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Pandemic 2009 Influenza A (H1N1) in New Mexico Influenza Hospitalization Surveillance, 2009-2010

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Pandemic 2009 Influenza A (H1N1) was first detected in the United States in April 2009. On May 2, 2009 the New Mexico Department of Health (NMDOH) confirmed the first case of H1N1 influenza in New Mexico and on June 11, 2009 the World Health Organization (WHO) declared the spread of the novel flu strain a pandemic. The Centers for Disease Control and Prevention (CDC) estimated that from April to December 12, 2009 between 39 and 80 million cases of 2009 H1N1 occurred and that between 173,000 and 362,000 H1N1-related hospitalizations occurred.[1] Due to the emergence of the H1N1 pandemic flu strain, the NMDOH instituted a statewide influenza-related hospitalization surveillance system.

Methods

In September 2009, the NMDOH contacted all acute care hospitals in New Mexico that could admit patients with influenza. The hospital infection preventionists (IPs) were asked to submit a weekly listing of all patients admitted to their hospital with suspected or confirmed influenza. A confirmed influenza hospitalized patient was defined as a resident of New Mexico, admitted to a hospital, that had any positive influenza test including rapid test or enzyme immunoassay (EIA), direct or indirect fluorescent antibody (DFA or IFA) test, reverse transcriptase polymerase chain reaction (RT-PCR) or viral culture performed by any laboratory. Suspected influenza hospitalized patients included those with influenza-like illness (ILI) (fever 100º Fahrenheit or higher, cough, and/or sore throat), pneumonia, bronchiolitis, cough, dyspnea, and congestive heart failure with fever. Patient demographics and co-morbidity information was gathered through review of medical records and completion of case investigation forms. In addition, healthcare providers were encouraged to send a nasopharyngeal specimen to the NMDOH Scientific Laboratory Division (SLD) for influenza testing.

Patients were considered at high risk for hospitalization and influenza-related complications based on the CDC defined high risk groups. The CDC high risk groups include: children under the age of two years old; adults 65 years of age and older; and pregnant or postpartum women. Also included were those patients with pre-existing medical conditions such as asthma, neurological and neurodevelopmental conditions (i.e. epilepsy, stroke, muscular dystrophy), chronic lung disease (i.e. chronic obstructive pulmonary disease), heart disease, blood disorders (i.e. sickle cell disease), endocrine disorders (i.e. diabetes mellitus), kidney disorders, liver disorders, metabolic disorders, weakened immune systems due to disease or medication (i.e. cancer or chronic steroid use), and people younger than 19 years of age who are receiving long-term aspirin therapy.[2]

This analysis included hospital admissions between September 14, 2009 and February 8, 2010. Rates were calculated using the U.S. Census Bureau July 1, 2008 population estimates.

Results

During the investigation period, 969 laboratory confirmed influenza hospitalizations occurred in New Mexico. The confirmed hospitalizations peaked during the week ending October 17, 2009 with approximately 190 hospitalizations (Figure 1). The overall laboratory confirmed hospitalization rate was 48.8 per 100,000 population. A total of 6134 suspected influenza hospitalizations occurred in New Mexico during the investigation period.

Hospitalizations by County. Laboratory confirmed influenza hospitalization rates varied by region. The New Mexico region with the lowest rate (38.4 per 100,000) was the Central region which includes Bernalillo county only. The region with the highest rate (58.1 per 100,000) was the Southeast region which includes Harding, Quay, Curry, Roosevelt, De Baca, Chavez, Lea and Eddy counties.

Hospitalizations by Age, Sex, and Racial/Ethnic Groups. Influenza hospitalization rates varied by age group with the 0-4 age group having the highest rate at 134 per 100,000 population and the 25-49 year old age group having the lowest rate at 35 per 100,000 population (Figure 2). The influenza hospitalization rates for females and males were similar at approximately 50 per 100,000 population for both men and women. American Indian/Alaskan Natives (AI/AN) had the highest hospitalization rate at 96 per 100,000 population, and non-Hispanic Whites had the lowest rate at 27 per 100,000 population (Figure 3). The rates for Hispanics, Blacks, and Asian/Pacific Islanders were 55, 46 and 33 per 100,000 population, respectively. The rate among AI/AN was 3.5 times greater than among Whites.

Figure 2. Influenza Hospitalization Rates by Age Group, New Mexico, September 14, 2009 – February 8, 2010

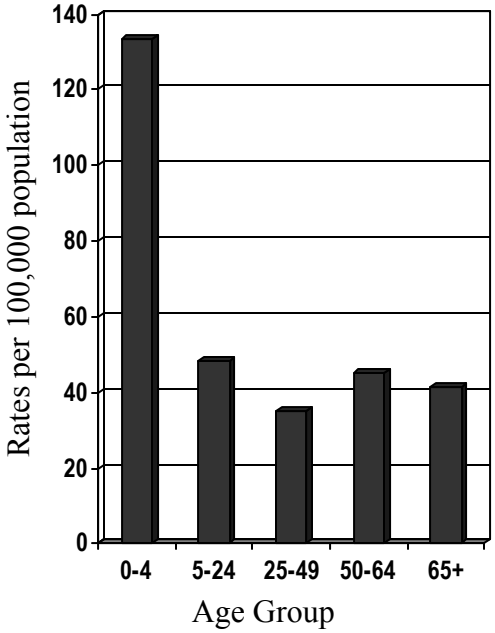
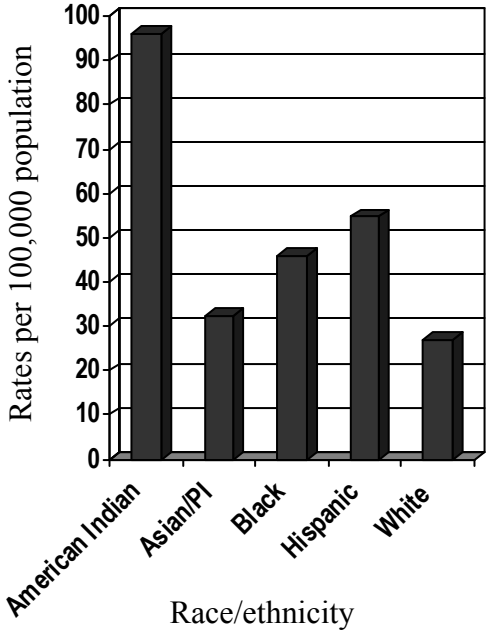


Figure 3. Influenza Hospitalization Rates per 100,000 Population by Race/Ethnicity, New Mexico, September 14, 2009 – February 8, 2010



Hospitalizations by High-Risk Group. There were a total of 747 (77.1%) persons hospitalized with influenza who had a pre-existing condition that put them at higher risk for influenza-related complications (Table 1). The most common high-risk condition was asthma and/or other chronic lung disease (42.3%). Chronic cardiovascular disease and diabetes were the second most common pre-existing conditions at 14.9% of the cases each.

Antiviral Treatment and Intensive Care Unit Admission. Treatment was also investigated. Antiviral therapy was given to 71.2% of hospitalized patients and 19.0% of hospitalized patients were admitted into intensive care units (ICUs). Approximately 11% of all hospitalized influenza patients required mechanical ventilation and of those patients admitted into the ICU, 57% required mechanical ventilation. The mean number of days from illness onset to the time of antiviral treatment also varied by race/ethnicity. The mean number of days from illness onset to receiving antiviral treatment were as follows; AI/AN: 5.1, Hispanic: 4.2, White: 3.6.

Table 1. Influenza Hospitalizations by High-risk Status, New Mexico, September 14, 2009 – February, 2010

Risk Factor/condition	Case count	Percent of total cases
Asthma/chronic lung disease	410	42.30%
Chronic cardiovascular disease	144	14.90%
Diabetes	144	14.90%
Any high risk factor	747	77.10%

Discussion

The 2009 H1N1 influenza pandemic was the first influenza pandemic since the 1968 H3N2 pandemic. Since influenza readily spreads through populations without immunity to a particular strain, the emergence of this new influenza strain placed a large burden on health departments and healthcare systems throughout the world. NMDOH's goal was to conduct real-time influenza surveillance in order to improve the epidemiological understanding of this pandemic and to provide data to guide policy development. Ultimately the goal was for this information to be used to reduce influenza morbidity and mortality in New Mexico during the current pandemic and to be used to prepare for future influenza pandemics and influenza seasons.

In NM the highest rates of lab-confirmed influenza hospitalizations were among the very young and AI/AN populations. The observation by New Mexico and Arizona in October that there were a disproportionate number of deaths related to H1N1 among AI/AN helped prompt the formation of a multidisciplinary workgroup to study H1N1-related deaths among AI/AN. The workgroup was comprised of representatives from 12 state health departments, the Council of State and Territorial Epidemiologists, tribal epidemiology centers, the Indian Health Service (IHS), and the CDC. The study found the mortality rate for the AI/AN group to be four times higher than for those in all other racial/ethnic groups combined. [3] Among the AI/AN deaths related to H1N1 influenza, a larger percentage of AI/AN had high-risk conditions including asthma and diabetes, compared to non-AI/AN.[3] Therefore, these groups should be targeted early in an influenza pandemic for influenza prevention and treatment.

In addition to influenza surveillance data being utilized to highlight age group and racial/ethnic disparities, data from 2009-2010 influenza surveillance has been used to confirm that influenza vaccine has been targeted appropriately. For example, H1N1 vaccine was initially targeted to children less than 5 years of age and the surveillance data confirmed that this was appropriate. Also, surveillance data was used to educate the public via weekly media updates and NMDOH website updates. Furthermore, health providers received pandemic updates via Health Alert Network (HAN) notifications. Continuous review of the influenza surveillance process has allowed for optimization of surveillance protocols for both current and future influenza seasons.

There were limitations to this investigation. There was a potential for racial misclassification and a lack of standardized definitions for some underlying conditions. For example, a condition could be defined as a metabolic disorder by some and not others. This data included only lab-confirmed cases, thus underestimating the numbers of hospitalized influenza patients. Also, there has been some debate about whether or not EIA or rapid tests are a reliable testing method for confirming a patient as having novel influenza.

Strengths of influenza surveillance during the 2009-2010 influenza season include statewide reporting of lab-confirmed hospitalizations to a centralized health department, widespread participation from hospitals all over the state, and collection of patient-level data such as underlying medical conditions.

Information gained from influenza surveillance has prompted additional analysis. Planning efforts are underway to further evaluate racial/ethnic disparities and regional differences. In addition, there is current planning for 2010-2011 influenza surveillance and assessment of methods to compare the 2009-2010 influenza season to both previous and future influenza seasons.

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Figure 1. Influenza Hospitalizations by Admission Date, New Mexico 2009-2010 Season