

## Use of EHR Data to Produce Estimates of Influenza Vaccine Effectiveness



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**Background:** Influenza causes substantial morbidity and mortality each year. Annual evaluations are necessary to understand variability in influenza vaccine effectiveness (VE). The COVID-19 pandemic highlighted the potential of using electronic health records (EHRs) to estimate VE for SARS-CoV-2 vaccines, offering advantages over prospective studies such as cost-effectiveness, time efficiency, and large sample sizes. This study aimed to explore the feasibility of utilizing EHR data to estimate

influenza VE.

**Methods:** This study analyzed EHR data from patients hospitalized in the Marshfield Clinic Health System (MCHS) during the 2022-2023 influenza season. The completeness of vaccination records and other important covariates were described. The proportion of patients tested for influenza and the characteristics associated with testing were assessed using multivariable logistic regression. VE was estimated among tested patients using a test negative design with multivariable logistic regression, adjusted for age, sex, calendar time, high-risk status, and prior COVID-19 vaccination.

**Results:** The full study population initially included 8,884 inpatient admissions. All vaccination records contained vaccine name, record source, and administration date. Vaccine manufacturer, lot number, and route of administration were available in 93%, 94%, and 97% of records respectively. Relative to patients aged 18-44, all other age groups were more likely to be tested for influenza. Those with asthma or another chronic lung disease, and immunocompromising conditions were more likely to be tested for influenza. Among the 1,548 patients tested for influenza VE was 40% (95% CI: 2%, 64%). VE was 69% (95% CI: 2%, 91%) and 9% (95% CI: -65%, 50%) for individuals 18-64 and  $\geq 65$  years, respectively. Among children, all 10 influenza cases occurred in unvaccinated patients.

**Conclusions:** There were significant variations in the likelihood of influenza testing by various patient characteristics, which raises concerns about selection bias in testing practices. However, the likelihood of testing was not influenced by influenza vaccination. Confidence intervals were wide, but the high VE estimated in younger adult and pediatric groups was consistent with prior studies reporting relatively high VE during the same influenza season. These results suggest that the use of EHR data is a potentially promising approach to estimating annual VE, but larger studies are needed to understand potential sources of bias.