
Racial/Ethnic Differences in Influenza Vaccination in the Veterans Affairs Healthcare System

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Background: Racial/ethnic differences in influenza vaccination exist among elderly adults despite nearly universal Medicare health insurance coverage. Overall influenza vaccination prevalence in the Veterans Affairs (VA) Healthcare System is higher than in the general population; however, it is not known whether racial/ethnic differences exist among older adults receiving VA healthcare. Racial/ethnic differences in influenza vaccination in VA were assessed, and barriers to and facilitators of influenza vaccination were examined among veteran outpatients aged 50 years and older.

Methods: A random sample of 121,738 veterans receiving care at VA outpatient clinics during the 2003–2004 influenza season completed the mailed Survey of Health Experiences of Patients (77% response rate). Multivariate logistic regression was used to examine associations among race/ethnicity and influenza vaccination prevalence, barriers, and facilitators. Analyses were conducted during 2005 and 2006.

Results: Based on unadjusted prevalences, non-Hispanic blacks, Hispanics, and American Indian/Alaskan Natives were significantly less likely to be vaccinated for influenza compared to non-Hispanic whites (71%, 79%, and 74%, respectively, vs 82%). After adjustment for age, gender, marital status, education level, employment, having a primary care provider, confidence and/trust in provider, and health status, only non-Hispanic blacks remained significantly less likely to be vaccinated compared to non-Hispanic whites (75% vs 81%). Influenza vaccination barriers and facilitators varied by race/ethnic group.

Conclusions: Compared to non-Hispanic whites, non-Hispanic blacks were less likely to receive influenza vaccination in the VA healthcare system during the 2003–2004 influenza season. Although these differences were small, results suggest the need for further study and culturally informed interventions.

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Introduction

Vaccination is a cost-effective strategy to prevent the morbidity and mortality associated with influenza infection.^{1–3} The *Healthy People 2010* target for influenza vaccination is 90% for adults aged 65 years and older, and 60% for high-risk adults aged 18 to 64.⁴ In addition, one of the two overarching goals of *Healthy People 2010* is to eliminate health disparities among different segments of the population. Since 2000, the Centers for Disease Control and Prevention (CDC) has recommended universal vaccination for adults aged 50 years and older.⁵ While adult influenza

vaccination levels have increased in the past decade, recent studies continue to document racial/ethnic differences in vaccination coverage. These differences have been reported in community-based population samples^{6–9} as well as in both fee-for-service and managed care Medicare beneficiaries.^{10,11}

While differences in the receipt of preventive services have often been attributed to differences in access to care, this may not be entirely true for influenza vaccination.^{7,8,10,12–14} Several studies have attempted to describe and understand racial/ethnic differences in influenza vaccination in various settings and populations. Almost all of these have found that differences in vaccination coverage remain after adjustment for various sociodemographic variables (e.g., age, gender, income, education, census division), access to care, health status, risks for influenza, and healthcare utilization.^{8,11,13,15} Hebert et al.¹⁶ found that access to care was not related to racial/ethnic differences in vaccination, while differences in attitudes and beliefs about vaccination and rates of

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primary care encounters did explain some of the differences.

The Veterans Affairs (VA) Healthcare System is a unique setting in which to study racial/ethnic differences in influenza vaccination, given equal access to care for eligible veterans.¹⁷ The VA is the nation's largest integrated healthcare system with 7.6 million enrollees and 5.2 million active users served by approximately 158 medical centers and 860 outpatient clinics. Unique features of the VA that are relevant to influenza vaccination delivery include the systemwide use of electronic medical records, electronic clinical reminders, an influenza vaccination performance measure with defined targets and financial incentives, facility-level feedback, a yearly influenza vaccination implementation toolkit disseminated to each facility influenza campaign coordinator, and national coordination of vaccine distribution.

Several recent studies have reported higher rates of preventive service delivery including influenza vaccination in the VA compared with a nationally representative community sample and a Medicare fee-for-service cohort.^{18,19} While overall influenza vaccination prevalence in the VA is higher than in the general population, it is not known whether racial/ethnic differences exist. The purpose of this study is to characterize racial/ethnic differences in receipt of influenza vaccination in a sample of VA users aged 50 and older, and to identify factors that may be barriers to, or facilitators of, vaccination. The hypothesis of this study is that racial/ethnic differences in influenza immunization exist and that these racial/ethnic differences would be smaller than those reported in the private sector.

Methods

Data Source and Study Population

This was a secondary data analysis examining responses to the written VA national outpatient Survey of Healthcare Experiences of Patients (SHEP) managed by the Veterans Health Administration (VHA) Office of Quality and Performance (OQP). Specific SHEP survey methods are detailed elsewhere.²⁰ Briefly, the SHEP is a cross-sectional, monthly survey that uses a stratified random sample without replacement design and recruitment strategies consistent with Dillman's "tailored design method."²¹ The study population eligible for selection included outpatients seen in VA primary and specialty care clinics during the 60 days before the monthly administration of the SHEP. The survey uses a complex sampling design employing stratification based on the location of care and accounting for an unequal probability of selection based on clinic size. A total of 159,104 patients aged ≥ 50 years were randomly selected to receive the survey during the influenza season months from November 2003 to March 2004. Of these, 77% returned completed surveys ($n=121,738$). Those with missing race information ($n=4121$) or with duplicate surveys ($n=3$) were removed, resulting in a final sample of 117,614 (74%) for this analysis. Given the

relatively small number of respondents with missing race compared to the overall sample size (3%), it is unlikely that this would have a significant impact on results. Data were analyzed in accordance with the governing Institutional Review Board approval and OQP data use agreement.

Measures

The primary outcomes of interest were obtained from responses to four SHEP questions that were added to the survey during the 2003–2004 influenza season. Prevalence of influenza vaccination was determined by an affirmative response to the question, "Did you get a flu shot in October 2003 or later?" ("yes," "no," or "don't know"). Barriers and facilitators of influenza vaccination were assessed by the questions, "If you did not get a flu shot in October 2003 or later, why?" and "Did any of the following reminders help you decide to get your flu shot?" The response options provided were based on the existing literature. Type of facility where influenza vaccination was given was determined by response to the item, "Where did you get your flu shot?" In addition to demographic information, other SHEP questions used in this analysis included the following: "Do you have one person who you think of as your regular doctor?" (primary care provider), "Did you have confidence and trust in the provider you saw?," and "In general, would you say your health is excellent, very good, good, fair, or poor?" (health status).

Variable Definitions

Racial/ethnic groups were based on self-report in five categories. When more than one category was endorsed, race/ethnicity was assigned according to the following hierarchy: Hispanic, American Indian /Alaskan Native (AI/AN), non-Hispanic black, Asian/Pacific Islander (Asian/PI), and non-Hispanic white. Age was dichotomized into ≥ 65 and 50 to 64, creating two age groups targeted by the CDC for priority influenza vaccination. Groupings for other variables used in multivariate logistic regression analyses were determined based on examination of variable distributions and their correlation with influenza vaccination prevalence. Variables whose distributions did not suggest natural dichotomous cutpoints were grouped into three or more levels, and included: marital status (married vs never married or divorced or widowed or separated), education (high school or equivalency diploma or did not complete high school vs some college or college graduate or beyond), income ($< \$15,000$ vs $\geq \$15,000$), and health status (excellent or very good or good vs fair or poor). Variables with more than two levels included employment (unable to work vs employed for wages or self-employed or student vs unemployed vs retired or homemaker), having a primary care provider (PCP) (no PCP vs VA PCP vs non-VA PCP), and confidence/trust in provider (no confidence/trust vs some confidence/trust vs complete confidence/trust).

Statistical Analyses

In order to calculate population estimates, sample weights (reflecting probability of selection from a clinic within a facility) and nonresponse weights (reflecting propensity-to-respond based on age, gender, and clinic site) were applied for all analyses. All analyses accounted for intraclass correla-

Table 1. Characteristics of patient respondents aged ≥ 50 during the 2003–2004 influenza season

Characteristic	Overall sample frequency (%) (n=117,614)	% by racial/ethnic categories				
		Non-Hispanic white (n=100,297)	Non-Hispanic black (n=7499)	Asian, Native Hawaiian, Pacific Islander (n=971)	American Indian or Alaskan Native (n=2819)	Hispanic (n=5398)
Age (years)						
50–64	75,860 (64.5)	32.7	54.1	49.8	59.2	47.0
≥ 65	41,754 (35.5)	67.3	45.9	50.2	40.8	53.0
Gender						
Male	113,561 (96.6)	96.7	95.4	96.3	93.7	97.3
Female	4,053 (3.4)	3.3	4.6	3.7	6.3	2.8
Marital status						
Married	79,279 (68.1)	69.7	50.3	70.7	60.4	66.1
Never married	5,286 (4.5)	4.2	9.0	7.2	4.6	5.1
Divorced	18,016 (15.5)	14.6	23.5	13.3	23.7	16.9
Widowed	11,522 (9.9)	10.1	9.1	6.2	7.7	8.1
Separated	2,387 (2.0)	1.5	8.1	2.6	3.6	3.8
Education						
Did not complete high school	24,255 (20.8)	20.6	22.4	12.6	17.5	25.8
High school graduate or GED	40,340 (34.7)	35.3	31.2	29.3	29.0	31.7
Some college	31,649 (27.2)	26.3	33.0	35.6	36.7	28.9
College graduate or beyond	20,137 (17.3)	17.7	13.5	22.5	16.7	13.6
Total household income						
$\leq \$15,000$	36,896 (33.3)	31.4	47.5	28.4	40.3	46.7
$\$15,001–\$30,000$	46,886 (42.3)	43.5	33.2	38.5	38.4	36.6
$> \$30,000$	26,952 (24.3)	25.1	19.3	33.1	21.2	16.7
Employment						
Employed or student	22,392 (19.2)	19.0	19.7	23.4	20.0	20.5
Retired or homemaker	65,694 (56.2)	58.6	39.9	53.3	33.9	47.0
Unable to work	25,421 (21.7)	19.9	34.7	19.9	41.7	28.3
Unemployed	3,374 (2.9)	2.6	5.7	3.3	4.4	4.2
Primary care provider (PCP)						
PCP is a VA provider	59,800 (53.8)	51.1	73.7	58.8	65.6	69.6
PCP is a non-VA provider	38,003 (34.2)	36.9	14.4	30.8	18.5	19.2
No PCP	13,352 (12.0)	12.0	11.9	10.4	15.9	11.2
Confidence/trust in provider						
Complete confidence/trust in provider	88,638 (77.7)	78.4	73.0	75.6	70.6	75.9
Some confidence/trust in provider	22,564 (19.8)	19.3	23.9	22.0	24.7	21.1
No confidence/trust in provider	2,851 (2.5)	2.4	3.1	2.4	4.7	3.1
Overall health status						
Poor	12,461 (10.8)	10.4	11.6	11.5	17.3	13.1
Fair	36,497 (31.7)	30.5	40.7	31.8	35.0	39.1
Good	43,022 (37.3)	38.1	33.9	32.9	32.8	31.2
Very good	19,684 (17.1)	17.8	11.7	20.3	12.0	13.2
Excellent	3,553 (3.1)	3.1	2.2	3.6	2.9	3.4

GED, general equivalency diploma; VA, Veterans Affairs.

tion among patients that was introduced by shared organizational features of the clinics in which they were seen. Crude prevalence for influenza vaccination among groups of Hispanics, non-Hispanic blacks, non-Hispanic whites, AI/AN, and Asian/PIs were calculated. Multivariate logistic regression was used to calculate and compare adjusted vaccination prevalence among racial/ethnic groups. Other independent variables used in the model were age, gender, marital status, education, employment status, income, primary care provider status, confidence/trust in provider, and overall health status. Type of facility where vaccination was received and reminders endorsed as influencing the decision to “get your flu shot”

(facilitators) were compared by racial/ethnic groups for veterans who reported getting a “flu shot.” Reasons endorsed for “not getting a flu shot” (barriers) were compared by racial/ethnic groups for veterans who reported “not getting a flu shot.” Facilitators and barriers to influenza vaccination were compared between non-Hispanic whites and other racial/ethnic groups using chi square analysis. For these multiple comparisons, a more conservative alpha level of 0.01 was used to determine statistical significance. All analyses were conducted in 2005 and 2006 using SAS, version 9.1 (SAS Institute, Cary NC, 2004; SAS-callable SUDAAN version 9.0, RTI International, Research Triangle Park NC, 2005).

Table 2. Prevalence^a of influenza vaccination by race/ethnicity in users of the Veterans Affairs Healthcare system aged ≥ 50 years

Race/ethnicity	Unadjusted prevalence (%) (95% CI)	Adjusted prevalence (%) ^b (95% CI)
White, non-Hispanic	82.1 (81.7–82.6)	81.2 (80.7–81.7)
Black, non-Hispanic	70.9* (69.2–72.6)	75.0* (73.3–76.7)
Hispanic	79.0* (76.8–81.0)	79.9 (77.7–82.0)
American Indian or Alaskan Native	74.1* (71.1–76.9)	78.5 (75.8–81.2)
Asian/Pacific Islander	84.4 (80.0–87.9)	84.8 (80.9–88.7)

^aEstimates of vaccination prevalence in the population of VA users adjusted for the unequal probability of selection and stratification scheme.

^bAdjusted for age, gender, race/ethnicity, marital status, education level, employment, having a primary care provider, level of confidence/trust in provider, and overall health status.

*Prevalence significantly different from non-Hispanic white prevalence at the $p < 0.05$ level (bolded).

CI, confidence interval.

Source: Data from the Survey of Healthcare Experiences of Patients, 2003–2004 influenza season.

Results

Survey respondent characteristics are provided in Table 1. A majority of this sample of adults aged ≥ 50 years was also more than aged 65 (65%), and fewer than 20% were employed. Most respondents reported having primary care providers and good relationships with their providers: Eighty-eight percent identified a single doctor responsible for their care, and 77% reported having complete trust in their provider.

Unadjusted and Adjusted Prevalence of Influenza Vaccination

The influenza vaccination population prevalence estimate for older adults in the VA based on this sample was 80.6% (95% CI = 80.2–81.4). For patients aged 50 to 64, the estimate was 73.0% (95% CI = 72.1–73.9%). For those aged ≥ 65 , the estimate was 86.2% (95% CI = 85.6–86.8%). Table 2 shows the unadjusted and adjusted prevalences by racial/ethnic group. Crude estimates showed that non-Hispanic blacks (70.9%), AI/NA (74.1%), and Hispanics (79.0%) were significantly less likely to report having been vaccinated compared to non-Hispanic whites (82.1%). In the multivariate model used to calculate adjusted prevalences (adjusted for age, gender, marital status, employment status, income, education, having a primary care provider, confidence/trust in provider, and overall health status), age accounted for most of the racial/ethnic differences, although non-Hispanic blacks were still significantly less likely to report influenza vaccination compared to non-Hispanic whites. To further assess the influence of age, the analysis was stratified by

separately examining the 50- to 64-year-old age group (for which universal vaccination is a more recent recommendation) and the group aged ≥ 65 . These results were consistent with findings of the unstratified analysis.

Significant predictors of influenza vaccination other than race/ethnicity and age included being married, having a total household income $> \$15,000$; being retired, a homemaker, or unable to work; having a VA or non-VA PCP; having complete trust in one's provider; and rating one's overall health status as fair or poor (Table 3).

Influenza Vaccination Facilitators and Barriers

A variety of patient-directed strategies for increasing influenza vaccination, including posters, handouts, newsletters, and written reminders disseminated with medicine refills or clinic appointment cards, were used by VA medical centers during the 2003–2004

Table 3. Adjusted^a ORs and 95% CIs for predictors of influenza vaccination other than race/ethnicity in users of the Veterans Health Administration aged ≥ 50 years

Characteristic	Adjusted OR (95% CI)
Age ≥ 65	2.31 (2.14–2.49)
Age < 65	Referent
Male	1.01 (0.84–1.22)
Female	Referent
Black, non-Hispanic	0.67 (0.61–0.74)
Hispanic or Latino descent	0.91 (0.79–1.06)
American Indian	0.84 (0.70–1.00)
Asian or Pacific Islander	1.31 (0.95–1.80)
White, non-Hispanic	Referent
Married	1.18 (1.10–1.26)
Not married	Referent
Some college or higher	1.06 (1.00–1.13)
High school education or less	Referent
Total household income $< \$15,000$	0.77 (0.72–0.83)
Total household income $\geq \$15,000$	Referent
Retired/homemaker	1.41 (1.29–1.54)
Unable to work	1.24 (1.14–1.36)
Unemployed	0.93 (0.80–1.08)
Employed or student	Referent
PCP is a VA doctor	1.42 (1.30–1.55)
PCP is not a VA doctor	1.80 (1.62–2.00)
No PCP	Referent
Complete confidence/trust in provider	1.30 (1.09–1.55)
Some confidence/trust in provider	1.14 (0.95–1.37)
No confidence/trust in provider	Referent
Overall health status is excellent, very good, or good	0.77 (0.72–0.82)
Overall health status is fair or poor	Referent

^aAdjusted for age, gender, race/ethnicity, marital status, education level, employment, having a PCP, level of confidence/trust in provider, and overall health status.

CI, confidence interval; OR, odds ratios; PCP, primary care provider; VA, Veterans Administration.

Source: Data from the Survey of Healthcare Experiences of Patients, 2003–2004 influenza season.

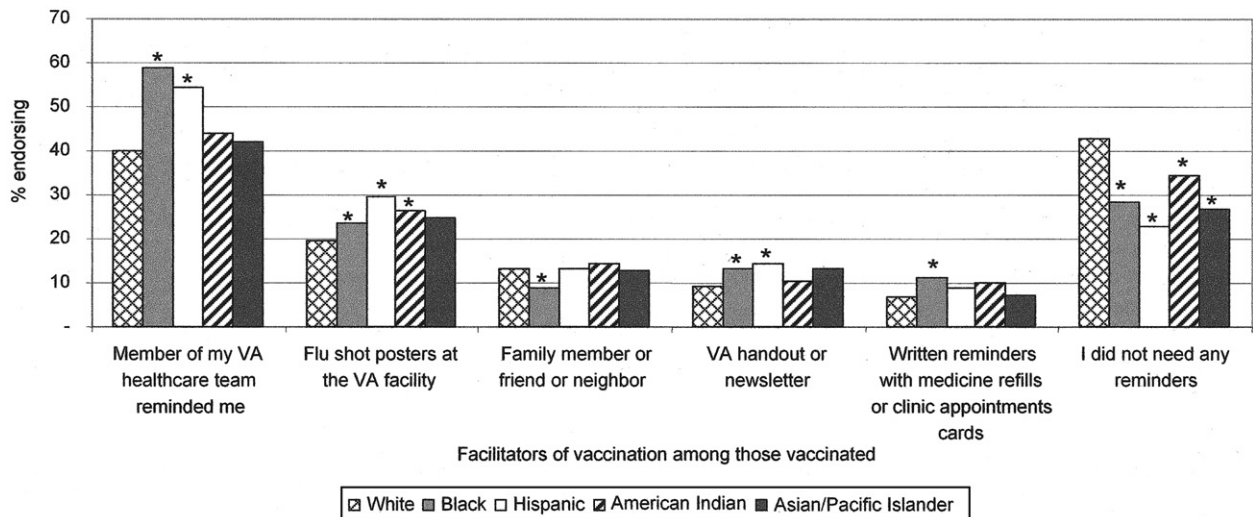


Figure 1. Facilitators of influenza vaccination among Veterans Health Administration users aged ≥ 50 by race and ethnicity. Data from the Survey of Healthcare Experiences of Patients, 2003–2004 influenza season.

*Significantly ($p < 0.01$) higher or lower as compared to non-Hispanic whites.

influenza season. Among those who received vaccination, reminder by a member of the patient’s VA healthcare team was the most frequently endorsed factor for deciding to “get a flu shot” (42.4%), followed by facility poster displays (20.8%), and family or friend’s reminder to “get a flu shot” (12.7%). Figures 1 and 2 illustrate the proportion of each racial/ethnic group endorsing reminders and barriers that influenced their decision to be vacci-

nated. The majority of unvaccinated respondents reported not wanting a “flu shot” (59.2%).

Compared to non-Hispanic whites, non-Hispanic blacks and Hispanics were more likely to report that a reminder by a healthcare provider influenced the decision to “get a flu shot” (39.8% vs 58.7%, and 54.5%, respectively; $p < 0.01$). Unvaccinated non-Hispanic blacks and Hispanics were more likely to report that they did not know they needed a “flu shot,” compared

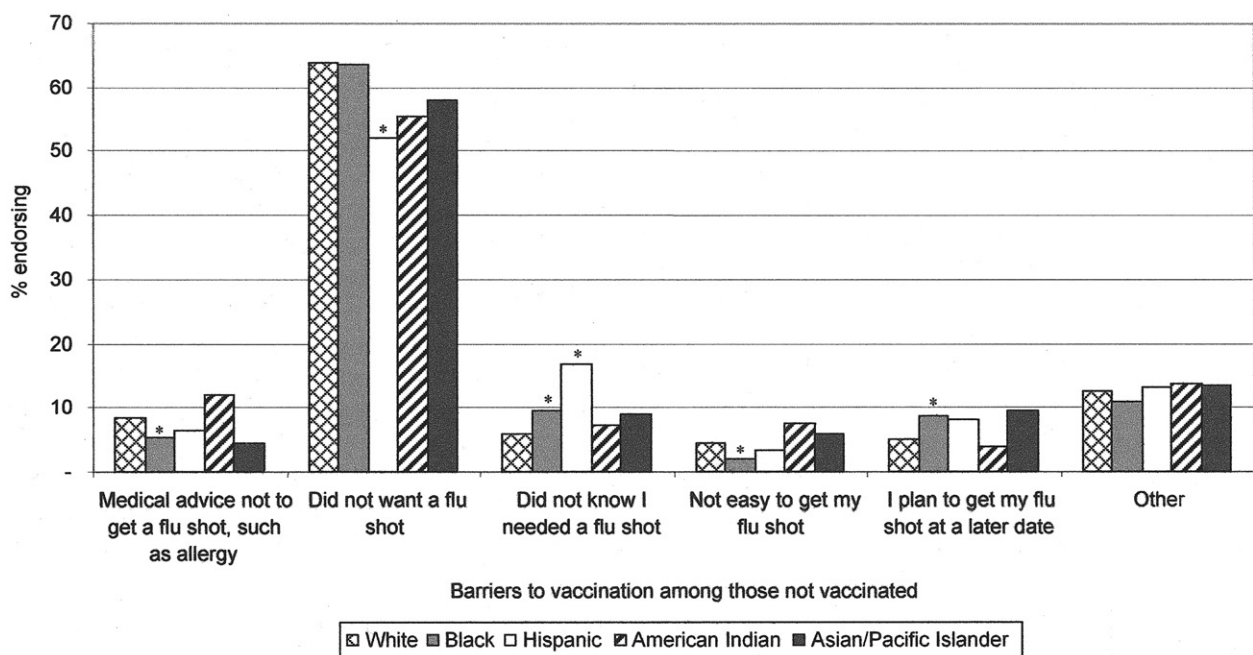


Figure 2. Barriers to influenza vaccination among Veterans Health Administration users age ≥ 50 by race and ethnicity. Data from the Survey of Healthcare Experiences of Patients, 2003–2004 influenza season.

*Significantly ($p < 0.01$) higher or lower as compared to non-Hispanic whites.

to non-Hispanic whites (9.5% and 16.8%, respectively, vs 5.8%; $p < 0.01$).

Facility Locale for Vaccine Administration

Most respondents reported receiving their influenza vaccinations at VA healthcare facilities (68.1%, 95% CI=67.6%–68.6%), although differences by racial/ethnic groups were evident. Non-Hispanic whites were less likely to get their vaccinations at VA facilities than were non-Hispanic blacks (64.7% vs 86.6%, $p < 0.05$).

Discussion

Using a large probability sample from a periodic survey of veterans using VA facilities, this study found that self-reported influenza vaccination during the 2003–2004 influenza season was high among veterans aged 50 years and older. The 86.2% prevalence estimate among VA users aged 65 and older is considerably higher than the 65.5% prevalence in the general population, based on the 2003 National Health Interview Survey (NHIS).¹ The difference is even more striking for VA users aged 50 to 64, for whom the prevalence was 73.0%, compared with 36.8% in the 2003 NHIS. Although sampling methods differed between this study's mailed survey of VA users and the NHIS telephone surveys of community-dwelling respondents,^{8,13} other studies examining Medicare fee-for-service beneficiaries have reported 73% as the highest level of self-reported influenza vaccination.¹⁰ This prevalence is substantially lower than the VA's 86% estimated prevalence for the same age group. Comparison of self-reported influenza vaccination in VA with other integrated healthcare delivery systems such as managed care suggests that VA influenza vaccination among adults over age 64 (86%) is greater than that reported for managed care patients (71%),¹¹ or individuals with Medicare plus private supplemental insurance (71%).⁹ However, these managed-care studies represent vaccination prevalence data from 1996 and 2001, respectively, and may not be comparable to 2003–2004 data. The impact of the VA's use of automated evidence-based practices to optimize influenza vaccination may have had a significant influence as they have been identified as effective components of organizational support.^{19,22–24} Further, active duty military members routinely receive many immunizations, including the annual mandatory influenza vaccination, so perhaps these veterans were less resistant to the idea of vaccination.

Non-Hispanic blacks were the only racial/ethnic minority group in this study less likely to receive influenza vaccination compared to non-Hispanic whites. Differences among racial/ethnic groups were partially accounted for by age. Racial/ethnic differences in the VA healthcare system have been studied

across a range of clinical areas with mixed findings. The likelihood of receiving some services (cardiovascular procedures, carotid imaging, nonsteroidal medications) have been noted to be decreased in minority VA patients compared with whites.^{25–28} In contrast, mortality rates,²⁹ use of ambulatory care and unmet healthcare needs among veterans using the VA's healthcare system were shown to have no racial/ethnic differences.³⁰ Non-VA healthcare facilities with no cost barrier to access (Medicare, health maintenance organizations [HMOs]) have reported similar racial/ethnic differences for influenza vaccination, even after adjustments for age, gender, education, income, access to care, healthcare utilization, supplemental insurance, perceived health status, and census division.^{8,10,13,15} Fully adjusted influenza immunization prevalences for elderly Medicare fee-for-services respondents in 2000, 2001, and 2002 were significantly different each year, respectively, for non-Hispanic blacks (60%, 57%, 61%) compared with non-Hispanic whites (74%, 70%, 72%).¹⁰ In contrast, Schneider et al.¹¹ found no significant difference between blacks and whites for receipt of the vaccination, nor for reasons for not receiving a vaccination.

Unvaccinated non-Hispanic blacks in this study most frequently endorsed "did not want it" as the primary reason for not getting a "flu shot," and both blacks and Hispanics more frequently reported that they "did not know I needed a flu shot," compared to unvaccinated non-Hispanic whites. It is possible that these patient groups were not as well informed about the benefits, effectiveness, and safety of the vaccine. Because patient knowledge, preferences, beliefs, and attitudes regarding immunization were not assessed, the observed racial/ethnic differences cannot necessarily be interpreted as caused by racial/ethnic disparity or bias, per the framework suggested by Rathore and Krumholz³¹ for interpreting racial/ethnic variations in health care. Differences in patient factors such as resistant attitudes and beliefs have explained some but not all of the racial/ethnic differences in vaccination.¹⁶ Sengupta et al.³² found that the predominant barrier to getting a vaccination reported by elderly African Americans was community word-of-mouth to "not get a flu shot." Other barriers reported included not knowing about the severity of influenza and belief that the shot itself could cause illness. In this study, non-Hispanic blacks endorsed "family member, friend, or neighbor" recommendations less often than did non-Hispanic whites as a reason for getting an influenza vaccination. This finding may reflect the influence of "word-of-mouth" within the non-Hispanic black community discouraging vaccinations.

Although access to influenza vaccination may be comparable among racial/ethnic groups receiving care at the VA, it is possible that racial/ethnic bias exists if, for example, providers do not offer, suggest,

or explain the importance of vaccination as frequently or as thoroughly to minorities as they do to whites. Interpersonal care aspects such as communication, partnership, respect, common understanding, affiliation, trust, and racial/ethnic concordance have been shown to influence patient-provider relationship quality, with potential impact on use of healthcare services.³³

Significantly greater reliance was found on reminders from healthcare team members and “flu shot” posters among non-Hispanic black, Hispanic, and AI/AN compared to non-Hispanic white veterans who received influenza vaccinations. In addition, non-Hispanic blacks were more likely to use VA facilities for influenza vaccination than were non-Hispanic whites. These findings reinforce the importance of patient/provider interactions and culturally tailored posted information, as emphasized in the CDC’s Racial and Ethnic Adult Disparities in Immunization Initiative (READII)³⁴ to increase influenza and pneumococcal vaccinations for African Americans and Hispanics aged 65 years and older.

Because a greater percentage of non-Hispanic whites endorsed “did not need any reminders” than endorsed “healthcare team reminded me,” it is possible that more non-Hispanic whites initiated vaccine-related encounters, thus reporting that they did not need a reminder. Hebert et al.¹⁶ found that white patients were more than six times as likely as African-American patients to make a trip to their provider for the primary purpose of obtaining a vaccination.¹⁶

Limitations of this study include the use of self-reported influenza vaccination status. However, previous studies have confirmed the reliability of self-reported vaccination.^{35–37} Because not all vaccines were received in VA healthcare facilities, confirmation of vaccination history through medical record review could not be done. A second limitation is that it could not be determined whether survey response varied by racial/ethnic group, based on VA administrative data available during initial sample selection for the Survey of Healthcare Experiences of Patients sample selection. Kressin et al.³⁸ and others have shown relatively low rates of agreement for race/ethnicity between VA administrative data and self-reported data. Third, other important factors that affect vaccination, such as attitudes, preferences, and beliefs were not assessed in the study survey. Further, it was not known which participants had supplemental health insurance, although the study controlled for self-reported non-VA provider use in its adjusted analyses. Similarly, neither number of provider visits¹⁰ nor patient-centered provider communication³⁹ was assessed, although both may be related to vaccination prevalence. The large sample size in this study yielded results with statistical significance that may not necessarily have clinical significance. On the other hand, the study’s larger national sample size may

explain why persistent differences for influenza immunization between non-Hispanic blacks and whites were found, whereas some other investigations did not have these findings.⁴⁰ Finally, these results represent vaccination prevalence estimates for users of the VA healthcare system within the last year, and cannot be generalized to all U.S. veterans.

Conclusion

Compared to non-Hispanic whites, non-Hispanic blacks were less likely to receive influenza vaccination in the VA healthcare system during the 2003–2004 influenza season. Although these differences were small (only 6 percentage points), results suggest a need for further study to continue reduction of racial/ethnic differences for this important and effective preventive service. The combination of high overall influenza vaccination prevalence among VA patients aged 50 or older (81%) and lack of significant racial/ethnic differences for influenza vaccination among Hispanics, non-Hispanics, American Indians/Native Alaskans, and Asian/Pacific Islanders suggests that efforts made within the VA integrated healthcare delivery system to increase influenza immunization are effective.

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References

1. Centers for Disease Control and Prevention. Prevention and control of influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rev* 2005;54:1–40.
2. Nichol KL, Wuorenma J, von Sternberg T. Benefits of influenza vaccination for low-, intermediate-, and high-risk senior citizens. *Arch Intern Med* 1998;158:1769–76.
3. Hak E, Buskens E, van Essen GA, et al. Clinical effectiveness of influenza vaccination in persons younger than 65 years with high-risk medical conditions: the PRISMA study. *Arch Intern Med* 2005;165:274–80.
4. U.S. Department of Health and Human Services. *Healthy people 2010*. In: Washington DC: U.S. Department of Health and Human Services, 2000.
5. Centers for Disease Control and Prevention. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rev* 2000;49:1–38.
6. Marin MG, Johanson WG Jr, Salas-Lopez D. Influenza vaccination among minority populations in the United States. *Prev Med* 2002;34:235–41.
7. Ostbye T, Taylor DH, Lee AM, Greenberg G, van Scoyoc L. Racial differences in influenza vaccination among older Americans 1996–2000: longitudinal analysis of the Health and Retirement Study (HRS) and the

- Asset and Health Dynamics Among the Oldest Old (AHEAD) survey. *BMC Public Health* 2003;3:41.
8. Egede LE, Zheng D. Racial/ethnic differences in influenza vaccination coverage in high-risk adults. *Am J Public Health* 2003;93:2074–8.
 9. Chen JY, Diamant A, Pourat N, Kagawa-Singer M. Racial/ethnic disparities in the use of preventive services among the elderly. *Am J Prev Med* 2005;29:388–95.
 10. Bonito AJ, Lenfestey NF, Eicheldinger C, Iannacchione VG, Campbell L. Disparities in immunizations among elderly Medicare beneficiaries, 2000–2002. *Am J Prev Med* 2004;27:153–60.
 11. Schneider EC, Cleary PD, Zaslavsky AM, Epstein AM. Racial disparity in influenza vaccination: does managed care narrow the gap between African Americans and whites? *JAMA* 2001;286:1455–60.
 12. Lu PJ, Singleton JA, Rangel MC, Wortley PM, Bridges CB. Influenza vaccination trends among adults 65 years or older in the United States, 1989–2002. *Arch Intern Med* 2005;165:1849–56.
 13. Rangel MC, Shoenbach VJ, Weigle KA, Hogan VK, Strauss RP, Bangdiwala SI. Racial and ethnic disparities in influenza vaccination among elderly adults. *J Gen Intern Med* 2005;20:426–31.
 14. Fiscella K. Commentary—anatomy of racial disparity in influenza vaccination. *Health Serv Res* 2005;40:539–49.
 15. Centers for Disease Control and Prevention. Racial/ethnic disparities in influenza and pneumococcal vaccination levels among persons aged ≥65 years—United States, 1989–2001. *MMWR Morb Mortal Wkly Rev* 2003;52:958–62.
 16. Hebert PL, Frick KD, Kane RL, McBean AM. The causes of racial and ethnic differences in influenza vaccination rates among elderly Medicare beneficiaries. *Health Serv Res* 2005;40:517–37.
 17. Oddone EZ, Petersen LA, Weinberger M, Freedman J, Kressin NR. Contribution of the Veterans Health Administration in understanding racial disparities in access and utilization of health care: a spirit of inquiry. *Med Care* 2002;40:S1–13.
 18. Jha AK, Perlin JB, Steinman MA, Peabody JW, Ayanian JZ. Quality of ambulatory care for women and men in the Veterans Affairs Health Care System. *J Gen Intern Med* 2005;20:762–5.
 19. Asch SM, McGlynn EA, Hogan MM, et al. Comparison of quality of care for patients in the Veterans Health Administration and patients in a national sample. *Ann Intern Med* 2004;141:938–45.
 20. Wright SM, Craig T, Campbell S, Schaefer J, Humble C. Patient satisfaction of female and male users of Veterans Health Administration services. *J Gen Intern Med* 2006;21:S26–32.
 21. Dillman DA. Mail and Internet surveys: the tailored design method. New York: John Wiley, 2000.
 22. Rust G, Strothers HS 3rd, Zimmerman RK. Re-engineering the primary care practice to eliminate adult immunization disparities. *Ethn Dis* 2005;15:S21–S36.
 23. Bardenheier BH, Shefer A, McKibben L, Roberts H, Rhew D, Bratzler D. Factors predictive of increased influenza and pneumococcal vaccination coverage in long-term care facilities: the CMS-CDC Standing Orders Program project. *J Am Med Dir Assoc* 2005;6:291–9.
 24. Fontanesi J, Shefer AM, Fishbein DB, et al. Operational conditions affecting the vaccination of older adults. *Am J Prev Med* 2004;26:265–70.
 25. Dominick KL, Bosworth HB, Jeffreys AS, Grambow SC, Oddone EZ, Horner RD. Nonsteroidal anti-inflammatory drug use among patients with GI bleeding. *Ann Pharmacother* 2004;38:1159–64.
 26. Mirvis DM, Burns R, Gaschen L, Cloar FT, Graney M. Variation in utilization of cardiac procedures in the Department of Veterans Affairs health care system: effect of race. *J Am Col Cardiol* 1994;24:1297–304.
 27. Mirvis DM, Graney MJ. Impact of race and age on the effects of regionalization of cardiac procedures in the Department of Veterans Affairs Health Care System. *Am J Cardiol* 1998;18:982–7.
 28. Whittle J, Conigliaro J, Good CB, Lofgren RP. Racial differences in the use of invasive cardiovascular procedures in the Department of Veterans Affairs medical system. *N Engl J Med* 1993;329:621–7.
 29. Selim AJ, Fincke G, Berlowitz DR, et al. No racial differences in mortality found among Veterans Health Administration out-patients. *J Clin Epidemiol* 2004;57:539–42.
 30. Institute of Medicine. Unequal treatment: confronting racial and ethnic disparities in healthcare. Washington DC: National Academy Press, 2003.
 31. Rathore SS, Krumholz HM. Differences, disparities, and biases: clarifying racial variations in health care use. *Ann Intern Med* 2004;141:635–8.
 32. Sengupta S, Corbie-Smith G, Thrasher A, Strauss RP. African American elders' perceptions of the influenza vaccine in Durham, North Carolina. *N C Med J* 2004;65:194–9.
 33. Cooper LA, Beach MC, Johnson RL, Inul TS. Delving below the surface: understanding how race and ethnicity influence relationships in health care. *J of Gen Intern Med* 2006;21:S21–7.
 34. Centers for Disease Control and Prevention. Racial and ethnic adult disparities in immunization initiative (READII), 2006. Available at: www.cdc.gov/nip/specint/readii/default.htm.
 35. Mac Donald R, Baken L, Nelson A, Nichol KL. Validation of self-report of influenza and pneumococcal vaccination status in elderly outpatients. *Am J Prev Med* 1999;16:173–7.
 36. Hutchison BG. Measurement of influenza vaccination status of the elderly by mailed questionnaire: response rate, validity and cost. *Can J Public Health* 1989;80:271–5.
 37. Zimmerman RK, Raymond M, Janosky JE, Nowalk MP, Fine MJ. Sensitivity and specificity of patient self-report of influenza and pneumococcal polysaccharide vaccinations among elderly outpatients in diverse patient care strata. *Vaccine* 2003;21:1486–91.
 38. Kressin NR, Chang BH, Hendricks A, Kazis LE. Agreement between administrative data and patients' self-reports of race/ethnicity. *Am J Public Health* 2003;93:1734–9.
 39. Johnson RL, Roter D, Powe NR, Cooper LA. Patient race/ethnicity and quality of patient-physician communication during medical visits. *Am J Public Health* 2004;94:2084–90.
 40. Zimmerman RK, Santibanez TA, Janosky JE, et al. What affects influenza vaccination rates among older patients? An analysis from inner-city, suburban, rural, and Veterans Affairs practices. *Am J Med* 2003;114:31–8.