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Validation of the Vision Toolbox in BD Kiestra in excluding VRE/MRGN from screening swabs

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Background:

With increasing incidence in hospitals worldwide, there are more calls for screening of Multi-Resistant Organisms (MROs), in particular Van A and CPE in Australia. Vision Toolbox™ (VT), an automated digital reader incorporated into BD Kiestra™ laboratory automation, promises to improve laboratory workflow by rapid categorization and grouping of negative screening samples by user programmable pre-defined criteria (colony colour, size and number), thereby allowing quick reading and clearance of multiple samples as 'no growth' in a single view.

Material/methods:

Approximately 1000 consecutive rectal screening samples for both VRE and MRGN (Multi-Resistant Gram-Negatives) were collected from patients during an institute-wide point prevalence survey in 3 health care facilities within Austin Health including a 600 bed tertiary referral centre, a 150-bed rehabilitation hospital, and a 70-bed low acuity geriatric facility in Melbourne, Australia. The accuracy of VT in correctly categorising the 'no growth' designation for VRE and MRGN cultures was compared against 3 modalities: i) culture reading on HD monitor by OPTIS software enhancement ("scientist read"), ii) direct visualisation of cultures by an independent reader ("manual read"), and a final classification of MRO by confirmatory phenotypic and genotypic testing ("confirmed MRO"). Selective chromogenic agar cIDVRE (Biomerieux, Qld, Australia) and ChromAgar ESBL (Micromedia Australia) plates were read at 38 hours and 19 hours respectively. VRE confirmation was via PCR detection of VanA/B genes and MRGN confirmatory tests included modified CLSI synergy testing, boronic acid inhibition for acquired AMPC and Multiplex PCR testing (AusDiagnostics easyplex 12 CRE) in Enterobacteriaceae.

Results:

1159 VRE and 1168 MRGN rectal screening swabs were obtained from 914 patients in Austin Health. Of these, 969 (83.6%) VRE and 973 (83.3%) were available for analyses (5.8% were lost due to software errors, 10.6% were missing study data). VRE incidence was 15.8% (183/1159 samples, Van B VRE predominant: 89.6%). VT had assigned the 'no growth' category to 626/969 VRE samples (64.6%). VRE was confirmed in 12/626 of these 'no growth' samples (false negative rate 1.9%). VT and scientist reads were concordant in 583/626 (93.1%) samples compared with 614/626 (98.1%) in the 'VT vs. manual reader' group. In the MRGN cohort, 124/1168 (10.5%) samples cultured 3rd/4th generation cephalosporin non-susceptible Enterobacteriaceae with ESBLs accounting for 107/124 (86.2%) of these samples. 630/973 samples were assigned the 'no growth' category (64.7%). MRGN was detected in 4/630 'no growth' samples (false negative rate 0.4%). Concordance rates were 96.3% and 96% in the 'VT vs. scientist read' and 'VT vs. manual read groups respectively.

Conclusions:

Vision Toolbox^{TM} performed well in excluding MRO (VRE: 98.1%, MRGN: 99.4%) and may be used as an adjunct to current methods of MRO screening. Vision Toolbox^{TM} has the ability to significantly improve workflow and is likely to provide cost savings in the future.