Evaluation of Oxoid's Denim Blue Agar for Detecting Methicillin-Resistant Staphylococcus aureus from Surveillance Specimens

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REVISED ABSTRACT

Background: The performance of chromogens for assisting detection of MRSA has markedly improved the ability of laboratories to manage large numbers of screening specimens in a rapid and comparable manner. However, before a new chromogen is adopted by a laboratory, Bio-Rad’s MRSA Select (BR), quicken became the standard for selective culture due to its high sensitivity, specificity and low false positive rates. Currently, Oxoid’s Denim Blue (DB) is BR.

Methods: Consecutive MRSA swabs received from 14 Toronto hospitals were planted in parallel onto DB and BR plates. The plating order was rotated every 50 swabs to avoid inoculation bias. Incubation was at 37°C in the dark for 24h with MRSA growing as blue (DB) or pink (BR) colonies. Hazes/penetrants were ignored on both media as previous studies proved these were not MRSA. MRSA were confirmed (Bio-Rad Pastorex Staph Phage, tube coagulase (coag), CLSI’s Pasteurex, and tetracycline screening) when possible. Denim blue colonies were identified by repeating original swabs to both media post broth enrichment.

Results: Overall, 120 MRSA were identified from 3,450 (3.5%) swabs obtained from 1,952 patients. The DB grew 116 MRSA from 21 of 261 wound, 32 of 925 rectal, 26 of 955 nasal and 37 of 1,309 pooled nasal-axilla-groin-perineum (NAGP) swabs, while the BR grew 117 MRSA from 20 wound, 33 rectal and 37 NAGP swabs. The 17 DB false positives (13 NAGP and 4 nasal) included 15 coag-negative staphylococci (CONS), enterococcus (ENT) and 1 staph. The 16 BR false positives (5 NAGP, 4 nasal, 4 wound) included 12 CONS, 1 ENT, 1 staph. Overall, *sensitivity of Denim Blue was significantly better than the MRSA Select (P<0.0001)

Resolutions of discrepancies

Both media were subject to the growth of organisms that exhibited the anticipated dusty pink or blue denim colour of a potential MRSA, that when confirmatory testing was performed, was found to be false positives. None were methicillin-susceptible S. aureus, rather they were most frequently coagulase-negative staphylococci, enterococcus, diphtheroids or the occasional coagulase-positive S. aureus.

CONCLUSIONS

The time from specimen planting to the time of MRSA notification of the ward or infection control was directly related to the amount of growth available for testing on each medium when it was removed from incubation. This also affected the time to MRSA confirmation (see Table 5 below). Confirmation is required to avoid misidentification of organisms such as the PBP2a-positive S. lugdunensis that grow as pink colonies and are Pasteurex-positive.

Table 5. Summary of times to MRSA notification and MRSA confirmation

<table>
<thead>
<tr>
<th>Specimen type</th>
<th>DB</th>
<th>BR</th>
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<tbody>
<tr>
<td>Nasal swabs (n=750)</td>
<td>46</td>
<td>31</td>
</tr>
<tr>
<td>Rectal swabs (n=750)</td>
<td>48</td>
<td>30</td>
</tr>
<tr>
<td>Wound swabs (n=750)</td>
<td>46</td>
<td>31</td>
</tr>
</tbody>
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Both media therefore scored very highly in both sensitivity and specificity, with clear advantages in terms of time to MRSA notification and confirmation. The results of this study strongly reinforce the need for laboratories to use both media in parallel to avoid potential delays in MRSA diagnosis and to determine which medium is more appropriate for each individual laboratory.

REFERENCES