Kingella kingae

Calibration of zone diameter breakpoints to MIC values
Kingella kingae
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.
**Kingella kingae**

Materials and methods

- Antimicrobial susceptibility testing was performed clinical isolates of *Kingella kingae* collected from several laboratories, including isolates with known resistance mechanisms. Disk diffusion was performed on MH-F media according to EUCAST methodology and MICs were determined with the ISO broth microdilution method using MH-F media or gradient tests.

- The distributions of MIC vs. zone diameter in this presentation are the result of a collaboration between EUCAST and Soroka University Medical Center, Israel.

- This presentation is based on EUCAST Clinical Breakpoint Tables v. 10.0.
Changes from previous version (1.2)

<table>
<thead>
<tr>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No changes. Breakpoints checked against latest version of EUCAST Clinical Breakpoint Tables.</td>
</tr>
</tbody>
</table>
Explanation of graphs:

These graphs show zone diameter distributions with MIC values or resistance mechanisms as coloured bars. Colours are related to current EUCAST MIC breakpoints.

**Agent X**

- **MIC (mg/L):**
  - ≥8
  - 4
  - 2
  - 1
  - 0.5
  - ≤0.25

- **Zone diameter breakpoint:**

**Agent Y**

- **MIC (mg/L):**
  - ≥64
  - 32
  - 16
  - 8
  - 4
  - 2
  - 1
  - 0.5
  - ≤0.25

- **Susceptible, increased exposure**
- **Susceptible, standard dosing regimen**
- **Resistant**
Benzylpenicillin 1 unit vs. MIC
Kingella kingae, 159 isolates

(1 data source)

No of observations

Inhibition zone diameter (mm)

0 2 4 6 8 10 12 14 16 18 20

MIC (mg/L)
- 2
- 1
- 0.5
- 0.25
- 0.125
- 0.06
- 0.03
- 0.016
- ≤0.008

Breakpoints
MIC S≤0.03, R>0.03 mg/L
Zone diameter S≥25, R<25 mm
Benzylpenicillin 1 unit vs. β-lactamase

*Kingella kingae*, 159 isolates

(1 data source)

<table>
<thead>
<tr>
<th>Inhibition zone diameter (mm)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>0</td>
</tr>
<tr>
<td>38</td>
<td>0</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>42</td>
<td>0</td>
</tr>
<tr>
<td>44</td>
<td>0</td>
</tr>
<tr>
<td>46</td>
<td>0</td>
</tr>
<tr>
<td>48</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

**Breakpoints**

Zone diameter  S≥25, R<25 mm

**β-lactamase**
- Positive
- Negative
Benzylpenicillin 1 unit vs. Ampicillin MIC
*Kingella kingae*, 159 isolates

(1 data source)

Benzylpenicillin can be used to determine susceptibility to ampicillin and amoxicillin.

**Breakpoints**
- **Ampicillin MIC**
  - S≤0.06, R>0.06 mg/L
- **Benzylpenicillin zone diameter**
  - S≥25, R<25 mm
Benzylpenicillin can be used to determine susceptibility to ampicillin and amoxicillin.

Breakpoints
Amoxicillin MIC  
S≤0.125, R>0.125 mg/L
Benzylpenicillin zone diameter  
S≥25, R<25 mm
Cefotaxime 5 µg vs. MIC
Kingella kingae, 159 isolates

(1 data source)

No of observations

Breakpoints
MIC       S≤0.125, R>0.125 mg/L
Zone diameter  S≥27, R<27 mm
Ceftriaxone 30 µg vs. MIC
Kingella kingae, 158 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06</td>
<td>0</td>
</tr>
<tr>
<td>0.03</td>
<td>0</td>
</tr>
<tr>
<td>≤0.016</td>
<td>0</td>
</tr>
</tbody>
</table>

Breakpoints

- MIC: S≤0.06, R>0.06 mg/L
- Zone diameter: S≥30, R<30 mm
Cefuroxime 30 µg vs. MIC
*Kingella kingae*, 158 isolates

(1 data source)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤0.03</td>
<td>6</td>
</tr>
<tr>
<td>0.06</td>
<td>8</td>
</tr>
<tr>
<td>0.125</td>
<td>10</td>
</tr>
<tr>
<td>0.25</td>
<td>15</td>
</tr>
</tbody>
</table>

**Breakpoints (iv)**

- MIC: S≤0.5, R>0.5 mg/L
- Zone diameter: S≥29, R<29 mm
Meropenem 10 µg vs. MIC
Kingella kingae, 155 isolates

(1 data source)

**Breakpoints**
MIC  
S≤0.03, R>0.03 mg/L

Zone diameter  
S≥30, R<30 mm
Ciprofloxacin 5 µg vs. MIC
Kingella kingae, 159 isolates

(1 data source)

No of observations

Breakpoints

MIC
S≤0.06, R>0.06 mg/L

Zone diameter
S≥28, R<28 mm
Levofloxacin 5 µg vs. MIC
*Kingella kingae*, 159 isolates

(1 data source)

**Breakpoints**
- **MIC**
  - S ≤ 0.125, R > 0.125 mg/L

- **Zone diameter**
  - S ≥ 28, R < 28 mm
Erythromycin 15 µg vs. MIC
Kingella kingae, 159 clinical isolates

(1 data source)

Breakpoints
MIC       S≤0.5, R>0.5 mg/L
Zone diameter S≥20, R<20 mm
Erythromycin 15 µg vs. Azithromycin MIC
*Kingella kingae*, 159 clinical isolates

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>Breakpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.125</td>
<td>S≤0.25, R&gt;0.25 mg/L</td>
</tr>
<tr>
<td>≤0.06</td>
<td>S≥20, R&lt;20 mm</td>
</tr>
</tbody>
</table>

Erythromycin can be used to determine susceptibility to azithromycin and clarithromycin.
**Erythromycin 15 µg vs. Clarithromycin MIC**

*Kingella kingae*, 159 clinical isolates

(1 data source)

Erythromycin can be used to determine susceptibility to azithromycin and clarithromycin.

**Breakpoints**

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>Clarithromycin MIC</th>
<th>Erythromycin zone diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤0.03</td>
<td>S≤0.5, R&gt;0.5 mg/L</td>
<td>S≥20, R&lt;20 mm</td>
</tr>
</tbody>
</table>
Tetracycline 30 µg vs. MIC
Kingella kingae, 159 isolates

(1 data source)

No of observations

Inhibition zone diameter (mm)

Breakpoints

MIC
S≤0.5, R>0.5 mg/L

Zone diameter
S≥28, R<28 mm
**Tetracycline 30 µg vs. Doxycycline MIC**

*Kingella kingae, 159 isolates*

(1 data source)

Isolates susceptible to tetracycline are also susceptible to doxycycline, but some resistant to tetracycline may be susceptible to doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.

**Breakpoints**

<table>
<thead>
<tr>
<th>Breakpoint</th>
<th>MIC (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doxycycline MIC</td>
<td>S≤0.5, R&gt;0.5 mg/L</td>
</tr>
<tr>
<td>Tetracycline zone diameter</td>
<td>S≥28, R&lt;28 mm</td>
</tr>
</tbody>
</table>
Rifampicin 5 µg vs. MIC
*Kingella kingae*, 159 isolates

(1 data source)

**Breakpoints**

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>S≤0.5, R&gt;0.5 mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>0.125</td>
<td></td>
</tr>
<tr>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>≤0.016</td>
<td></td>
</tr>
</tbody>
</table>

**Zone diameter**

| S≥20, R<20 mm |
|---------------|---------------|
| 0.5           |                |
| 0.25          |                |
| 0.125         |                |
| 0.06          |                |
| 0.03          |                |
| ≤0.016        |                |
Trimethoprim-sulfamethoxazole 1.25-23.75 µg vs. MIC
Kingella kingae, 159 isolates

(1 data source)

Breakpoints
MIC: S≤0.25, R>0.25 mg/L
Zone diameter: S≥28, R<28 mm