O072
Oral Session
Automation in diagnostic bacteriology

EVALUATION OF MANUAL VERSUS AUTOMATED INOCULATION

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Objectives

The emergence of automation in bacteriology opens a new era in clinical diagnostic laboratories. Automation is impacting the management and the laboratory workflow but also offers new perspectives for research and development in bacteriology. Sample inoculation is a fastidious and repetitive process that represents a significant laboratory workload. Moreover, the quality of inoculation is critical to achieve optimal yield of discrete colonies in both single and mixed microbial samples to perform identification and antibiotic susceptibility testing (AST). The true effectiveness of automated inoculation needs to be validated. Consequently, we compared manual inoculation to two automated inoculation systems, the Walk Away Specimen Processor (WASP, Copan, Italy) and the InoqulA BT systems (BD Kiestra, Netherland).

Methods

Defined mono- and polymicrobial samples of 4 bacterial species as well as cloudy urines have been inoculated on chromogenic agar by the WASP, the Inoqula BT and manually following a zig-zag pattern with or without a preceding central streaking across the agar plate. Images have been taken with the ImagA BT digital imaging solution module (BD Kiestra) and were analyzed with a Vision software (BD Kiestra) to accurately assess the quality of colony growth. Several parameters including (1) the yield of single colonies, (2) distribution, (3) reproducibility, (4) need for re-isolation, (5) time-to-results and (6) analytical costs were determined for each inoculation approach.

Results

A 3 to 10 fold higher yield of discrete colonies was observed following automated inoculation with both the Inoqula and the WASP systems compared to manual inoculation. The capacity of automated inoculation systems to generate high yield of discrete colonies allowed the recovery of isolated colonies of most bacterial species composing mixed samples in sufficient amount to conduct identification by Maldi-Tof MS and AST. Consequently, automated inoculation greatly decreases the requirement of bacterial re-isolation and thus results in a significant reduction of time-to-results, laboratory workload and analytical costs. Compared to manual inoculation, automated systems exhibited a very high reproducibility which, when coupled to regular and gradual distribution throughout the agar surface, allowed a precise quantification of the specimen bacterial load ranging from 10^9 to 10^3 bacteria per milliliter. Thus, both the WASP and the InoqulA offers the possibility to obtain simultaneously an optimal yield of discrete colonies and a precise quantification from both single and mixed microbial samples.

Conclusion

This work represents one of the first studies conducted by an independent clinical diagnostic laboratory that demonstrates the true effectiveness of automated inoculation systems to generate highly quantitative and qualitative microbial growth. Unlike manual inoculation, automated streaking systems are highly reproducible and offer the possibility to investigate new technical inoculation approaches to improve the quality and the quantification of colony growth and thus to further increase the productivity of the diagnostic laboratory.