Title: Comparison of the APAS Independence Automated Plate Reader System with manual standard-of-care for processing urine culture specimens

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Background: Urine cultures are amongst the highest volume tests run in clinical microbiology laboratories and usually require considerable manual labor to perform. We evaluated the APAS Independence Automated Plate Reader System and compared it to our standard-of-care (SOC) for processing urine cultures to determine whether APAS could expedite quality results while reducing manual steps required to process urine cultures. The APAS Independence System works by providing an automated image interpretation of growth characteristics from urine culture plates and binning those that require further evaluation and/or identification of pathogens.

Methods: We performed duplicate urine cultures for 1535 specimens over a 4-month period and evaluated each using our SOC and the APAS system. We compared APAS growth interpretations, including differences in enumeration and growth descriptions, to those of our manual SOC in a blinded manner. We also performed antimicrobial susceptibility testing (AST) of the pathogens recovered by both methods using microbroth dilution with the BD Phoenix instrument, with an ultimate view to assess the impact of an APAS-implemented workflow on turnaround-times for cultures with AST results.

Results: We found that 75 of the 1535 total specimens (4.89%) had growth discrepancies. Only 2 of these 75 growth discrepancies (0.13% of total samples in the study) resulted in clinically significant differences in pathogens identified. Overall, there were 56 identification discrepancies, which represented 3.65% of the urine cultures performed. The majority of the identification discrepancies uncovered an additional pathogen, with 12 (21.4%) specimens identifying an additional pathogen for the SOC and 40 (71.4%) identifying an additional pathogen for the APAS System. There were 222 discrepancies identified out of 7953 total antimicrobial tests when comparing the duplicate cultures, which represented 2.79% of the AST results. Of those discrepancies, 145 (1.82%) represented minor errors (mE), 41 (0.52%) represented major errors (ME), and 36 (0.45%) represented very major errors (VME). Many of the ME and VME occurred in a small subset of only 13 pathogens, suggesting that different strains of the same pathogens having differing ASTs were present. Additional analyses examining differences in labor and turnaround times are ongoing.

Conclusions: Given the significant manual labor required to perform urine cultures, the APAS Independence System has the potential to reduce manual steps while maintaining the identity and antimicrobial susceptibilities of urinary pathogens.

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