The Montana Department of Public Health and Human Services has conducted antimicrobial susceptibility surveillance and provided a statewide antibiogram since 2005. Thirty two Montana laboratories provided antimicrobial susceptibility data from testing performed January 1, 2011 through December 31, 2011, for over 37,000 bacterial isolates. These data were compiled to create a statewide antibiogram using the methodology described by the Clinical and Laboratory Standards Institute (CLSI), in document M39-A3, Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data; Approved Guideline.¹

Rare and improbable susceptibility patterns continue to be reported. In some cases, the occurrence of even one of these susceptibility patterns would be of public health significance. These results raise a concern over possible errors in methodology, a concern that is exacerbated by the fact that none of the isolates were referred for confirmatory testing. It is important that laboratorians understand the potential significance of unusual resistance patterns so deviations from the expected will be recognized and reported. This can be accomplished by reviewing intrinsic resistance tables in CLSI document M-100, Performance Standards for Antimicrobial Susceptibility Testing² and by consulting statewide data. Invalid results may have significant impact on treatment of individual patients and on public health outcomes. In most instances, unexpected or improbable data do not affect the average percentage rates for the state-wide antibiogram, but they do convey potentially erroneous susceptibility data to local providers.

Of greatest concern is the continued reporting of vancomycin-resistant Staphylococcus aureus. Although twelve S. aureus isolates were reported as vancomycin resistant in 2011, none were referred to the public health laboratory for confirmation and further testing. Other improbable results included 84 isolates of Klebsiella pneumoniae reported as ampicillin-susceptible, 237 Pseudomonas aeruginosa isolates reported as cefepime-resistant, and susceptibility levels for specific antimicrobial agents that were significantly different from the state average.

Since 2006, the statewide proportion of methicillin resistant Staphylococcus aureus (MRSA) isolates has steadily decreased from 40% to 33% of total Staphylococcus aureus. (Figure 1) Data from both 2010 and 2011 indicate a significantly higher than average occurrence of MRSA across the northern region of the state. (Figure 2)

The state antibiogram is presented for surveillance purposes only and should not be used as the primary basis for determining antimicrobial therapy for individual patients.

The following tables summarize the susceptibility patterns for select bacteria of public health and clinical importance. An asterisk (*) following a number indicates that data were received from five or fewer laboratories. Data received from a single laboratory are not included. Agents tested against fewer than 100 isolates are not included. Red numbers reflect total isolates tested against each agent.

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### 2011 Montana Antibiogram

**Data collection:** January 1 through December 31, 2011. This antibiogram reflects data submitted by 32 clinical laboratories in Montana. These data should not be used for the determination of therapy for individual patients.

#### 2011 Montana Antibiogram

<table>
<thead>
<tr>
<th>2011 Gram Positive Isolates</th>
<th># of isolates tested</th>
<th>percent susceptible</th>
<th>Red: # of isolates tested</th>
<th>Black: percent susceptible</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S. aureus</strong></td>
<td>1088</td>
<td>53%</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td><strong>S. pneumoniae</strong></td>
<td>1117</td>
<td>34%</td>
<td>589</td>
<td>35%</td>
</tr>
<tr>
<td><strong>S. faecalis</strong></td>
<td>231</td>
<td>56%</td>
<td>127</td>
<td>52%</td>
</tr>
<tr>
<td><strong>S. faecium</strong></td>
<td>284</td>
<td>56%</td>
<td>127</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Enterococcus spp</strong></td>
<td>1008</td>
<td>50%</td>
<td>508</td>
<td>50%</td>
</tr>
<tr>
<td><strong>P. aeruginosa</strong></td>
<td>4630</td>
<td>60%</td>
<td>2845</td>
<td>60%</td>
</tr>
<tr>
<td><strong>K. pneumoniae</strong></td>
<td>2035</td>
<td>40%</td>
<td>836</td>
<td>40%</td>
</tr>
<tr>
<td><strong>A. baumannii</strong></td>
<td>527</td>
<td>100%</td>
<td>527</td>
<td>100%</td>
</tr>
</tbody>
</table>

#### 2011 Gram Negative Isolates

<table>
<thead>
<tr>
<th>2011 Gram Negative Isolates</th>
<th># of isolates tested</th>
<th>percent susceptible</th>
<th>Red: # of isolates tested</th>
<th>Black: percent susceptible</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E. coli</strong></td>
<td>20329</td>
<td>50%</td>
<td>1008</td>
<td>50%</td>
</tr>
<tr>
<td><strong>K. pneumoniae</strong></td>
<td>3588</td>
<td>50%</td>
<td>1117</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Proteus</strong></td>
<td>1167</td>
<td>50%</td>
<td>527</td>
<td>50%</td>
</tr>
<tr>
<td><strong>P. aeruginosa</strong></td>
<td>2194</td>
<td>50%</td>
<td>527</td>
<td>50%</td>
</tr>
</tbody>
</table>

#### Single Agent Classes

- **β-lactam/β-lactamase inhibitor**
- **cephems**
- **quinolones**
- **carbapenems**
- **Single Agent Classes**

#### Carbohydrates

- **Gentamicin**
- **Tobramycin**
- **Amikacin**
- **Aminoglycoside**
- **Ticarcillin**
- **Ticarcillin-Clavulanic Acid**
- **Carbenicillin**
- **Carbapenem**
- **Levosimendan**
- **Linezolid**
- **Moxifloxacin**
- **Sulfisoxazole**
- **Trimethoprim**

#### Other Antibiotics

- **Ampicillin**
- **Ampicillin-Sulbactam**
- **Cefazolin**
- **Cefuroxime**
- **Cefoxitin**
- **Ceftazidime**
- **Norfloxacin**
- **Ciprofloxacin**
- **Ertapenem**
- **Ceftazidime or Ceftriaxone**
- **Linezolid**
- **Vancomycin**
- **Piperacillin-Tazobactam**

#### Percent Susceptible

- **Urine Percent Susceptible**
- **Non-Urine Percent Susceptible**
- **All isolates Percent Susceptible**
Single Agent Classes

MONTANA
2010
ANTIBIOGRAM