Partial Protection of Influenza Vaccine in a Primary Care Population – Wisconsin: 2012-2015

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Background

Annual influenza vaccination is recommended routinely for all persons aged 6 months and older for the prevention of influenza.[1] Estimates of vaccine effectiveness (VE) typically are calculated using a test-negative design: differential rates of laboratory-confirmed influenza among vaccinated and unvaccinated persons.[2] VE estimates could be affected by the sampling design, the magnitude of influenza activity, the timing of surveillance, timing of vaccine administration, and the age of vaccinees.[3] The remaining VE estimate in the test-negative design provides an assessment of partial protection of influenza vaccine which could be characterized as milder clinical presentations in patients with laboratory-confirmed influenza.

Methods

• The Wisconsin Influenza Incidence Surveillance Project (WISIP) conducted prospective surveillance in five primary care clinics (figure 1) of patients presenting with acute respiratory infections (ARI) – respiratory symptoms) from July 2012 through June 2015.

• A standard set of epidemiologic information and symptoms were collected from each patient for influenza PCR.

• Receipt of influenza vaccine ≥ 14 days before the onset of illness was confirmed through patient chart audit with linkage to the Wisconsin Immunization Registry.

• Patients with PCR-confirmed influenza were categorized as meeting ILI criteria (fever with cough or sore throat) or having a non-ILI respiratory illness (figure 2).

• ILI has been shown in previous WIISP analyses to be associated with more severe clinical presentations (figure 3).

• We calculated the odds of ILI based on influenza vaccination status using bivariate logistic regression, adjusting for age, time from illness onset, and sex. Analyses combined all seasons; individual season data were displayed in figure 4.

• The overall vaccination rate for WISIP surveillance patients was 48% (figure 5) which was higher than the general Wisconsin population (>30% for the same time period; figure 6). Similar age-specific patterns of vaccine receipt were noted between WISIP and the general Wisconsin population.

Results

• The odds of a vaccinated patient meeting ILI criteria as compared to unvaccinated was 0.639 (95% CI: 0.592–0.687) (p < 0.001) (figure 5).

• Acute respiratory infection visits were recorded for 2,212 patients aged 18 days to 94.5 years (mean 34.9 years), of which 561 (24.9%) had laboratory-confirmed influenza. Among influenza-positive patients, 351 (70.0%) met the ILI case criteria.

• No significant differences were observed between influenza positive and negative patients in terms of age or sex. Influenza cases tended to present earlier after onset (p < 0.001) than did influenza-negative cases; influenza cases were more severe (p < 0.002) and were more likely to meet ILI case definition (p < 0.001). Symptoms of influenza cases are displayed in figure 4.

• The observed “partial protection” offered by influenza vaccines appears to vary by the dominant influenza strain and the level of vaccine match.

• In post-hoc analyses, a reduction in fever appears to be the key symptom contributing to the reduced likelihood of ILI.

• Estimation of vaccine mismatch is complicated by the fact that influenza vaccination status is not routinely collected on laboratory surveillance data set that was not created for the purpose of assessing vaccine efficacy.

• New approaches to evaluating vaccine efficacy should be examined to provide a more robust assessment of the value of influenza vaccines in the general population.

• Such approaches could consider duration and intensity of symptoms.

Conclusions

• influenza vaccines, when they fail to prevent influenza, likely confer partial protection to vaccine recipients.

• Influenza vaccination is recommended routinely for all persons aged 6 months and older for the prevention of influenza.

• This study focused on individuals who had acute respiratory tract infections with laboratory-confirmed influenza and assessed clinical outcomes based on vaccine status.

• In the usual assessment of vaccine efficacy, these patients—had they received influenza vaccine—would reduce the estimated vaccine efficacy.

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References and Acknowledgements

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3. Wisconsin State Laboratory of Hygiene

4. U.S. Centers for Disease Control and Prevention

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