



Comparison of Influenza Vaccine Effectiveness against outpatient and inpatient illness in the 2021–22 season

Data from the US Flu VE Network,
New Vaccine Surveillance Network (NVSN), and
Flu and Other Viruses in the Acutely Ill Network (IVY)

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Advisory Committee on Immunization Practices

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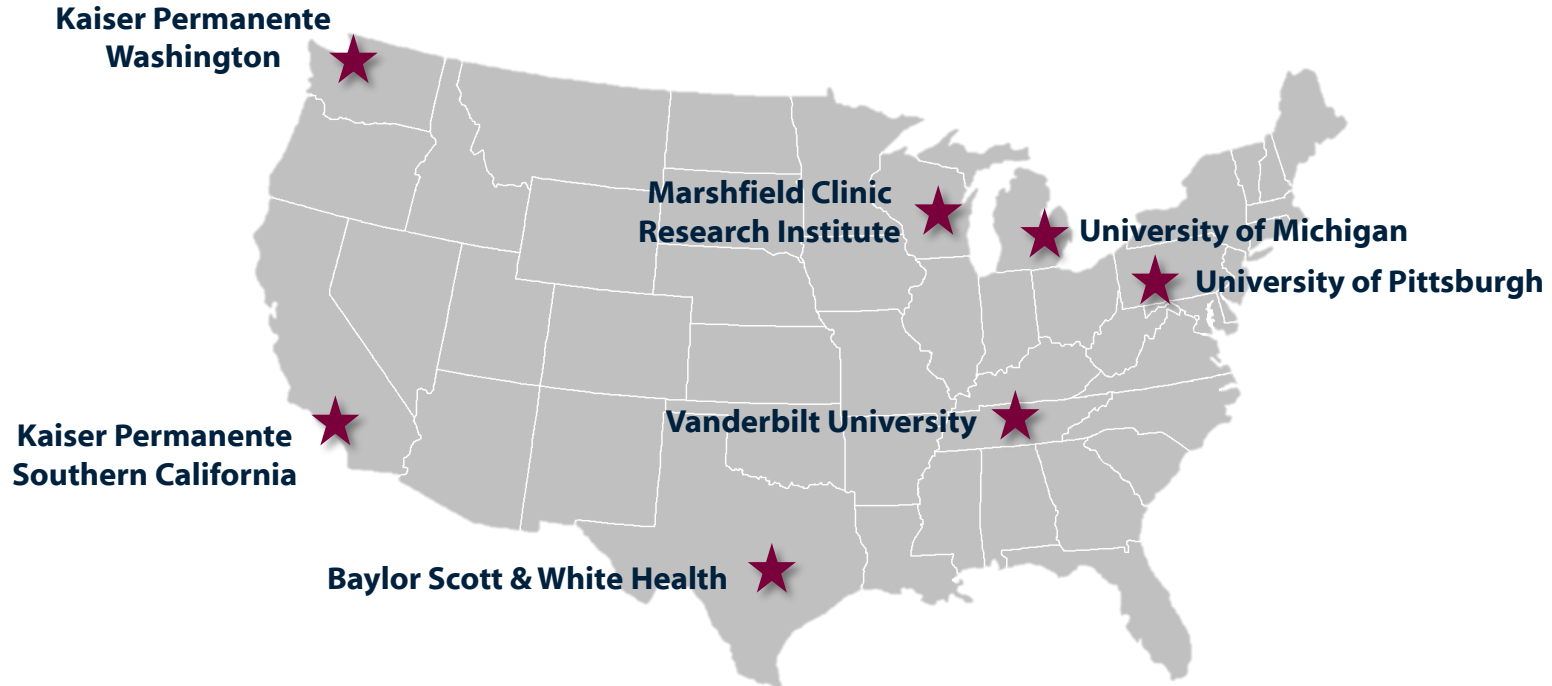
Preliminary results

3 networks to evaluate vaccine effectiveness against laboratory-confirmed influenza-associated **outpatient visits, emergency department visits, and hospitalization**

VE against influenza-associated **outpatient
visits among patients aged ≥ 6 months**

US Flu VE Network

US Flu VE Network Sites, 2021–2022 Influenza Season



US Flu VE Network Methods

Enrollees: Ambulatory patients aged ≥ 6 months with acute respiratory illness with fever or cough ≤ 7 days duration

Dates of enrollment: October 4, 2021–April 30, 2022

Design: Test-negative design

- Comparing vaccination odds among influenza RT-PCR positive cases and influenza RT-PCR negative controls, excluding persons testing positive for SARS-CoV-2
- Vaccination status: receipt of at least one dose of any 2021–22 seasonal flu vaccine according to medical records, immunization registries, and/or self-report

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

- Adjustment for study site, age, self-rated general health status, race/ethnicity, and month of onset

Preliminary vaccine effectiveness against **outpatient** medically attended A/H3N2, 2021–22

	Influenza positive		Influenza negative ¹		Vaccine Effectiveness			
					Unadjusted		Adjusted ²	
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	VE %	95% CI	VE %	95% CI
Influenza A/H3N2								
All ages ≥6 mos	182/440	41	2265/3844	59	51	(40 to 60)	36	(20 to 49)
6 mos –17 years	72/212	34	570/1121	51	50	(32 to 63)	45	(22 to 61)
18–64 years	93/205	45	1363/2311	59	42	(23 to 57)	28	(2 to 47)
≥65 years	17/23	74	332/412	81	32	(-79 to 74)	NR³	NR³

¹ Persons testing negative for both influenza and SARS-CoV-2 using molecular assays.

² Multivariable logistic regression models adjusted for site, age, month of onset, self-rated general health status, and race/ethnicity.

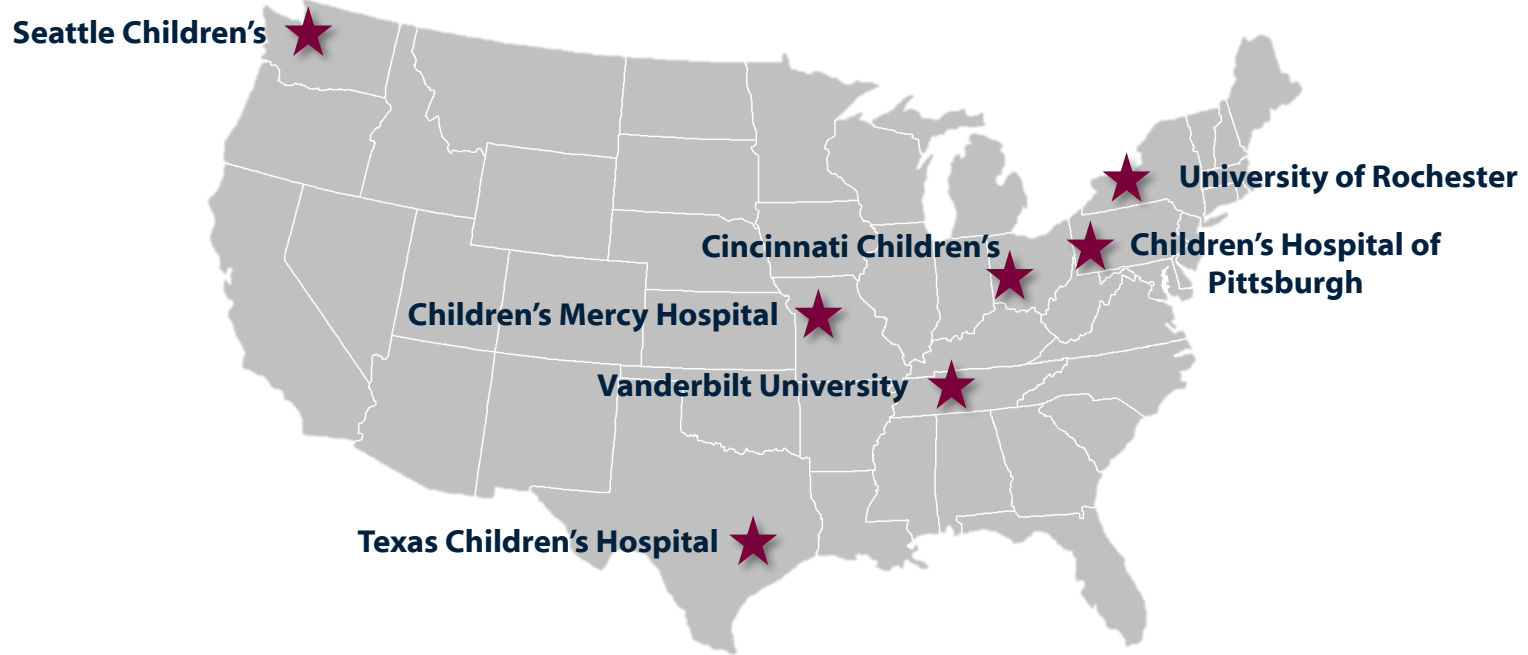
³ Not Reported

VE against influenza-associated emergency department visits and hospitalization among patients aged 6 months – 17 years

NVSN

Preliminary Results

NVSN* Pediatric Inpatient Network sites, 2021-2022



*NVSN--New Vaccine Surveillance Network

NVSN Methods

Enrollees: Inpatient and ED patients aged ≥ 6 months to 17 years with acute respiratory illness within 10 days of illness onset

Dates of enrollment: November 27, 2021–June 7, 2022

Design: Test-negative design

- Comparing vaccination odds among influenza RT-PCR positive cases and influenza RT-PCR negative controls, excluding persons testing positive for SARS-CoV-2
- Vaccination status: Receipt of at least one dose of any 2021–22 seasonal flu vaccine according to medical records, immunization registries, and/or self-report

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

- Adjustment for site, age, and calendar time

Preliminary vaccine effectiveness against laboratory confirmed influenza A/H3N2 in **hospital** and **ED**, NVSN, 2021–2022

	Influenza positive		Influenza negative ¹		Vaccine Effectiveness			
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	Unadjusted		Adjusted ²	
					VE %	95% CI	VE %	95% CI
Influenza A/H3N2								
All 6 mos –17 years	107/297	36	1428/2849	50	44	(28 to 56)	30	(8 to 46)
ED	74/227	33	644/1471	44	38	(17 to 54)	19	(-12 to 41)
Inpatient	33/70	47	784/1378	57	32	(-9 to 58)	31	(-14 to 58)

¹ Persons testing negative for both influenza and SARS-CoV-2 using molecular assays.

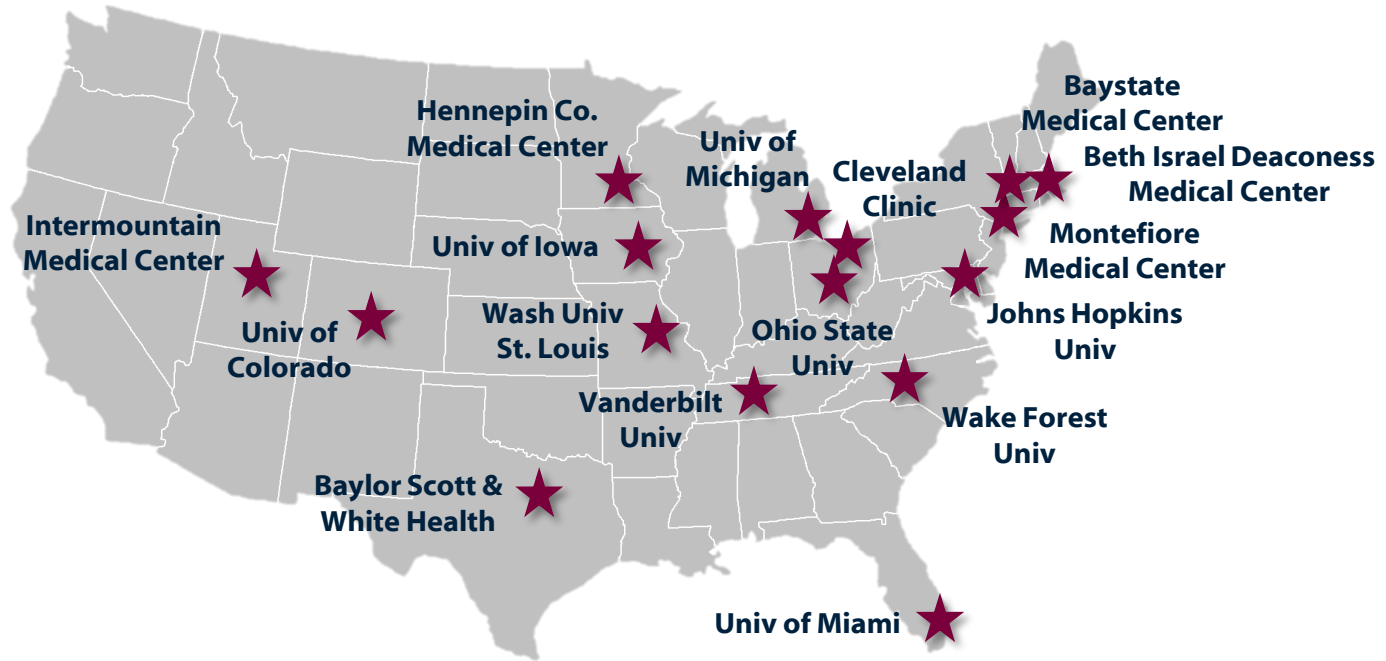
² Multivariable logistic regression models adjusted for age (categorical), NVSN site, calendar time (screening month).

VE against influenza-associated
hospitalization among patients aged
≥18 years

IVY

Preliminary Results

IVY* Adult Inpatient Network sites, 2021-2022



*IVY—Influenza and Other Viruses in the Acutely Ill

IVY Methods

Enrollees: Hospitalized patients aged ≥ 18 years with acute respiratory illness and molecular testing for influenza and SARS-CoV-2 within 10 days of illness onset

Dates of enrollment: January 31, 2022–June 15, 2022

Design: Test-negative design

- Comparing vaccination odds among influenza positive cases and influenza negative controls, excluding persons testing positive for SARS-CoV-2
- Vaccination status: receipt of at least one dose of any 2021–22 seasonal flu vaccine according to medical records, immunization registries, and/or self-report

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

- Adjustment for study site, age, sex, race/ethnicity, and calendar time (biweekly intervals)

Vaccine effectiveness against laboratory confirmed influenza A/H3N2 in inpatient setting, 2022

	Influenza positive		Influenza negative ¹		Vaccine Effectiveness			
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	Unadjusted		Adjusted ²	
					VE %	95% CI	VE %	95% CI
Influenza A/H3N2								
≥18 years	139/295	47	622/1175	53	21	(-2 to 39)	11	(-19 to 33)
18–64 years	49/139	35	279/624	45	33	(1 to 54)	26	(-14 to 52)
≥65 years	90/156	58	343/551	62	17	(-19 to 42)	-3	(-54 to 31)

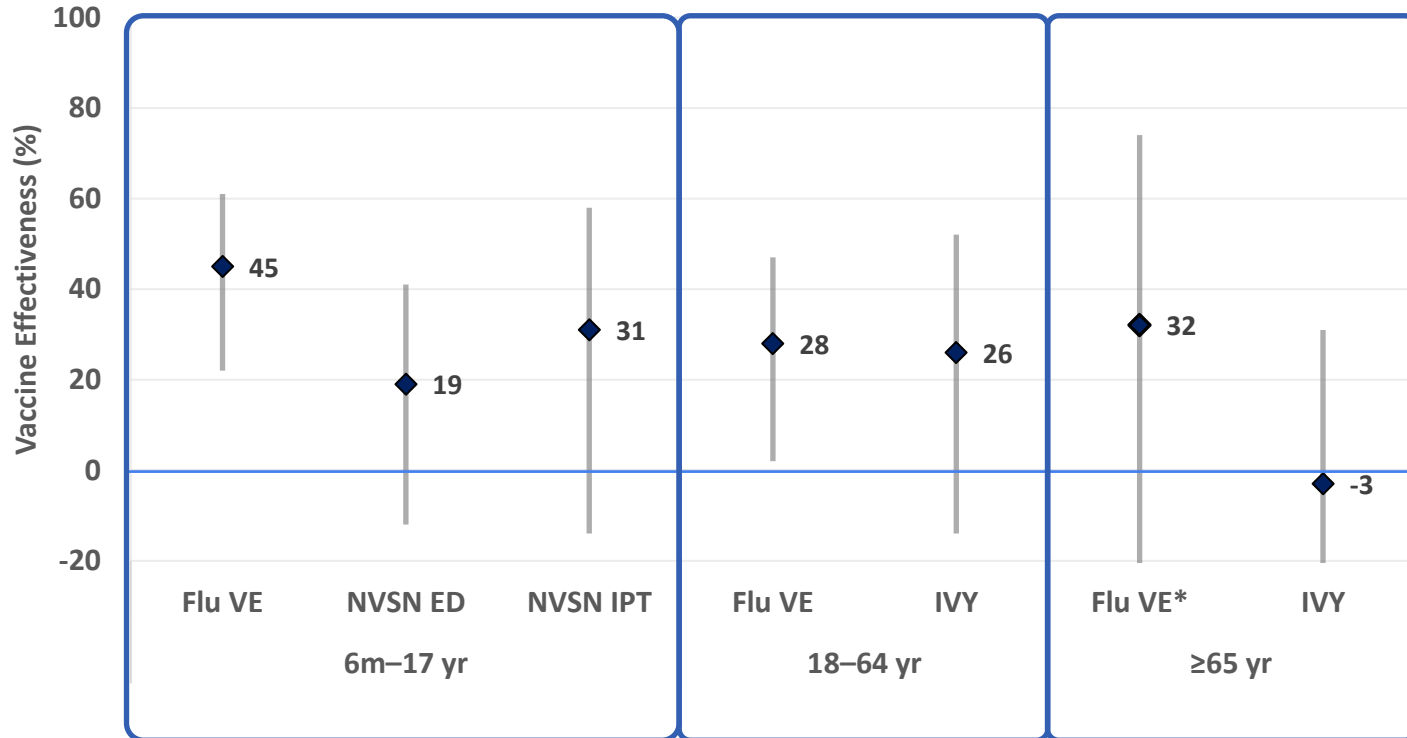
¹ Persons testing negative for both influenza and SARS-CoV-2 using molecular assays.

² Multivariable logistic regression models adjusted for study site, age, sex, race/ethnicity, and calendar time (biweekly intervals).

Comparison of VE by setting and age group

Preliminary Results

Comparing Outpatient, ED, and Inpatient VE against influenza A/H3N2 by age group, 2021-2022



*Unadjusted

Discussion

Summary—Importance of three Flu VE networks

- 2021–2022 influenza vaccination provided low to non-significant protection against predominant influenza A/H3N2 illness of varying severity
 - 36% (95%CI: 20, 49) against outpatient illness aged ≥ 6 months (Flu VE)
 - 19% (95%CI: -12, 41) against pediatric ED visits (NVSN)
 - 31% (95%CI: -14, 58) against pediatric hospitalizations (NVSN)
 - 11% (95%CI: -19, 33) against adult hospitalizations (IVY)
- Protection was similar to pre-pandemic A/H3N2-dominant seasons
- Trend suggested higher VE in outpatient setting compared to pediatric hospitalization/ED visits but not adult inpatient influenza

Acknowledgments

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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.



VE against laboratory confirmed influenza A/H3N2 in inpatients *stratified by immunocompromising condition (IC), 2022*

	Influenza positive		Influenza negative ¹		Vaccine Effectiveness			
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	Unadjusted		Adjusted ²	
					VE %	95% CI	VE %	95% CI
IC status								
No	101/233	43	453/900	50	24	(-1 to 44)	18	(-13 to 41)
Yes	38/62	61	169/275	61	1	(-75 to 44)	-24	(-145 to 37)
No IC								
18–64 years	28/100	28	199/471	42	47	(15 to 67)	50	(15 to 71)
≥65 years	73/133	55	254/429	59	16	(-24 to 43)	-11	(-73 to 29)

¹ Persons testing negative for both influenza and SARS-CoV-2 using molecular assays.

² Multivariable logistic regression models adjusted for study site, age, sex, race/ethnicity, and calendar time (biweekly intervals).