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Rapid Molecular Detection of Methicillin-Resistant *Staphylococcus aureus*

Two recent studies using conventional screening methods have demonstrated significant reductions in wound infections due to methicillin-resistant *Staphylococcus aureus* (MRSA) following use of preoperative topical suppression in carriers (3, 5). Analysis of wound infection surveillance in this hospital suggests that each MRSA surgical wound infection costs an average of £4,200 ($7,500) in addition to that of routine care (6).

Over 90% of these costs relate to the prolonged stay in the hospital. Conventional screening takes up to 3 days, during which time staff can unwittingly spread MRSA from carriers to others (1). Rapid detection of MRSA carriage should therefore contribute to the prevention of transmission. However, most of the currently available rapid techniques cannot differentiate between pure MRSA and a mixture of methicillin-sensitive *Staphylococcus aureus* and methicillin-resistant coagulase-negative staphylococci.

A new test (IDI-MRSA; GeneOhm Sciences) claims to reliably detect MRSA in nasal swabs on the same day as receipt. This is achieved by target amplification with primers and probes designed to detect the right-hand region of the *mecA* cassette and the neighboring *orfX* gene. The amplified targets are then detected using fluorescent molecular beacon technology. An internal control is included to detect the presence of moieties inhibitory to the PCR.

Of 1,879 samples tested, multiple samples from the same site in the same patient were excluded, resulting in 1,240 patients and 1,211 resolved nasal specimens (1,217 with direct culture on mannitol salt agar plates containing 4 mg/liter oxacillin and 1,211 with an IDI test result). Resolved results are those where discrepant results were further tested using an enrichment protocol of overnight incubation of the original swab at 35°C in nutrient broth supplemented with 4% NaCl and subculture onto appropriate solid media for 24 to 48 h at 35°C. Currently, preenrichment of samples before carrying out the PCR is not performed on routine screening samples as this would add unacceptable delay and affect "same-day" turnaround for the majority of samples.

Overall the prevalence of positive results for MRSA in nasal swabs was 4.8% and 7.4% for culture and IDI tests, respectively. After enrichment, the resolved prevalence was 6.6%. The results for the performance of the IDI test are presented in Table 1.

We have also performed the IDI-MRSA test on 340 screening swabs from other sites and have shown the method to give similar results (not shown here).

When tested against culture for MRSA in 288 patients in another study, this method achieved a similar sensitivity of 91.7%, a specificity of 93.5%, and positive and negative predictive values of 82.5% and 97.1%, respectively (4). The manufacturer's product insert (DMR03-S5-M04) reports a sensitivity of 92.5% and a specificity of 96.4% versus culture in 786 nasal specimens. The same method detected 98.7% of a series of 1,657 MRSA strains in another study (2). Although 4.6% of 569 methicillin-sensitive *S. aureus* isolates were misidentified, none of 286 coagulase-negative isolates were picked out. In 18 nasal swabs spiked with MRSA, the detection limit was reported as 25 CFU. Results are available in less than 3 hours, allowing for easier and more flexible screening at preassessment clinics and the prescription of a topical suppression protocol before admission for surgery. In practice, specimens are processed in daily batches and not out of office hours. Nevertheless, this short turnaround time is especially useful for patients who are admitted as emergency cases, as measures relating to MRSA colonization can often be invoked before the patient undergoes surgery.

We now consider the logistics of specimen acquisition, transport, and action subsequent to the test result a larger obstacle to overcome than the test itself.

TABLE 1. Results for the performance of the IDI test[a]

IDI MRSA result	No. of results resolved	
	Negative	Positive
Negative	1,117	4
Positive	14	76

[a] Sensitivity, 95.0% (95% confidence interval, 87.7–98.6%); specificity, 98.8% (95% confidence interval, 97.9–99.3%); positive predictive value, 84.4% (95% confidence interval, 75.3–91.2%); negative predictive value, 99.6% (95% confidence interval, 99.1–99.9%).

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