Comparing Pandemic 2009 H1N1 and Seasonal Influenza A Hospitalizations in the Minneapolis-St. Paul Metropolitan Area (MSP), Minnesota

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Abstract

Background: High rates of hospitalization for influenza among children have been noted during the 2009-2010 influenza season. The Minnesota Department of Health (MDH) surveillance system for influenza A hospitalizations (IAH) based on laboratory-confirmed cases identified epidemic levels of hospitalization for influenza A cases in children younger than 65 years of age during the 2009 H1N1 influenza season (September 2009-December 2009). Inpatient medical records were reviewed and a case report form completed. Results: 1,651 influenza A hospitalizations were identified between October 2009-December 2009. 2009 H1N1 accounted for 60% of all influenza A hospitalizations from 2006-2009. The overall rate of hospitalization for 2009 H1N1 was significantly higher in children aged 0-17 years of age (63.0). Among SIA cases, the rate was highest among persons 65+ years of age (18.7). Influenza prevention and control efforts should occur before the 2010-2011 influenza season, particularly targeting individuals at risk for severe disease.

Introduction

• Incidence of seasonal influenza (IA) can vary widely between years – 2007-2008 season was particularly severe in children aged 0-4 years
• First case of 2009 pandemic influenza A (2009 H1N1) virus was reported in Mexico in March 2009
• April 30, 2009 - first hospitalized case of 2009 H1N1 in Minnesota – no travel and no exposure to someone who traveled to Mexico
• By May 2009, severe illness was reported in the United States and in healthy young adults as well as persons at risk for complications from seasonal influenza, such as: - Young children - Pregnant women - Persons with underlying medical conditions
• Spring pandemic wave (April-August 2009) in Minnesota showed highest incidence of hospitalization among children (<18 years)

Objectives

• Examine rates of IA and 2009 H1N1 hospitalization across multiple influenza seasons
• Describe the epidemiological differences and compare key measures of severity and outcomes between SIA and 2009 H1N1 hospitalizations

Methods

• Laboratory-confirmed, hospitalized influenza surveillance established in 2003 in 7-county Minneapolis-St. Paul metropolitan (MSP) area as part of the CDC Emerging Infections Program (EIP)
• 2009 H1N1 defined as laboratory-confirmed 2009 H1N1 via real-time reverse transcriptase polymerase chain reaction (RT-PCR) or viral culture in a MSP resident hospitalized at a MSP area hospital between April-December 2009
• Inpatient medical records reviewed and case report form completed
• Information collected included demographics, comorbidities, disease course, and outcome
• Provincial 2007 population data used to calculate incidence and relative risk; SIA were calculated as an average (over 3 seasons)

Results

• 1,651 influenza A hospitalizations were identified between October 2009-December 2009 (Figure 1)
• 2009 H1N1 accounted for 60% of all influenza A hospitalizations from 2006-2009 (Figure 2)
• Overall, the rate of hospitalization for 2009 H1N1 was significantly higher than SIA cases (34.4 vs. 17.5, p<0.01) (Table 1). This represents a 4.4 times increase in hospitalizations for 2009 H1N1 when compared to SIA.
• For 2009 H1N1, the rate of hospitalization was highest among persons 0-17 years of age (63.0). Among SIA cases, the rate was highest among persons 65+ years of age (18.7). Among all persons, the rate was highest among persons aged 65+ years of age (28.9 per 100,000). Persons with one or more of the following co-morbidities were more likely to be hospitalized: heart disease, pulmonary disease, respiratory disease, chronic lung disease (OR 2.15; 95% CI, 1.4-3.1) and COPD (OR 2.16; 1.3-3.5) compared to seasonal influenza cases (OR 1.2, CI 0.9-1.5) 

Table 1. Annual Rates by Age and Median Age of Influenza A Hospitalizations by Type, Minneapolis-St. Paul, Minnesota 2006-2009

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Rate per 100,000</th>
<th>Rate per 100,000</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>160 (24)</td>
<td>1.82</td>
<td>0.55</td>
</tr>
<tr>
<td>5-14 years</td>
<td>160 (24)</td>
<td>1.82</td>
<td>0.55</td>
</tr>
<tr>
<td>15-44 years</td>
<td>250 (38)</td>
<td>2.30</td>
<td>0.62</td>
</tr>
<tr>
<td>45-64 years</td>
<td>250 (38)</td>
<td>2.30</td>
<td>0.62</td>
</tr>
<tr>
<td>65+ years</td>
<td>660 (99)</td>
<td>7.80</td>
<td>2.05</td>
</tr>
</tbody>
</table>

• Among all persons less than 65 years of age, the rate of hospitalization was significantly higher for 2009 H1N1 compared to SIA (Table 1)
• Median age at time of admission was 23.7 years for 2009 H1N1 compared to 47.8 years for SIA (p<0.01) (Table 1)

• 67% of 2009 H1N1 cases and 66% of SIA cases had at least one co-morbidity upon admission (Table 3)
• Median age at time of admission was 23.7 years for 2009 H1N1 compared to 47.8 years for SIA (p<0.01) (Table 1)

• After adjusting for age, 2009 H1N1 cases more likely to have had a one co-morbidity compared to SIA cases (95% CI; 1.3-2.2) (Table 2) – Among all ages, co-morbidities were higher among 2009 H1N1 hospitalized cases compared to SIA cases
• 2009 H1N1 accounted for 60% of all hospitalizations (4.4 times more hospitalizations) in the MSP area from October 2006-December 2009

Conclusions

• 2009 H1N1 accounted for 60% of all hospitalizations (4.4 times more hospitalizations) in the MSP area from October 2006-December 2009
• Rates of 2009 H1N1 hospitalizations was significantly higher among all age group >65 years of age when compared to SIA
• Two-thirds of all hospitalized influenza A cases had least 1 co-morbidity that put them at increased risk for severe influenza disease
• For persons with at least 1 co-morbidity, the presence of a chronic underlying respiratory condition was more prevalent among 2009 H1N1 cases compared to SIA cases
• 2009 H1N1 cases were significantly more likely to have been diagnosed with pneumonia and have been admitted to an intensive care unit than SIA cases

Acknowledgments

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