Direct Phoenix Identification and Antimicrobial Susceptibility Testing from Positive Blood Culture Broths

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Abstract : Objectives: Using standard lab methods, a positive blood culture requires a minimum of two days (two occasions of overnight incubation) to obtain a final identification (ID) and antimicrobial susceptibility results (AST) report. In this study, we aimed to evaluate the accuracy and precision of identification and antimicrobial susceptibility testing of an alternative method (direct method) that will reduce the turnaround time by 24 hours. This method involves the direct inoculation of positive blood culture broths into the Phoenix system using serum separation tubes (SST). Method: This prospective study included monomicrobial-positive blood cultures obtained from January 2022 to May 2023 in SQUH. Blood cultures containing a mixture of organisms, fungi, or anaerobic organisms were excluded from this study. The result of the new “direct method” under study was compared with the current “standard method” used in the lab. The accuracy and precision were evaluated for the ID and AST using Clinical and Laboratory Standards Institute (CLSI) recommendations. The categorical agreement, essential agreement, and the rates of very major errors (VME), major errors (ME), and minor errors (MIE) for both gram-negative and gram-positive bacteria were calculated. Passing criteria were set according to CLSI. Result: The results of ID and AST were available for a total of 158 isolates. Of 77 isolates of gram-negative bacteria, 71 (92%) were correctly identified at the species level. Of 70 isolates of gram-positive bacteria, 47(67%) isolates were correctly identified. For gram-negative bacteria, the essential agreement of the direct method was ≥92% when compared to the standard method, while the categorical agreement was ≥91% for all tested antibiotics. The precision of ID and AST were noted to be 100% for all tested isolates. For gram-positive bacteria, the essential agreement was >93%, while the categorical agreement was >92% for all tested antibiotics except moxifloxacin. Many antibiotics were noted to have an unacceptable higher rate of very major errors including penicillin, cotrimoxazole, clindamycin, ciprofloxacin, and moxifloxacin. However, no error was observed in the results of vancomycin, linezolid, and daptomycin. Conclusion: The direct method of ID and AST for positive blood cultures using SST is reliable for gram negative bacteria. It will significantly decrease the turnaround time and will facilitate antimicrobial stewardship.

Keywords : bloodstream infection, oman, direct ast, blood culture, rapid identification, antimicrobial susceptibility, phoenix, direct inoculation
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