Comparison of the AMS Gram-Negative Susceptibility Flex Panel GNS-V and Agar Disk Diffusion for Testing of *Pseudomonas aeruginosa*

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Sixty *Pseudomonas aeruginosa* isolates were tested by the agar disk diffusion, AMS Vitek GNS-V flex panel (Vitek Systems, Inc., Hazelwood, Mo.), and agar dilution methods. Although the results of aminoglycoside tests were satisfactory, those of piperacillin and cefoperazone by Vitek GNS-V (T2.05 program) were not acceptable.

Agar disk diffusion and the AMS Vitek method (Vitek Systems, Inc., Hazelwood, Mo.) are the routine methods for determining antimicrobial susceptibility in our laboratory. We are currently using the Vitek flex panel GNS-V, which contains the following agents: amikacin, ampicillin, cefazolin, cefoperazone, cefotaxime, cefoxitin, gentamicin, netilmicin, nitrofurantoin, piperacillin, and trimethoprim-sulfamethoxazole.

Initial findings with the GNS-V (with computer program T2.05, June 1986) indicated some discrepancies when isolates of *Pseudomonas aeruginosa* were tested against cefoperazone and piperacillin. This, coupled with previous experience of poor results with tests of *Pseudomonas* isolates in other systems (1), prompted a study to test 60 clinical isolates of *P. aeruginosa*. These were tested against cefoperazone, piperacillin, and three aminoglycosides in the Vitek system. The National Committee for Clinical Laboratory Standards reference aerobic agar dilution method (2) was used to evaluate the relative accuracies of agar disk diffusion (3) and the GNS-V flex panel. The antimicrobial agents and ranges for the agar dilution method used were:

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**TABLE 1. Comparison of Vitek GNS-V and agar disk diffusion with reference agar dilution for 60 isolates of *P. aeruginosa***

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>No. of isolates (%) by reference agar dilution*</th>
<th>Error and accuracy* for:</th>
<th>Vitek GNS-V</th>
<th>Agar disk diffusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S</td>
<td>I</td>
<td>R</td>
<td>VM</td>
</tr>
<tr>
<td>Amikacin</td>
<td>54</td>
<td>90.0</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>50</td>
<td>83.3</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Netilmicin</td>
<td>40</td>
<td>66.7</td>
<td>16</td>
<td>26.7</td>
</tr>
<tr>
<td>Cefoperazone</td>
<td>46</td>
<td>76.7</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Piperacillin</td>
<td>43</td>
<td>71.6</td>
<td>8</td>
<td>13.3</td>
</tr>
</tbody>
</table>

* S, Susceptible; I, intermediate; R, resistant.
* VM, Very major error, test susceptible, truly resistant; Ma, major error, test resistant, truly susceptible; Mi, minor error, involving an intermediate result; EA, essential accuracy; CA, complete adherence.

amikacin (Bristol Laboratories of Canada, Ottawa, Ontario, Canada), 2.0 to 64 µg/ml; gentamicin and netilmicin (Schering Canada Inc., Pointe Claire, Quebec, Canada), 0.5 to 32 µg/ml; tobramycin (Eli Lilly Canada Inc., Scarborough, Ontario, Canada), 0.5 to 32 µg/ml; cefoperazone (Pfizer Canada, Inc., Kirkland, Quebec, Canada), 8.0 to 128 µg/ml; and piperacillin (Lederle Cyanamid Canada Inc., Willowdale, Ontario, Canada), 8.0 to 256 µg/ml.

Care was taken not to repeat use of any isolate from a patient. In addition, *P. aeruginosa* ATCC 27853, *Escherichia coli* ATCC 25922, and a laboratory control organism (*Enterobacter cloacae*) with known MICs were used with the agar dilution plates.

The results are tabulated in Table 1. Essential accuracy (EA) and complete accuracy (CA) are defined as follows:

\[
\text{EA} = n - (\text{VM + Ma} \times 100) \\
\text{CA} = n - (\text{VM + Ma + Mi} \times 100)
\]

where VM is very major error, test method susceptible, reference method resistant; Ma is major error, test method resistant, reference method susceptible; Mi is minor error (any discrepancy involving an intermediate result); and n is number of test isolates.

Our laboratory has set limits that new methods should achieve EA > 94% and CA > 80%.

All test results were satisfactory except those of cefoperazone and piperacillin with Vitek GNS-V. CAs between the reference agar dilution results and those of Vitek were only 57 and 58%, respectively, in tests of cefoperazone and piperacillin. EAs, calculated by excluding the minor errors, were only 73 and 70%, respectively. The CAs for gentamicin and netilmicin at 78% were slightly below our standard. These results contrast with those of the agar disk diffusion.
method, where cefoperazone and piperacillin had EAs of 98 and 100%, respectively. Thus, we continue in our diagnostic laboratory to test P. aeruginosa isolates by agar disk diffusion rather than by the Vitek GNS-V system until satisfactory corrections are made in the computer program, which the company assures us are in progress.

LITERATURE CITED