Utility of CHROMAgar VRE for the Identification of VRE in Epidemiology Screens

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Abstract - Revised

Strains of enterococci that carry the *vanA* or *vanB* genes are important nosocomial pathogens responsible for increased morbidity and mortality among infected patients. Infection control measures including VRE screening followed by isolation of VRE positive patients are key to preventing the dissemination of this organism in the health care setting. Various screening methods have been employed to rapidly identify this organism from rectal swabs of hospitalized patients although no specific method has been recommended. Preliminary studies of 290 rectal swab cultures compared Thayer Martin media and CHROMagar-VRE (CA-VRE) (CHROMagar Paris, FR) for detection of VRE. VRE was confirmed using biochemical assays and growth on BHI Agar containing 6µg/ml Vancomycin. CA-VRE enhanced the recovery of VRE from screening cultures by 13.7% compared to Thayer-Martin media. Preliminary studies indicated that Vancomycin susceptible *Enterococcus* (VSE) was indistinguishable from VRE on CA-VRE. Comparison of two formulations of the CHROMagar media, CA-VRE and -VRE Blue, was performed for detection of VRE in screening cultures. VRE appears as a mauve colony on CA-VRE and as a blue colony on CA-VRE-Blue. Five hundred rectal swabs were obtained and analyzed for VRE over a 48 hour period. Fifty isolates of VRE were identified using both media. Forty-nine of these isolates were identified using CA-VRE, 47 isolates were identified using CA-VRE Blue with one additional isolate that was not detected using CA-VRE. 11 isolates (2%) and 14 isolates (3%) of VSE were identified on CA-VRE and CA-VRE Blue, respectively. One isolate of *VanC* containing enterococci was detected on both CA-VRE and CA-VRE Blue. The sensitivity and specificity of CHROMagar VRE Blue compared to CHROMagar VRE is 94% and 96.7%, respectively. CA-VRE and CA-VRE Blue are additional tools that can be used to identify VRE in patient samples. However, breakthrough of VSE and *vanC* containing enterococci on both media indicates that Vancomycin susceptibility screening and additional biochemical assays should be performed to confirm the presence of *vanA* or *vanB* containing VRE.

Introduction

Enterococcus spp. are a component of the normal human gastrointestinal tract flora. These organisms are intrinsically resistant to trimethoprim-sulfamethoxazole, cephalosporins and many penicillins. Strains of enterococci have aquired resistance to many other classes of antibiotics including tetracyclines, macrolides, lincosamines, fluroquinolones, aminoglycosides and penicillins. Resistance to vancomycin was originally reported in Europe in 1986 and in the US in 1989. Vancomycin resistance is caused by transposable *van* gene complexes that alter the binding target for vancomycin in the synthesis of bacterial cell wall. To date, six *van* gene complexes have been described. Of these, *vanA* and *vanB* are of the most concern clinically.

Vancomycin-Resistant Enterococci (VRE) has emerged as an important nosocomial pathogen. It is listed as the second to third cause of nosocomial infections is US hospitals. The National Nosocomial Infectious Surveillance Systems has reported an increase in VRE infections among ICU patients over the past decade with the current rate greater than 30%. Active surveillance of hospital patients for VRE has resulted in a 22.7% reduction in the transmission of VRE. In this study, we evaluate the use of chromogenic media manufactured by CHROMAgar (Paris,France) to detect VRE in surveillance cultures.

Methods

Specimen Collection

Rectal swabs were collected from inpatients at University of North Carolina-Chapel Hill Hospitals. Isolation media was inoculated with the swabs and analyzed for VRE over a 48 hour period. Colonies that were mauve or blue on CHROMAgar VRE or CHROMAgar VRE-Blue respectively were further analyzed. VRE was determined by bile-esculin reaction, growth in 6.5% NaCl, MGP reaction and growth on 6 ug/mL Vancomycin BHI Agar plates. Cultures were considered positive if any amount of VRE was present. Enterococci not consistent with nosocomially aquired VRE (i.e. E. galinarium/ E. cass) was reported as "Not Detected".

Results

	Not Detected Thayer Martin	Positive Thayer Martin	WorkUp Required Thayer-Martin Not Detected	Total
Not Detected CHROMAgar VRE	206	0	19	225
Positive CHROMAgar VRE	1	45	6	52
WorkUp Required VRE Not Detected	3	0	10	13
Total	210	45	35	

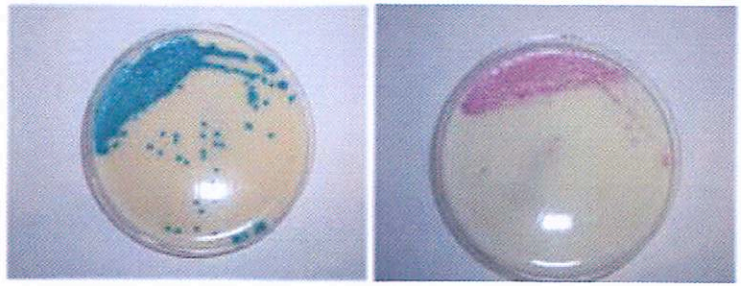

Figure 1. Appearance of VRE on selective media

	Negative	Positive	VRE	VSE	Non-VRE
CHROMAgar VRE	438	62	47	13	1
CHROMAgar VRE-BLUE	439	61	49	10	1

	CHROMAgar VRE N (%)	CHROMAgar VRE-BLUE N (%)
VRE	47 (9.4)	49 (9.8)
VSE	14 (2.8)	11 (2.2)
Non. E. faecium/facalis	1 (0.2)	1 (0.2)
Staphylococcus	17 (3.4)	23 (4.6)
Yeast	1 (0.2)	2 (0.4)
GNR	1 (0.2)	2 (0.4)

Summary and Conclusion

- CHROMAgar VRE and CHROMAgar VRE Blue are effective in recovery of VRE from screening cultures for epidemiology purposes.
- Although CHROMAgar VRE Blue produces robust colonies, they can be difficult to distinguish from *Staphylococcus* that may breakthrough on this media
- CHROMAgar VRE is the preferred media for recovery of VRE from screening cultres. However, additional testing should be performed to confirm the identification of the organism and resistance to Vancomycin.

References

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