Evaluation of Brilliance Staph 24 Agar For Detection of Staphylococci In A Clinical Setting

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Overview

Purpose: The aim of this study was to evaluate the use of Thermo Scientific™ Brilliance™ Staph 24 Agar (Thermo Fisher Scientific) for detection of coagulase positive staphylococci from wound swabs in a clinical setting.

Methods: Wound swabs were inoculated onto Brilliance Staph 24 Agar, SASelect™ Agar (BioRad Laboratories) and CBA. Post-incubation, any presumptive staphylococcal colonies were confirmed using routine laboratory methods, including MALDI-TOF and cefoxitin antimicrobial sensitivity testing (AST).

Results: Brilliance Staph 24 Agar detected more coagulase positive staphylococci within 24 hr. incubation than SASelect Agar, compared to the routine laboratory method using SASelect Agar and Columbia Blood Agar incubated for up to 48 hr.

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Introduction

Staphylococcus aureus causes systemic infections and a range of skin and soft-tissue infections (SSTIs), such as surgical site infections, abscesses, carbuncles, and boils. S. aureus is an important cause of serious, invasive and healthcare-associated infections worldwide. In high-income countries, it remains a leading cause of community and nosocomial bacteremia, associated with mortality rates of 25%-55% and large economic burdens.

Brilliance™ Staph 24 Agar (figure 1) is a selective and diagnostic chromogenic medium for the isolation and enumeration of coagulase-positive staphylococci. Brilliance Staph 24 Agar was compared to a leading UK hospital laboratory’s routine method for detection of S. aureus from wound swabs involving culture onto SASelect Agar and Columbia Blood Agar (CBA) (Thermo Fisher Scientific).

Methods

Five hundred and fifty eight wound swabs submitted to the wound bench at Royal Liverpool and Broadgreen University Hospitals NHS Trust were inoculated onto Brilliance Staph 24 Agar, SASelect Agar and CBA using the Kiestra™ Inoqua™ laboratory automation system (KIESTRA Lab Automation BV). Swabs consisted of priority (e.g. surgical wounds, fluids and abscesses) and non-priority (e.g. general wounds and leg ulcers) types.

Brilliance Staph 24 Agar was incubated at 37±1°C for 24 hr. Any blue colonies on Brilliance Staph 24 Agar were confirmed using Thermo Scientific™ Staphylocyst Plus™ (Thermo Fisher Scientific) then MALDI-TOF (Bruker). Any S. aureus were followed up with cefoxitin AST and Oxoid penicillin binding protein (PBP2) latex agglutination test (Thermo Fisher Scientific). SASelect Agar and CBA were incubated at 37±1°C for 24-48 hr. Pink-orange colonies on SASelect Agar and typical staphylococcal colonies on CBA were confirmed using MALDI-TOF and cefoxitin AST according to routine laboratory methods.

Performance (sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV)) of the three media was calculated using the laboratory routine method for staphylococci detection as the reference method. Agreement (positive percentage agreement, negative percentage agreement and overall agreement) of results from Brilliance Staph 24 Agar was also compared with that from SASelect Agar.

Results

Brilliance Staph 24 Agar isolated coagulase positive staphylococci from 30% of all wound swabs tested; MRSA were isolated from 11% of these swabs.

Performance of Brilliance Staph 24 Agar, SASelect Agar and CBA is summarised in table 1.

Table 1. Performance of Brilliance Staph 24 Agar, SASelect Agar and CBA

<table>
<thead>
<tr>
<th>Performance</th>
<th>Brilliance Staph 24 Agar</th>
<th>SASelect Agar</th>
<th>CBA</th>
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<tbody>
<tr>
<td>Sensitivity (%)</td>
<td>95.5 (95% CI = 93.8-97.2)</td>
<td>83.2 (95% CI = 80.1-86.3)</td>
<td>96.1 (95% CI = 94.5-97.7)</td>
</tr>
<tr>
<td>Specificity (%)</td>
<td>98.1 (95% CI = 97.0-99.2)</td>
<td>100 (95% CI = 100)</td>
<td>100 (95% CI = 100)</td>
</tr>
<tr>
<td>PPV (%)</td>
<td>95.5 (95% CI = 93.8-97.2)</td>
<td>95.5 (95% CI = 93.8-97.2)</td>
<td>100 (95% CI = 100)</td>
</tr>
<tr>
<td>NPV (%)</td>
<td>98.1 (95% CI = 93.8-97.2)</td>
<td>98.2 (95% CI = 93.8-97.2)</td>
<td>98.2 (95% CI = 93.8-97.2)</td>
</tr>
</tbody>
</table>

Sensitivity of Brilliance Staph 24 Agar was statistically significantly higher than SASelect Agar (P = 0.0002). NPV of Brilliance Staph 24 Agar was also higher than SASelect Agar. Specificity of Brilliance Staph 24 Agar was comparable to SASelect Agar whereas the PPV was slightly lower.

Although Brilliance Staph 24 Agar showed growth of blue colonies that were confirmed as coagulase negative staphylococci or Corynebacterium species from 8 swabs (1% of all swabs tested), the plate did detect considerably (12%) more coagulase positive staphylococci than SASelect Agar.

Staphylococci colonies observed on Brilliance Staph 24 Agar were at least 1 mm in diameter and easy to pick off, giving enough material for further confirmatory testing. It was also noted that Brilliance Staph 24 Agar seemed more efficient at recovering small numbers of S. aureus than SASelect Agar.

Conclusion

- Brilliance Staph 24 Agar detected more coagulase positive staphylococci than SASelect Agar.
- Sensitivity of Brilliance Staph 24 Agar was statistically significantly higher than SASelect Agar.
- NPV of Brilliance Staph 24 Agar and CBA was considerably higher than SASelect Agar.
- Results were available within 24 hr. when using Brilliance Staph 24 Agar; routine laboratory methods using SASelect and CBA took up to 48 hr. to give a result.
- Specificity of Brilliance Staph 24 Agar was comparable to SASelect Agar and CBA.
- Brilliance Staph 24 Agar has proven to be a highly sensitive and reliable medium for detection of coagulase positive staphylococci from wound swabs in a clinical setting.

References
