Results from the 2016 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 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.

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 $\geq$128 mg/L) by both EUCAST and CLSI breakpoints. The 891 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.

Reduced susceptibility to ertapenem is not uncommon among isolates expressing AmpC enzymes although the MICs are not commonly reported by participants using different guidelines and methods.

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,

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.

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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.

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.

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

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

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

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