



The A.C.D. Quarterly

PHILADELPHIA DEPARTMENT OF PUBLIC HEALTH

VOLUME 2 : ISSUE 2

Influenza: A Seasonal Comparison

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Guidance on the H7N9 virus found in China is available on the PDPH website: <https://hip.phila.gov>

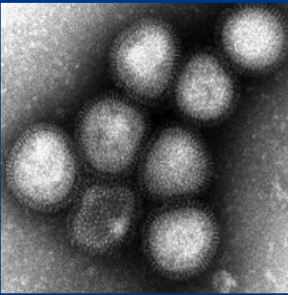
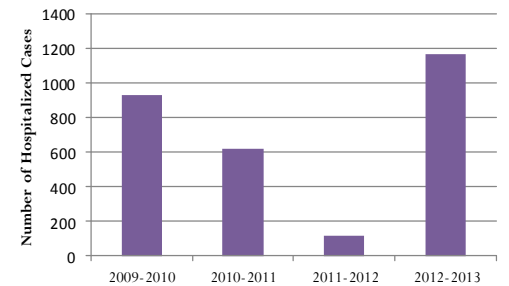


Image of H7N9- WHO Collaborating Centre for Reference and Research on Influenza, National Institute of Infectious Diseases, Japan

As the 2012-2013 influenza season is winding down in Pennsylvania and across the US, it is evident that this season has been one of the more severe influenza seasons seen in years. Two of the most frequently asked questions about an influenza season are, what factors contribute to seasonal severity and how can severity be predicted. The severity and characteristics of a season are, in part, determined by which strains of influenza viruses are in circulation. Characteristics of an influenza season such as when a season will begin, how severe it will be, how long it will last, which influenza viruses will be in circulation and whether the vaccine will be effective in preventing disease, are often difficult to predict. Characteristics of the past four influenza seasons will be examined in the following paragraphs.

The emergence of pandemic influenza H1N1 during the spring of 2009 complicated the 2009-2010 influenza season. This virus became the dominant influenza virus of the 2009-10 flu season which peaked in October. This was unusually early as most flu seasons peak in February. Due to the emergence of the 2009 H1N1 virus, it was necessary to create an additional vaccine, as protection was not provided against this virus in the planned seasonal vaccine. Vaccine effectiveness (VE) for the vaccine produced against the 2009 H1N1 virus was estimated at 62%, but initially it was challenging to disseminate due to its late production and limited supply. For the seasonal vaccine, VE could not be estimated due to the predominance of 2009 H1N1 pandemic virus and the low circulation of seasonal viruses. Nationwide, the 2009-2010 season was associated with a greater number of pediatric deaths, and higher hospitalization numbers in children and young adults than previous seasons. Nine hundred and thirty hospitalized cases of influenza were reported in Philadelphia (Figure 1). Fifty nine percent of hospitalized cases were in those 17 years and younger while three percent were in those 65 and older (Figure 2).

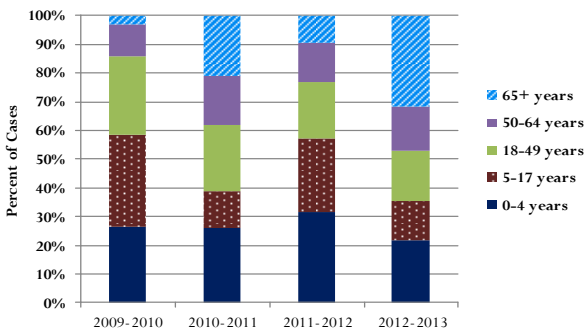
Figure 1. Philadelphia Hospitalized Influenza Cases by Season



The dominant virus of the 2010-2011 season was influenza A H3N2, but influenza A 2009 H1N1 and influenza B viruses also circulated at high levels. This influenza season followed the typical pattern of flu seasons and peaked in February. The 2010-11 flu season was less severe compared to the 2009-10 flu season, as fewer flu-related hospitalizations and deaths were reported. However, influenza did have an impact on all age groups due to extensive co-circulation of the aforementioned influenza viruses. Nationally, higher rates of hospitalizations for those 65+ occurred this season than in the previous season and lower hospitalization rates were seen in the younger population than during the previous season. VE was estimated at 60%. The hospitalized case count in Philadelphia was 622 cases (Figure 1). Twenty one percent of cases were in those 65 and older and 39% were in those 17 and younger (Figure 2).

The 2011-2012 influenza season went on record as having the lowest and shortest peak of any season for which data is available. During this season, influenza A H3N2, influenza A 2009 H1N1 and influenza B co-circulated throughout the United States with H3N2 viruses predominating. Influenza activity remained low through the beginning of the season and did not peak until the middle of March 2012. National data suggests that those most likely to be hospitalized during this season were those 65 years and older and children younger than five years. Hospitalization rates for this season were much lower than the prior two seasons and this season was considered mild overall.

Figure 2. Age of Philadelphia Hospitalized Influenza Cases by Season



According to the CDC the mild nature of this influenza season may have been due to a number of factors, an important one being that the viruses in circulation were similar to those that circulated during the past two seasons. This most likely allowed for increased immunity in the general population for the season. A total of 117 hospitalized cases were reported in Philadelphia (Figure 1). Only 9 percent of hospitalized cases were in the elderly while 59 percent of cases were reported in those 17 years and younger (Figure 2).

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The elderly were impacted more severely this season than other age groups in terms of serious illness causing hospitalization and death. Preliminary vaccine effectiveness estimates yielded an effectiveness of 60%, although the CDC warns that this may be considerably lower in the 65+ age group as the vaccine is usually more effective in younger populations than in the elderly. As of April 6th, 1,172 hospitalized cases have been reported in Philadelphia (Figure 1). Of these cases 32% were in the elderly and 35% were in children 17 and under (Figure 2).

Comparison of influenza strain dominance and seasonal severity has shown that different age groups can be affected either more or less severely from season to season. The differences between H1N1 and H3N2 seasons are best illustrated by the differing morbidity between the 2009-10 and 2012-13 seasons, as these were dominated by those respective viruses. The 2009-10 H1N1 dominated season was more likely to affect younger individuals. In the 2012-13 H3N2 dominated season, the elderly were more likely to become severely ill resulting in hospitalization, than in the H1N1 season. Comparisons of Philadelphia hospitalized case data support these conclusions and show that those with asthma were more likely to be affected during the H1N1 season. Median age for the H1N1 season was 14 (0–92) years and 47 (0–102)* years for the H3N2 season, (p<0.01). Median age of ICU cases for the 2009-10 season was 26 (0–81) years and 56 (0–99)* years for the 2012-13 season (p<0.01). Of the 89 (10%) 2009-10 intensive care unit (ICU) cases, 14 (16%) had chronic obstructive pulmonary disease (COPD), 15 (17%) had cardiovascular disease (CVD) and 33 (37%) had asthma. There were 147 (13%)* 2012-13 ICU cases reported, of which 23* (16%) had COPD, 25* (17%) had CVD, and one* (0.7%) had asthma. *(As of week 11).

Box 1. 2013-2014 Vaccine Virus Recommendations:
 The 2013-2014 seasonal influenza vaccine should contain:

- an A/California/7/2009-like (2009 H1N1) virus
- an A/Victoria/361/2011 (H3N2) or similar virus
- a B/Massachusetts/2/2012-like (B/Yamagata) virus

Quadrivalent 2013-2014 seasonal vaccines should also contain:

- a B/Brisbane/60/2008-like (B/Victoria lineage) virus

Scientists believe that seasonal differences between affected ages are partly due to how individuals develop an immune response to flu viruses. A more robust immune response is elicited, and thus greater protection is thought to be acquired, against those viruses that we are exposed to early in life (2). Our bodies are thought to produce fewer antibodies to subsequent infections as we age in a process called antigenic seniority (2). The logic of antigenic seniority gives an explanation for why older individuals are more likely to be affected during an H3N2 season and less likely to be affected by an H1N1 season. Human influenza A H3N2 viruses began circulating in 1968, meaning that those living before this time were not exposed early in life to this strain of influenza. Research on the subject has suggested that pre-existing antibodies provided cross-protection to those individuals older than 65 years of age during the 2009-2010 H1N1 season, as they were previously exposed to similar H1N1 when these viruses were in circulation prior to 1957 (1,3).

Unfortunately, it is difficult to predict which viruses will be in circulation in future seasons and by extension which age groups will be more at risk. The CDC, FDA and WHO make annual recommendations for vaccine virus inclusion based upon studies of viral samples collected from around the globe (Box 1). For example, during the 2012-2013 season, vaccine virus components were well matched to circulating flu viruses. Despite this, significant morbidity was still seen, particularly among the elderly. In contrast, the fall onset of pandemic H1N1 during the 2009-2010 season could not have been predicted and thus the seasonal vaccine provided no immunity to the dominant circulating virus. The CDC continues to recommend yearly vaccination as the best method to protect individuals against influenza infections.

References:

1. Ikonen N, Strengell M, Kinnunen L, Osterlund P, Pirhonen J, Broman M, Davidkin I, Ziegler T, Julkunen I. High frequency of cross-reacting antibodies against 2009 pandemic influenza A(H1N1) virus among the elderly in Finland. Euro Surveill. 2010;15(5):pii=19478. Online at: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19478>.
2. Lessler J, Riley S, Read JM, Wang S, Zhu H, et al. (2012) Evidence for Antigenic Seniority in Influenza A (H3N2) Antibody Responses in Southern China. PLoS Pathog 8(7): e1002802. doi:10.1371/journal.ppat.1002802
3. Simonsen L, Clarke MJ, Schonberger LB, Arden NH, Cox NJ, Fukuda K. Pandemic versus Epidemic Influenza Mortality: A Pattern of Changing Age Distribution. Journal of Infectious Diseases. 1998;178(53-60).



Lyme Disease Vector: Deer or Black-legged Tick (*Ixodes scapularis*)

Lyme Disease Season is Just Around the Corner...

Lyme Corps Can Help Your Practice Prepare!

This Spring, volunteers from CDC’s Lyme Corps in collaboration with PDPH are offering primary-care practices in Philly brief educational sessions and patient materials on the prevention of Lyme Disease, the most common vector-borne disease in our area.

If your practice is interested in an in-service, please contact Dana Perella at (215) 685-6742.

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Contributors:

Amanda Driesse, BA

Editors:

Ami Patel, PhD MPH

Jose Lojo, MPH



REPORT OUTBREAKS AND REPORTABLE DISEASES AND CONDITIONS TO PDPH AT:

PHONE: 215-685-6742

FAX: 215-238-6947

REPORTING REQUIREMENTS AND FORMS ARE POSTED ONLINE AT hip.phila.gov.