Results from the 2018 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 (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

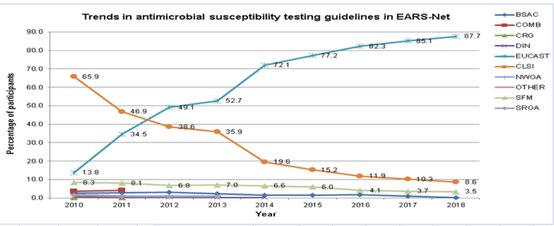
- To determine the accuracy of antimicrobial susceptibility test results reported by individual laboratories.
- To assess the comparability of results between laboratories and countries and thus justify the pooling and comparison of routinely collected antimicrobial susceptibility test data across Europe.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

Material/Methods

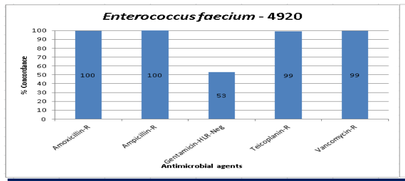
- Participation was invited from 952 laboratories in 30 countries to take part in the EQA exercise.
- Results were returned by 859 laboratories.
- Organisms distributed were: *Enterococcus faecium, Klebsiella pneumoniae, Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa* and *Streptococcus pneumoniae*.
- Participants' results for identification and antimicrobial susceptibility testing were collated and assessed.

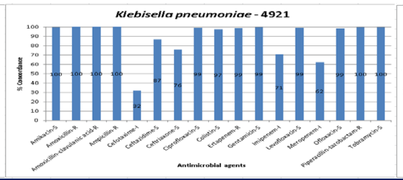
Results

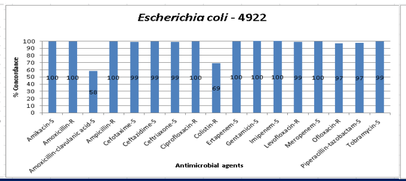
- Overall concordance with the intended results of 89% (range 15-100%) depending on the bug-drug combination.
- ≥95% concordance was achieved for 56/70 bug-drug combinations tested.

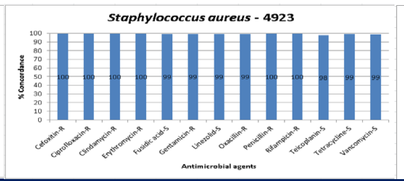


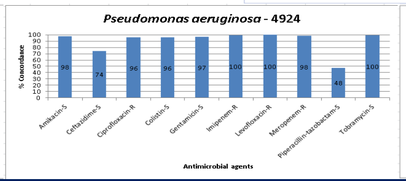
Charts displaying participants' concordance with the intended results for each of the six specimens in the 2018 EQA panel:

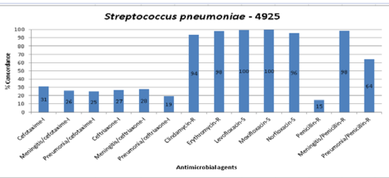










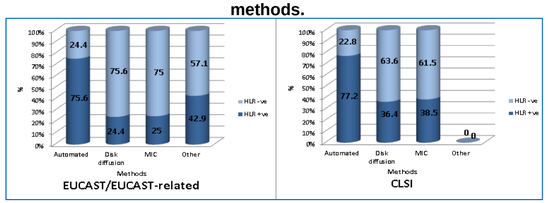


Results (continued)

Specimen 4920 contained an *E. faecium* negative for high level gentamicin resistance (MIC 32mg/L).

- Only 53.2% of participants correctly categorised the strain as not expressing high level gentamicin resistance.
- 54.7% & 36.4% of participants following EUCAST & CLSI guidelines respectively reported the correct result.
- Those using automated methodology were more likely to report false positive results, with 76.4% categorising the strain as positive, compared to 31.1% of participants using disk or MIC methods Chart 1 shows the breakdown via guideline.

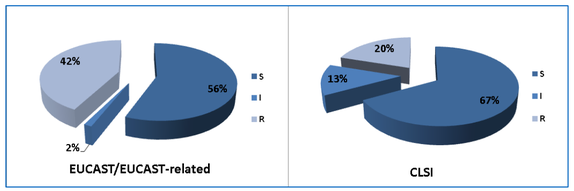
Chart 1: Susceptibility of *E. faecium* 4920 to high level gentamicin resistance reported by participants using different guidelines and methods.



Specimen 4922 contained a strain of *E. coli* with the MRC-1 gene, exhibiting resistance to colistin, amoxicillin/ampicillin and fluoroquinolones.

- Only 69.2% participants correctly identified colistin resistance.
- The colistin reference MIC was 4 mg/L, which was resistant by EUCAST guidelines (>2 mg/L). There is no CLSI breakpoint.

Chart 2: Susceptibility *of E.coli* 4922 to amoxicillin-clavulanate reported by participants using different guidelines and methods.

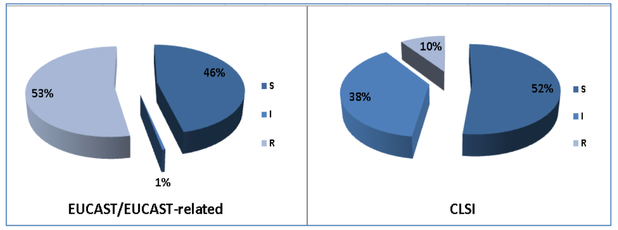


- Only 58.2% correctly identified amoxicillin-clavulanate susceptibility. The reference MIC was 8 mg/L, which is susceptible by EUCAST (≤8 mg/L) and CLSI (≤8 mg/L). (Chart 2)

Specimen 4924 contained a strain of *P. aeruginosa* susceptible to aminoglycosides, ceftazidime, piperacillin-tazobactam and colistin.

- Only 47.6% correctly identified piperacillin-tazobactam as susceptible. The reference MIC was 16 mg/L, which is susceptible by EUCAST (≤ 16 mg/L) and CLSI (≤16 mg/L) (chart 3).
- Those reporting intermediate by EUCAST, should review their methodology as there is no intermediate category for this antibiotic in the 2018 guidelines.

Chart 3: Susceptibility of *P. aeruginosa* 4924 to piperacillin-tazobactam reported by participants using different guidelines and methods.



Specimen 4925 contained a strain of *S. pneumoniae* with reduced susceptibility to cefotaxime (1 mg/L).

- Only 26.1% reported intermediate for cefotaxime (meningitis) by EUCAST/CLSI breakpoints.
- Participants following EUCAST guidelines were more likely to achieve the intended result when using automated methods, than disk or MIC methods.

Conclusion

Overall concordance was high, except where there was borderline susceptibility to the antibiotics.
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

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.