants using CLSI methodology, chart 4. In line with differences in breakpoints,

Chart 3: Susceptibility of *P. aeruginosa* 3678 to ceftazidime reported by participants using different guidelines and methods.



participants following CLSI guidelines were more likely to report intermediate or susceptible than those following EUCAST guidelines.

Chart 4: Susceptibility of *P. aeruginosa* 3678 to piperacillin-tazobactam reported by participants using different guidelines and methods.



Conclusion

Participation in an 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.

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.