Interim Estimates of 2017–18 Seasonal Influenza Vaccine Effectiveness against Medically Attended Influenza from the US Flu VE Network

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For the US Flu VE Network

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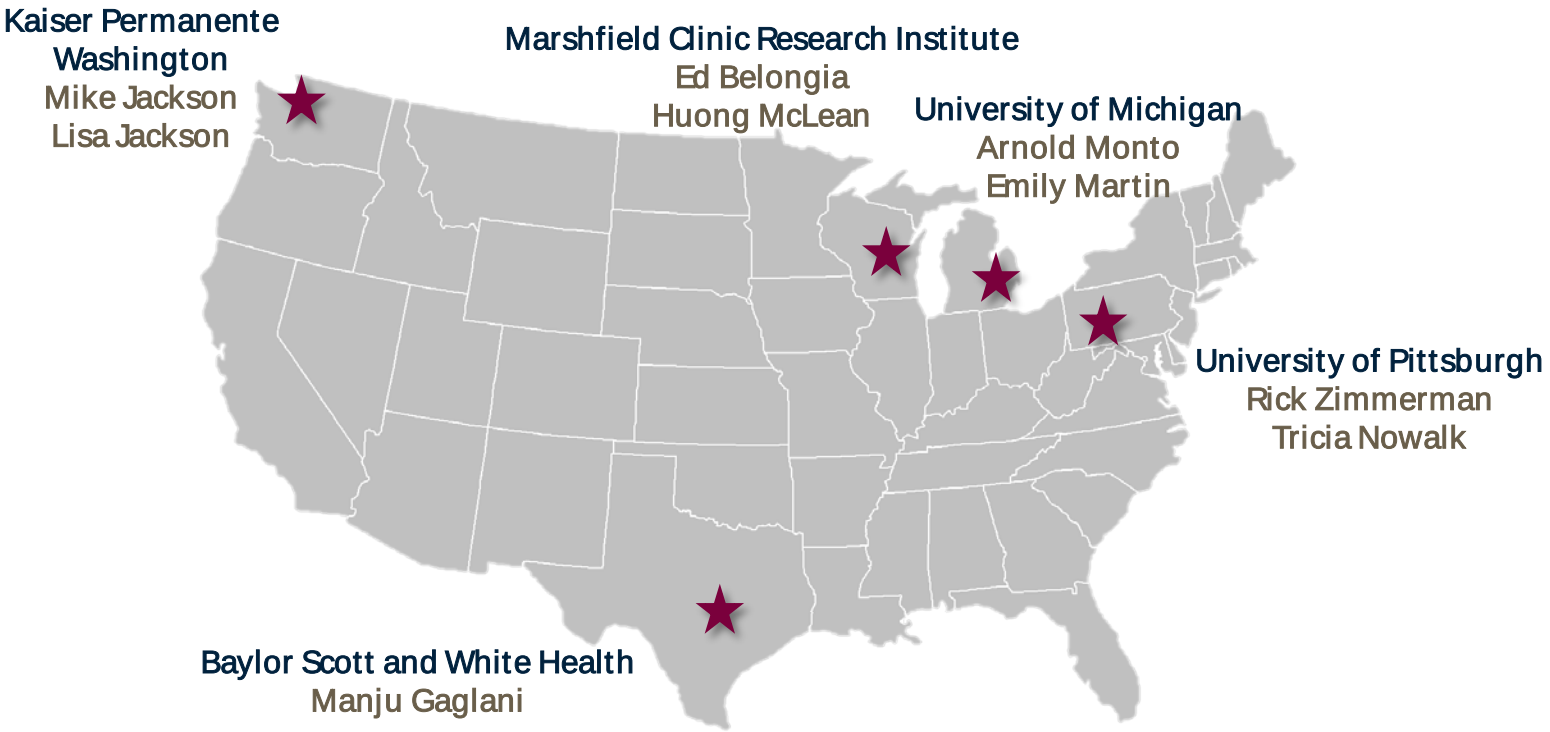
US Flu VE Network sites and principal investigators



US Flu VE Network Methods

Enrollees: Outpatients aged ≥6 months with acute respiratory illness with cough ≤7 days duration

Dates of enrollment: November 2, 2017–February 3, 2018

Design: Test-negative design

- Comparing vaccination odds among influenza RT-PCR positive cases and RT-PCR negative controls
- Vaccination status: receipt of at least one dose of any 2017–18 seasonal flu vaccine according to medical records, immunization registries, and/or self-report

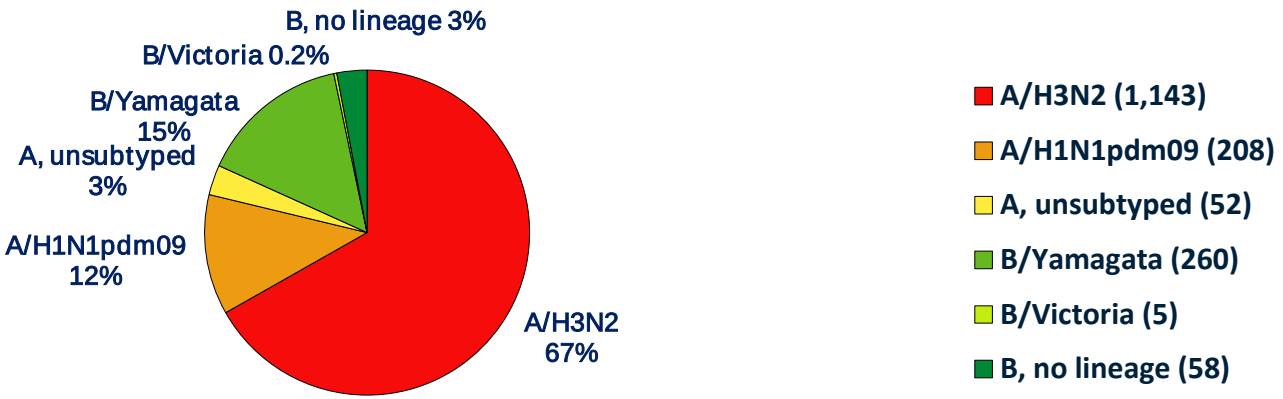
Analysis: VE = (1 – adjusted OR) x 100%

- Adjustment for study site, age, self-rated general health status, race/Hispanic ethnicity, interval from onset to enrollment, and calendar time

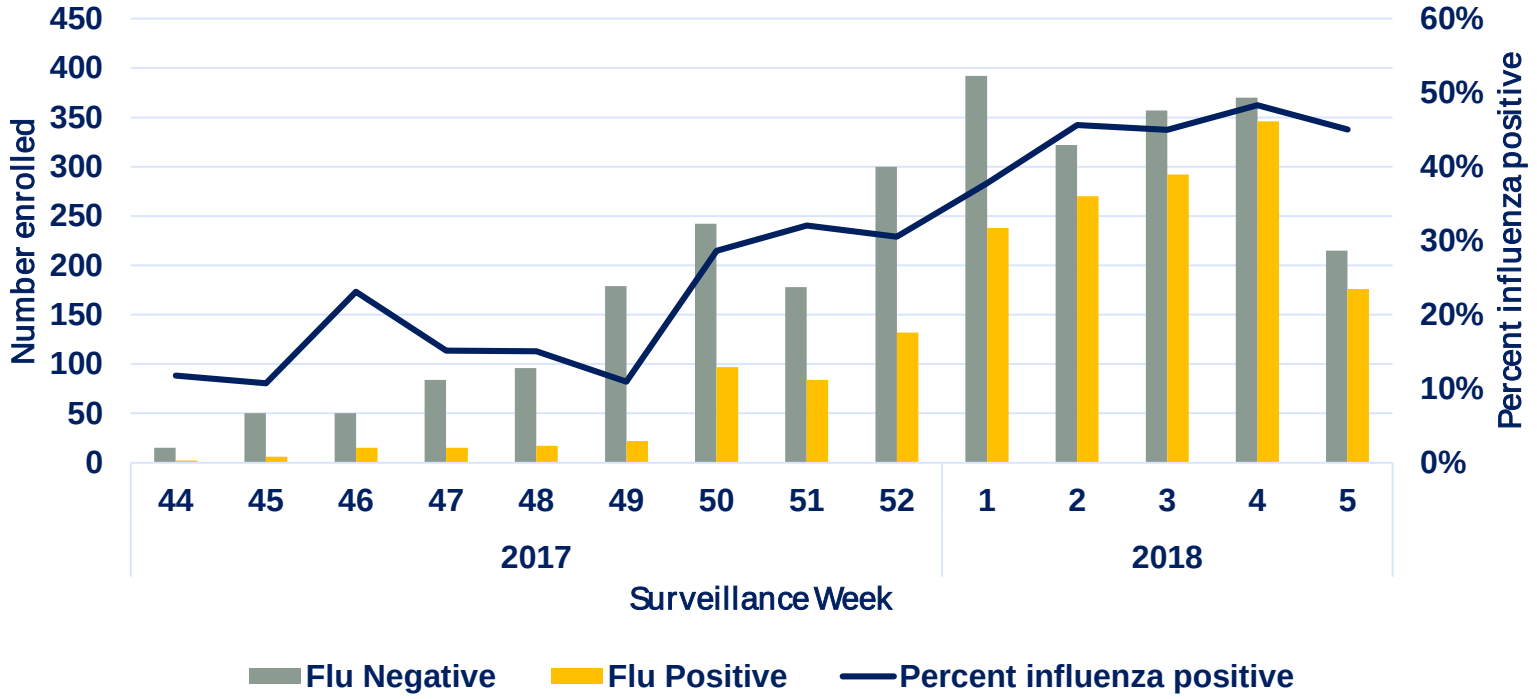
Interim Results

- 4,562 enrolled from Nov 2, 2017–Feb 3, 2018 at 5 sites
- 1,712 (38%) influenza RT-PCR positive
- 2,850 (62%) influenza RT-PCR negative

Cases enrolled by (sub)type, N=1,712



Number of enrolled participants by influenza RT-PCR result and percent positivity by week of onset



Note: Week 5 only includes patients with completed laboratory tests and thus does not reflect all enrolled patients during that week across study sites.

Interim adjusted vaccine effectiveness against medically attended influenza by age group, 2017–18

					Vaccine Effectiveness			
	Influenza positive		Influenza negative		Unadjusted		Adjusted*	
Any influenza A or B virus	N vaccinated /Total	(%)	N vaccinated /Total	(%)	VE %	95% CI	VE %	95% CI
Overall	741/1712	(43)	1518/2850	(53)	33%	(24 to 41)	**36%**	**(27 to 44)**
Age group (yrs)								
6 mos–8	127/359	(35)	408/739	(55)	56%	(42 to 66)	**59%**	**(44 to 69)**
9–17	100/288	(35)	104/300	(35)	0%	(-41 to 29)	**5%**	**(-38 to 34)**
18–49	198/561	(35)	444/989	(45)	33%	(17 to 46)	**33%**	**(16 to 47)**
50–64	159/288	(55)	277/454	(61)	21%	(-6 to 42)	**17%**	**(-15 to 40)**
≥65	157/216	(73)	285/368	(78)	23%	(-14 to 47)	**18%**	**(-25 to 47)**

* Multivariate logistic regression models adjusted for site, age, sex, race/ethnicity, self-rated general health status, interval from onset to enrollment, and calendar time.

Interim adjusted vaccine effectiveness against medically attended influenza A(H3N2) by age group, 2017–18

	Influenza positive		Influenza negative		Vaccine Effectiveness			
					Unadjusted		Adjusted*	
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	VE %	95% CI	VE %	95% CI
Influenza A/H3N2								
Overall	530/1143	(46)	1518/2850	(53)	24%	(13 to 34)	**25%**	**(13 to 36)**
Age group (yrs)								
6 mos–8	79/200	(40)	408/739	(55)	47%	(27 to 61)	**51%**	**(29 to 66)**
9–17	75/203	(37)	104/300	(35)	-10%	(-60 to 24)	**-8%**	**(-62 to 29)**
18–49	155/395	(39)	444/989	(45)	21%	(-1 to 37)	**20%**	**(-4 to 38)**
50–64	115/198	(58)	277/454	(61)	11%	(-24 to 37)	**12%**	**(-26 to 39)**
≥65	106/147	(72)	285/368	(78)	25%	(-16 to 51)	**17%**	**(-35 to 49)**

* Multivariate logistic regression models adjusted for site, age, sex, race/ethnicity, self-rated general health status, interval from onset to enrollment, and calendar time.

Interim adjusted vaccine effectiveness against medically attended influenza A(H1N1)pdm09 and B by age group, 2017–18

	Influenza positive		Influenza negative		Vaccine Effectiveness			
					Unadjusted		Adjusted*	
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	VE %	95% CI	VE %	95% CI
Influenza A/H1N1pdm09								
Overall	60/208	(29)	1518/2850	(53)	64	(52 to 74)	**67**	**(54 to 76)**
Age group (yrs)								
6 mos–17	22/105	(21)	512/1039	(49)	73	(56 to 83)	**78**	**(63 to 87)**
18–64	26/84	(31)	721/1443	(50)	55	(28 to 72)	**51**	**(20 to 70)**
≥65	12/19	(63)	285/368	(78)	50	(-31 to 81)	**34**	**(-96 to 78)**
Influenza B								
Overall	132/323	(41)	1518/2850	(53)	39	(23 to 52)	**42**	**(25 to 56)**
Age group (yrs)								
6 mos–17	46/127	(36)	512/1039	(49)	42	(14 to 60)	**36**	**(1 to 58)**
18–64	53/151	(35)	721/1443	(50)	46	(23 to 62)	**50**	**(28 to 66)**
≥65	33/45	(73)	285/368	(78)	20	(-62 to 60)	**25**	**(-62 to 66)**

* Multivariate logistic regression models adjusted for site, age, sex, race/ethnicity, self-rated general health status, interval from onset to enrollment, and calendar time.

Summary

- Interim results for 2017–18 season (through February 3, 2018) indicate vaccination reduced influenza medically attended illness by 36%
  - 25% (13 to 36) VE against A(H3N2) for all ages
    - 51% (29 to 66) in children aged 6m – 8 years
    - No other age groups had statistically significant VE estimates
  - 67% (54 to 76) VE against A(H1N1)pdm09
  - 42% (25 to 56) VE against B (mostly B/Yamagata, not in IIV3)
- Final VE results will be shared at end of season
- Final VE used to calculate averted burden (cases, hospitalizations, deaths)
  - Vaccination averts thousands of hospitalizations each year—during 2014-15, 47,000 (11,000 – 144,000) influenza hospitalizations averted

Understanding VE against A(H3N2) viruses

- Vaccine:
  - DoD VE studies: VE for IIV4 and cell-culture (ccIIV4) vaccines in active military and dependents (AFHSB and USAFSAM)
  - Comparative vaccine effectiveness (FDA and Centers for Medicare and Medicaid Services): Hospitalization/medically-attended influenza rates by vaccine type (ccIIV and IIV, SD, HD and adjuvanted vaccines)
- Related to the immune response to vaccine or prior infection:
  - Effects of repeat vaccination and birth cohort or age effects (US Flu VE)
  - Vaccine response by vaccine type, prior vaccination (serology)
- Virus: Sequencing of positive specimens using next-generation sequencing

US Flu VE Network

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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.