

# MRSA screening from hospital patients using Thermo Scientific Oxoid *Brilliance* MRSA 2 Agar

Clare Reynolds  
Brighton and Sussex University Hospitals NHS Trust, West Sussex, UK

## Key Words

MRSA, Screening plate, Infection control, 24 hour result, Healthcare, associated infection

## Abstract

The Microbiology department at Princess Royal Hospital in Haywards Heath, UK (part of Brighton and Sussex University Hospitals NHS Trust) conducted a study to evaluate Thermo Scientific™ Oxoid™ *Brilliance*™ MRSA 2 Agar alongside chromID™ MRSA Agar (BioMérieux) and MRSASelect™ Agar (BioRad). Two thousand, one hundred and ninety nine (2199) samples collected from hospital patients were inoculated onto the three agar plates. Presumptive MRSA colonies on any of the three agar plates were confirmed using routine laboratory tests. *Brilliance* MRSA 2 Agar outperformed both chromID MRSA Agar and MRSASelect Agar.

## Introduction

The transmission of methicillin-resistant *Staphylococcus aureus* (MRSA) in hospitals and in the community poses an increased risk of infection in all populations<sup>1</sup>. Methicillin resistance in *S. aureus* is coded for by the *mecA* gene, which is carried on a mobile genetic element termed the staphylococcal cassette chromosome *mec* (SCC*mec*)<sup>2</sup>. The mobile nature of the gene allows rapid transmission of methicillin resistance between *S. aureus* bacteria. Recently, Panton-Valentine Leukocidin (PVL) has also been implicated in pathogenicity of community acquired MRSA (CA-MRSA)<sup>3</sup>.

MRSA are also resistant to all  $\beta$ -lactam antibiotics, including cephalosporins and carbapenems. Healthcare associated MRSA (HA-MRSA) isolates are often multiply resistant to other commonly used antimicrobial agents, including erythromycin, clindamycin, and tetracycline<sup>4</sup>, which dramatically reduces treatment options.

In 2009, the UK Department of Health (DoH) introduced mandatory MRSA screening for patients in England prior to elective admission to hospital<sup>5</sup>. By 2011, MRSA screening will also be compulsory for all emergency hospital admissions as well<sup>6</sup>.

Many European countries, including the UK, have seen the number of reported HA-MRSA decrease in the last few years,<sup>7,8</sup> indicating the implementation of preventative interventions such as screening and infection control measures are proving effective.

## The Study

Two thousand, one hundred and ninety nine (2199) samples taken from a wide range of patient sites (including nasal, axilla and wound swabs, sputum and urine) were incorporated in the study. All swab samples were emulsified in sterile saline prior to inoculation; sputum and urine samples were directly inoculated. All samples were streaked onto *Brilliance* MRSA 2 Agar, chromID MRSA Agar and MRSASelect Agar using a 10 $\mu$ L loop. All plates were incubated in ambient air at 37 $\pm$ 1°C for 18–24 hr.

Presumptive MRSA colonies were confirmed using a *Staphylococcus* latex test, PBP2' latex and ceftioxin and oxacillin antibiotic susceptibility testing as outlined by Clinical Laboratory Standards Institute (CLSI) Performance Standards for Antimicrobial Susceptibility Testing guidelines<sup>9</sup>.

## Results

A total of 50 confirmed MRSA were isolated on one or more of the three agars, equating to a 2.3% prevalence rate. Performance (sensitivity, specificity, PPV and NPV) of *Brilliance* MRSA 2 Agar was higher than chromID MRSA Agar and MRSASelect Agar (see table 1 and figure 1).

*Brilliance* MRSA 2 Agar isolated a greater number of MRSA than the two other media. *Brilliance* MRSA 2 Agar was the only plate that generated no false-positive results. The number of false-negative results (i.e. MRSA isolates that were not detected by the chromogenic agar) on *Brilliance* MRSA 2 Agar was also lower than on chromID MRSA Agar and MRSASelect Agar.

Table 1. Performance of three chromogenic MRSA agars

Performance measure	<i>Brilliance</i> MRSA 2 Agar	chromID MRSA Agar	MRSASelect Agar
<b>TP</b>	44	35	39
<b>TN</b>	2149	2145	2148
<b>FP</b>	0	7	2
<b>FN</b>	6	12	10
<b>Sensitivity (%)</b>	88 (95% CI 86.6-84.4)	74.5 (95% CI 72.7-76.3)	79.6 (95% CI 77.9-81.3)
<b>Specificity (%)</b>	100	99.7 (95% CI 99.5-99.9)	99.9 (95% CI 99.8-100)
<b>PPV (%)</b>	100	83.3 (95% CI 81.7-84.9)	95.1 (95% CI 94.2-96.0)
<b>NPV (%)</b>	99.7 (95% CI 99.5-99.9)	99.4 (95% CI 99.1-99.7)	99.5 (95% CI 99.2-99.8)

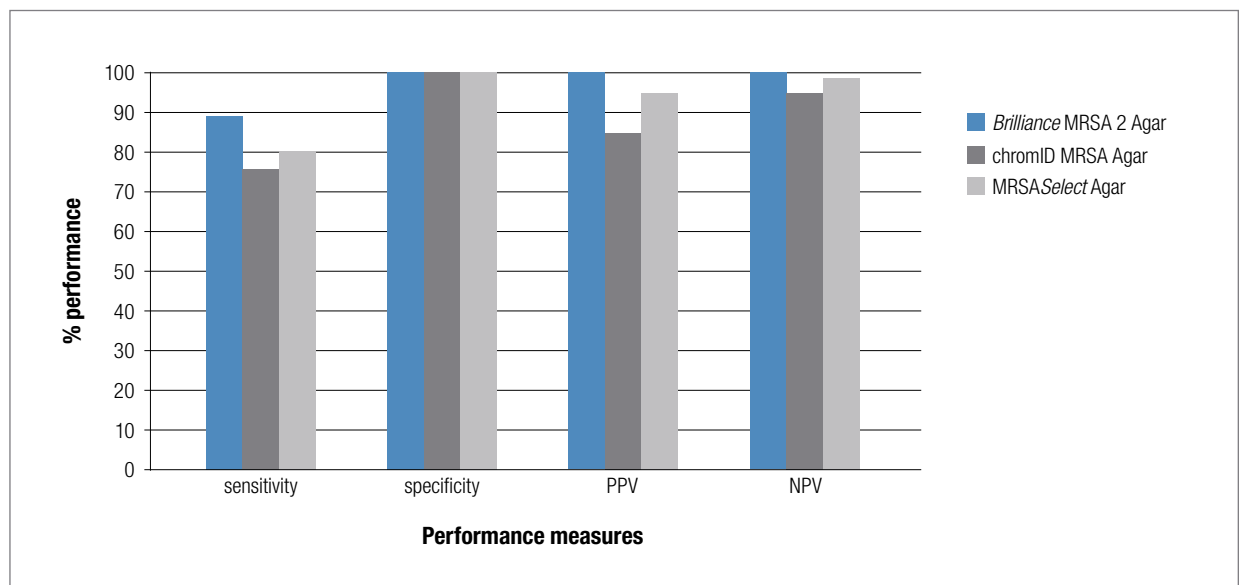


Figure 1. Performance of three chromogenic MRSA agars

## Conclusion

The reduction in reported MRSA prevalence highlights the need for a reliable negative screening method with a high specificity and NPV. *Brilliance* MRSA 2 Agar showed excellent specificity and NPV while retaining the highest sensitivity of all the products tested.

The Microbiology department at Princess Royal Hospital found *Brilliance* MRSA 2 Agar outperformed both chromID MRSA Agar and MRSASelect Agar. *Brilliance* MRSA 2 Agar proved to be a highly sensitive and specific agar plate for isolation and detection of MRSA from clinical samples, detecting more MRSA and giving fewer false-positive results than any of the other products. The distinctive, blue MRSA colonies observed in under 24 hr. (figure 2) on *Brilliance* MRSA 2 Agar made the plate straightforward to interpret and facilitated isolation of colonies for further confirmatory tests.

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Figure 2. MRSA (blue colonies) and non-MRSA (small, pink colonies) on *Brilliance* MRSA 2 Agar

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csemail@thermofisher.com  
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