

Influenza Illness and Hospitalizations Prevented by Influenza Vaccination — United States, 2013-2014, Morbidity and Mortality Weekly Report

MMWR Report Summary

- The December 12, 2014 Morbidity and Mortality Weekly Report (MMWR) contains a report estimating the number of influenza-associated illnesses, medically attended illnesses and hospitalizations that were prevented last season by 2013-2014 influenza vaccination.
- The MMWR report is available on the CDC website at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6349a2.htm?s_cid=mm6349a2_w.
- In 2013, CDC published a model to estimate the number of influenza-associated illnesses and hospitalizations averted by influenza vaccination during the 2005-2013 influenza seasons. (More information about this model and earlier findings is available in the [Background section](#) below.)
- Using this model and updated estimates of influenza vaccination coverage, vaccine effectiveness, and influenza hospitalizations, CDC estimated that during the 2013-2014 flu season, flu vaccination prevented 7.2 million influenza-associated illnesses, 3.1 million medically-attended illnesses, and 90,000 hospitalizations.
- Influenza vaccination during the 2013-2014 season thus resulted in an estimated 17% fewer adverse health outcomes associated with influenza.
- According to the report, vaccination last season had the greatest benefit on those who are most vulnerable (young children and people aged 65 years and older).
- Children aged 6 months–4 years and persons aged ≥ 65 years (two groups known to be at higher risk for influenza-related complications), accounted for 60% of averted hospitalizations. Persons aged ≥ 65 years accounted for 55% of all prevented hospitalizations.
- There were somewhat fewer estimated influenza-associated hospitalizations overall during the 2013-2014 season than during the 2012-2013 flu season, which had been a moderately severe season during which A(H3N2) viruses predominated.
- The report supports the conclusion that influenza vaccination in the United States produced a substantial health benefit during 2013-2014 in terms of preventing illness, medical visits and hospitalizations.
- Although flu vaccine can prevent a substantial number of flu cases and hospitalizations, fewer than half of Americans aged 6 months and older are estimated to have been vaccinated against flu during the 2013-2014 season.
- The study also notes, however, that raising vaccination rates and producing more effective vaccines would greatly increase the benefits realized by influenza vaccination in the United States.
- The MMWR points out that if influenza vaccination levels had reached the Healthy People 2020 target of 70%, an additional 5.9 million influenza illnesses, 2.3 million medically attended illnesses, and 42,000 hospitalizations could have been prevented.

NOTE: Hospitals do not detect all patients with influenza, so the true number of influenza patients is higher than the number reported. To estimate the true number of influenza patients, the reported number is multiplied by a number called a “multiplier.” Updated multipliers were used to adjust estimates for the 2013-2014 flu season. In previous years, hospitalization rates were adjusted based on data collected during the 2009 influenza pandemic that were not age-specific. There were concerns that influenza testing might have varied by age and not have been as common as during the pandemic, thus data were collected during two post-pandemic seasons to update these multipliers. The estimates using the updated multipliers were similar to the previous estimates for children and younger adults, but were higher for older adults, indicating that estimated hospitalization rates among older adults in recent seasons were too low. Direct comparisons of the current estimates to published flu outcomes averted for recent seasons may not be accurate because they did not incorporate the updated multipliers. If applied retrospectively, the updated multipliers would be expected to increase the estimates from previous seasons.

Background

- The 2013-2014 estimates were derived using the same methodology that was originally published on June 19, 2013 in the journal PLOS ONE. (The original PLOS ONE study is available at <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0066312>.)
- In that publication, CDC first presented this method for estimating the impact of the U.S. flu vaccination program using influenza vaccination coverage rates, influenza vaccine effectiveness (VE) estimates, and influenza hospitalization rates.
- The original study estimated the number of illnesses, medical visits and hospitalizations prevented by vaccination for flu seasons from 2005-2006 to 2011-2012. Estimates were updated last year for the 2012-2013 season.
- The estimates for the 2012-2013 flu season were the highest for any one season since 2005-2006.
- CDC estimated that during the 2012-2013 flu season influenza vaccination prevented 6.6 million illnesses, 3.2 million medical visits and 79,000 hospitalizations.
- The previously provided estimates for the 2012-2013 season are likely an underestimate because they used a multiplier determined during the 2009 pandemic. Data collected during recent seasons suggest that the correct multipliers for years after the pandemic are higher than the 2009 multiplier for older adults.
- When estimates for the 2012-2013 flu season are re-calculated using the newly-updated multipliers, the results indicate that influenza vaccination prevented 6.8 million illnesses, 3.2 million medical visits, and 120,000 hospitalizations.
- Vaccination benefits are greater during seasons with high intensity and less during seasons of lower intensity; fewer influenza cases can be prevented when the underlying amount of disease is low.
- The December 12, 2014 MMWR provides the 2013-2014 update to CDC’s influenza vaccine program impact data.
- This program impact data will be updated and published annually.

Methods

- Existing U.S. national influenza surveillance data are used to estimate the number of outcomes (e.g., influenza-associated cases, medically attended illnesses, and hospitalizations) that occur during a season.
- Researchers then calculate the rates of influenza illness and influenza hospitalization among susceptible individuals throughout the months of each season while accounting for vaccination coverage, the effectiveness of the influenza vaccine, and disease occurrence.
- Lastly, researchers use these rates to project the burden of influenza that would have occurred in the absence of vaccination.
- In previous years' estimates, hospitalization rates were multiplied by a factor of 2.7 for all age groups based on data collected during the 2009 influenza pandemic that were not age-specific. There were concerns that this multiplier might have underestimated hospitalizations in non-pandemic years when influenza testing might not have been as common as during the pandemic.
- Thus data were collected during two post-pandemic seasons to update the multiplier. The updated multipliers were similar to the previous figure for children and younger adults, but were higher for older adults. Thus, estimated hospitalization rates among older adults in recent seasons were too low.
- The 2013–2014 estimates of vaccination coverage through April 2014 and end-of-season vaccine effectiveness data were used to estimate how many people were not protected by vaccination during the season and at risk of influenza infection .
- The difference between the estimated number of outcomes with vaccination as compared to without vaccination equals the burden averted by vaccination.
- Results are estimated for four age categories in this model: 6 months-4 years old, 5-19 years old, 20-64 years old, and 65 years and older.