Evaluation of MicroScan Rapid Panels for Detection of High-Level Aminoglycoside Resistance in Enterococci

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The ability of MicroScan rapid panels to detect high-level aminoglycoside-resistant enterococci was evaluated. By agar dilution, 46 of 139 isolates were susceptible to gentamicin (GNT) and streptomycin (STRP); the rest were highly resistant to one or both agents. Rapid panels detected 97.5% of STRP- and GNT-resistant isolates and had a specificity of 95.6%. Detection of resistance by conventional panels at 18 h was 64.6% for STRP and 90.2% for GNT.

Enterococci are significant human pathogens, and serious infections require therapy with penicillin or ampicillin plus streptomycin (STRP) or gentamicin (GNT). Isolates with high-level resistance to STRP (MIC > 2,000 μg/ml) were first described in 1970, and, in 1979, strains highly resistant to GNT were reported (1, 6). Such strains are not killed by penicillin plus the respective aminoglycoside; therefore, to determine optimal therapy, clinically significant enterococci should be tested for high-level resistance to STRP and GNT.

The abilities of commercial systems to detect high-level aminoglycoside resistance vary. The sensitivity of the synergy screen (one well with 2,000 μg of GNT per ml and one with 2,000 μg of STRP per ml) in the reformulated conventional MicroScan panels (Baxter, West Sacramento, Calif.) at 18 to 24 h has ranged from 49 to 98% for STRP and from 42 to 100% for GNT (2, 4, 8, 9). Recently, Baxter developed MicroScan panels that provide susceptibility test results in 3.5 to 15 h. These panels, which also have synergy screen wells with 2,000 μg of GNT or STRP per ml, must be incubated in and read with the WalkAway system. Antimicrobial agents are diluted in water with fluorogenic compounds, and the MICs are determined by comparing the increase in fluorescence in the antimicrobial agent dilutions with that in growth control wells. The purpose of this study was to evaluate the reliability of MicroScan rapid panels for detection of high-level aminoglycoside-resistant enterococci. Synergy screen results provided by rapid and reformulated conventional MicroScan panels were compared with the reference agar dilution (agar screen) test.

Organisms. A total of 139 enterococci recovered from clinical specimens between February and September 1992 were tested. Quality control organisms recommended by the manufacturer were tested regularly. Enterococcus faecalis ATCC 29212 and an E. faecalis strain known to be highly resistant to GNT and STRP were susceptible and resistant controls, respectively, for the agar screen.

MicroScan panels. Reformulated conventional (Pos Combo Type 6) and rapid (Pos Combo Type 1) panels were inoculated, incubated, and read according to the manufacturer’s directions, except the total incubation time for conventional panels was 48 h. Both panel types were incubated in and interpreted with the MicroScan WalkAway-96 system. Rapid panels were read at 3.5, 4.5, 5.5, 7, 8, 11, and 15 h; the results were reported when growth in the control wells was adequate. Conventional panels were read with the WalkAway system after 18 h and then examined visually. If one or both synergy screen wells showed no growth, the panel was reincubated off-line at 35°C in ambient air and read visually after incubation for a total of 48 h. If a discrepancy existed between synergy screen results provided by the two panels or between results from a panel and agar dilution, tests with both panels were repeated.

Agar dilution. Agar dilution was performed according to standard practice (5). Briefly, Mueller-Hinton agar was supplemented with 2,000 μg of GNT or STRP per ml. Mueller-Hinton agar without antimicrobial agents was the growth control. The inoculum was prepared from an overnight culture by making a suspension to match the turbidity of a McFarland standard of 0.5, and 0.01 ml was inoculated onto one quadrant of each agar plate. Plates were incubated at 35°C in ambient air for 24 h. Isolates showing any growth were considered resistant.

Of the 139 isolates, 46 were susceptible to GNT and STRP. 30 were resistant to both agents, 52 were resistant to STRP only, and 11 were resistant to GNT only. At 18 and 48 h, respectively, conventional panels detected 64.6% (53 of 82) and 90.2% (74 of 82) of isolates resistant to STRP and 90.2% (37 of 41) and 95.1% (39 of 41) of those resistant to GNT. Two additional isolates were resistant to GNT by the WalkAway system but susceptible by visual inspection. No other discrepancies between WalkAway system and visual interpretations were detected. The 10 isolates with false-susceptible results at 48 h were retested; 6 of the 8 STRP-resistant strains and both GNT-resistant strains were correctly read as resistant.

Rapid panels detected 97.5% (80 of 82) of STRP-resistant isolates and 97.5% (40 of 41) of GNT-resistant isolates. Most results were available in 4.5 to 5.5 h. Two isolates susceptible to GNT by agar screen were resistant by the rapid panels (specificity, 95.6%). No false resistance to STRP was detected with either panel type. The five isolates with discrepant rapid panel and agar screen results were retested; one of the two STRP-resistant isolates and the GNT-resistant strain...
were correctly read as resistant, and one of the two GNT-susceptible strains was correctly read as susceptible.

The MicroScan rapid synergy screen results in our study are similar to those of Nolte et al. (3), who tested 37 E. faecalis strains with high-level resistance to one or both aminoglycosides. In their evaluation, rapid panels detected 100% of isolates resistant to STRP, GNT, or both and gave one false-resistant GNT result (specificity, 96%). Our data regarding reformulated conventional panels are most similar to those of Louie et al. (2) and Sahm et al. (4), who reported lower sensitivities at 18 h (80 and 59%, respectively, for GNT; 77 and 65%, respectively, for STRP) than at 48 h (97 and 89%, respectively, for GNT; 84 and 88%, respectively, for STRP). In other studies, sensitivities at 18 h have been higher (95 to 100% for GNT and 85 to 98% for STRP) (3, 7, 8). The reasons for this discrepancy are not apparent.

In summary, we found that MicroScan rapid Pos Combo Type 1 panels reliably detect high-level aminoglycoside-resistant enterococci in 3.5 to 15 h and most in 4.5 to 5.5 h. Their major drawback is the requirement for the WalkAway system. MicroScan conventional Pos Combo Type 6 panels also are suitable for the detection of resistance but only after incubation for 48 h.

REFERENCES