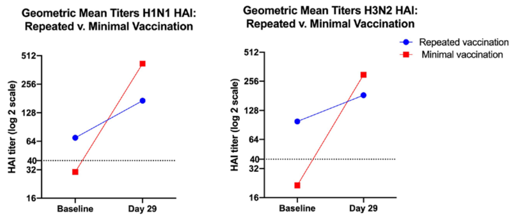
FIGURE C



2741. Seasonal Influenza Vaccine Timing in Children and Adults Hospitalized with Influenza in the United States, FluSurv-NET, 2013–2017

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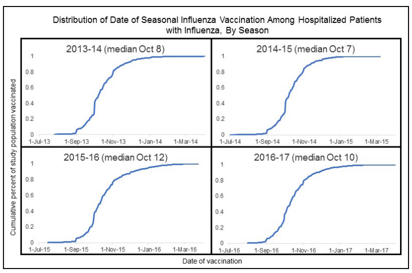
Session: 278. Vaccines: Influenza
Saturday, October 5, 2019: 12:15 PM

Background: Seasonal influenza vaccine may attenuate disease severity among people infected with influenza despite vaccination, but vaccine effectiveness may decrease with increasing time between vaccination and infection. Patient characteristics may play a role in the timing of vaccine receipt.

Methods: We used data from the Influenza Hospitalization Surveillance Network (FluSurv-NET) and included patients ≥ 9 years hospitalized with laboratory-confirmed influenza during October 1–April 30 of influenza seasons 2013–2014 through 2016–2017 who received seasonal influenza vaccine ≥ 14 days prior to admission. Vaccine history was obtained from vaccine registries, medical charts, and patient interviews. We defined "early vaccination" as vaccine receipt before October 15 and "late vaccination" as receipt after (date selected using typical season onset and median vaccination dates). Early and late groups were compared using Chi-square or Fisher exact tests.

Results: Among 21,751 vaccinated patients, 61% received vaccine before October 15, and distribution of vaccination date was similar across seasons (figure). Vaccination occurred earlier with increasing age (45% were vaccinated early among those 9–17 years but 65% in those ≥ 80 years, $P < 0.01$). White non-Hispanic patients were more likely to receive vaccine early compared with black non-Hispanic and Hispanic patients (63% vs. 55% and 54%; $P < 0.01$). Those with metabolic disorders, cardiovascular disease, kidney disease, and cancer were vaccinated earlier whereas those with HIV and liver disease were vaccinated later. Vaccine timing also varied by state ($P < 0.01$) but not by sex.

Conclusion: Among influenza-vaccinated older children and adults hospitalized with influenza, older age, white race, and certain medical conditions were associated with early receipt of influenza vaccination in unadjusted analysis. This may be due to frequent healthcare encounters and targeted public health strategies in high-risk groups. Understanding how timing of vaccine receipt varies among populations can provide insights into variables that must be controlled for in studying possible vaccine effectiveness waning and attenuation of disease among those who are infected despite vaccination.



***Disclosures.* All authors:** No reported disclosures.

2742. The Impact of Influenza Vaccination on Antibiotic Use in the United States, 2010–2017

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Session: 278. Vaccines: Influenza
Saturday, October 5, 2019: 12:15 PM

Background: Antibiotic resistance is a cause of morbidity and mortality driven by inappropriate prescribing. In the United States, a third of all outpatient antibiotic prescriptions may be inappropriate. Seasonal influenza rates are significantly associated with antibiotic prescribing rates. The impact of influenza vaccination coverage on antibiotic prescribing is unknown.

Methods: We conducted a retrospective analysis of state-level vaccination coverage and antibiotic prescribing rates from 2010 to 2017. We used fixed effects regression to analyze the relationship between cumulative vaccine coverage rates for a season and the per capita number of prescriptions for systemic antibiotics for the corresponding season (January–March) controlling for temperature, poverty, healthcare infrastructure, population structure, and vaccine effectiveness.

Results: Rates of vaccination coverage ranged from 33% in Nevada to 52% in Rhode Island for the 2016–2017 season, while antibiotic use rates ranged from 25 prescriptions per 1,000 inhabitants in Alaska to 377 prescriptions per 1,000 inhabitants in West Virginia (Figure 1). Vaccination coverage rates were highly correlated with reduced prescribing rates, and controlling for other factors, we found that a one percent increase in the influenza vaccination rate was associated with 1.40 (95% CI: 2.22–0.57, $P < 0.01$) fewer antibiotic prescriptions per 1,000 inhabitants (Table 1). Increases in the vaccination coverage rate in the pediatric population (aged 0–18) had the strongest effect, followed by the elderly (aged 65+).

Conclusion: Vaccination can reduce morbidity and mortality from seasonal influenza. Though coverage rates are far below levels necessary to generate herd immunity, we found that higher coverage rates in a state were associated with lower antibiotic prescribing rates. While the effectiveness of the vaccine varies from year to year and the factors that drive antibiotic prescribing rates are multi-factorial, these results suggest that increased vaccination coverage for influenza would have significant benefit in terms of reducing antibiotic overuse and correspondingly antibiotic resistance.

Table 1. Total antibiotic prescriptions (between January and March) per 1,000 residents, U.S. 2010-2017

	All Ages Coefficient (95% CI)	0-18 years old Coefficient (95% CI)	19-64 years old Coefficient (95% CI)	65+ years old Coefficient (95% CI)
Influenza vaccination coverage (percent)	-1.40 (-2.22- -0.57)***	-1.50 (-2.12- -0.88)***	-0.92 (-1.62- -0.22)**	-1.35 (-1.99- -0.71))***
Kidney dialysis centers per 1 million population	0.34 (-0.79-1.48)	-0.41 (-2.10-1.28)	0.11 (-0.90-1.13)	0.44 (-1.18-2.06)
Physicians' offices per 10,000 population	0.69 (-5.58-6.96)	5.99 (-12.61-24.59)	5.24 (-5.56-16.05)	-14.55 (-30.75-1.65)*
Childcare centers per 10,000 population under five	-0.53 (-1.62-0.56)	0.89 (-1.81-3.59)	-0.78 (-2.23-0.68)	-1.20 (-3.41-1.00)
January-July temperature difference	-0.46 (-0.70- -0.21)***	-0.25 (-0.79-0.30)	-0.47 (-0.66- -0.28)***	-1.53 (-1.95- -1.11)***
Percentage of population with income below poverty line	6.58 (4.38-8.78)***	7.53 (4.01-11.05)***	2.92 (0.68-5.17)**	4.97 (2.00-7.95)***
Vaccine effectiveness rate	0.15 (-0.005-0.31)*	0.44 (0.24-0.65)***	0.13 (-0.01-0.28)*	-0.03 (-0.22-0.16)

Note: CI = confidence interval; * p<0.1; **p<0.05; ***p<0.01

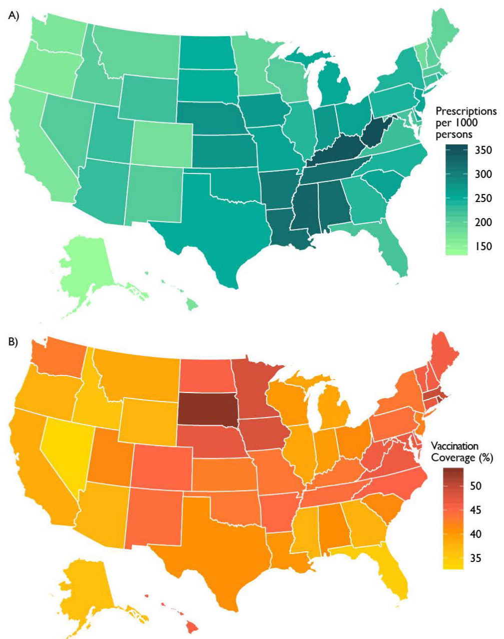

Figure 1: Antibiotic prescriptions and influenza vaccination coverage for each state, United States, 2016-2017
(A) Per capita prescribing rate of antibiotics from January 2017 to March 2017 by state; (B) Influenza vaccination coverage percent for populations ≥ 6 months for 2016-2017 influenza season. Source: CDC FluVaxView, IQVIA MIDAS, 2000-2015, IQVIA Inc. All rights reserved.

***Disclosures.* All authors:** No reported disclosures.