Interim Estimates of 2023–24 Seasonal Influenza Vaccine Effectiveness

Aaron M. Frutos, PhD, MPH

On behalf of CDC Influenza Vaccine Effectiveness Collaborators

Advisory Committee on Immunization Practices

February 28, 2024
Four networks to evaluate vaccine effectiveness (VE) against laboratory-confirmed influenza for children, adolescents, and adults in the outpatient and inpatient settings
CDC Influenza Vaccine Effectiveness Networks

Investigating Respiratory Viruses in the Acutely Ill (IVY)

New Vaccine Surveillance Network (NVSN)

U.S. Flu Vaccine Effectiveness Network (US Flu VE)

Virtual SARS-CoV-2, Influenza, and Other respiratory viruses Network (VISION)
These networks include all ages across settings

<table>
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<tr>
<th>Setting</th>
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US Flu VE

NVSN

VISION

IVY
NVSN: all settings

Setting

- Outpatient clinic
- Emergency department/urgent care
- Hospitalization

Age

- Children and adolescents (6 months–17 years)
- Adults (≥18 years)
US Flu VE: Outpatient clinic and ED/UC

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VISION: ED/UC & hospitalization

Setting

- Outpatient clinic
- Emergency department/urgent care
- Hospitalization

US Flu VE

NVSN

VISION

Age

- Children and adolescents (6 months–17 years)
- Adults (≥18 years)
IVY: hospitalization

- Outpatient clinic
- Emergency department/urgent care
- Hospitalization

Age
- Children and adolescents (6 months–17 years)
- Adults (≥18 years)

IVY
US Flu VE: Outpatient clinic and ED/UC

Setting
- Outpatient clinic
- Emergency department/urgent care
- Hospitalization

Age
- Children and adolescents (6 months–17 years)
- Adults (≥18 years)

US Flu VE
- IVY
VISION: ED/UC & hospitalization

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US Flu VE
VISION
IVY
These networks include all ages across settings.

- **Outpatient clinic**
  - Children and adolescents (6 months–17 years)
  - Adults (≥18 years)
- **Emergency department/urgent care**
  - Children and adolescents (6 months–17 years)
  - Adults (≥18 years)
- **Hospitalization**
  - Adults (≥18 years)
CDC influenza VE networks include patients from 22 states
2023-2024 Influenza VE Methods

**Enrollees:** Have acute respiratory illness

**Dates of enrollment:** Fall 2023- Early 2024

**Design:** Test-negative design

- Comparing vaccination odds among case patients with influenza confirmed by molecular assay versus control patients testing negative for influenza and SARS-CoV-2
- Vaccination status: receipt of any 2023–24 seasonal flu vaccine according to medical records, immunization registries, claims data, and/or self-report
2023-2024 Influenza VE Methods

**Analysis:** VE = (1 – adjusted OR) x 100%

- Adjusted for geographic region, age, calendar time of illness
  - IVY, US Flu VE, and VISION also adjusted for sex and race and ethnicity
  - US Flu VE also adjusted for days between illness onset and enrollment and self-reported general health status.
- VE estimates were calculated for influenza A subtypes A(H1N1)pdm09 and A(H3N2) when possible
  - Subtype not available for VISION
- VE was not estimated for some age groups and settings when sample size was small or when models did not converge
Pediatric VE

(aged 6 months–17 years)
## Pediatric VE against any influenza

<table>
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<tr>
<th>Influenza test result by influenza vaccination status, no. vaccinated/Total (%)</th>
<th>Influenza-positive</th>
<th>Influenza-negative</th>
<th>VE (95% CI)</th>
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<tr>
<td>NVSN (Outpatient)</td>
<td>123/622 (20)</td>
<td>793/2,577 (31)</td>
<td>59 (48, 67)</td>
</tr>
<tr>
<td>US Flu VE (Outpatient)</td>
<td>29/283 (10)</td>
<td>182/736 (25)</td>
<td>67 (48, 80)</td>
</tr>
<tr>
<td>VISION (Outpatient)</td>
<td>961/6,068 (16)</td>
<td>4,579/15,274 (30)</td>
<td>60 (57, 64)</td>
</tr>
<tr>
<td>NVSN (Inpatient)</td>
<td>29/128 (23)</td>
<td>543/1,321 (41)</td>
<td>61 (40, 75)</td>
</tr>
<tr>
<td>VISION (Inpatient)</td>
<td>21/113 (19)</td>
<td>299/921 (32)</td>
<td>52 (16, 72)</td>
</tr>
</tbody>
</table>
Pediatric VE against any influenza

VE: 59–67%

VE: 52–61%
Pediatric VE against influenza A

Outpatient

VE: 46–59%

Inpatient

VE: 46–56%

CAUSN
US Flu VE
VISION
Pediatric VE against influenza A(H1N1)pdm09

VE: 54–61%

VE: 60%

Outpatient

Inpatient

NVSN
US Flu VE
Pediatric VE against influenza A(H3N2)

VE: 55%

Not estimated

NVSN
US Flu VE
Pediatric VE against influenza B

VE: 64–89%

Not estimated

Outpatient

Inpatient

NVSN
US Flu VE
VISION
Adult VE

(aged ≥18 years)
## Adult VE against any influenza

### Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

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<td>US Flu VE (Outpatient)</td>
<td>177/568 (31)</td>
<td>803/1,807 (44)</td>
<td>33 (16, 47)</td>
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<tr>
<td>VISION (Outpatient)</td>
<td>4,501/18,385 (24)</td>
<td>21,356/52,657 (41)</td>
<td>49 (47, 51)</td>
</tr>
<tr>
<td>IVY (Inpatient)</td>
<td>200/632 (32)</td>
<td>1,517/3,872 (39)</td>
<td>44 (32, 54)</td>
</tr>
<tr>
<td>VISION (Inpatient)</td>
<td>728/1,839 (40)</td>
<td>7,425/14,168 (52)</td>
<td>41 (34, 47)</td>
</tr>
</tbody>
</table>
Adult VE against any influenza

- Outpatient: VE: 33–49%
- Inpatient: VE: 41–44%

Legend:
- IVY
- US Flu VE
- VISION
Adult VE against influenza A

- Outpatient: VE: 27–46%
- Inpatient: VE: 40–42%

Legend:
- IVY
- US Flu VE
- VISION
Adult VE against influenza A(H1N1)pdm09

VE: 25%

Outpatient

VE: 50%

Inpatient

IVY

US Flu VE
Adult VE against influenza A(H3N2)

VE: 54%

Not estimated
Adult VE against influenza B

VE: 78%

VE: 60%

Outpatient

Inpatient

IVY
US Flu VE
VISION
Adult (aged ≥65) VE
# Adult (aged ≥65) VE against any influenza

## Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

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<td>41/79 (52)</td>
<td>300/439 (68)</td>
<td>51 (14, 72)</td>
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<tr>
<td><strong>VISION (Outpatient)</strong></td>
<td>1,944/3,687 (53)</td>
<td>12,162/19,571 (62)</td>
<td>41 (36, 45)</td>
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<tr>
<td><strong>IVY (Inpatient)</strong></td>
<td>113/249 (45)</td>
<td>938/1,945 (48)</td>
<td>42 (23, 56)</td>
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<tr>
<td><strong>VISION (Inpatient)</strong></td>
<td>531/1,066 (50)</td>
<td>6,058/10,118 (60)</td>
<td>42 (34, 50)</td>
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Adult (aged ≥65) VE against any influenza

VE: 41–51%

VE: 42%
Adult (aged ≥65) VE against influenza A

VE: 40–52%

VE: 42–47%

Outpatient

Inpatient
Adult (aged ≥65) VE against influenza B

VE: 69%

Not estimated
Discussion
Summary of four CDC influenza VE networks

Vaccination with a 2023-24 influenza vaccine reduced the risk for medically attended influenza outpatient visits and hospitalizations among children, adolescents, and adults across 22 US States.

Vaccination was effective against both influenza A (mostly subtype A(H1N1)pdm09) and B (lineage Victoria) viruses that have circulated this season.

Results were consistent across networks.
Thank you

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We’d like to thank our many collaborators from CDC, IVY, NVSN, US Flu VE, and VISION

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Overall VE (pediatric and adults) by season*

*Estimates are from US Flu VE except for 2022-23 which are from a study from WI