National Ambulatory Health Resource Utilization and Geographic Disparities of Influenza in the United States, 2009 to 2016

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Background

- Influenza is a contagious viral illness and one of the most common causes of human respiratory infections worldwide
- Influenza can lead to more severe complications, particularly in the elderly[1]
- Vaccine requires annual re-formulation to counteract the constantly changing virus, leading to antigenic mismatch and imperfect effectiveness; however, even with mismatches, the influenza vaccine can reduce the risk of infection by 56-60%[2]
- Despite this, vaccination rates in the U.S. have not significantly changed since 2013[3]
- Outpatient physician offices and hospital departments remain a critical site for vaccination and treatment of influenza; however, it is unclear the extent to which patients are seeking care for these health resources in these settings.
- **Primary objective**: To describe the prevalence of influenza, influenza vaccination rates, and treatment among U.S. outpatients

Methods

Study design:

- Cross-sectional study of the CDC's 2009-2016 National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Care Survey (NHAMCS)

Study definitions:

- Patient demographics included age, sex, race, and ethnicity
- Antiviral treatment and receipt of influenza vaccine defined by Multum codes; influenza diagnosis defined by ICD-9/10 codes
- Diagnosis and vaccination rates presented as visits per 1,000 total patient visits
- Influenza treated with an antiviral agent presented in percentages
- Patient data weights were used to extrapolate to national estimates
- U.S. geographic regions defined by U.S. Census Bureau

Data and statistical analyses:

- Baseline demographics compared between visits with and without an influenza diagnosis, as well as visits with and without an influenza vaccination using chi-square or Wilcoxon rank sum tests.

Discussion

- Influenza diagnoses and the provision of influenza vaccinations and treatment were relatively uncommon and did not significantly change over the study period
- Certain patient populations were less likely to be vaccinated and more likely to be diagnosed with influenza, which could help inform future public health initiatives and allocation of resources to optimize influenza prevention and treatment
- Lower vaccination rates could be due to misconceptions of the flu vaccine

Limitations:

- Prior history and longitudinal follow-up not available due to cross-sectional design
- Surveys used in this study only accounted for outpatient physician offices and hospital emergency and outpatient departments, which underestimates overall vaccine coverage in the U.S.

Results

Table 1. Baseline demographics

Characteristic*	Influenza (n=18,975,264)	No influenza (n=7,390,905,001)	Vaccination (n=145,168,281)	No vaccination (n=7,264,711,983)
Age (years), median (IQR)	19 (7-42)	49 (26-66)	19 (4-59)	50 (26-66)
Female sex, %	57.5	58.0	52.2	58.1
Race, %				
White only	58.3	60.4	54.5	60.5
Black/African American	9.4	8.7	6.9	8.7
Asian only	3.0	3.4	4.7	3.4
American Indian/Alaskan	0.5	0.3	0.3	0.3
Hawaiian/Pacific Islander	0.3	0.2	0.2	0.2
More than one race	0.2	0.3	0.3	0.3
Hispanic or Latino, %	11.9	10.3	13.5	10.2

*All comparisons significant at p<0.0001

Figure 1. Influenza rates by month

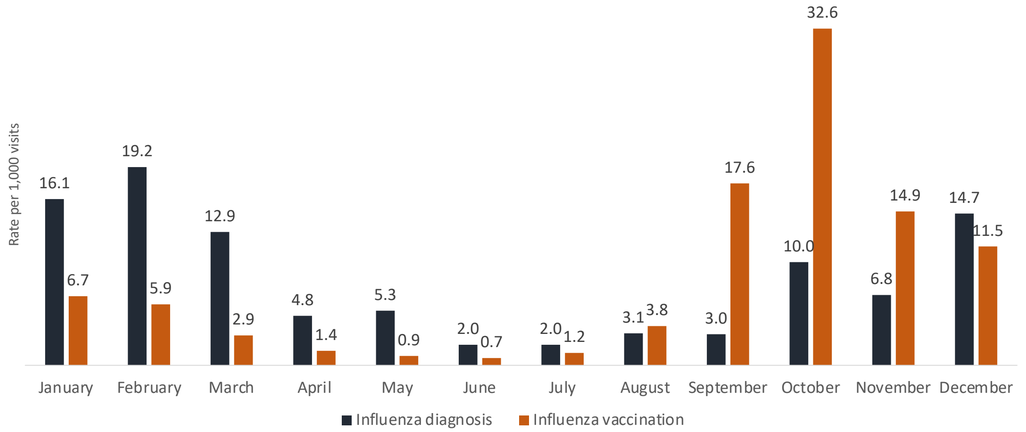


Figure 2. Influenza and vaccination rates by survey year

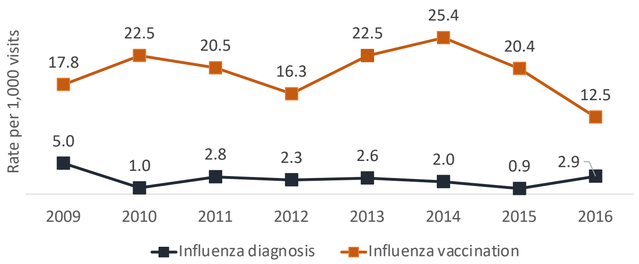


Figure 3. Proportion of influenza antiviral treatment (%) by survey year

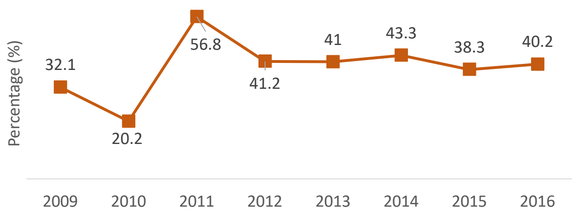


Figure 4. Influenza diagnosis and vaccination rates by age group

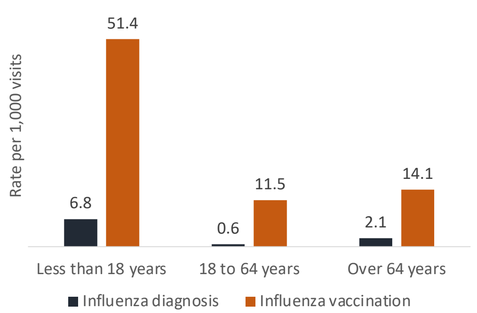
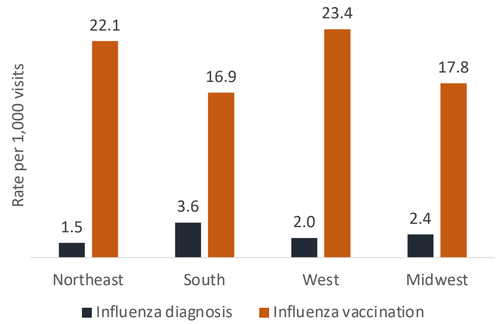


Figure 5. Diagnosis and vaccination rates by geographical region



Conclusions

- In this national study, there were no significant changes in influenza diagnosis or vaccination rates among U.S. outpatients
- Monthly influenza vaccination and diagnosis rates followed expected trends, peaking in fall and winter, respectively
- Findings from this study support enhanced efforts to improve influenza vaccination efforts, particularly in underserved populations

References

1. Lewnard JA, Cobey S. Immune History and Influenza Vaccine Effectiveness. Vaccines 2018;2.
2. Moghadami M. A Narrative Review of Influenza: A Seasonal and Pandemic Disease. Iran J Med Sci 2017;1:2-13.
3. Centers for Disease Control and Prevention. Vaccination Trends. https://www.cdc.gov/flu/fluvaxview/trends.htm.

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