Recovery of Interfering Bacteria in the Nasopharynx following Antimicrobial Therapy of Acute Maxillary Sinusitis with Telithromycin or Amoxicillin-Clavulanate

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The nasopharynx is colonized by nonpathogenic aerobic and anaerobic organisms (12), some capable of interfering with the growth of potential pathogens. Interfering organisms are less often isolated from sinusitis-prone patients than controls (5). These organisms include alpha-hemolytic streptococci (AHS) and Prevotella melaninogenic (14). Conversely, colonization by potential pathogens increases in otitis media-prone children and adults during respiratory illness (9). Interfering flora may therefore inhibit the colonization or growth of potential pathogens and prevent sinusitis (5, 12).

Administration of antimicrobials can affect the composition of the nasopharyngeal flora (10). Oral flora with interfering capability such as aerobic and anaerobic streptococci and penicillin-susceptible Prevotella spp. are generally susceptible to amoxicillin. However, over one-half of Prevotella spp. resist penicillins through the production of beta-lactamase (3) but are susceptible to amoxicillin-clavulanate (AC). In contrast these Prevotella spp. are generally less susceptible to ketolides (11).

This study compared the effects on the nasopharyngeal flora of therapy of acute maxillary sinusitis with either AC, a wide-spectrum antimicrobial effective against potential pathogens as well as aerobic and anaerobic interfering organisms, and the ketolide telithromycin (TE), which is effective against pathogenic organisms (1) but is less inhibitory towards interfering Prevotella spp. Inhibitory activity was tested as previously described (5) against one strain each of recent clinical isolates of Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis. Processing of specimens, organism identification, and determination of beta-lactamase production were done as previously described (5, 13, 17).

Intermediate resistance to penicillin was defined as a MIC of 0.1 to 1.0 μg/ml, and high resistance was defined as a MIC of ≥2.0 μg/ml. MICs were determined using the CLSI (formerly NCCLS) broth microdilution method with Mueller-Hinton broth, supplemented with 5% lysed horse blood (15, 16). A

TABLE 1. Potential pathogens recovered from the nasopharynges of patients treated with amoxicillin-clavulanate and telithromycin

<table>
<thead>
<tr>
<th>Potential pathogen</th>
<th>Amoxicillin-clavulanate therapy (n = 25)</th>
<th>Telithromycin therapy (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before therapy</td>
<td>After therapy</td>
</tr>
<tr>
<td>Streptococcus pneumoniae</td>
<td>8 (3)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Haemophilus influenzae (non-type b)</td>
<td>3 (2)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Moraxella catarrhalis</td>
<td>3 (3)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Total</td>
<td>14 (8)</td>
<td>5 (3)</td>
</tr>
</tbody>
</table>

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Numbers in parentheses are numbers of isolates with penicillin resistance.
The presence of interfering organisms may play a role in the prevention of respiratory infections. A greater number of interfering organisms and fewer *H. influenzae* organisms were recovered in the adenoids of non-otitis-prone children compared to otitis-prone children (2). Interfering organisms inhibit colonization in patients and in vitro growth of pathogens (4–7, 13). The production of bacteriocin and other growth-inhibitory substances or utilization of essential nutrients may explain this phenomenon (7).

This study suggests the potential benefit of an antimicrobial that selectively spares interfering organisms while eliminating potentially pathogens. Further studies are warranted to explore the clinical implications of these findings and how quickly pathogens can recolonize the nasopharynx following therapy with various antimicrobials.

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### REFERENCES


### TABLE 2. Effect of antimicrobial therapy on the recovery of interfering bacteria capable of interfering with the growth of potential pathogens in patients treated with either amoxicillin-clavulanate or telithromycin for acute maxillary sinusitis

<table>
<thead>
<tr>
<th>Interfering organisms</th>
<th>Amoxicillin-clavulanate therapy (n = 25)</th>
<th>Telithromycin therapy (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before therapy</td>
<td>After therapy</td>
</tr>
<tr>
<td>Alpha-hemolytic streptococci</td>
<td>26</td>
<td>7*</td>
</tr>
<tr>
<td>Prevotella spp.</td>
<td>28</td>
<td>9*</td>
</tr>
</tbody>
</table>

*p* < 0.001 compared to number before therapy.