Evaluation Of Brilliance VRE Agar For Detection Of Vancomycin Resistant Enterococci From Four Geographically Different Hospitals In The United States

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Overview

Purpose: The study evaluated performance of Thermo Scientific™ Oxoid™ *Brilliance*™ VRE Agar and Remel™ Bile Aesculin Azide Agar (Thermo Fisher Scientific) containing 6µg/ml vancomycin (BAAV) for detection of Vancomycin-resistant enterococci (VRE) .

Methods: *Brilliance* VRE Agar and BAAV was inoculated with rectal swabs and stool samples prior to incubation. Performance of the two media was compared.

Results: *Brilliance* VRE Agar performed better than BAAV for the detection of VRE and inhibited more non-VRE than BAAV.

Introduction

VRE)are becoming more prevalent worldwide. The two most common species, *Enterococcus faecalis* and *E. faecium*, can harbour transmissible *vanA* and *vanB* genes, which encode resistance to vancomycin[1]. In the USA, between 1989 and 1993, there was a 20-fold increase in the proportion of enterococci resistant to vancomycin, with some infection rates estimated as high as 1 in 3 patients on intensive care units[2].

VRE are therefore significant nosocomial pathogens and may cause serious infections, including bacteremia[3]. Management of a VRE outbreak requires strategies to contain cases and decrease rates of transmission, including isolation of infected or colonized patients. VRE colonization can be monitored by screening stools or rectal swabs, using selective media[4].

Brilliance VRE Agar (figure 1) is a chromogenic screening medium for the detection of VRE directly from clinical samples. It provides early presumptive identification of VRE, allowing appropriate treatment and infection control procedures to be adopted earlier, improving treatment outcomes and the effectiveness of infection control measures.

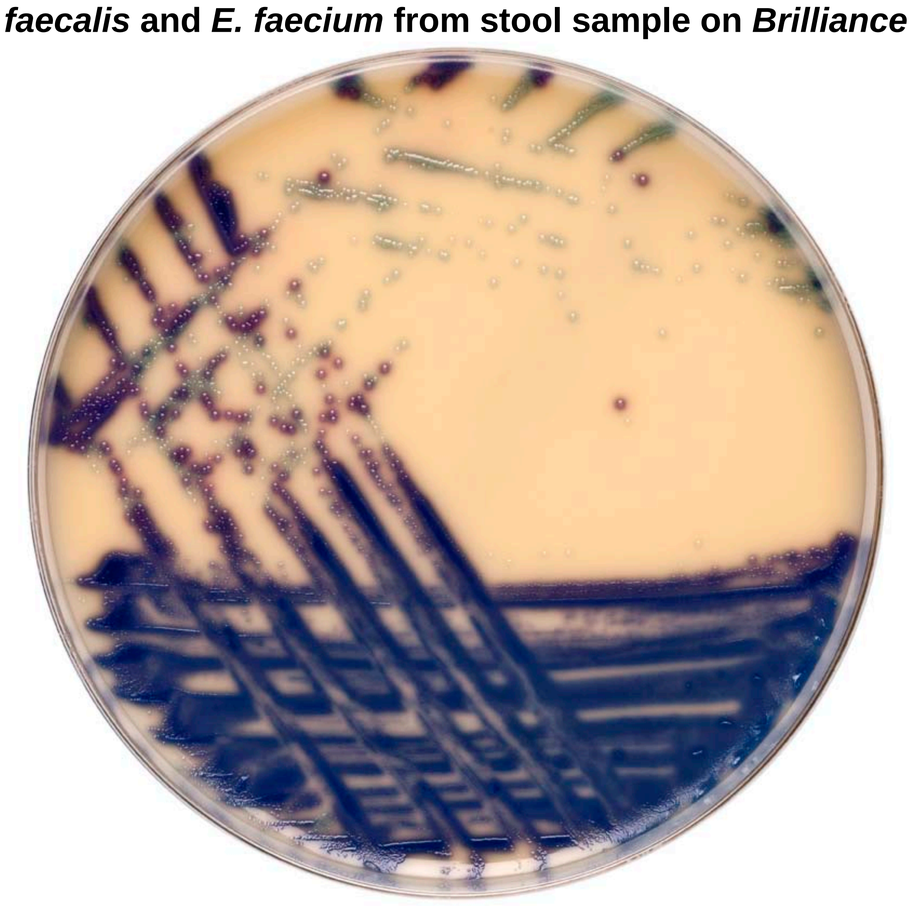
Methods

Three hundred and ninety eight stool samples and 250 rectal swabs were collected from asymptomatic patients undergoing screening for VRE colonization at four geographically different hospitals in the United States. Stools/swabs were streaked onto *Brilliance* VRE Agar and BAAV.

All plates were incubated at 35±2°C. *Brilliance* VRE Agar was read at 24 h incubation. BAAV was read at 24 h; if no presumptive VRE colonies were observed, BAAV was re-incubated for a further 24 h incubation. Presumptive VRE colonies were identified to species level, and their antibiotic susceptibility determined using laboratory standard methods. The gold standard was deemed to be identification of an enterococcus with a vancomycin MIC ≥6 µl/ml.

McNemar's chi squared test was used for statistical evaluation. P<0.05 was considered statistically significant.

Figure 1. *E. faecalis* and *E. faecium* from stool sample on *Brilliance* VRE Agar



Results

Two hundred and twenty one vancomycin-resistant *Enterococcus faecalis* and *E. faecium* (all with MIC >256µg/ml) were isolated from 208 specimens, showing a 34% prevalence rate.

Performance of *Brilliance* VRE Agar and BAAV are shown in table 1.

Table 1. Performance of Brilliance VRE Agar and BAAV

Performance	*Brilliance* VRE Agar	BAAV
Sensitivity (%)	98.6 (95% CI 97.7-99.5)	96.0 (95% CI 94.5-97.5)
Specificity (%)	99.8 (95% CI 99.5-100)	82.2 (95% CI 79.3-85.1)
PPV (%)	99.5 (95% CI 99.0-100)	76.5 (95% CI 73.3-79.7)
NPV (%)	99.3 (95% CI 98.7-99.9)	97.1 (95% CI 95.8-98.4)

Both the sensitivity (P=0.0455) and specificity (P<0.0001) of *Brilliance* VRE Agar were significantly higher than BAAV; the PPV and NPV were also markedly higher. Overall performance of *Brilliance* VRE Agar was equivalent to the gold standard whereas performance of BAAV was significantly lower (P<0.0001).

BAAV failed to inhibit growth of vancomycin-sensitive enterococci (MIC <6µg/ml); also *Leuconostoc*, *Pediococcus* and *Lactobacillus* species (all intrinsically resistant to vancomycin) as well as other Gram positive rods. This resulted in a considerable increase in the number of additional confirmatory tests required to identify VRE.

Brilliance VRE Agar is able to differentiate between the clinically relevant vancomycin-resistant *E. faecalis* and *E. faecium* (light blue and indigo-purple colonies respectively) while inhibiting growth of intrinsically resistant *E. gallinarum* and *E. casseliflavus* whereas BAAV is unable to distinguish between *Enterococcus* species.

Conclusion

Brilliance VRE Agar is a effective and reliable product for the screening of gastrointestinal colonisation of VRE, providing reliable and accurate results within 24 h to aid the prevention and control of VRE infection in healthcare settings.

References

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