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Using routinely collected laboratory and health administrative data to assess influenza vaccine effectiveness: introducing the Flu and Other Respiratory Viruses Research (FOREVER) Cohort

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Introduction

Annual evaluation of influenza vaccine effectiveness (VE) is required because of frequent changes to circulating and vaccine strains. Traditionally, VE studies enroll patients who fulfill case definitions for respiratory infections and are tested for influenza. VE estimates generated from convenience samples of routinely collected specimens might be biased.

Objectives and Approach

We assessed the validity of using data from respiratory specimens collected during clinical encounters to estimate VE. We created the Flu and Other Respiratory Viruses Research (FOREVER) Cohort by linking respiratory virus laboratory test results from 2009-2014 from 11 public health and 8 hospital laboratories across Ontario to health administrative databases, including databases with billing claims for physician- and pharmacist-administered influenza vaccines. We evaluated the presence of information and selection biases when using these data and estimated VE in community-dwelling older adults (>65) using the test-negative design under conditions that emulated the inclusion criteria in traditional VE studies.

Results

The FOREVER Cohort included test results from 283,711 respiratory specimens obtained from 216,730 individuals. The overall linkage proportion to health administrative databases using deterministic and probabilistic linkage methods was 97.5%. Influenza positivity for older adults with unknown lag between illness onset and specimen collection was similar to those for whom illness onset date was documented to be $\leq$7 days before specimen collection, suggesting minimal outcome misclassification associated with information bias. The likelihood of influenza testing was similar between vaccinated and unvaccinated individuals, suggesting an absence of selection bias that could arise when a case definition for influenza testing is not employed. Lastly, VE estimates were similar under various conditions, demonstrating the robustness of using these data, and were comparable to published estimates.

Conclusion/Implications

The FOREVER Cohort can be used to estimate VE with negligible bias. Compared to traditional VE studies that are limited to recruited patients, routinely collected specimens create a larger, more generalizable sample. Linkage to health administrative databases can identify those with comorbidities and permit evaluation of VE in high-risk groups.

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