Pseudomonas non-aeruginosa

Calibration of zone diameter breakpoints to MIC values

Version 5.0
January 2019
Pseudomonas non-aeruginosa
MIC and zone diameter correlates

- The following histograms present inhibition zone diameter distributions from EUCAST antimicrobial susceptibility testing. In most, the different colours of the bars indicate different MIC values. In some, the colours of the bars indicate a resistance gene or a resistance mechanism.

- The distributions include data for wild-type isolates and for isolates with acquired resistance mechanisms. A large number of isolates with MIC values close to the edge of the wild-type distribution and/or close to EUCAST clinical breakpoints were intentionally included. These distributions can not be used to infer resistance rates or the performance of the tests with routine isolates.

- For some agents, isolates were tested on more than one occasion, including parallel tests with disks and media from several manufacturers. When this is the case, data are presented as both the “number of isolates tested” and the “total number of MIC-zone diameter correlates”, including replicate tests and parallel tests with disks and media from different sources.
**Pseudomonas non-aeruginosa**  
Materials and methods

- Antimicrobial susceptibility testing was performed on clinical isolates of *Pseudomonas non-aeruginosa*. Disk diffusion was performed according to EUCAST methodology and MIC determination was performed with broth microdilution or gradient tests. Species identification was performed with MALDI-TOF MS.

- The distributions of MIC vs. zone diameter in this presentation are the result of a collaboration between EUCAST and JMI Laboratories, North Liberty, USA. These distributions are followed by zone diameter distributions with different species shown as coloured bars.

- This presentation is based on EUCAST Clinical Breakpoint Tables v. 9.0.
## Changes from previous version (4.0)

<table>
<thead>
<tr>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Doripenem graphs removed due to removed breakpoints.</td>
</tr>
<tr>
<td>• MIC and zone diameter breakpoints changed for imipenem and aztreonam.</td>
</tr>
</tbody>
</table>
Pseudomonas species according to MALDI-TOF

- 192 clinical isolates:
  
  - Putida group*: (n=113)
    - P. putida, P. oryzihabitans, P. monteilii, P. mosselii,
    - P. plecoglossicida, P. fulva.
  
  - Stutzeri group*: (n=35)
    - P. stutzeri, P. luteola, P. balearica
  
  - Flourescens group*: (n=20)
    - P. flourescens, P. synxantha, P. libanensis, P. azotoformans,
    - P. extremorientalis, P. rhodesiae, P. antarctica.
  
  - Aeruginosa group*: (n=6)
    - P. mendocina, P. oleovorans.
  
  - Other*: (n=18)
    - P. chlororaphis, P. koreensis, P. graminis, P. asplenii

Explanation of graphs:

Zone diameter distribution with MIC values or resistance mechanisms as coloured bars.

Piperacillin-tazobactam 30-6 µg vs. MIC
*Pseudomonas non-aeruginosa*, 191 isolates

Susceptible by EUCAST MIC breakpoints

Resistant by EUCAST MIC breakpoints

MIC (mg/L)

- ≥128
- 64
- 32
- 16
- 8
- 4
- 2
- 1
- ≤0.5
Piperacillin 30 µg vs. MIC
*Pseudomonas* non-*aeruginosa*, 171 isolates

(1 data source)

**Breakpoints**
- **MIC**
  - $S \leq 16$, $R > 16$ mg/L
- **Zone diameter**
  - $S \geq 18$, $R < 18$ mm
Piperacillin-tazobactam 30-6 µg vs. MIC
Pseudomonas non-aeruginosa, 191 isolates

(1 data source)

Breakpoints

MIC
S ≤ 16, R > 16 mg/L

Zone diameter
S ≥ 18, R < 18 mm
Ticarcillin-clavulanic acid 75-10 µg vs. MIC

*Pseudomonas non-aeruginosa*, 150 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>256</th>
<th>128</th>
<th>64</th>
<th>32</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of observations</td>
<td>≥256</td>
<td>128</td>
<td>64</td>
<td>32</td>
<td>16</td>
</tr>
</tbody>
</table>

Breakpoints

- **MIC**
  - S≤16, R>16 mg/L
- **Zone diameter**
  - S≥18, R<18 mm
Cefepime 30 µg vs. MIC

*Pseudomonas non-aeruginosa*, 191 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥32</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>0.5</td>
<td>22</td>
</tr>
<tr>
<td>0.25</td>
<td>24</td>
</tr>
<tr>
<td>≤0.125</td>
<td>26</td>
</tr>
</tbody>
</table>

**Breakpoints**

MIC: S≤8, R>8 mg/L
Zone diameter: S≥21, R<21 mm
Ceftazidime 10 µg vs. MIC

*Pseudomonas non-aeruginosa*, 188 isolates

(1 data source)

Inhibition zone diameter (mm)

No of observations

MIC (mg/L)
- ≥32
- 16
- 8
- 4
- 2
- ≤1

Breakpoints
- MIC
  - S≤8, R>8 mg/L
- Zone diameter
  - S≥17, R<17 mm
Imipenem 10 µg vs. MIC
*Pseudomonas* non-*aeruginosa*, 187 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>S≤4, R&gt;4 mg/L</th>
<th>S≥20, R&lt;20 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤0.125</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No of observations

Inhibition zone diameter (mm)
Meropenem 10 µg vs. MIC
*Pseudomonas non-aeruginosa*, 190 isolates

(1 data source)

Breakpoints
- **MIC**  
  S≤2, R>8 mg/L
- **Zone diameter**  
  S≥24, R<18 mm
Aztreonam 30 µg vs. MIC

*Pseudomonas* non-*aeruginosa*, 191 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥32</td>
<td>25</td>
</tr>
<tr>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>15</td>
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<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>0.25</td>
<td>1</td>
</tr>
<tr>
<td>≤0.125</td>
<td>1</td>
</tr>
</tbody>
</table>

**Breakpoints**

<table>
<thead>
<tr>
<th>MIC</th>
<th>S≤16, R&gt;16 mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone diameter</td>
<td>S≥18, R&lt;18 mm</td>
</tr>
</tbody>
</table>
Ciprofloxacin 5 µg vs. MIC
*Pseudomonas non-aeruginosa*, 173 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>≤0.03</th>
<th>0.06</th>
<th>0.125</th>
<th>0.25</th>
<th>0.5</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>≥8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone diameter</td>
<td>≤26</td>
<td>26-28</td>
<td>28-30</td>
<td>30-32</td>
<td>32-34</td>
<td>34-36</td>
<td>36-38</td>
<td>38-40</td>
<td>40-50</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Breakpoints**

- **MIC**
  - S ≤0.5, R >0.5 mg/L
- **Zone diameter**
  - S ≥26, R <26 mm
Levofloxacin 5 µg vs. MIC
*Pseudomonas non-aeruginosa*, 191 isolates

(1 data source)

**Breakpoints**
- **MIC**
  - S≤1, R>1 mg/L
- **Zone diameter**
  - S≥22, R<22 mm
Amikacin 30 µg vs. MIC

*Pseudomonas non-aeruginosa*, 158 isolates

(1 data source)

Breakpoints

MIC
S≤8, R>16 mg/L

Zone diameter
S≥18, R<15 mm
Gentamicin 10 µg vs. MIC

*Pseudomonas* non-*aeruginosa*, 191 isolates

(1 data source)

**Breakpoints**

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>Zone diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤4, &gt;4 mg/L</td>
<td>≥15, &lt;15 mm</td>
</tr>
</tbody>
</table>

*No of observations*

**Inhibition zone diameter (mm)**

- **MIC (mg/L)**: ≥16, 8, 4, ≤2
- **Zone diameter**: S≥15, R<15 mm
Netilmicin 10 µg vs. MIC

*Pseudomonas non-aeruginosa*, 190 isolates

(1 data source)

Breakpoints

- **MIC**
  - S ≤ 4, R > 4 mg/L
- **Zone diameter**
  - S ≥ 12, R < 12 mm
Tobramycin 10 µg vs. MIC

*Pseudomonas non-aeruginosa*, 192 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥32</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
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<td>8</td>
<td>12</td>
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<tr>
<td>4</td>
<td>14</td>
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<td>2</td>
<td>16</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>0.5</td>
<td>22</td>
</tr>
<tr>
<td>≤0.25</td>
<td>24</td>
</tr>
</tbody>
</table>

**Breakpoints**

- **MIC**
  - S ≤4, R > 4 mg/L
- **Zone diameter**
  - S ≥16, R < 16 mm
*Pseudomonas* non-*aeruginosa*

Zone diameter distributions vs. species
Piperacillin 30 µg vs. species
*Pseudomonas* non-*aeruginosa*, 192 isolates

<table>
<thead>
<tr>
<th>Species</th>
<th>Breakpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone diameter</td>
</tr>
<tr>
<td></td>
<td>$S \geq 18$, $R &lt; 18$ mm</td>
</tr>
</tbody>
</table>

- Pseudomonas non-aeruginosa
- Other
- Aeruginosa group
- Fluoresscens group
- Stutzeri group
- Putida group
Piperacillin-tazobactam 30-6 µg vs. species
*Pseudomonas* non-*aeruginosa*, 192 isolates

**Species**
- Other
- *Aeruginosa* group
- *Fluorescens* group
- *Stutzeri* group
- *Putida* group

**Breakpoints**
Zone diameter  S≥18, R<18 mm
Ticarcillin-clavulanate 75-10 µg vs. species
*Pseudomonas* non-*aeruginosa*, 191 isolates

**Species**
- Other
- Aeruginosa group
- Fluorescens group
- Stutzeri group
- Putida group

**Breakpoints**
Zone diameter $\geq 18, R < 18$ mm
Cefepime 30 µg vs. species
*Pseudomonas* non-*aeruginosa*, 192 isolates

**Breakpoints**
Zone diameter  \( S \geq 21, R < 21 \) mm
Ceftazidime 10 µg vs. species
_Pseudomonas non-aeruginosa_, 192 isolates

<table>
<thead>
<tr>
<th>Species</th>
<th>Breakpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>S≥17, R&lt;17 mm</td>
</tr>
<tr>
<td>Aeruginosa group</td>
<td></td>
</tr>
<tr>
<td>Flourescens group</td>
<td></td>
</tr>
<tr>
<td>Stutzeri group</td>
<td></td>
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<tr>
<td>Putida group</td>
<td></td>
</tr>
</tbody>
</table>

No of observations

Inhibition zone diameter (mm)

Breakpoints
Zone diameter S≥17, R<17 mm
Imipenem 10 µg vs. species

*Pseudomonas non-aeruginosa*, 192 isolates

**Breakpoints**
Zone diameter  S≥20, R<20 mm
Meropenem 10 µg vs. species
*Pseudomonas* non-*aeruginosa*, 191 isolates

**Breakpoints**
Zone diameter $S \geq 24$, $R < 18 \text{ mm}$
Aztreonam 30 µg vs. species

_Pseudomonas non-aeruginosa_, 192 isolates

<table>
<thead>
<tr>
<th>Species</th>
<th>Breakpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone diameter</td>
</tr>
<tr>
<td></td>
<td>S≥18, R&lt;18 mm</td>
</tr>
</tbody>
</table>

**Species**
- Other
- Aeruginosa group
- Fluorescens group
- Stutzeri group
- Putida group
Ciprofloxacin 5 µg vs. species
*Pseudomonas* non- *aeruginosa*, 192 isolates

**Breakpoints**
Zone diameter $S \geq 26$, $R < 26$ mm
Levofloxacin 5 µg vs. species

*Pseudomonas non-aeruginosa*, 192 isolates

### Breakpoints

Zone diameter: $S \geq 22$, $R < 22$ mm

### No of observations

<table>
<thead>
<tr>
<th>Inhibition zone diameter (mm)</th>
<th>Other</th>
<th>Aeruginosa group</th>
<th>Fluorescens group</th>
<th>Stutzeri group</th>
<th>Putida group</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
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<td>50</td>
<td>1</td>
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</tr>
</tbody>
</table>
Amikacin 30 µg vs. species
*Pseudomonas non-aeruginosa*, 192 isolates

<table>
<thead>
<tr>
<th>Species</th>
<th>Breakpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>S≥18, R&lt;15 mm</td>
</tr>
<tr>
<td>Aeruginosa group</td>
<td></td>
</tr>
<tr>
<td>Fluorescens group</td>
<td></td>
</tr>
<tr>
<td>Stutzeri group</td>
<td></td>
</tr>
<tr>
<td>Putida group</td>
<td></td>
</tr>
</tbody>
</table>

No of observations
Gentamicin 10 µg vs. species
*Pseudomonas non-aeruginosa*, 192 isolates

**Inhibition zone diameter (mm)**

**Species**
- Other
- Aeruginosa group
- Fluorescens group
- Stutzeri group
- Putida group

**Breakpoints**
Zone diameter $S \geq 15$, $R < 15$ mm
<table>
<thead>
<tr>
<th>Species Group</th>
<th>Zone Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netilmicin 10 µg vs. species Pseudomonas non-aeruginosa, 192 isolates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S≥12, R&lt;12 mm</td>
</tr>
</tbody>
</table>

**Species**
- **Other**
- **Aeruginosa group**
- **Flourescens group**
- **Stutzeri group**
- **Putida group**

**Breakpoints**
- Zone diameter: S≥12, R<12 mm
Tobramycin 10 µg vs. species
*Pseudomonas non-aeruginosa*, 192 isolates

<table>
<thead>
<tr>
<th>Breakpoints</th>
<th>Zone diameter</th>
<th>S≥16, R&lt;16 mm</th>
</tr>
</thead>
</table>

No of observations

Species
- Other
- Aeruginosa group
- Fluorescens group
- Stutzeri group
- Putida group