Impact of Antimicrobial Stewardship Interventions Using Rapid Molecular Testing on the Appropriate Use of Antiviral Therapy and Reduction of Unnecessary Antibiotic Therapy for Patients Admitted with Acute Influenza

Paula A. Politis, PharmD, BCPS; George Kallstrom, PhD; Michael J. Tan, MD, FACP, FIDSA; Thomas M. File Jr., MD, MSc, MACP, FIDSA, FCCP

Summa Health System – Akron Campus, Akron, OH

Amended Abstract

Background: Summa Health System – Akron Campus (SHS-AC) utilizes a FDA approved influenza/RSV polymerase chain reaction (PCR) assay and multiplex respiratory panel (RP). In addition, our institution commonly utilizes procalcitonin (PCT) levels. The Antimicrobial Stewardship Program (ASP) at SHS-AC routinely recommends use of these rapid diagnostic tests to assist with antimicrobial and antiviral usage.

Methods: A retrospective review of all ASP interventions on influenza positive patients at SHS-AC was performed from December 2017-March 2018. Data collected included: intervention type and acceptance rate.

Results: 231 total recommendations were made by the ASP on influenza positive patients, with a 97% acceptance rate. Intervention types included the following: obtain PCT level (52/231), de-escalate or stop antibiotics based on culture, PCR, or PCT results (116/231), obtain influenza or respiratory PCR (8/231), initiate oseltamivir or peramivir (39/231), and other (16/231).

Conclusion: ASP intervention combined with PCT levels and PCR results contributed to the reduction of unnecessary antibiotic use, and the initiation of antiviral therapy in influenza positive patients.

Introduction

• The 2017-2018 influenza season was a high severity season across all age groups, resulting in high rates of hospitalizations.1
• Patients admitted with respiratory symptoms are often empirically treated with antibacterial agents. Once influenza virus has been identified, these patients may be continued on antibiotics (ABX) for concern of bacterial co-infection.
• Rapid molecular methods have created new opportunities for the clinical microbiology laboratory, a key component of ASPs, to affect patient care in the areas of initial diagnosis and therapy.

Materials and Methods

• Per standard practice, the ASP reviews all patients on broad spectrum antibiotics > 48 hours and all influenza positive patients without Infectious Disease consultation. The appropriateness of antimicrobial and antiviral therapy is assessed, including assessment of culture and PCR results, PCT levels, indication of therapy, and renal function.
• A retrospective review of all ASP interventions on influenza positive patients at SHS-AC was performed from December 2017-March 2018.
• Data collected included: intervention type and acceptance rate.

Materials and Methods

• Per standard practice, the ASP reviews all patients on broad spectrum antibiotics > 48 hours and all influenza positive patients without Infectious Disease consultation. The appropriateness of antimicrobial and antiviral therapy is assessed, including assessment of culture and PCR results, PCT levels, indication of therapy, and renal function.
• A retrospective review of all ASP interventions on influenza positive patients at SHS-AC was performed from December 2017-March 2018.
• Data collected included: intervention type and acceptance rate.

Discussion

• Patients with identified influenza who require hospitalization are often treated with antibacterial therapy in addition to antiviral therapy on the concern for bacterial co-infection. If concomitant bacterial infection is absent the use of antibacterial agents is unnecessary.
• There are few tools or diagnostic strategies that reliably differentiate influenza virus infection alone from influenza and bacterial co-infection.
• PCT has been used in an attempt to differentiate between bacterial and viral pneumonia. The diagnostic value for PCT to exclude bacterial co-infection among influenza patients was reasonably high in a study by Wu et al.2
• One meta-analysis of data from patients with acute respiratory infections enrolled in 26 RCTs reported that PCT-guided antibiotic treatment reduced 30-day mortality, antibiotic exposure, and antibiotic-related adverse effects.3
• In our experience, we have observed the use of PCT provided information that allowed discontinuation of antibacterial therapy when there was very low likelihood of concomitant bacterial infection and the patient had an identified viral infection; thus, promoting better antimicrobial stewardship.

Conclusions

• A total of 231 recommendations were made by the ASP on influenza positive patients with a 97% acceptance rate.
• 80/231 recommendations were to discontinue ABX. The majority of discontinuations were recommended due to > 0.1 PCT levels.
• ASP intervention combined with PCT levels and PCR results contributed to the reduction of unnecessary ABX use, and the initiation of antiviral therapy in influenza positive patients.

References


Results

Figure 1: Intervention Type & Acceptance Rate

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Number of Interventions</th>
<th>Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discontinue antimicrobial based on culture, PCR, or PCT results</td>
<td>80</td>
<td>95% (76/80)</td>
</tr>
<tr>
<td>Obtain PCT level</td>
<td>52</td>
<td>94% (49/52)</td>
</tr>
<tr>
<td>Initiate oseltamivir or peramivir therapy</td>
<td>39</td>
<td>100% (39/39)</td>
</tr>
<tr>
<td>De-escalate antimicrobial based on culture or PCT results</td>
<td>36</td>
<td>100% (36/36)</td>
</tr>
<tr>
<td>Other (duration, change antibiotic, consult, adjust dose, lab, IV to PO, urine antigens)</td>
<td>16</td>
<td>94% (15/16)</td>
</tr>
<tr>
<td>Obtain influenza or RP PCR</td>
<td>8</td>
<td>100% (8/8)</td>
</tr>
<tr>
<td>Total</td>
<td>231</td>
<td>97% (223/231)</td>
</tr>
</tbody>
</table>

Figure 2: Use of Procalcitonin with + Viral PCR

- **PCT<0.10**
  - Yes: Individualize; if < 0.25 usually stop ABX
  - No: PCT < 0.25, ABX Discontinued (ASP Recommendation)

- **PCT>0.10**
  - Yes: Individualize; usually stop ABX
  - No: PCT > 0.25, ABX Continued per Provider

Figure 3: Impact of ABX Usage Based on PCT Results

- PCT < 0.25, ABX Discontinued (ASP Recommendation)
- PCT > 0.25, ABX De-escalated (ASP Recommendation)
- PCT < 0.25, ABX Continued (ASP Recommendation)
- PCT > 0.25, ABX Continued per Provider
- PCT < 0.25, ABX Discontinued per Provider
- PCT > 0.25, ABX Discontinued per Provider
- Unaccepted Recommendation

Materials and Methods

- Per standard practice, the ASP reviews all patients on broad spectrum antibiotics > 48 hours and all influenza positive patients without Infectious Disease consultation. The appropriateness of antimicrobial and antiviral therapy is assessed, including assessment of culture and PCR results, PCT levels, indication of therapy, and renal function.
- A retrospective review of all ASP interventions on influenza positive patients at SHS-AC was performed from December 2017-March 2018.
- Data collected included: intervention type and acceptance rate.