Interim Estimates of 2019–20 Seasonal Influenza Vaccine Effectiveness against Medically Attended Influenza from the US Flu VE Network

For the US Flu VE Network

February 26, 2020

Morbidity and Mortality Weekly Report (*MMWR*)

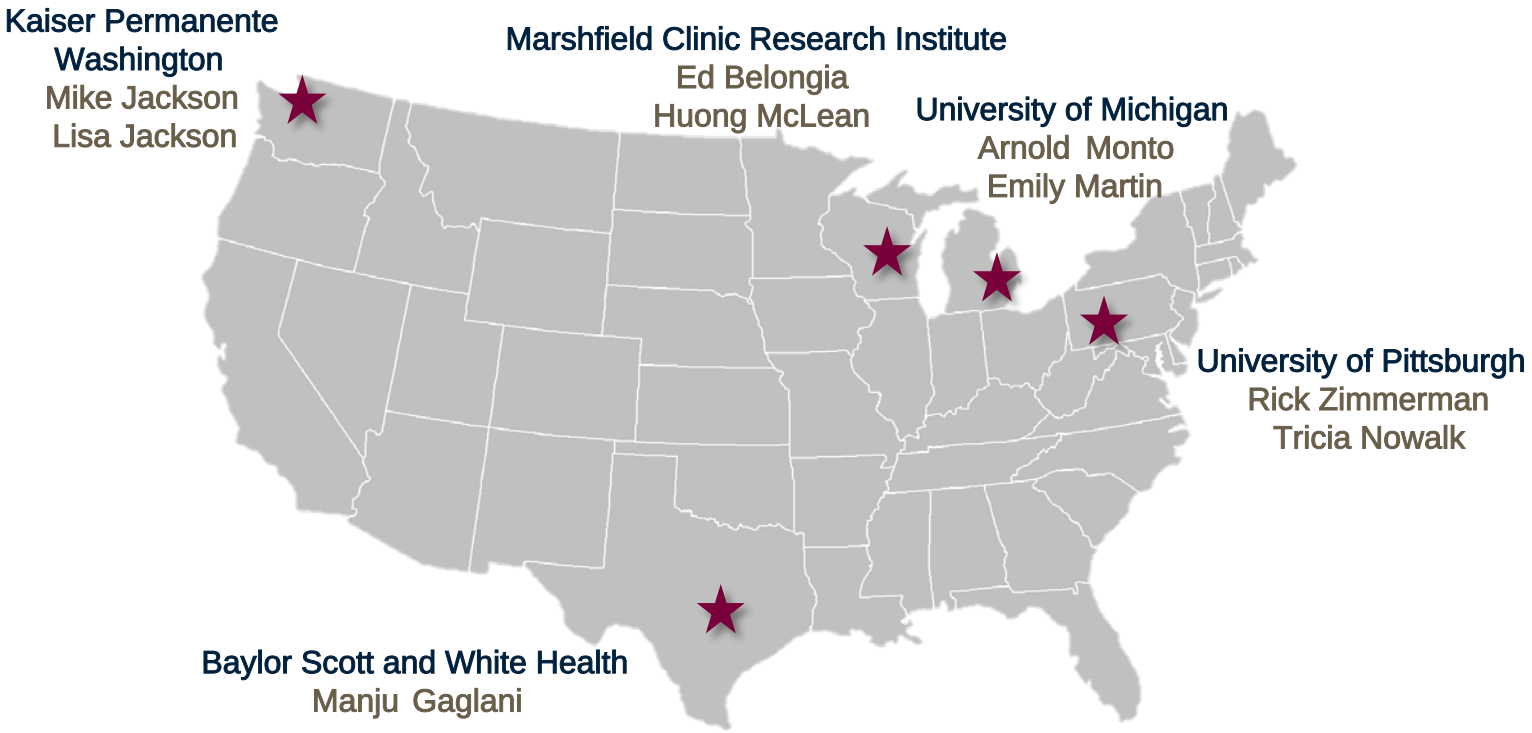
CDC

Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices — United States, 2019–20 Influenza Season

2019-20 northern hemisphere influenza vaccine components

A(H1N1)pdm09	A/Brisbane/02/2018 (6B.1A)
A(H3N2)	A/Kansas/14/2017 (3C.3a)
B Victoria	B/Colorado/06/2017 (V1A.1)
B Yamagata	B/Phuket/3073/2013 (Y3)

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: October 23, 2019–January 25, 2020

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 2019–20 seasonal flu vaccine according to medical records, immunization registries, and/or self-report

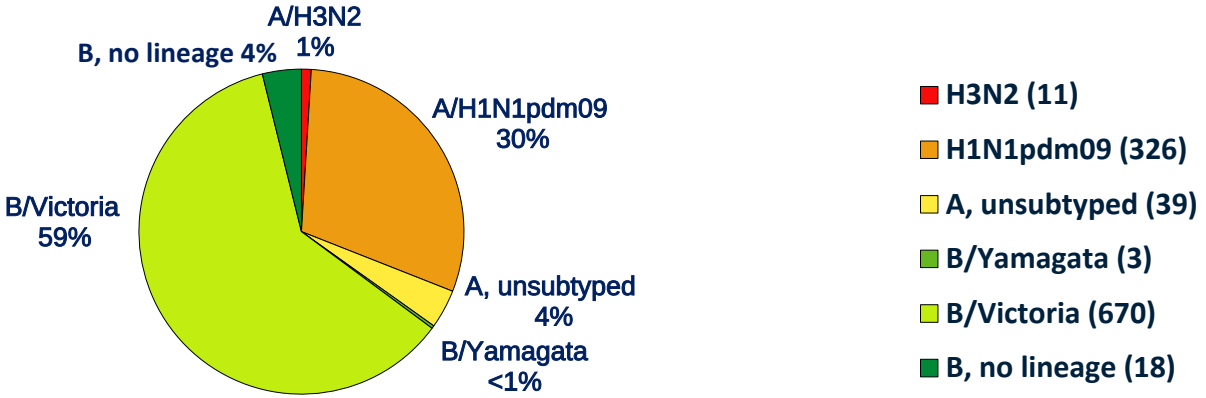
Analysis: VE = (1 – adjusted OR) x 100%

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

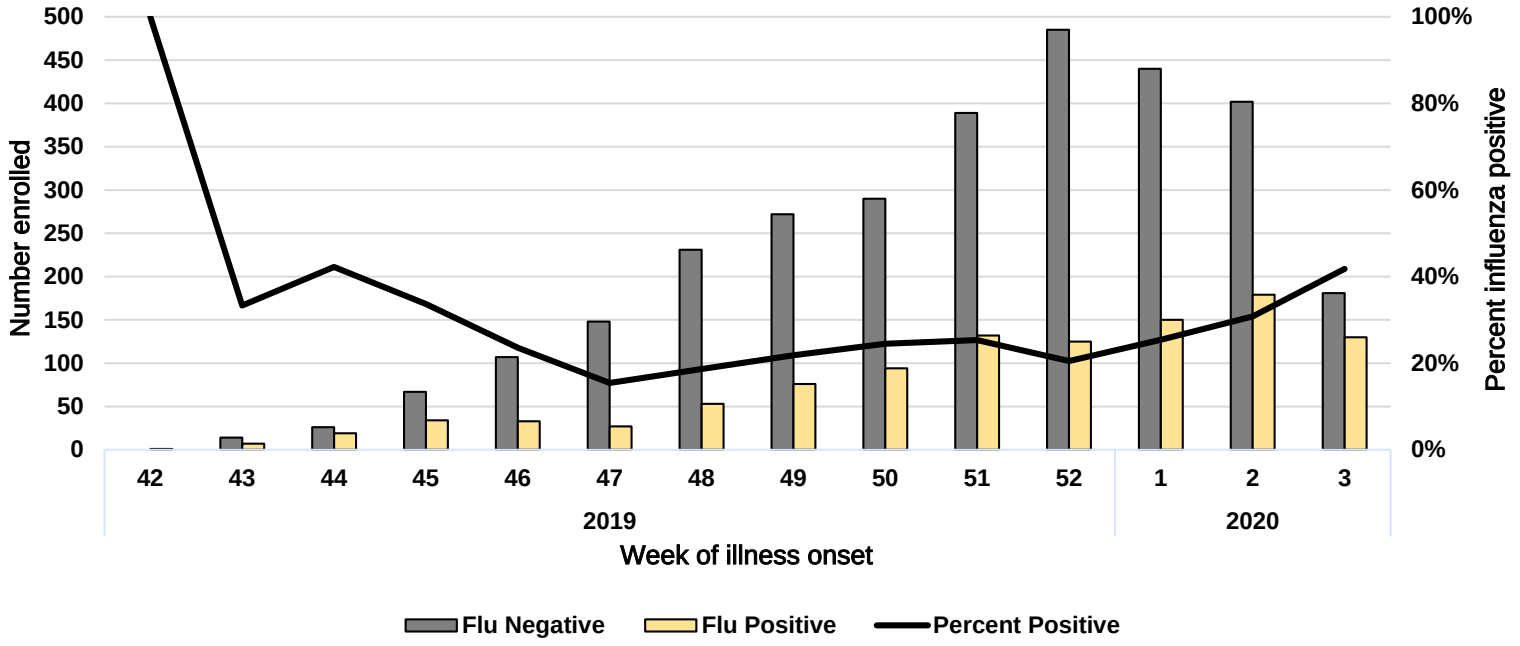
Interim Results

- 4,112 enrolled from Oct 23, 2019–Jan 25, 2020 at 52 clinics at 5 sites
- 1,060 (26%) influenza RT-PCR positive
- 3,052 (74%) influenza RT-PCR negative

Cases enrolled by (sub)type, N=1,060



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



Note: Week 3 only includes patients with completed laboratory tests and thus does not reflect all enrolled patients during that week across study sites.

Interim vaccine effectiveness against medically attended influenza A/B by age group, 2019–20

					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	390/1060	37	1682/3052	55	53	(45 to 59)	**45**	**(36 to 53)**
Age group (yrs)								
6 mos–17	142/462	31	492/934	53	60	(50 to 69)	**55**	**(42 to 65)**
18–49	143/413	35	452/1084	42	26	(6 to 42)	**25**	**(3 to 41)**
≥50	105/185	57	738/1034	71	47	(27 to 62)	**43**	**(19 to 60)**

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

Interim vaccine effectiveness against influenza B/Victoria by age group, 2019–20

	Influenza positive		Influenza negative		Vaccine Effectiveness			
					Unadjusted		Adjusted*	
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	VE %	95% CI	VE %	95% CI
Influenza B/Victoria**								
Overall	221/670	33	1682/3052	55	60	(52 to 66)	**50**	**(39 to 59)**
Age group (yrs)								
6 mos–17	104/353	29	492/934	53	62	(51 to 71)	**56**	**(42 to 67)**
≥18	117/317	37	1190/2118	56	54	(42 to 64)	**32**	**(11 to 48)**

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

** 262 B/Victoria viruses from US Flu VE Network participants have been sequenced:
--256 (98%) V1A.3 (2020 S. hemisphere vaccine component)
--6 (2%) V1A.1 clade (2019-20 N. hemisphere vaccine component)

Interim vaccine effectiveness against influenza A/H1N1pdm09 by age group, 2019–20

	Influenza positive		Influenza negative		Vaccine Effectiveness			
					Unadjusted		Adjusted*	
	N vaccinated /Total	(%)	N vaccinated /Total	(%)	VE %	95% CI	VE %	95% CI
Influenza A/H1N1pdm09**								
Overall	138/326	42	1682/3052	55	40	(25 to 53)	**37**	**(19 to 52)**
Age group (yrs)								
6 mos–17	35/98	36	492/934	53	50	(23 to 68)	**51**	**(22 to 69)**
18–49	48/125	38	452/1084	42	13	(-27 to 40)	**5**	**(-45 to 37)**
≥50	55/103	53	738/1034	71	54	(31 to 69)	**50**	**(20 to 68)**

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

** 94 A(H1N1)pdm09 viruses from US Flu VE Network participants have been sequenced:
--94 (100%) 6B.1A (2019-20 N. hemisphere vaccine component)

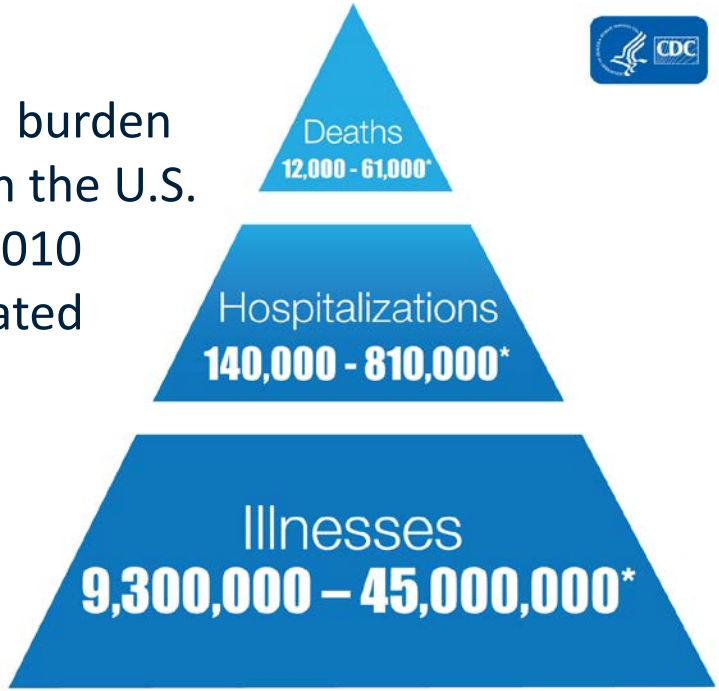
Interim estimates of 2019/20 vaccine effectiveness during early-season co-circulation of influenza A and B viruses, Canada, February 2020

Influenza outcome	Age group (years)	Total	Cases			Controls			Adjusted VE %[a,b,c]	95% CI
			All	Vaccinated	%	All	Vaccinated	%		
Any A or B[d]	All ages	2,808	1,411	191	14	1,397	399	29	58	47 to 66
	1–19	866	512	33	6	354	70	20	74	59 to 84
	20–64	1,718	841	122	15	877	229	26	55	41 to 66
	≥65[e]	224	58	36	62	166	100	60	18	−59 to 58
A(H1N1)pdm09	All ages	1,948	551	107	19	1,397	399	29	44	26 to 58
	1–19	478	124	13	10	354	70	20	63	25 to 81
	20–64	1,273	396	75	19	877	229	26	39	14 to 56
	≥65	197	31	19	ND	166	100	60	NE	
A(H3N2)	All ages	1,561	164	22	13	1,397	399	29	62	37 to 77
	1–19	414	60	2	3	354	70	20	NE	
	20–64	967	90	11	12	877	229	26	64	29 to 81
	≥65	180	14	9	ND	166	100	60	NE	
Influenza B[f]	All ages	2,080	683	60	9	1,397	399	29	69	57 to 77
	1–19	679	325	18	6	354	70	20	77	59 to 87
	20–64	1,224	347	34	10	877	229	26	68	51 to 79
	≥65	177	11	8	ND	166	100	60	NE	

*Skowronski et al, Eurosurveillance 21 Feb 2020. www.eurosurveillance.org

Estimated annual burden of influenza in the U.S. since 2010

Annual burden of flu in the U.S. since 2010 (estimated range)



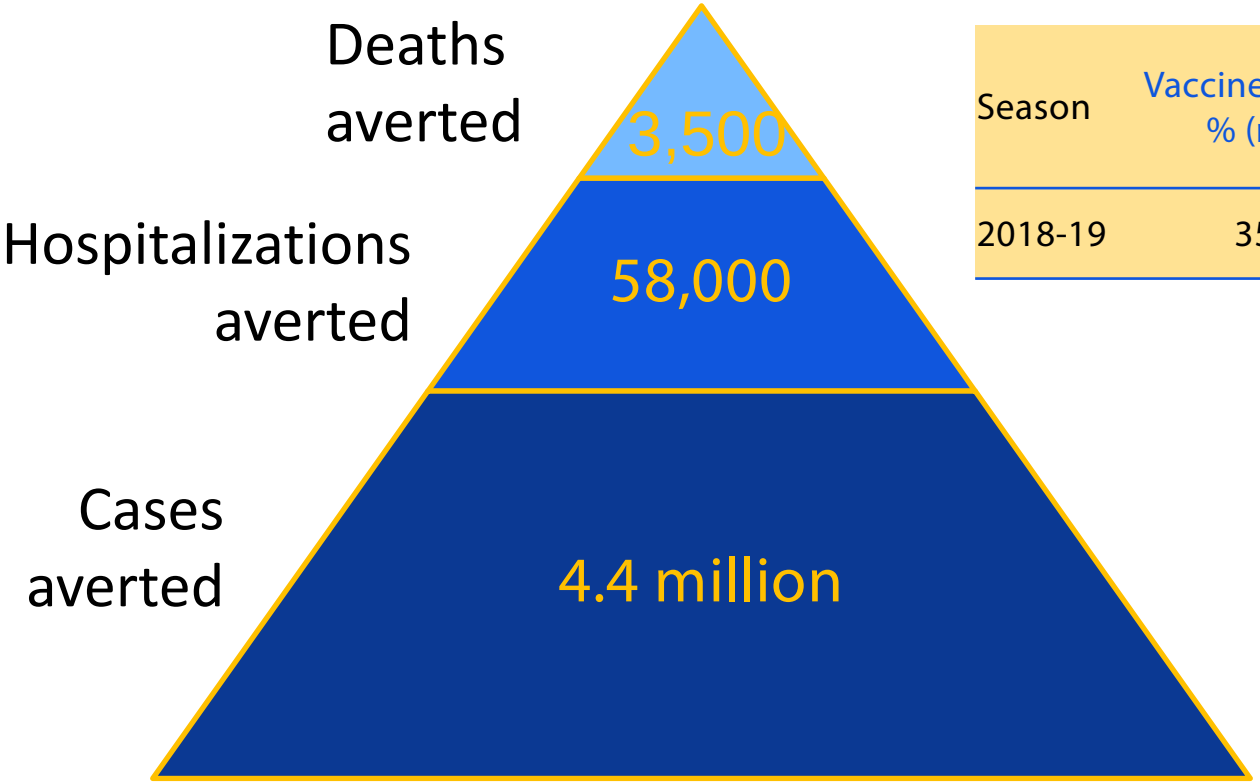
*The top range of these burden estimates are from the 2017-2018 flu season. These are preliminary and may change as data are finalized.

Recent influenza seasons

Season	Illnesses	Hospitalizations	Deaths
2017-18	45,000,000	810,000	61,000
2018-19	35,000,000	490,000	34,000

www.cdc.gov/flu/about/burden/index.html

Deaths, hospitalizations and cases averted in the US due to influenza vaccination, 2018-19 flu season



Season	Vaccine coverage % (range)	Vaccine effectiveness % (95% CI)
2018-19	35–73	26 (19–33)

Estimates of 2019-20 averted burden expected in fall 2020

Chung et al, Clinical Infectious Diseases 2020

Summary

- Interim results for 2019–20 season indicate vaccination reduced medically attended illness due to any influenza virus type by 45% (CI: 36 to 53) based on enrollment through January 25, 2020
  - 55% (CI: 42 to 65) VE against any influenza in children 6m–17 years
- Vaccination provided 50% (CI: 39 to 59) protection against predominant influenza B/Victoria virus (clade V1A.3)
- Overall effectiveness against H1N1pdm09 = 37% (CI: 19 to 52)
  - H1N1pdm09 circulation has increased since January 2020—increased enrollment will improve precision of age-specific estimates

US Flu VE Network

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