Prior use of fluoroquinolones (FQ), fluoroquinolone resistance and gyrA/parC mutations in Streptococcus pneumoniae (SPN) in Ontario

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Abstract

Objective: Use of FQs is known to be associated with selection for FQ resistance (FQR) in SPN. We assess the extent to which prior FQ use was associated not only with increases in FQR but also with increases in gyrA and parC FQR associated with SPN.

Methods: TIBDN performs population-based surveillance for invasive pneumococcal disease (IPD) in Toronto/Peel (pop. 4M). Respiratory isolates are also collected. Prior antibiotic use is collected via a chart review and paediatrician interview. Brief microsatellite susceptibility testing to SC1 standards is performed. GyrA (at codons 83 and 84) and ParC (at codon 57) were selected for analysis.

Results: From 2000–2009, FQ use increased from 64/97 (6.6%) to 197/1000 (19.7%) in the same individuals. Of the 6838 cases with data regarding antibiotic use at the time the culture yielding S. pneumoniae was taken, 113 (1.7%) were receiving a fluoroquinolon, including 58 of 3437 (1.7%) cases of IPD and 55 of 3401 (1.6%) patients with respiratory isolates. Of the 5588 cases with complete data on FQ exposure in the prior 3 months, 948 (17%) had received a fluoroquinolon (436/2876 (15%) of IPD cases and 512/2712, (19%) of patients with respiratory isolates).

Conclusions: Exposure to fluoroquinolones has significantly increased in patients who has more recently been exposed to fluoroquinolones; however, FQ exposure more than three months prior to infection was still associated with significantly higher rates of resistance (Figure 3).

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Table 1: Prevalence of QDRDR mutations by fluorquinolon susceptibililty

<table>
<thead>
<tr>
<th>Susceptibility</th>
<th>gyrA only</th>
<th>gyrA/parC</th>
<th>parC only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprofloxacin</td>
<td>2</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Levofloxaixin</td>
<td>6</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
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Figure 5: Rates of levofloxaixin and moxifloxacin resistance in patients with previous exposure to fluoroquinolones, by number of days from last dose of fluoroquinolone to date culture obtained