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Artificial intelligence (AI)-assisted antimicrobial susceptibility testing (AST): automated imaging and the use of artificial intelligence for interpretation of disc-diffusion AST according to EUCAST, including rapid antimicrobial susceptibility testing (RAST).

03. Bacterial susceptibility & resistance

3c. Susceptibility testing methods (incl assay validation and comparative studies, excl TB)

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Background Disc diffusion remains an essential part of AST and EUCAST has recently expanded its guidelines to include breakpoints for rapid disk diffusion read at 4, 6 or 8 hours. Disc diffusion has several advantages such as easy phenotypic detection of resistance markers, fast adaption to new antimicrobials, and reduced cost compared with other AST methods. Manual reading and interpretation of disc diffusion zone sizes, however, is labour intensive, time consuming, and associated with other problems of manual methods such as dependence on the experience and skill of the performer. Automated reading and zone-size interpretation can eliminate these problems and greatly enhance the value of disc diffusion AST for daily routine.

Methods Using the APAS-Independence we analysed disc diffusion AST using a total of 80 organisms sourced from urine cultures which included E. coli, K. pneumoniae, P. aeruginosa, and S. aureus. All strains were processed and interpreted according to EUCAST methodology and breakpoints, including a rapid read at 6 hours, which generated over 740 unique antimicrobial reads. APAS-based AI-assisted reads and interpretations were compared with manual reads by two experienced microbiologists at 6 and 24 hours with regard to the categorical agreement (S/I/R, EUCAST) between the manual plate-in-hand (PIH) and APAS-AI-assisted (AAA) result.

Results Using the EUCAST breakpoints, overall categorical agreement between AAA and PIH at 6 and 24 hours was hours was 93.8 % and 95.1 %, respectively. At 6 hours the very major errors (VME), major errors (ME), and minor (MIN) errors was 1.6%, 0.3%, and 2.2% respectively. At 24 hours the VME, ME and MIN was 1.3%,

0.0%, and 2.5% respectively. Discrepancies for ATU were 1.94% at 6 hours, and 0.92% at 24 hours.AAA speed equalled approximately 200 plates/hour.

Conclusions In our study AAA yielded comparable results to PIH and provides a promising alternative to PIH for disk diffusion for standard and RAST EUCAST breakpoint reading.

Keyword 1
Artificial Intelligence
Keyword 2
APAS
Keyword 3
AST

Conflicts of interest

Do you have any conflicts of interest to declare?
I have the following potential conflict(s) of interest to report
I hold stock or stock options in companies in the medical field