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Colorado Department
of Public Health
and Environment

Influenza Surveillance Summary Colorado, 2006-2007

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<http://www.cdphe.state.co.us/dc/Influenza/index.html>**

Summary

Influenza activity in Colorado during the 2006-2007 season was relatively mild compared to previous years. Based on data from influenza-associated hospitalizations and sentinel providers' reports, the season peaked during the month of March and was primarily caused by type A influenza. As in previous years, influenza-associated hospitalizations showed bimodal distribution with the majority of hospitalizations reported for the ages less than 5 and over 60 years. There was only one pediatric death reported and the number of outbreaks reported from long-term care facilities was considerably lower than previous years.

Components of Colorado's influenza surveillance

Influenza surveillance in Colorado during the 2006-2007 season was based on: reports of influenza-associated hospitalizations, influenza-like illness (ILI) reported by sentinel providers and Kaiser Permanente Colorado, circulating strain surveillance, influenza-associated pediatric deaths and reports of influenza outbreaks in long-term care facilities (LTCF).

Reports of influenza-associated hospitalizations

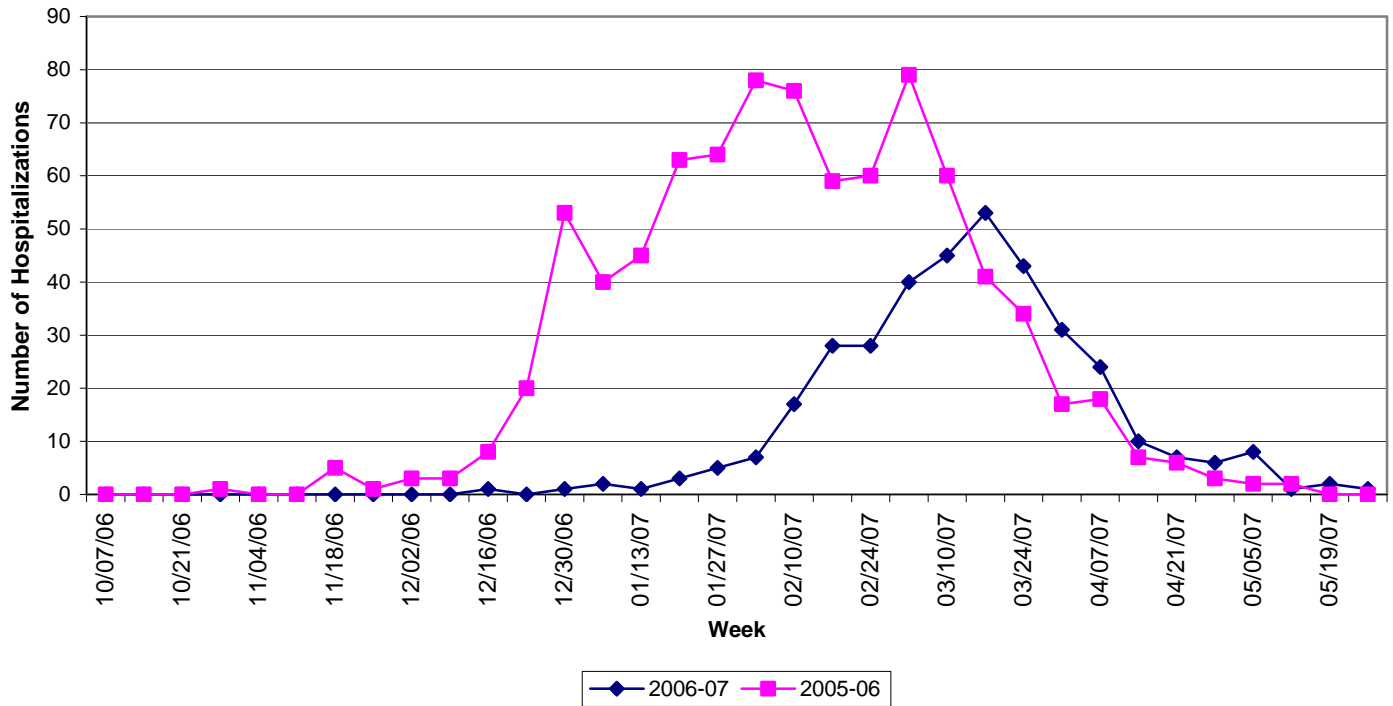
During the months of October through early February, hospitals throughout the state submitted 35 specimens collected from hospitalized patients that had tested positive by rapid antigen tests. Only 14 (40%) of these confirmed at the state laboratory by RT-PCR, highlighting the low specificity of influenza rapid antigen tests when there is little influenza virus circulating (i.e., low prevalence) and the importance of "confirmatory" testing at these times. Therefore, prior to Feb 5th, reported influenza-associated hospitalizations were only officially counted in state surveillance statistics if confirmed at the state laboratory by RT-PCR (or by DFA or viral culture at other laboratory). After February 5th, reported hospitalizations were counted based on positive rapid antigen tests alone.

After a "late" start, influenza-associated hospitalization reports began steadily increasing at the end of January. Type A-associated hospitalizations peaked during the week ending March 17th, whereas, small numbers of type B-associated hospitalizations were spread throughout the season and did not have a defined peak. There were a total of 364 influenza-associated hospitalizations reported from 10/01/06 through 5/26/07 in Colorado (compared to 848 reported during the 2005-2006 season, Figure 1). Among reported cases with specified influenza virus type (98% of reported cases), 97% were type A and 3% were type B.

As shown in Table 1 and Figure 2, influenza-associated hospitalizations showed a typical bimodal distribution when analyzed by age-specific rates: the highest rates were in infants <6 months of age, followed by persons 80 years of age or older and children 6-23 months of age. Compared to the 2005-06 season, hospitalization rates among the 80+ years age group were proportionately lower than this comparison for the <6 months age group. Children less than 5

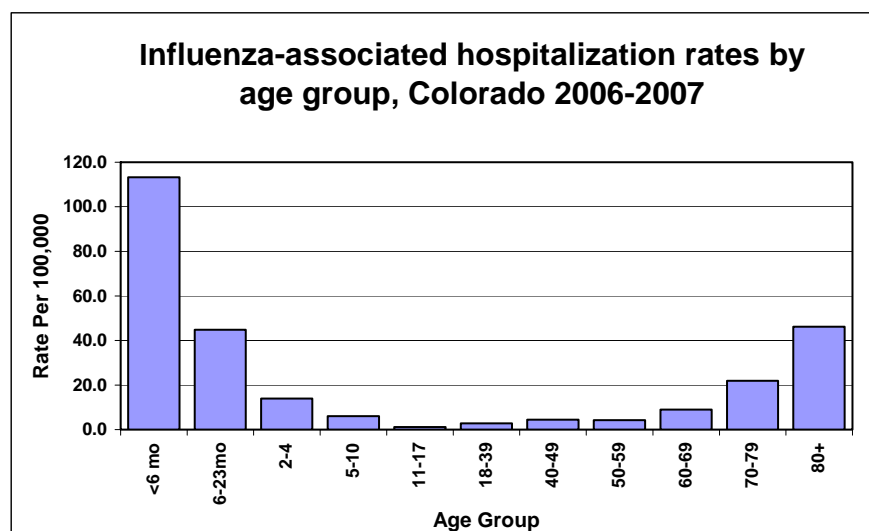
years of age accounted for 31% of the hospitalizations, whereas adults 60 years of age or older accounted for 35% of the reported hospitalizations.

**Figure 1. Influenza-associated hospitalizations by week of diagnosis.
Colorado, 2005-06 vs. 2006-7 flu seasons**



**Influenza-Associated Hospitalizations
by age group, Colorado 2006-2007**

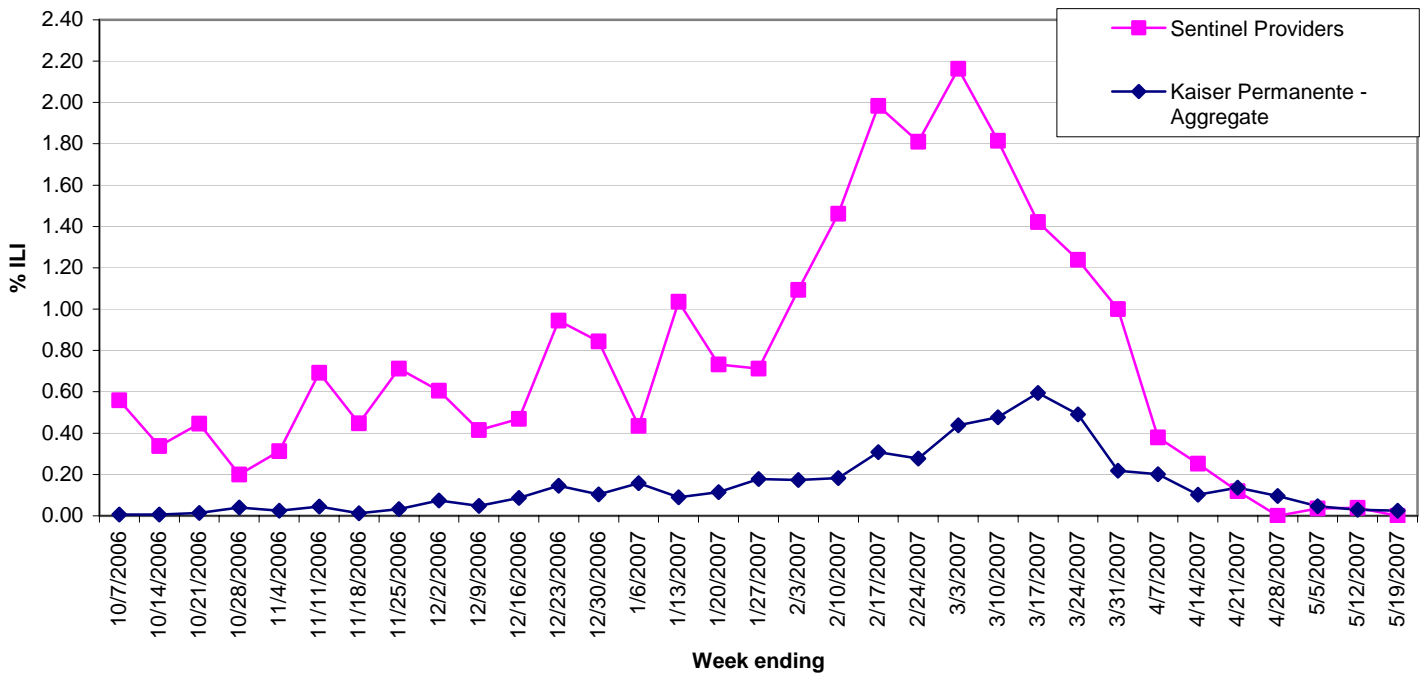
Age	No.	%	Rate per 100,000
<6 mo	39	10.7	113.3
6-23mo	46	12.6	44.82
2-4	27	7.4	14.0
5-10	23	6.3	6.1
11-17	5	1.4	1.1
18-39	42	11.5	2.8
40-49	34	9.3	4.6
50-59	24	6.6	4.3
60-69	27	7.4	9.0
70-79	44	12.1	21.9
80+	53	14.6	46.2
Total	364	100	7.9



Reports of influenza-like illness (ILI) by sentinel providers and Kaiser Permanente

Twenty-six sentinel providers reported ILI data during the 2006-07 flu season. Their reports included the total number of patient visits to their practices (average of 3568) each week and number of patient visits for ILI. Kaiser Permanente (KP), an HMO in the Denver metro area, also reported data. ILI data from an average of 17,000 patients visits to KP primary care providers every week are electronically recorded and sent to CDPHE. Based on ILI reports from sentinel providers (Figure 3), the 2006-07 season appears to have been less severe than previous seasons, peaking during the week ending March 03 at 2.2% (compared to 3% in 2005-06) and returning to background levels after the week ending April 28. Similarly, KP influenza-like illness was milder than previous years and peaked during the week ending March 17 at 0.6% (compared to 1.0% in 2005-06). These data correlate well with influenza-associated hospitalization reports, which also peaked during the week ending March 17.

Figure 3. Percent of Patients Seen Weekly by a Participating Sentinel Provider with a Diagnosis of Influenza-like Illness (ILI) vs. Kaiser-Permanente Aggregate Data, Colorado 2006-07 Influenza Season



Circulating strain surveillance

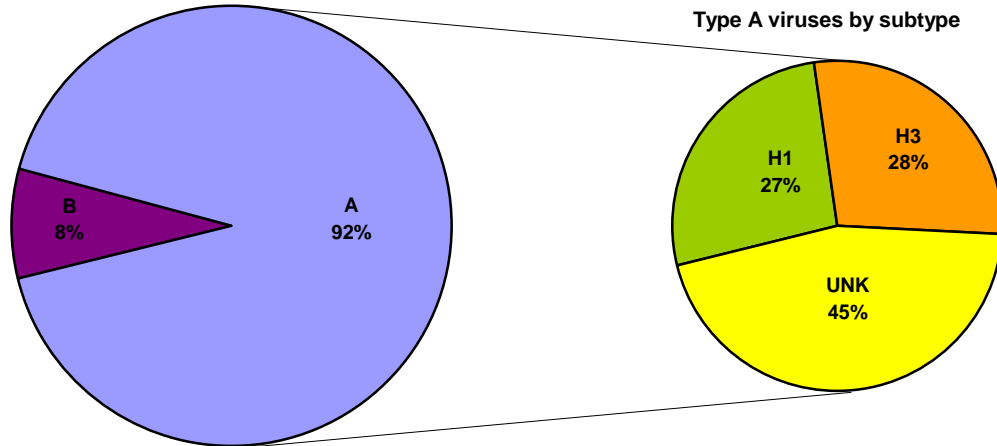
An important component of influenza surveillance consists of the typing (A vs. B), subtyping (i.e. A/H1 vs. A/H3) and antigenic characterization of influenza virus isolates throughout the season to determine the circulating strain(s) of influenza virus and how well these match to seasonal flu vaccine. Sentinel providers and hospitals (typically during early season only) submit clinical specimens to the state laboratory, which performs typing and subtyping by RT-PCR. A subset of the positive specimens is cultured and the virus isolates are sent to CDC for antigenic characterization. Several hospitals in Colorado also have the capability to determine virus type by performing viral culture or direct fluorescent antibody (DFA) testing.

During October through December, the state laboratory performed RT-PCR on 96 submitted specimens from both inpatients and outpatients that had tested positive by rapid antigen tests. Only 18 (19%) of these were confirmed by RT-PCR. This further emphasizes the importance of confirming rapid antigen testing results with a high specificity test when the prevalence of the virus is low.

During the 2006-07 season, 187 specimens submitted from Colorado residents were typed by viral culture, RT-PCR or DFA (Figure 4). One hundred seventy two (92%) of these were type A and 15 (8%) were type B. Forty-six (27%) of the type A isolates were subtype H1 and forty-eight (28%) were subtype H3.

Nineteen influenza virus isolates were submitted to CDC for antigenic characterization. Of these, 2 isolates were characterized as A/Wisconsin/67/2005-like (H3N2), this is an antigenic variant that evolved from A/California/07/2004 and was recommended by WHO as the H3 component for the 2006-07 Northern Hemisphere vaccine formulation and most recently for the 2007-08 Northern Hemisphere vaccine formulation. Eleven isolates were characterized as A/Wisconsin/67/2005-like strain but had somewhat reduced titers with the antisera tested and CDC is conducting additional analyses for such viruses. Five type A isolates were A/New Caledonia/20/99-like (H1N1), this was the WHO recommended H1 component of the 2006-07 vaccine formulation for the Northern Hemisphere. One of the type A isolates was A/Solomon Islands/03/2006-like (H1N1), a minor antigenic variant of A/New Caledonia/20/99 and the H1 component recommended for the 2007/08 vaccine for the Northern Hemisphere.

**Figure 4. Cumulative circulating influenza viruses by type and subtype
Colorado, 2006-07 Influenza Season
N=187**



Reports of influenza-associated pediatric deaths

During the 2006-07 influenza season, there was one pediatric death reported in a previously healthy 7 year-old boy who presented to the ED in cardio-respiratory arrest after several days of upper respiratory symptoms and low-grade fever. A rapid antigen test performed at the ED was positive for influenza A, which was later confirmed by immunohistochemical assays performed on respiratory tract tissues post-mortem.

Reports of influenza outbreaks in long-term care facilities (LTCF)

Long-term care facilities (LTCF) are requested to report outbreaks of influenza or ILI. The number of outbreaks reported during the 2006-2007 flu season (n = 15) was considerably lower than the number reported during the previous season (n = 34); as in past seasons, 100% of the outbreaks were caused by influenza type A.