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ePoster Session
Getting better and faster: resistance detection

Automatic digital analysis of chromogenic media for vancomycin-resistant enterococci screens using the WASPLab interpretation software

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Background: Early detection of vancomycin resistant enterococci (VRE) is essential for reducing healthcare associated outbreaks. To aide in early detection of VRE, many clinical laboratories offer VRE screening for at risk patients, but even with the use of chromogenic agar manual reading is costly and labor intensive. Digital imaging can differentiate between colors of pixels and so software that can identify and remove negative chromogenic plates prior to technologist reading could reduce laboratory cost. In this study we evaluated the performance of the Chromogenic Detection Module (CDM) (Copan, Brescia, IT) to detect pigmented colonies from a digital image and compared the results to manual reading using VRE chromogenic agar.

Material/methods: Specimens submitted for VRE screening at three different laboratories were enrolled and inoculated onto either Colorex VRE (BioMed Diagnostics, White City, OR) or Oxoid VRE (Oxoid, Basingstoke, UK) using the WASPLab. Digital images were taken at 0 and 24 hours post inoculation and were scored by the CDM software and technologist for positive VRE growth. Colorimetric analysis of digital images was performed by converting RGB pixels into a bubble shape tolerance composed of Hue, Saturation and Value (HSV). If HSV resulted within the set tolerance level the specimen was reported as automation positive (AP). Otherwise the specimen was resulted as automation negative (AN). Technologists were blinded to the software's results and performed plate readings from digital images on a HD monitor. Specimens were reported as Manual Positive (MP) or Manual Negative (MN) based on presence or absents of chromogen color. Images of discrepant results were sent to the sites laboratory director/manager for review and separated into three categories: residual matrix/yeast, borderline colors and positive on second review.

Results: In total 104,730 specimens were enrolled and tested with prevalence of VRE ranging from 3.7-12.9% at the three sites. Automation agreed with manual reading with 90.1% of specimens tested. No MP plates were missed by automation, but 10,348 plates were called AP/MN. These data resulted in a sensitivity of 100% and specificity of 89.5%. Discrepant analysis of the AP/MN demonstrated that 498 (4.8%) were characterized as positive after director/manager review, 1,616 (15.6%) were

identified as having borderline colors not reported by the laboratory and 8,234 (79.6%) contained colorimetric reactions due to residual matrix or yeast growth.

Conclusions: Overall the CDM software was highly sensitive and specific for detection of VRE on chromogenic agar. VRE chromogenic agar had issues with breakthrough of pigmented yeast lowering the specificity. The software identified an additional 498 specimens that were missed by the initial manual score, suggesting that automation may be more sensitive. If implemented into the clinical laboratory segregation of negative plates alone would have removed 84% of the plates read by a technologist reducing workload.