### Abstract

**Background:** Respiratory viral (RV) infection is one of the most common illnesses, causing more yearly doctor visits and absences from school and work than any other illness. The viruses involved may be respiratory adenoviruses (Adeno), parainfluenza (parainfl) viruses, human metapneumovirus (HMPV), Influenza (Flu) viruses, respiratory syncytial virus (RSV), and rhinoviruses (Rhino). This study described and compared the clinical and financial impact of these infections in a pediatric hospital serving the District of Columbia metropolitan area.

**Methods:** This cohort study included children and adolescents admitted to the institution between 9/2011 and 12/2013 for a community-acquired RV infection, defined as the detection of one or more respiratory viral pathogens detected in nasopharyngeal aspirates using multiplex PCR, in patients with clinical symptoms within four days of admission. Information on patient demographic, discharge diagnoses, length of stay (LOS), intensive care unit (ICU) admission LOS and discharge disposition was extracted from the hospital’s administrative database. A patient that had greater than one RV detected in one specimen was excluded from the analysis.

**Results:** The study identified 2905 patients who encountered 3666 hospitalizations resulting in a total of 25,151 days LOS and $2.86 million hospital charges. Nearly 30% (29.5%) of patients were admitted to the ICU for a total ICU LOS in the ICU of 6,852 days. Thirty-three (9.9%) patients died during the hospitalization. The majority of hospitalizations were due to Rhino/enterovirus (48.7%), followed by RSV (25.7%). The average hospital charges per hospitalization were the highest in Flu (Type B) followed by HMPV (36.0%). The case-fatality rate was the highest in adenovirus (2.1%) followed by HMPV and parainfluenza infections (1.5%).

**Conclusions:** This study demonstrated that RV infections in pediatric patients are associated with substantial healthcare expenses. It remains prudent to improve measures such as public vaccination and education to reduce severe infections that would require medical attention and hospitalization.

### Objective

- To evaluate the clinical and financial impact of community-associated acute viral respiratory tract infections in inpatient pediatric patients

### Methods

- **Study Design:** Retrospective observational cohort study conducted at Children’s National Medical Center (CNMC) in Washington, D.C.
- **Study Population:**
  - Inclusion Criteria:
    - Patients admitted to a CNMC inpatient floor or an intensive care unit with upper respiratory symptoms between 09/2011 to 12/2013.
    - Detection within four days of admission of one or more of the following respiratory viral pathogens in nasopharyngeal aspirate specimens using multiplex PCR:
      - Adenovirus
      - Parainfluenza, type 1, 2, 3
      - Rhinovirus/enterovirus
      - Influenza, type A (H3N2 seasonal, H1N1 pandemic 2009), Type B
      - Human metapneumovirus
      - Respiratory syncytial virus
  - Exclusion Criteria:
    - Patients who had greater than one respiratory virus detected in one nasopharyngeal aspirate were excluded from the analysis.

### Results

The study identified 2905 patients who encountered
- 3,666 hospitalizations including 1080 (29.5%) admissions to ICU
- 25,151 hospital days including 6,852 ICU days
- $2.86 million hospital charges
- 33 (0.9%) deaths

**Figure: Community-associated acute respiratory viral infections**

<table>
<thead>
<tr>
<th></th>
<th>Adeno</th>
<th>Flu, Type A (H3N2 Seasonal)</th>
<th>Flu, Type A (H1N1 pandemic 2009)</th>
<th>Flu, Type B</th>
<th>HMPV</th>
<th>Rhino/Enterovirus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>188</td>
<td>74</td>
<td>114</td>
<td>108</td>
<td>267</td>
<td>1776</td>
</tr>
<tr>
<td>Number of cases</td>
<td>52</td>
<td>12</td>
<td>41</td>
<td>26</td>
<td>101</td>
<td>572</td>
</tr>
<tr>
<td>Average ages (years)</td>
<td>3.72</td>
<td>6.08</td>
<td>7.73</td>
<td>6.7</td>
<td>3.98</td>
<td>4.26</td>
</tr>
<tr>
<td>LOS (days): average</td>
<td>6.95</td>
<td>4.31</td>
<td>7.65</td>
<td>8.6</td>
<td>7.29</td>
<td>7.41</td>
</tr>
<tr>
<td>Expired upon discharge</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Case-fatality</td>
<td>2.1%</td>
<td>0.0%</td>
<td>0.9%</td>
<td>0.9%</td>
<td>1.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Charges ($) : average</td>
<td>$90,854</td>
<td>$38,987</td>
<td>$90,067</td>
<td>$90,412</td>
<td>$90,668</td>
<td>$86,511</td>
</tr>
<tr>
<td>Patient Admitted to Intensive Care Unit (ICU)</td>
<td>$192,729</td>
<td>$80,758</td>
<td>$175,492</td>
<td>$280,527</td>
<td>$102,583</td>
<td>$138,524</td>
</tr>
</tbody>
</table>

**Conclusions:**

- Respiratory viral infections are associated with substantial healthcare expenses in pediatric patients.
- Preventive measures such as hand hygiene, vaccination and education remain prudent in limiting severe infections.
- Further studies and research are warranted in the development of vaccines and anti-viral therapeutics.