Results from the 2017 Antimicrobial Susceptibility Testing External Quality Assessment (EQA) Exercise Organised for EARS-Net Participants

E. J. Fagan, S. Seaton, M. Sahni, P. Shah, F. Kartal, M. Morshed, M. Mutso, P. R. Chadwick, S. Rughooputh
UK NEQAS, Public Health England, Colindale, UK

UK NEQAS
International Quality Expertise

Introduction

The United Kingdom National External Quality Assessment Service (UK NEQAS) for Microbiology provides the annual external quality assessment (EQA) for antimicrobial susceptibility testing to the EARS-Network.

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

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

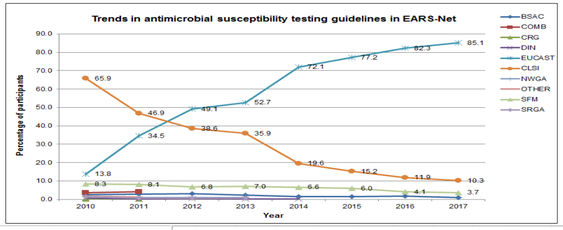
Material/Methods

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 894 laboratories.

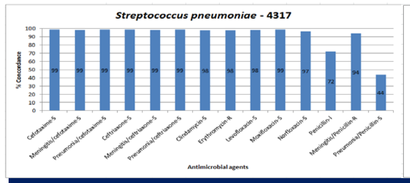
The organisms distributed were: *Streptococcus pneumoniae, Staphylococcus aureus, Enterococcus faecium, Escherichia coli, Klebsiella pneumoniae* and *Acinetobacter baumannii* complex. Participants' results for identification and antimicrobial susceptibility testing were collated and assessed.

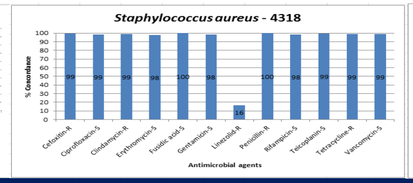
Results

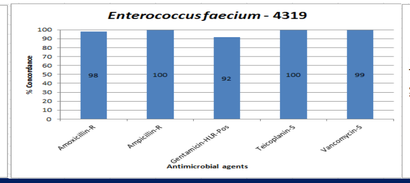
The level of performance with these quality assessment specimens was generally high, with an overall concordance with the intended results of 92% (range 16-100%) depending on the bug-drug combination.

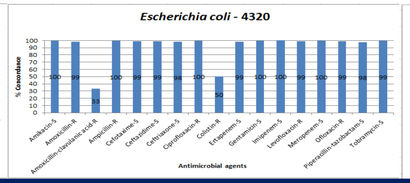


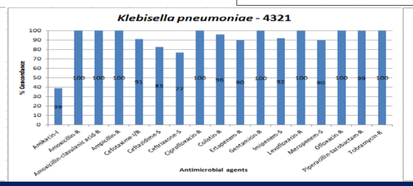
Charts displaying participants' concordance with the intended results for each of the six specimens in the 2017 EQA panel:

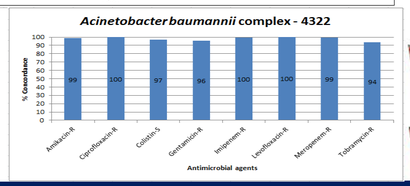










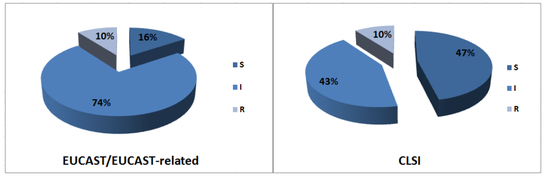


Results (continued)

Specimen 4317 contained a *Streptococcus pneumoniae* with reduced susceptibility to penicillin (MIC 0.25 mg/L).

- 72.1% of participants correctly categorised the strain as having an intermediate level of resistance to penicillin. Those using CLSI methodology were more likely to report false susceptible MIC results, with 46.6% categorising the strain as susceptible, compared to 15.6% of participants following EUCAST methods (chart 1).
- Penicillin/pneumonia: only 44% reported a correct susceptible result.

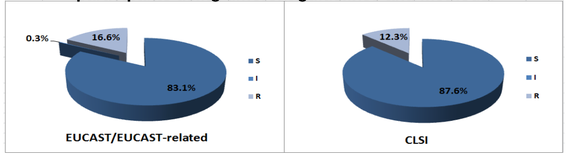
Chart 1: Susceptibility of *S. pneumoniae* 4317 to penicillin reported by participants using different guidelines and methods.



Specimen 4318 contained a strain of *Staphylococcus aureus* resistant to beta-lactam agents, clindamycin, linezolid and tetracycline.

- Only 16.3% participants correctly identified linezolid resistance:
  - 1st time a linezolid-resistant strain of *S. aureus* included and testing requested.
- The linezolid reference MIC was 16 mg/L, which was resistant by EUCAST (>4 mg/L) and CLSI (>8 mg/L) breakpoints.
- Participants using EUCAST methodology were more likely to report resistant results if they used a non-automated MIC method, but there were no other clear differences between methods (chart 2).

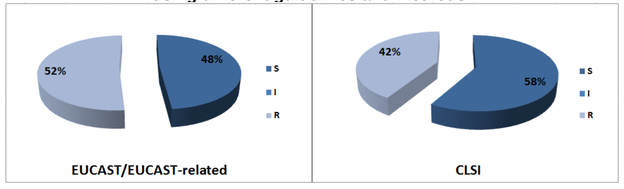
Chart 2: Susceptibility *of S. aureus* 4318 to linezolid reported by participants using different guidelines and methods.



Specimen 4320 contained an *Escherichia coli* with a *MRC-1* gene, exhibiting resistance to amoxicillin, amoxicillin-clavulanate, colistin and quinolones.

- Only 33.0% correctly identified amoxicillin-clavulanate resistance. The reference MIC was 32 mg/L, which is resistant by EUCAST (>8 mg/L) and CLSI (32 mg/L).
- The MIC for colistin was borderline resistant (4mg/L) (EUCAST breakpoint >2 mg/L, CLSI no breakpoint) and only 50.1% of participants reported a resistant result. Participants following EUCAST methodology were more likely to achieve the intended result than those who used CLSI methods (chart 3).

Chart 3: Susceptibility of *E.coli* 4320 to colistin reported by participants using different guidelines and methods.



Specimen 4321 contained a *Klebsiella pneumoniae* with both OXA-1 and SHV-1 enzymes.

- Only 38.8% reported intermediate/susceptible for amikacin by EUCAST/CLSI breakpoints respectively (reference MIC = 16 mg/L).
- Participants following CLSI methodology were more likely to achieve the intended result than those using EUCAST 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. It highlights the importance of laboratories being able to identify the emergence of new or unexpected resistance patterns.

Acknowledgement

We would like to thank all the EARS-Net participants for taking part, the national co-ordinators for their contribution in delivery of the EQA, the reference laboratories: EUCAST Development Laboratory (EDL), Central Hospital, Växjö, Sweden and Specialist Antimicrobial Chemotherapy Unit (SACU), Public Health Wales, Cardiff, UK for confirming susceptibilities of the organisms distributed and our colleagues at UK NEQAS.

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