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## U.S. Influenza Activity and Preliminary 2023-24 Influenza Vaccine Effectiveness Estimates

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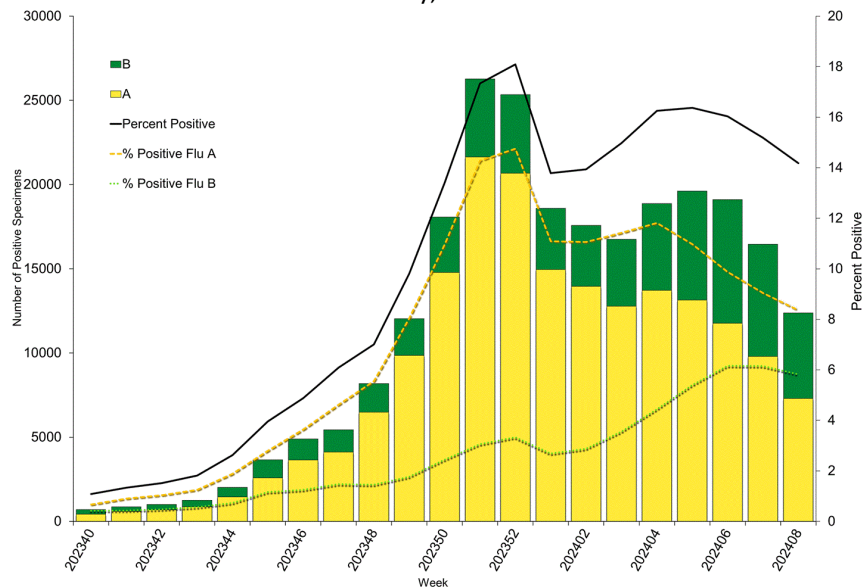
**Centers for Disease Control and Prevention**

Vaccines and Related Biological Products Advisory Committee

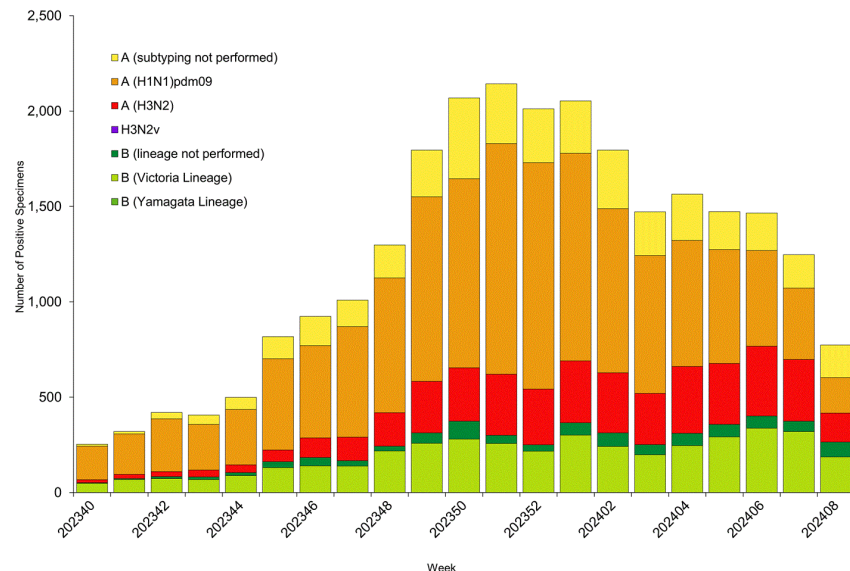
March 5, 2024

# Virologic Surveillance

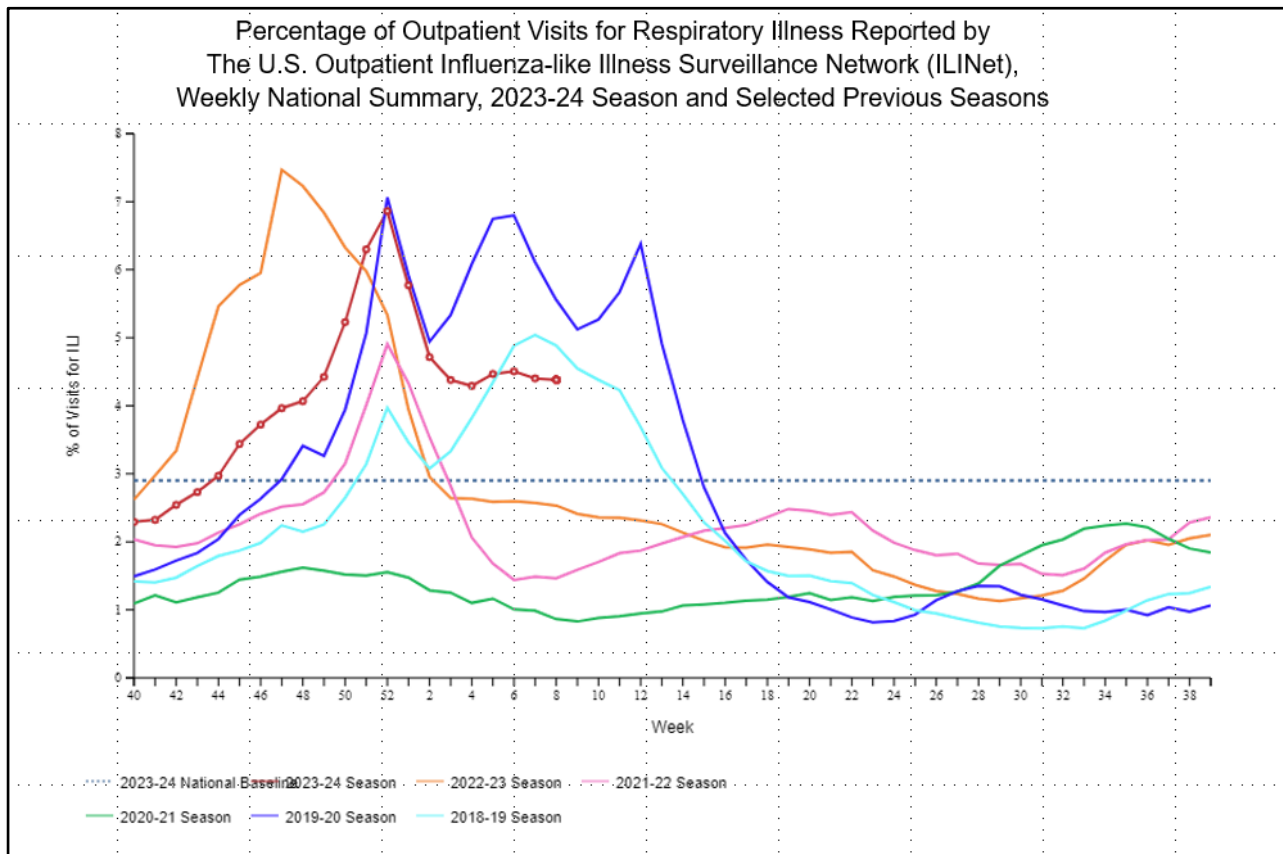
Influenza Positive Tests Reported to CDC by U.S. Clinical Laboratories, National Summary, 2023-2024 Season



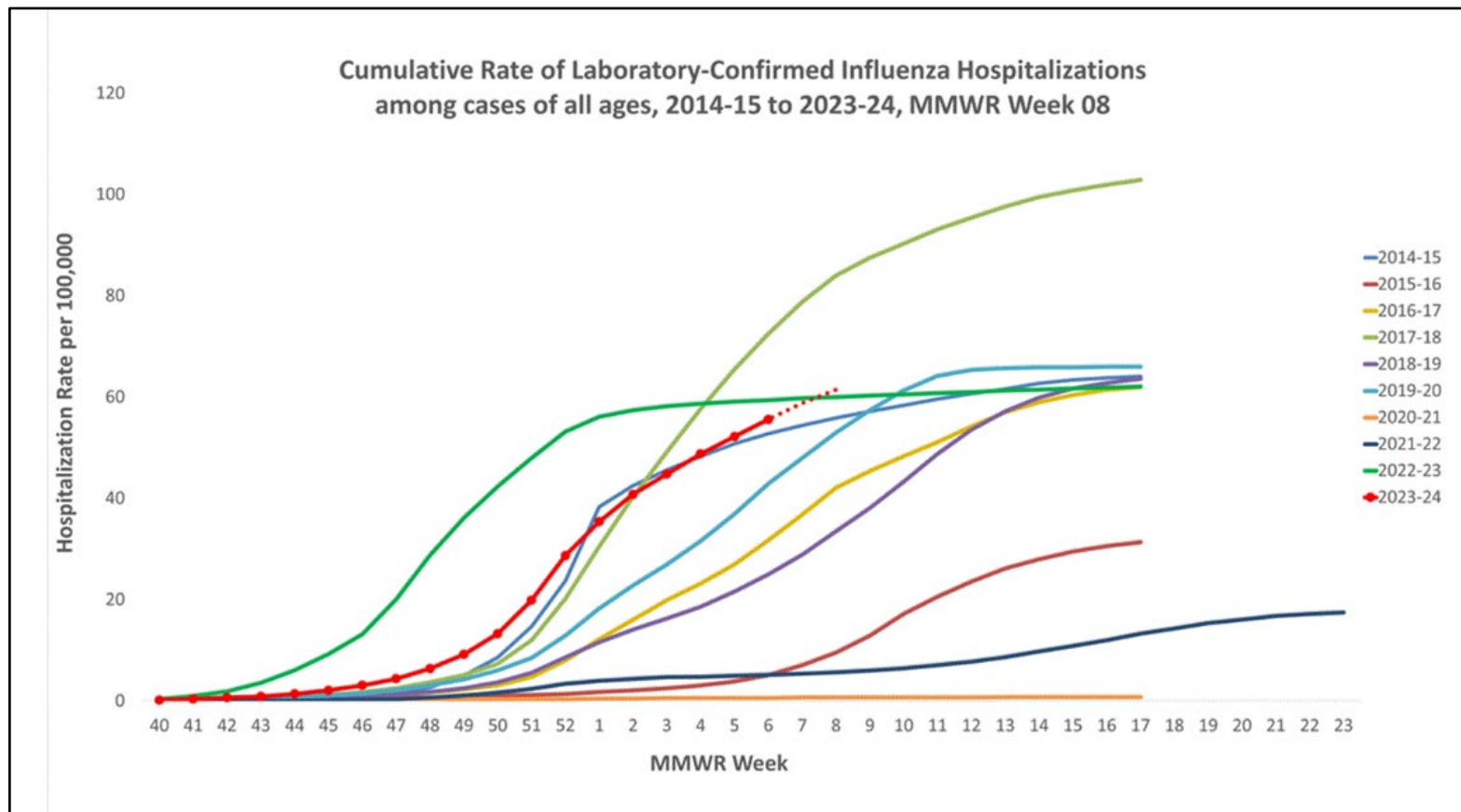
Influenza Positive Tests Reported to CDC by U.S. Public Health Laboratories, National Summary, 2023-2024 Season



# Influenza-Like Illness (ILI) Activity—ILINet



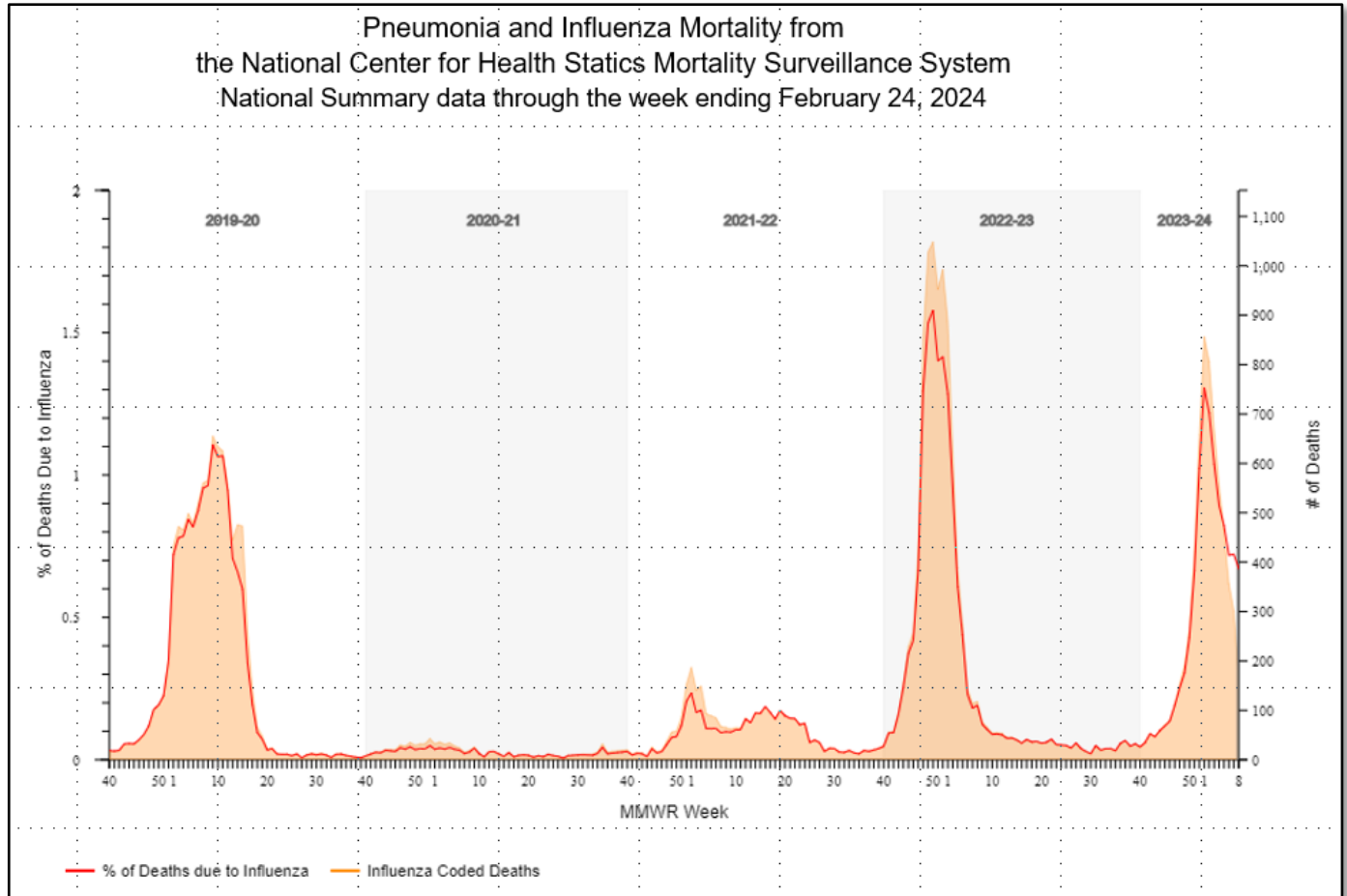
# Influenza-Associated Hospitalizations—FluSurv-NET



# Pneumonia, and Influenza (P&I) Mortality—

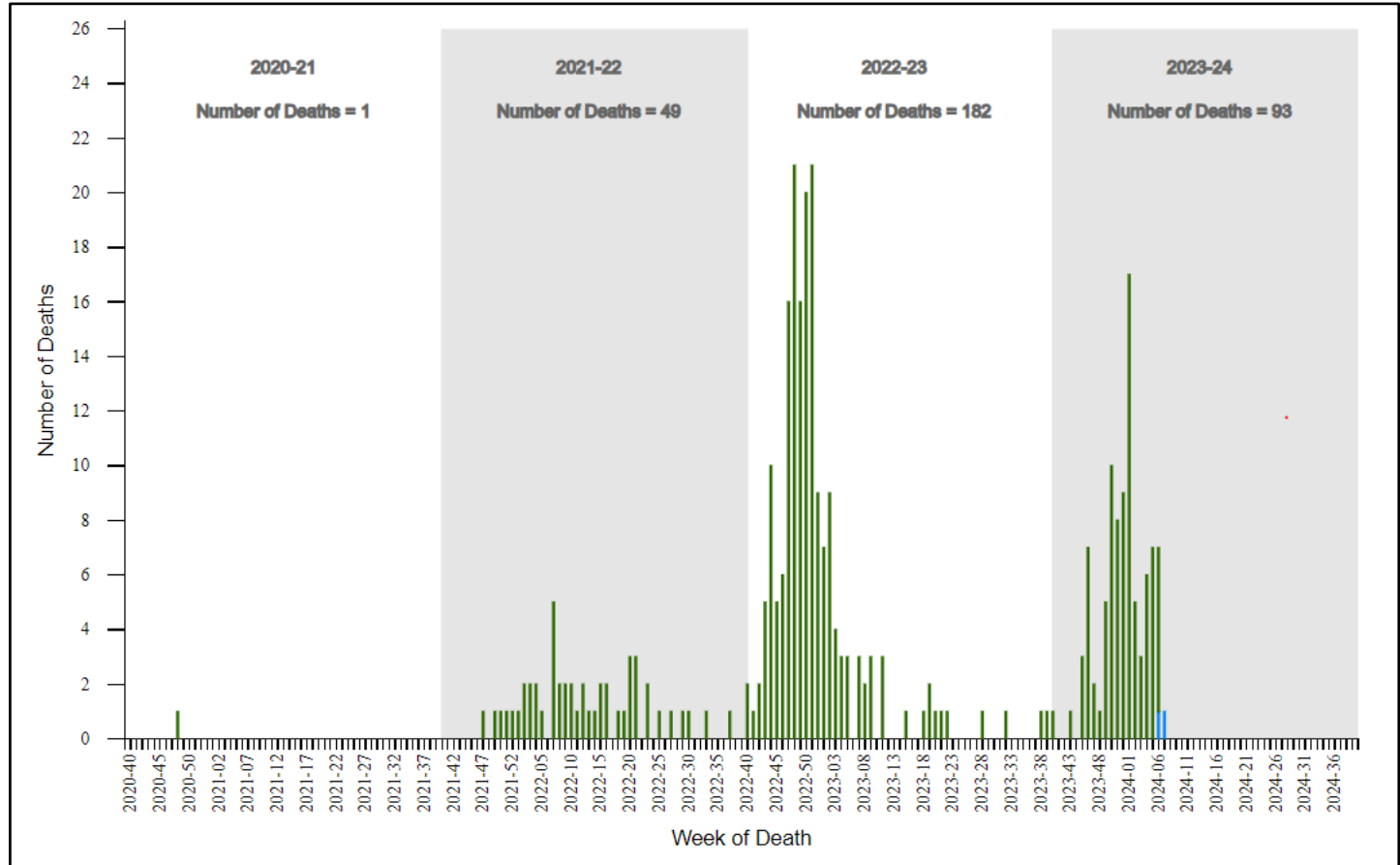
National  
Center for  
Health  
Statistics  
Mortality  
Surveillance  
System

[CDC FluView](#)—  
week ending  
February 24, 2023



# Pediatric Mortality

[CDC FluView](#) —  
week ending  
February 24, 2023



# Summary as of the Week Ending February 24, 2024

- U.S. influenza activity has lessened slightly in recent weeks but is ongoing.
  - Percent of tests positive peaked at ~18% in late December; currently ~14%.
- Influenza A(H1N1)pdm09 viruses have predominated, with co-circulation of influenza A(H3N2) and B viruses.
- The cumulative influenza-associated hospitalization rate is 61.5/100,000.
- 93 influenza-associated pediatric deaths reported thus far this season.



## Interim Estimates of 2023–24 Seasonal Influenza Vaccine Effectiveness

**Originally presented by Aaron M. Frutos, PhD, MPH**

**On behalf of CDC Influenza Vaccine Effectiveness Collaborators**

Advisory Committee on Immunization Practices

February 28, 2024

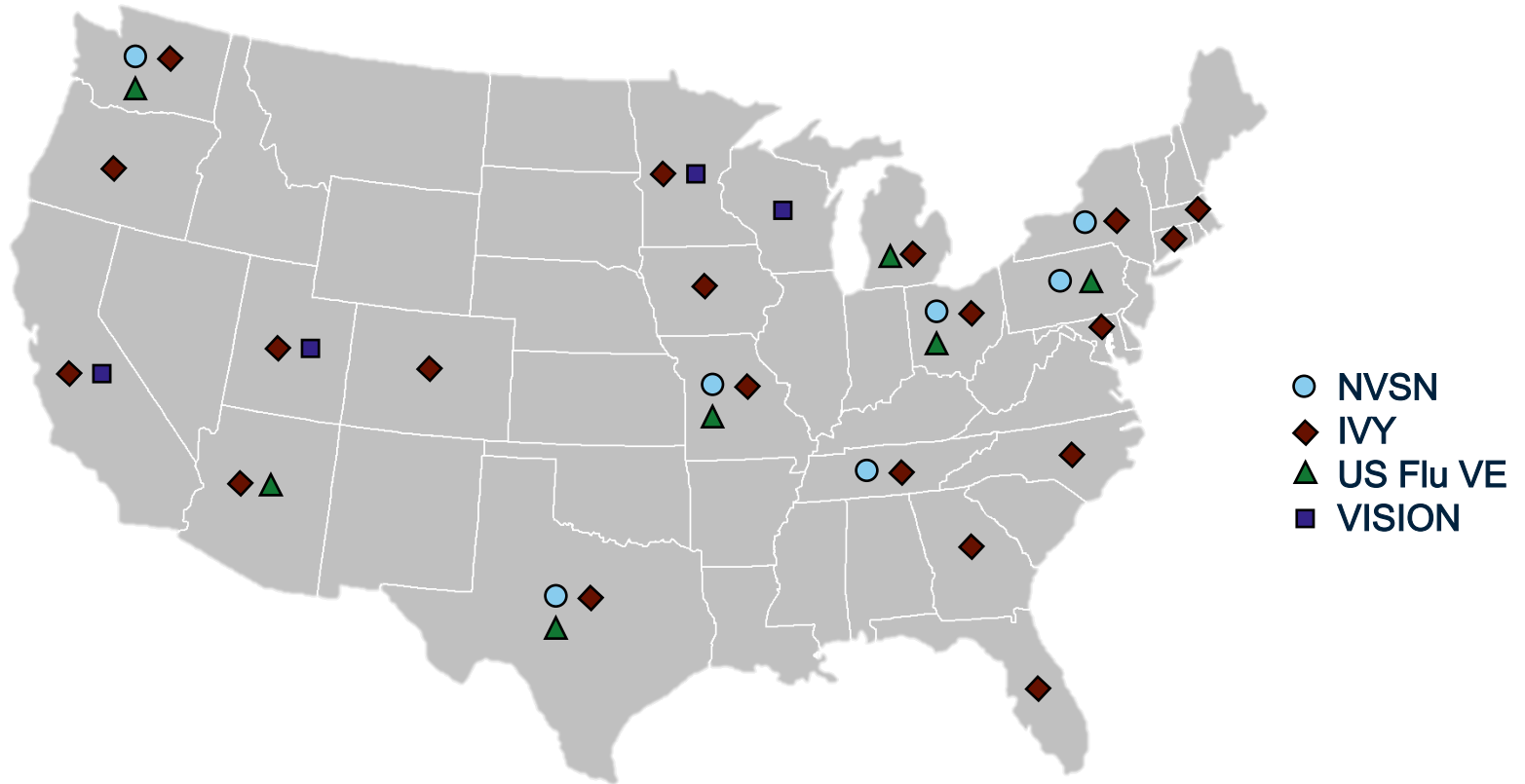
# CDC Influenza Vaccine Effectiveness Networks

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)**
  - Adults  $\geq 18$  years
  - Hospitalization
- **New Vaccine Surveillance Network (NVSN)**
  - Children/adolescents 6 months through 17 years
  - Outpatient visits, emergency department/urgent care, hospitalization
- **U.S. Flu Vaccine Effectiveness Network (US Flu VE)**
  - Children/adolescents 6 months through 17 years; adults  $\geq 18$  years
  - Outpatient visits, emergency department/urgent care
- **Virtual SARS-CoV-2, Influenza, and Other respiratory viruses Network (VISION)**
  - Children/adolescents 6 months through 17 years; adults  $\geq 18$  years
  - Emergency department/urgent care, hospitalization

# 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:**  $VE = (1 - \text{adjusted OR}) \times 100\%$

- 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

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



# Pediatric VE against Influenza A

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	84/411 (20)	793/2,577 (31)	55 (41, 66)
US Flu VE (Outpatient)	27/212 (13)	182/736 (25)	46 (15, 67)
VISION (Outpatient)	920/5,524 (17)	4,579/15,274 (30)	59 (55, 62)
NVSN (Inpatient)	25/102 (25)	543/1,321 (41)	56 (30, 73)
VISION (Inpatient)	21/105 (20)	299/921 (32)	46 (7, 69)

# Pediatric VE against Influenza A(H1N1)pdm09

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	61/298 (20)	793/2,577 (31)	54 (37, 66)
US Flu VE (Outpatient)	11/120 (9)	182/736 (25)	61 (26, 81)
NVSN (Inpatient)	18/79 (23)	543/1,321 (41)	60 (32, 77)

# Pediatric VE against Influenza A(H3N2)

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	19/87 (22)	793/2,577 (31)	55 (20, 74)
US Flu VE (Outpatient)	2/17 (12)	182/736 (25)	Not estimated
NVSN (Inpatient)	4/10 (40)	543/1,321 (41)	Not estimated

## Pediatric VE against Influenza B

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	39/216 (18)	793/2,577 (31)	64 (47, 75)
US Flu VE (Outpatient)	3/76 (4)	182/736 (25)	89 (70, 97)
VISION (Outpatient)	45/571 (8)	4,579/15,274 (30)	79 (71, 85)
NVSN (Inpatient)	4/27 (15)	543/1,321 (41)	Not estimated
VISION (Inpatient)	0/10 (0)	299/921 (32)	Not estimated

# Adult VE

(aged  $\geq 18$  years)



# Adult VE against any influenza

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	177/568 (31)	803/1,807 (44)	33 (16, 47)
VISION (Outpatient)	4,501/18,385 (24)	21,356/52,657 (41)	49 (47, 51)
IVY (Inpatient)	200/632 (32)	1,517/3,872 (39)	44 (32, 54)
VISION (Inpatient)	728/1,839 (40)	7,425/14,168 (52)	41 (34, 47)

# Adult VE against Influenza A

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	168/495 (34)	803/1,807 (44)	27 (9, 43)
VISION (Outpatient)	4,343/15,896 (27)	21,356/52,657 (41)	46 (44, 48)
IVY (Inpatient)	80/264 (30)	1,517/3,872 (39)	42 (23, 57)
VISION (Inpatient)	713/1,742 (41)	7,425/14,168 (52)	40 (33, 47)

# Adult VE against Influenza A(H1N1)pdm09

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	111/308 (36)	803/1,807 (44)	25 (1, 43)
IVY (Inpatient)	58/209 (28)	1,517/3,872 (39)	50 (30, 64)



# Adult VE against Influenza A(H3N2)

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	14/67 (21)	803/1,807 (44)	54 (11, 77)
IVY (Inpatient)	18/45 (40)	1,517/3,872 (39)	Not estimated

# Adult VE against Influenza B

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	9/76 (12)	803/1,807 (44)	78 (57, 90)
VISION (Outpatient)	164/2,530 (6)	21,356/52,657 (41)	78 (74, 81)
IVY (Inpatient)	5/21 (24)	1,517/3,872 (39)	Not estimated
VISION (Inpatient)	18/103 (17)	7,425/14,168 (52)	60 (30, 77)

**Adult (aged 18–64) VE**



## Adult (aged 18–64) VE against any influenza

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	136/489 (28)	503/1,368 (37)	25 (3, 42)
VISION (Outpatient)	2,557/14,698 (17)	9,194/33,086 (28)	52 (50, 55)
IVY (Inpatient)	87/383 (23)	579/1,927 (30)	49 (33, 61)
VISION (Inpatient)	197/773 (25)	1,367/4,050 (34)	40 (28, 50)

# Adult (aged 18–64) VE against Influenza A

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	128/417 (31)	503/1,368 (37)	13 (-13, 34)
VISION (Outpatient)	2,425/12,294 (20)	9,194/33,086 (28)	49 (46, 51)
IVY (Inpatient)	37/156 (24)	579/1,927 (30)	42 (13, 61)
VISION (Inpatient)	187/694 (27)	1,367/4,050 (34)	38 (24, 48)

## Adult (aged 18–64) VE against Influenza B

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	8/75 (11)	503/1,368 (37)	75 (50, 89)
VISION (Outpatient)	135/2,433 (6)	9,194/33,086 (28)	79 (75, 82)
IVY (Inpatient)	2/16 (12)	579/1,927 (30)	Not estimated
VISION (Inpatient)	13/83 (16)	1,367/4,050 (34)	50 (5, 74)

**Adult (aged  $\geq 65$ ) VE**

## Adult (aged $\geq 65$ ) VE against any influenza

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	41/79 (52)	300/439 (68)	51 (14, 72)
VISION (Outpatient)	1,944/3,687 (53)	12,162/19,571 (62)	41 (36, 45)
IVY (Inpatient)	113/249 (45)	938/1,945 (48)	42 (23, 56)
VISION (Inpatient)	531/1,066 (50)	6,058/10,118 (60)	42 (34, 50)



# Adult (aged $\geq 65$ ) VE against Influenza A

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	40/78 (51)	300/439 (68)	52 (16, 73)
VISION (Outpatient)	1,918/3,602 (53)	12,162/19,571 (62)	40 (36, 45)
IVY (Inpatient)	43/108 (40)	938/1,945 (48)	47 (19, 65)
VISION (Inpatient)	526/1,048 (50)	6,058/10,118 (60)	42 (34, 49)

## Adult (aged $\geq 65$ ) VE against Influenza B

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)			
	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	1/1 (100)	300/439 (68)	Not estimated
VISION (Outpatient)	29/97 (30)	12,162/19,571 (62)	69 (51, 80)
IVY (Inpatient)	3/5 (60)	938/1,945 (48)	Not estimated
VISION (Inpatient)	5/20 (25)	6,058/10,118 (60)	Not estimated

# Summary



# 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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For more information, contact CDC  
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TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

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.

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