Investigating Clinical Factors Contributing to Continued Antibiotic Therapy in Patients with Viral Upper Respiratory Tract Infections

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Background
Respiratory tract infections are common reasons for patients to seek care in the Emergency Departments, particularly during the influenza season.

It has been shown that over 50% of these patients will be started on empirical antibiotic therapy and even in the presence of a confirmed respiratory virus infection, 40-70% will be continued on therapy. However, the clinical and biological factors that may contribute to the continued therapy remains unclear.

Objectives
• To assess the impact of the identification of a respiratory virus infection in clinical samples on antibiotic usage in the Emergency Department for patients presenting with a respiratory tract infection.
• To assess the impact of clinical and biochemical parameters on the antibiotic usage in patients with confirmed respiratory virus infection.

Methods
During peak influenza season (February 14th-February 24th, 2018), consecutive patients, aged ≥ 18 years, presenting to the Emergency Department of the McGill University Health Centre, found to have a positive respiratory virus on PCR testing were included in the study.

Patients were classified into groups according to their exposure to antibiotics relative to the timing of the PCR result. At the MUHC, a 12 target PCR for respiratory viruses is performed 3-5 times per day in peak influenza season, with results available the same day or within 24 hours.

For each patient, the clinical, laboratory and radiologic characteristics recorded and compared were:
• Antibiotic use before and after PCR result
• Temperature at presentation
• Systolic Blood Pressure at presentation
• Length of Stay in Hospital
• White Blood Cell Count
• Neutrophil Count
• Chest x-ray

The association between antibiotic use and the clinical/biochemical factors were studied qualitatively.

122 patients were included in the study. The majority (77%) were found to have an Influenza infection, while the remainder were mixed between other upper respiratory tract viruses (Figure 1).

Discussion
The results presented here suggest that,
• the identification of a respiratory virus infection in patients presenting with a suspected respiratory tract infection is insufficient for a significant proportion of physicians to stop antibiotics.
• Antibiotics are continued for patients with confirmed viral infections in the absence of worrisome clinical features.

The reason behind this practice is unknown. Possible explanations include,
• An underestimation of the capacity of respiratory viruses to cause severe enough disease to warrant presentation to medical care.
• The perceived harms of continuing antibiotics in this population is considered less than that of missing a bacterial superinfection.

While a multiplex respiratory virus PCR could strengthen antibiotic stewardship efforts in this patient population, our results suggest the results on their own have a limited impact on prescribing behavior. Specific biomarkers for bacterial infection, such as procalcitonin, are not measured at the MUHC. Inclusion of this could help increase the impact of the respiratory virus PCR result.

Limitations
The data collected was retrospective through chart review.
• The MUHC is a solid organ and stem cell transplant centre but the study did not identify if the included patients had had these transplants, nor did it include any details on potential immunocompromise.
• Duration of symptoms and the risk of a suspected bacterial superinfection was not be determined

Conclusion
Identification of a respiratory virus in a patient with a respiratory tract infection results in lower antibiotic usage in only a relatively small number of patients. Procalcitonin testing, education and direct stewardship interventions may be warranted to reduce antibiotic usage in patients with documented viral infections.

Table 1. Clinical Characteristics of Patients who received antibiotics. Values indicate percentage of patients with the particular clinical characteristic

<table>
<thead>
<tr>
<th>Clinical Characteristics</th>
<th>Antibiotics Before (N = 47)</th>
<th>Antibiotics After (N = 43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemodynamically Unstable</td>
<td>12.7%</td>
<td>16.3%</td>
</tr>
<tr>
<td>Abnormal Chest X-Ray</td>
<td>46.8%</td>
<td>32.6%</td>
</tr>
<tr>
<td>Leukocytosis or Leukopenia</td>
<td>29.8%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Neutrophilia or Neutropenia</td>
<td>48.9%</td>
<td>44.2%</td>
</tr>
<tr>
<td>Sepsis (SIRS criteria)</td>
<td>23.4%</td>
<td>27.9%</td>
</tr>
<tr>
<td>Nil</td>
<td>17.0%</td>
<td>18.4%</td>
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