Evaluation of the AutoMicrobic System Gram-Positive Susceptibility-MIC Card for Detection of Oxacillin-Resistant Coagulase-Negative Staphylococci

BERT F. WOOLFREY,* RICHARD T. LALLY, AND MARY N. EDERER
Department of Anatomic and Clinical Pathology, Microbiology Section, St. Paul-Ramsey Medical Center, St. Paul, Minnesota 55101

Received 12 August 1985/Accepted 25 November 1985

A total of 398 consecutive clinical staphylococcus isolates, of which 205 were coagulase negative and 193 were coagulase positive, were tested in parallel by using AutoMicrobic system Gram-Positive Susceptibility-MIC cards and modified Mueller-Hinton agar containing 4% NaCl and oxacillin (6 μg/ml). The AutoMicrobic system cards correctly detected 103 of 104 (99%) oxacillin-resistant coagulase-negative isolates with no reports of false resistance.

Although the AutoMicrobic system (AMS) has been evaluated by several investigators for its ability to detect oxacillin resistance in Staphylococcus aureus, (1, 2, 5, 8) only limited data is available concerning detection of oxacillin-resistant, coagulase-negative staphylococci (MR CNS). A single previous study (5) shows that, by using the then-current AMS microprocessor program and Gram-Positive Susceptibility cards, 6 of 95 (6.3%) MR CNS strains were undetected and 11 (11.6%) were detected only by using modified analysis. These isolates were presumed to be heteroresistant, and their frequency of occurrence among MR CNS populations was thought to be geographically dependent. Since a large proportion of coagulase-negative staphylococci isolated in our laboratory are resistant to oxacillin (57% in 1984), we undertook to evaluate the ability of AMS to detect MR CNS with the current AMS microprocessor program and Gram-Positive Susceptibility-MIC (GPS-MIC) cards, recently modified by the manufacturer to enhance detection of heteroresistance for oxacillin-resistant S. aureus.

For 3 months, all staphylococci encountered in routine clinical specimens in the Clinical Microbiology Laboratory at St. Paul-Ramsey Medical Center were tested for oxacillin susceptibility by AMS GPS-MIC cards. Mueller-Hinton agar (MHA) supplemented with 4% NaCl and 6 μg of oxacillin per ml (6, 7) was inoculated in parallel with GPS-MIC cards to serve as a reference medium for oxacillin susceptibility testing. This method has been shown to be equivalent in sensitivity and specificity to the broth microdilution method recently recommended by the National Committee for Clinical Laboratory Standards for detection of oxacillin-resistant staphylococci (4). In addition, inoculation is rapid, is simple to perform, and is readily integrated into the clinical laboratory as a check step for use with an automated instrument. Staphylococci were defined as catalase-positive, gram-positive cocci and were further delineated as S. aureus or coagulase-negative staphylococci by the tube coagulase test. Each isolate was tested as encountered in the laboratory by preparation of a suspension equivalent to a 0.5 McFarland turbidity standard and subsequent dilution in 0.45% saline as described in the instructions of the manufacturer for GPS-MIC cards. Material from this final dilution was inoculated into GPS-MIC cards and was then spot inoculated onto the modified MHA-oxacillin plates by touching the tip of the AMS transfer tube to the agar surface. Purity subculture blood agar plates were prepared for each organism suspension. A comparison of the test results is presented in Table 1.

Of the 398 isolates tested, 205 (51.5%) were identified as coagulase-negative staphylococci. Of the 104 (50.7%) CNS found to be oxacillin resistant on the modified MHA-oxacillin plates, 103 were detected by AMS GPS-MIC cards. The single discrepancy (MIC of >32 μg/ml) was detected by AMS on repeat testing. There were no instances of false resistance reports for coagulase-negative staphylococci by AMS. Of interest is the fact that AMS correctly detected 26 oxacillin-resistant strains of S. aureus among 193 strains of S. aureus tested. We previously found that GPS-MIC cards detected only 85 and 88%, respectively, of oxacillin-resistant isolates of S. aureus from two different outbreaks (3). The present investigation however, involves relatively low numbers of resistant S. aureus isolates; hence, a 12 to 15% false susceptibility rate may not be detectable without testing a larger number of resistant isolates of S. aureus. Relative to results obtained by Stotler and Meyer with Gram-Positive Susceptibility cards (5), the high rate (99%) of detection of MR CNS by AMS GPS-MIC cards in our study may indicate that the GPS-MIC card formulation or changes in the AMS microprocessor program or both have significantly enhanced the capabilities of AMS for detecting MR CNS. Since our evaluation involves strains from only one geographical region, results may also indicate a relatively high, and therefore more readily detectable, percentage of heteroresistance in the test population of MR CNS. Although our data indicate

| Table 1. Comparison of modified MHA-oxacillin plates and GPS-MIC cards for detection of oxacillin-resistant staphylococci |
|---|---|---|---|---|
| Strains tested (n) | No. of strains, test used | Oxacillin resistant | Oxacillin susceptible |
| | | GPS-MIC | MHA-oxacillin | GPS-MIC | MHA-oxacillin |
| Coagulase-negative staphylococci (205) | 103 | 104 | 102 | 101 |
| S. aureus (193) | 26 | 26 | 167 | 167 |

* Corresponding author.
that AMS GPS-MIC cards successfully detect MRCNS, we recommend use of supplementary testing in other centers until evidence is available to ensure detection of MRCNS which might have variable levels of heteroresistance to oxacillin. The modified MHA-oxacillin plates provide a simple and reliable means for supplementary testing and are readily integrated into the AMS workflow.

This study was financed by the St. Paul-Ramsey Hospital Medical Education and Research Foundation grant 8-333.

LITERATURE CITED