

Influenza Vaccination- Opportunity to Extend Cardiovascular Disease Prevention to Millions of Hearts

(National Adult and Influenza Immunization Summit Plenary Session)

May 20, 2021

Laurence Sperling, MD, FACC, FACP, FAHA, FASPC

Executive Director, Million Hearts®

Division for Heart Disease and Stroke Prevention, CDC

Center for Clinical Standards and Quality, CMS

Katz Professor in Preventive Cardiology

Professor of Global Health

Emory University



1

Disclaimer/Disclosure



The opinions expressed by the speaker do not necessarily reflect the opinions of the US Department of Health and Human Services, the Public Health Service, the Centers for Disease Control and Prevention, or the Center for Medicare and Medicaid Services.

Dr. Sperling has no conflicts to disclose.



2

Influenza and Cardiovascular Disease

- Viral illnesses (such as seasonal influenza) increase the likelihood of acute coronary syndromes, stroke, hospitalization, heart failure (notably in high risk populations)
- Mechanisms
 - Cytokines / plaque destabilization
 - Increased demand
- Among adults hospitalized with influenza from 2018-19 heart disease among most common chronic conditions (47.2%)



cdc.gov/flu/high_risk/heart_disease.htm
Corrales-Edina VF, et al. Lancet Infect Dis. 2010;10(2): 83-92

3

Influenza Vaccination for Cardiovascular(CV) Disease Prevention

- AHA/ ACC Class I Recommendation for Secondary Prevention (LOE B)
- Myocardial infarction 6 X greater within week of influenza
- Influenza vaccination reduces burden of influenza-associated illness including CV events (15-45%- similar relative risk reduction as other Guideline-directed medical therapy; single administration)
- Readiness for influenza seasons needed
 - Health systems and team-based approaches







cdc.gov/flu/high_risk/heart_disease
Davis MM, et al. Circulation 2006;114(14)
Kwong JC, et al. NEJM 2018;378(4)
MacIntyre CR, et al. Heart 2016; 102(4)

4


Influenza Burden and Vaccination

- Only 45% of adult Americans received influenza vaccine during the 2018-2019 flu season
- There is a significant association between clinician recommendation and vaccination

CDC estimates* that, from October 1, 2019, through April 4, 2020, there have been:

<p>39,000,000 – 56,000,000 flu illnesses</p> 	<p>18,000,000 – 26,000,000 flu medical visits</p> 
<p>410,000 – 740,000 flu hospitalizations</p> 	<p>24,000 – 62,000 flu deaths</p> 

*Because influenza surveillance does not capture all cases of flu that occur in the U.S., CDC provides these estimated ranges to better reflect the larger burden of influenza. These estimates are calculated based on CDC's [weekly influenza surveillance data](https://www.cdc.gov/flu/fluview/coverage-1819estimates.htm) and are preliminary.



<https://www.cdc.gov/flu/fluview/coverage-1819estimates.htm>

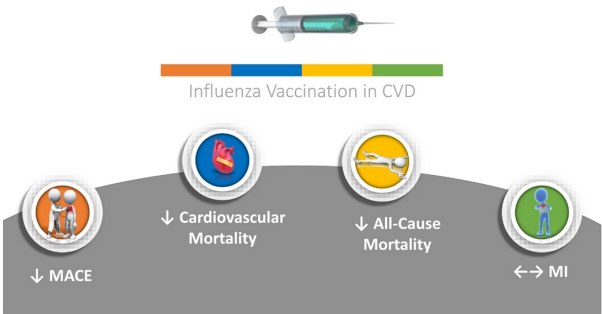
<https://www.cdc.gov/flu/about/burden/preliminary-in-season-estimates.htm>


Lu PJ, et al. Association of provider recommendation and offer and influenza vaccination among adults aged ≥18 years – United States. Vaccine 2018;36(6): 890-898

5

Influenza Vaccination and Cardiovascular Risk

- Meta-analysis
- 16 trials (4 RCT, 12 Observational)
- 237K participants
- Mean age 69 , 37% women
- Median follow-up 19.5 mo.
- All cause mortality relative risk (RR) 0.75
- CV mortality RR 0.82
- MACE RR 0.87
- MI RR 0.73 (CI 0.49-1.09, p=0.12)
- **Cardiologists least likely of all medical professionals to stock flu vaccines in clinic)**





Yedlapat SH, et al. JAHA 2021;doi.10.1161

6

Disparities in Influenza Vaccination Access and Uptake

- Disparities in influenza vaccination access and uptake

Table. Estimated Influenza Vaccination Coverage Among US Adults by Race and Ethnicity for 2017-2018 and 2018-2019 Influenza Seasons³

Group	Vaccination coverage, %	
	2017-2018	2018-2019
Overall	37.1	45.3
Non-Hispanic		
White	40.2	48.7
Black	32.3	39.4
Hispanic	28.4	37.1
Asian	42.0	44.0
American Indian/Alaskan Native	33.1	37.6
Other or multiple races	32.4	39.7

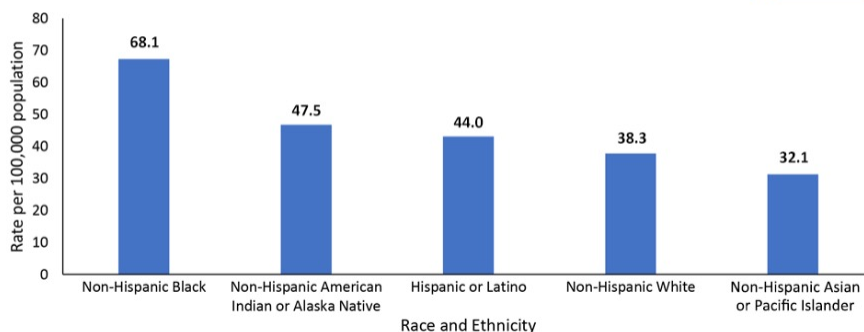


Grohskopf LA, Liburd LC, Redfield RR. JAMA 2020; 324(11): 1029-30
cdc.gov / fluSurv-NET

7

Disparities in Influenza-associated Hospitalization

Age-adjusted influenza-associated hospitalization rates by race and ethnicity — FluSurv-NET, 2009-10 through 2018-19



Logan JL. J Natl Med Assoc. 2009; 101(2): 161-166
cdc.gov / fluSurv-NET

8

Disparities in Influenza Vaccination Among Adults with ASCVD in the U.S.

- Cross-sectional pooled analysis from Medical Expenditure Panel Survey extrapolated to U.S. population
- Influenza vaccination rates (self-reported in year prior to completion of survey) from 2008-2016 in adults > 40 yo with Atherosclerotic Cardiovascular Disease (ASCVD) (self-report and / or ICD-9)

Sociodemographic Disparities in Influenza Vaccination Among Adults With Atherosclerotic Cardiovascular Disease in the United States

Gowtham R. Grandhi, MD, MPH; Reed Mszar, MPH; Farhaan Vahidy, MBBS, MPH, PhD; Javier Valero-Elizondo, MD, MPH; Ron Blankstein, MD; Michael J. Blaha, MD, MPH; Salm S. Virani, MD, PhD; Julia D. Andrieni, MD; Saad B. Omer, MBBS, MPH, PhD; Khurram Nasir, MD, MPH, MSc

DESIGN, SETTING, AND PARTICIPANTS Pooled Medical Expenditure Panel Survey data from 2008 to 2016 were used and included adults 40 years or older with ASCVD. Participants' ASCVD status was ascertained via self-report and/or *International Classification of Diseases, Ninth Revision* diagnosis of coronary heart disease, peripheral artery disease, and/or cerebrovascular disease. Analysis began April 2020.

RESULTS Of 131 881 adults, 19 793 (15.7%) had ASCVD, corresponding to 22.8 million US adults annually. A total of 7028 adults with ASCVD (32.7%), representing 7.4 million adults, lacked influenza vaccination. The highest odds of lacking vaccination were observed among individuals aged 40 to 64 years (odds ratio [OR], 2.32; 95% CI, 2.06-2.62), without a usual source of care (OR, 2.00; 95% CI, 1.71-2.33), without insurance (OR, 2.05; 95% CI, 1.63-2.58), with a lower education level (OR, 1.25; 95% CI, 1.12-1.40), with a lower income level (OR, 1.14; 95% CI, 1.01-1.27), and of non-Hispanic Black race/ethnicity (OR, 1.24, 95% CI, 1.10-1.41).



Grandhi GR, et al. *JAMA Cardiol* 2020.3978; published online Sept. 9, 2020

9

Prevalence and characteristics of adults with ASCVD who lacked influenza vaccination during the past year

Table. Prevalence and Distribution of Influenza Vaccination by Patient Characteristics Among Individuals With ASCVD

Characteristics	Total No.	Not vaccinated		Estimated US population	OR (95% CI) ^a
		No.	Weighted prevalence, %		
Total population	19 793	7028	32.7	7 437 189	NA
Age category, y					
≥65	10 996	2842	23.7	3 263 511	1 [Reference]
40-64	8787	4186	46.4	4 173 678	2.32 (2.06-2.62)
Sex					
Female	9933	3534	32.1	3 412 762	1 [Reference]
Male	9860	3494	33.2	4 024 427	0.99 (0.90-1.10)
Race/ethnicity ^b					
Non-Hispanic White	10 919	3452	30.5	5 273 282	1 [Reference]
Non-Hispanic Black	4245	1776	40.8	994 897	1.24 (1.10-1.41)
Non-Hispanic Asian	779	228	30.5	167 502	0.82 (0.60-1.12)
Hispanic	3331	1360	39.9	773 076	1.03 (0.88-1.22)
Family income					
Middle/high	10 277	3438	31.2	4 387 358	1 [Reference]
Low	9516	3590	35.1	3 049 831	1.14 (1.01-1.27)
Insurance status					
Insured	18 421	6137	31.0	6 712 468	1 [Reference]
Uninsured	1372	891	64.9	724 721	2.05 (1.63-2.58)
Education level ^b					
≥Some college	7567	2537	30.5	3 093 802	1 [Reference]
≤High school	12 053	4420	34.4	4 297 964	1.25 (1.12-1.40)
Usual source of care ^b					
Yes	17 847	5917	30.8	904 797	1 [Reference]
No	1649	981	56.6	6 485 839	2.00 (1.71-2.33)
Region					
Northeast	3288	1060	29.6	1 235 355	1 [Reference]
Midwest	4098	1399	31.4	1 627 660	1.07 (0.88-1.29)
South	8379	3204	34.6	3 149 798	1.13 (0.97-1.32)
West	4028	1365	33.1	1 424 376	1.13 (0.93-1.38)

Abbreviations: ASCVD, atherosclerotic cardiovascular disease; NA, not applicable; OR, odds ratio.
^a Model adjusted for age, sex, race/ethnicity, family income, insurance status, education, geographic region, usual source of care, cardiovascular risk factors, and comorbidities.
^b Counts may not add to total owing to missing values.

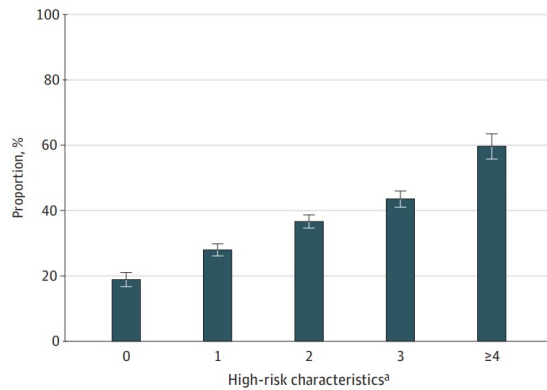


Grandhi GR, et al. *JAMA Cardiol*. Published online September 09, 2020.

10

Prevalence of Lacking Influenza Vaccination with Stepwise Increasing High-Risk Characteristics

Figure 1. Weighted Proportions and Variations in Lacking Influenza Vaccination Among Adults With Atherosclerotic Cardiovascular Disease Stratified by the Cumulative Number of High-risk Sociodemographic Characteristics



Grandhi GR, et al. *JAMA Cardiol.* Published online September 09, 2020.



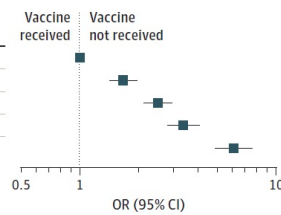
^a High-risk characteristics include age 40 to 64 years, non-Hispanic Black race/ethnicity, low/poor family income, uninsured, lack of usual source of care, and high school education level or less.

11

Odds of Lacking Influenza Vaccination with Increasing High-Risk Characteristics

Figure 2. National Estimates and ORs of Lacking Influenza Vaccination Among Adults With Atherosclerotic Cardiovascular Disease and High-risk Sociodemographic Characteristics

High-risk characteristics ^a	No.	Estimated US population	OR (95% CI) ^b
0	503	778 157	1 [Reference]
1	1503	2 154 839	1.67 (1.43-1.96)
2	2238	2 452 879	2.51 (2.13-2.95)
3	1613	1 318 791	3.38 (2.81-4.07)
4	1171	732 524	6.06 (4.88-7.53)



A stepwise increase in the odds of lacking influenza vaccination with increasing high-risk characteristics was noted. Individuals with 4 or more high-risk characteristics had nearly 6-fold higher odds of lacking influenza vaccination.

^a High-risk characteristics include age 40 to 64 years, non-Hispanic Black

race/ethnicity, low/poor family income, uninsured, lack of usual source of care, and high school education level or less.

^b Model adjusted for sex, geographic region, cardiovascular risk factors, and comorbidities. Odds ratios (ORs) and 95% CIs are presented on a log scale.



Grandhi GR, et al. *JAMA Cardiol.* Published online September 09, 2020.

12

Potential Impact of Sociodemographic Disparities in Influenza Vaccination among Adult with ASCVD in U.S.

- Findings extrapolated to U.S. population
- 1 in 3 adults with ASCVD reported no influenza vaccination in past year- representing 7.4M annually
- Adults with 2 high-risk characteristics had 2.5 fold greater odds of lacking vaccination- representing 2.4M / year
- Adults with 4 or more high-risk characteristics and ASCVD (OR 6.06 of no vaccination)- representing 733K / year



• Grandhi GR et al. JAMA Cardiol. 2020.3978. published online Sept. 9, 2020

13

Editorial / Commentary

- Report by Grandhi, et al. first to highlight potential magnitude of gap associated with sociodemographic and age-related disparities of influenza vaccination in those with ASCVD possibly affecting millions

This Issue Views **829** | Citations **0** | Altmetric **18**

Editorial

September 9, 2020

Disparities in Influenza Vaccination—Opportunity to Extend Cardiovascular Prevention to Millions of Hearts

Laurence S. Sperling, MD^{1,2}; Michelle A. Albert, MD, MPH²; Ram Koppaka, MD, PhD⁴

[» Author Affiliations](#) | [Article Information](#)

JAMA Cardiol. 2021;6(1):11-12. doi:10.1001/jamacardio.2020.3983



Sperling LS, Albert MA, Koppaka R. JAMA Cardiol 2020.3978. published online Sept. 9, 2020

14

Disparities in Influenza Vaccination- Opportunity to Extend Cardiovascular Prevention to Millions of Hearts

- Composite model of high-risk characteristics highlights disparities and opportunities
- Significant 2-fold higher odds of not receiving influenza vaccination among 40-64 year old group
- Barriers exist at patient, clinician, community, and health system level
- Multi-faceted approaches required to reduce disparities
- Extension of proven, effective, and high-impact strategies for CVD prevention
- Given prospect of co-circulation of COVID-19 with influenza never been more important time to reduce these disparities



Sperling LS, Albert MA, Koppaka R.. JAMA Cardiol. 2020.3978. published online Sept. 9, 2020

15

Missed Opportunities to Prevent Cardiovascular Events

9.0 M not taking aspirin as recommended
40.1 M with uncontrolled HBP
39.1 M not using statins when indicated
54.1 M combustible tobacco users
+ **70.9 M** who are physically inactive

213.1 M missed opportunities

Millions of opportunities to provide influenza vaccination



Wall HK, Ritchey MD, Gillespie C, Omura JD, Jamal A, George MG. *Vital Signs: Prevalence of Key Cardiovascular Disease Risk Factors for Million Hearts 2022* — United States, 2011–2016. MMWR Morb Mortal Wkly Rep 2018;67:983–991. DOI: <http://dx.doi.org/10.15585/mmwr.mm67.35a4>.

16

Addressing Influenza Vaccination Disparities During the COVID-19 Pandemic

- Prevention or reduction in severity of acute respiratory illnesses to conserve strained healthcare resources
- Medical and public health professionals working with partners trusted by racial and ethnic minority communities
- Prioritize measures to help ensure full and equal access to influenza vaccination, and reduce disproportionate effect of illness on racial and ethnic minorities



Grohskopf LA, Liburd LC, Redfield RR.. JAMA. 2020. 324(11): 1029-30

17

A Million Thanks!

More on Million Hearts at [Millionhearts.hhs.gov](https://millionhearts.hhs.gov)

Reach me at LSperling@cdc.gov

Twitter [@MillionHeartsUS](https://twitter.com/MillionHeartsUS)



18