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### 995. Effectiveness of Influenza Vaccine for Prevention of Influenza-Associated Hospitalizations Among High-Risk Adults in the United States, 2015–2016

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**Session:** 130. Adult and Pediatric Influenza Vaccine  
Friday, October 5, 2018: 12:30 PM

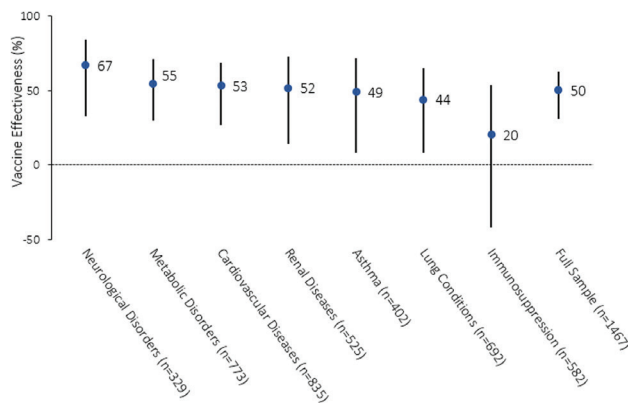
**Background.** Individuals with cardiopulmonary and other chronic conditions are at increased risk for severe complications of influenza. Few studies have examined influenza vaccine effectiveness (VE) in high-risk groups. We evaluated VE against influenza-associated hospitalization among adults with specific high-risk conditions.

**Methods.** Adults hospitalized with acute respiratory illness (ARI) during the 2015–2016 influenza season were enrolled at eight hospitals participating in the US Hospitalized Adult Influenza Vaccine Effectiveness Network (HAIIVEN) study. Respiratory specimens were tested for influenza by reverse transcription PCR. Measures of illness severity, underlying health status, and vaccination were obtained from medical records and enrollment interviews. The presence of high-risk conditions was determined from clinical codes assigned to prior year medical encounters. We estimated VE using a test-negative design as  $(1 - \text{adjusted odds ratio})$ , comparing odds of PCR-confirmed influenza among vaccinated patients vs. unvaccinated controls. Multivariate logistic regression was adjusted for age, sex, and other factors, stratifying by chronic conditions.

**Results.** Of 1,467 adults hospitalized with ARI, 236 (16%) had PCR-confirmed influenza; 180 (78%) were A(H1N1)pdm09. In all, 1,358 (93%) had  $\geq 1$  high-risk medical condition, and 1,026 (70%) had  $\geq 3$  conditions. Cardiovascular ( $n = 835$ ), metabolic (including diabetes) ( $n = 773$ ) and lung conditions ( $n = 692$ ) were most common (figure). Patients with  $\geq 1$  high-risk conditions were more likely to be vaccinated (70%) vs. patients not at high risk (31%,  $P < 0.001$ ). Among all patients, VE against any influenza-associated hospitalization was 50% (95% CI: 31–63). VE was similarly high among patients with neurologic (VE = 64%, 95% CI: 26–83), metabolic (VE = 55%, 95% CI: 30–71), and cardiovascular (VE = 53%, 95% CI: 27–69) conditions, though lower for patients with immunosuppression and malignancy (VE = 20%, 95% CI: –42–54).

**Conclusion.** Vaccination significantly reduced risk of influenza hospitalization among adults with the most prevalent high-risk cardiovascular, metabolic, and lung conditions. Results support the benefit of vaccinating adults with existing specific chronic conditions.

Figure. Estimated influenza vaccine effectiveness against influenza-associated hospitalization among U.S. adults with specific comorbid conditions, 2015–16



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### 996. A Cluster-Randomized Trial of Adjuvanted Trivalent Influenza Vaccine vs. Standard Dose in US Nursing Homes

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**Session:** 130. Adult and Pediatric Influenza Vaccine  
Friday, October 5, 2018: 12:30 PM

**Background.** Pneumonia and influenza lead as vaccine-preventable infections among nursing home (NH) residents. Immunosenescence reduces vaccine response and protection from infections. More immunogenic vaccines, e.g., adjuvanted trivalent influenza vaccine [aTIV], can improve clinical outcomes. We evaluated all-cause hospitalization among long-stay NH residents offered aTIV vs. trivalent influenza vaccine (TIV).

**Methods.** We randomized 823 NHs within 75 miles of a Centers for Disease Control and Prevention influenza reporting city to offer one of the two egg-based influenza vaccines, aTIV or TIV, as their 2016–2017 influenza season standard of care. For the subset of long-stay NH residents >100 days in facility as of October 1, 2016) aged  $\geq 65$  years, we determined how many were hospitalized from November 1, 2016 to June 1, 2017 on an intent-to-treat basis. We obtained all-cause hospitalization, patient-, and facility-level characteristics from Minimum Data Set and Certification and Survey Provider Enhanced Reporting data. Our primary outcome was time to first hospitalization, using Cox proportional hazards models.

**Results.** The analytic sample included 26,300 residents in 412 NHs randomized to offer aTIV and 26,474 in 410 NHs randomized to TIV. Mean age was 82.3 vs. 82.3 years, 69.3% vs. 68.6% were women, and 15.5% vs. 20.1% were African-American, for aTIV and TIV NHs, respectively. The number of residents vaccinated in the facility against influenza was 17,976 (68.3%) and 18,364 (69.4%), with an overall vaccination rate of 78.4% and 79% for aTIV and TIV NHs. Mean staff vaccination was 53.4% and 54.4% for aTIV and TIV NHs. There were 5,479 (20.8%) hospitalizations in the aTIV and 5,839 (22.1%) in TIV NHs, respectively [adjusted as prespecified, hazard ratio (HR) 0.94, 95% confidence interval (CI): 0.88, 0.99]. Post-hoc adjustment for the imbalance in race increased heterogeneity, HR 0.97, 95% CI: 0.91, 1.04. A total of 18.2% vs. 17.5% (HR 1.05, 95% CI: 0.99, 1.11) of residents in aTIV and TIV NHs died.

**Conclusion.** Compared with TIV, aTIV may reduce hospitalization risk of long-stay NH residents during a predominantly A/H3N2 influenza season, despite reported reduced effectiveness due to egg-based mutagenesis of egg-based vaccines.

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### 997. Protection of Unvaccinated Individuals by Influenza Vaccine Coverage of Household Contacts

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**Session:** 130. Adult and Pediatric Influenza Vaccine  
Friday, October 5, 2018: 12:30 PM

**Background.** The evidence that influenza vaccination programs provide some protection to unvaccinated members of a community (i.e., indirect effects) is lacking. We sought to determine the indirect effects of influenza vaccine in prospective cohort study of households with children.

**Methods.** We used longitudinal data over six influenza seasons from the Household Influenza Vaccine Evaluation (HIVE) study. We categorized households each season based on the proportion of members who received a seasonal influenza vaccination: unvaccinated (0%), low coverage (1–50%), moderate coverage (50–99%), and fully vaccinated (100%). We used mixed-effect Poisson regression models adjusted for age group and sex with random effects to account for household clustering and repeated measures. We estimated the association between the proportion of vaccinated household members and the incidence of influenza virus infection in the entire cohort. We then estimated the indirect effects of influenza vaccination by comparing unvaccinated members of households with low levels of vaccination to unvaccinated members of households with higher levels of vaccination.

**Results.** During 7,286 person-seasons of follow-up, we detected 578 cases (8 per 100/season) of influenza virus infection. The seasonal incidence rate was highest in completely unvaccinated households (10 per 100/seasons) and lower at all other levels of vaccine coverage (Figure 1). Individuals in fully vaccinated households had a 29% lower seasonal incidence rate of influenza infection compare to those in unvaccinated households (IRR 0.72, 95% CI 0.56–0.93). The estimated indirect VE comparing unvaccinated individuals in completely unvaccinated households to those in households with moderate vaccine coverage was 40% (95% CI –4 to 65).