Herpes Zoster Vaccination Among Adults Aged 60 Years and Older, in the U.S., 2008

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Background: Shingles (herpes zoster [HZ]) is a localized, generally painful and debilitating disease that occurs most frequently among older adults. It is caused by reactivation of varicella-zoster virus. HZ causes substantial morbidity, especially among older adults. The vaccine to prevent HZ was approved by Food and Drug Administration and recommended by the Advisory Committee for Immunization Practices for people aged ≥60 years in 2006 (these recommendations were published in 2008).

Purpose: To examine HZ vaccination among people aged ≥60 years in the U.S. in 2008.

Methods: Data from the 2008 National Health Interview Survey among people aged ≥60 years were analyzed in 2010. Multivariable logistic regression and predictive marginal analyses were conducted to identify factors independently associated with HZ vaccination. Potential missed opportunities also were assessed.

Results: By 2008, only 6.7% (95% CI=5.9%, 7.6%) of adults aged ≥60 years reported having had HZ vaccination. The level of HZ vaccination coverage was lower (4.7%) among people aged 60–64 years compared to people aged 65–74 years (7.4%); 75–84 years (7.6%); and ≥85 years (8.2%). Coverage was statistically higher for non-Hispanic whites (7.6%) compared with non-Hispanic blacks (2.5%) and Hispanics (2.1%). Among people aged ≥60 years who reported never receiving HZ vaccination, 95.1% reported at least one missed opportunity to be vaccinated. People more likely to report ever having been vaccinated were older, female, non-Hispanic white, married, more educated, and reporting received influenza vaccination in the past year.

Conclusions: By 2008, HZ vaccination coverage was 6.7%. The coverage level was low among all groups, but it was lowest among minority groups. Increased efforts are needed to remove barriers and to enable HZ vaccination among all adults aged ≥60 years.

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Introduction

Herpes zoster (HZ, also called shingles) consists of a painful, vesicular rash that results from reactivation of latent varicella-zoster virus.[1,2] The condition typically occurs many decades after the initial varicella-zoster virus infection. Of those who experience HZ, 10%–30% develop postherpetic neuralgia (PHN), a debilitating neuropathic pain syndrome that can last months or even years and is often refractory to treatment.[3–5]

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An estimated 1 million cases of HZ occur in the U.S. annually.[4–10] Incidence and severity increase with advancing age; more than half of people with HZ are aged >50 years, and cases among this group are also much more likely to develop PHN.[5] HZ results in more than 2 million healthcare visits annually, costing an estimated $566 million in direct healthcare costs.[11] Indirect costs are substantial as well, causing an average loss of more than 129 hours of work per episode.[6,12] Much of the burden of HZ and PHN is, however, borne by patients as reduced quality of life because of pain and suffering.[3,4]

The herpes zoster vaccine (HZV) was licensed in May 2006. A large clinical trial demonstrated that HZV is well tolerated and efficacious in subjects aged ≥60 years. The vaccine reduced the incidence of HZ (vaccine effectiveness [VE]=51%); the burden of HZ pain (VE=61%); and the incidence of PHN (VE=67%).[3] The Advisory Committee on Immunization Practices (ACIP) recommended

Table 1. Sample characteristics and herpes zoster vaccination coverage among people aged ≥60 years in the U.S., by demographic and access-to-care variables, NHIS 2008

Characteristic	Sample *n* (%)	Vaccination coverage[a] (% [95% CI])	Adjusted vaccination coverage[b] (% [95% CI])
Total	5751	6.7 (5.9, 7.6)	
Quarter of interview			
January–March	1470 (24.5)	6.7 (5.3, 8.4)	6.8 (4.4, 9.1)
April–June	1713 (25.4)	5.4 (4.5, 7.1)	6.7 (4.9, 8.4)
July–September	1692 (25.1)	6.7 (5.4, 8.2)	7.6 (5.9, 9.3)
October–December	876 (25.0)	7.8 (6.0, 10.1)	6.7 (4.8, 8.5)
Age (years)			
60–64 (ref)	1465 (29.4)	4.7 (3.5, 6.2)	4.8 (3.3, 6.3)
65–74	2217 (37.9)	7.4 (6.1, 8.9)*	7.8 (6.2, 9.4)*
75–84	1526 (24.4)	7.6 (6.1, 9.4)*	7.8 (5.8, 9.9)*
≥85	543 (8.3)	8.2 (5.8, 11.5)*	9.4 (5.3, 13.4)*
Gender			
Male (ref)	2296 (44.4)	4.8 (3.8, 6.1)	4.6 (3.4, 5.7)
Female	3455 (55.6)	8.2 (7.1, 9.5)*	9.3 (7.8, 10.9)*
Race/ethnicity			
Non-Hispanic white (ref)	4134 (80.2)	7.6 (6.7, 8.7)	7.5 (6.4, 8.6)
Non-Hispanic black	766 (8.5)	2.5 (1.5, 4.1)*	3.8 (1.6, 6.0)*
Hispanic	562 (6.9)	2.1 (1.2, 3.7)*	3.4 (1.4, 5.4)*
Other	289 (4.3)	4.9 (2.4, 9.9)	5.9 (1.9, 10.0)
Marital status			
Married (ref)	2567 (59.5)	7.6 (6.4, 8.9)	8.2 (6.8, 9.6)
Widowed	1802 (22.5)	6.8 (5.6, 8.2)	5.8 (4.4, 7.2)*
Divorced/separated	950 (11.9)	3.9 (2.6, 5.7)*	4.8 (2.8, 6.8)*
Never married	414 (6.1)	3.2 (1.8, 5.4)*	3.8 (1.4, 6.1)*
Education			
<High school (ref)	1360 (20.5)	3.4 (2.4, 4.7)	3.7 (2.2, 5.2)
High school graduate	1828 (32.8)	5.5 (4.3, 6.9)*	5.0 (3.7, 6.4)
≥Some college	2513 (46.7)	9.1 (7.8, 10.6)*	9.8 (8.2, 11.4)*
Employment status			
Employed (ref)	1322 (25.8)	5.7 (4.4, 7.5)	6.3 (4.5, 8.1)
Not employed	4428 (74.2)	7.1 (6.2, 8.0)	7.3 (6.2, 8.4)
Poverty level			
At or above poverty	3980 (90.6)	7.4 (6.5, 8.5)	7.1 (6.2, 8.1)
Below poverty (ref)	636 (9.4)	2.8 (1.8, 4.4)*	5.1 (2.6, 7.6)
Region			
Northeast (ref)	1051 (18.9)	6.6 (4.8, 9.0)	6.7 (4.4, 9.0)

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Table 1. *(continued)*

Characteristic	Sample *n* (%)	Vaccination coverage[a] (% [95% CI])	Adjusted vaccination coverage[b] (% [95% CI])
Midwest	1313 (23.9)	6.5 (5.1, 8.3)	6.6 (4.9, 8.3)
South	2127 (36.2)	6.8 (5.6, 8.4)	7.7 (5.9, 9.4)
West	1260 (21.0)	6.8 (5.2, 8.8)	6.7 (4.8, 8.5)
Physician contacts within past year			
None (ref)	420 (6.6)	3.4 (1.7, 6.7)	7.5 (2.2, 12.9)
1	608 (11.1)	5.7 (3.9, 8.5)	7.9 (4.6, 11.1)
2–3	1398 (25.6)	6.5 (5.0, 8.3)	6.7 (5.0, 8.4)
4–9	2124 (37.1)	7.6 (6.3, 9.2)*	7.5 (6.0, 9.0)
≥10	1136 (19.6)	7.2 (5.7, 9.2)*	6.1 (4.4, 7.9)
Hospitalization within past year			
Yes (ref)	937 (15.7)	7.8 (5.8, 10.4)	8.5 (5.6, 11.4)
No	4812 (84.3)	6.5 (5.7, 7.4)	6.8 (5.8, 7.6)
Regular physician			
Yes (ref)	5487 (95.6)	6.9 (6.1, 7.9)	7.1 (6.1, 8.1)
No[c]	264 (4.4)	2.0 (1.0, 4.8)*	5.1 (0.4, 9.7)
Influenza vaccination in the past year			
Yes (ref)	3512 (61.6)	8.7 (7.5, 10.0)	8.3 (7.0, 9.6)
No	2235 (38.4)	3.6 (2.7, 4.7)*	4.5 (3.2, 5.9)*
Health insurance			
With health insurance (ref)	5554 (96.9)	6.9 (6.1, 7.8)	7.1 (6.1, 8.1)
Without health insurance[c]	189 (3.1)	0.4 (0.1, 2.9)*	1.4 (–1.3, 4.2)

[a]Estimates are from bivariable analysis and do not use predictive marginals
[b]The adjusted percentages (i.e., predictive marginals) are a type of direct standardization that averages the predicted values from the logistic model, controlling for the confounding factors in the population.
[c]Estimate is not reliable because sample size is less than 30 or the relative SE (RSE) is greater than 0.30.
*$p<0.05$ (t-test for comparisons within each variable with the indicated reference level)
NHIS, National Health Interview Survey

routine vaccination of all persons aged ≥60 years with one dose of HZV in October 2006; these recommendations were published in May 2008.[4,13,14]

In the current study, data were analyzed from the 2008 National Health Interview Survey (NHIS) and the following questions were examined: (1) What is the most recent national HZ vaccination coverage among people aged ≥60 years? (2) What factors affect HZ coverage among adults aged ≥60 years? (3) What are the missed opportunities for individuals who had not been vaccinated?

Methods

The NHIS is an annual household survey conducted in the U.S. by the National Center for Health Statistics of the CDC.[15] Estimates were weighted to the adult civilian non-institutionalized population of the U.S. Face-to-face interviews were conducted in a probability sample of households; interviews took place weekly during January through December of 2008. In the sample adult core, one adult per sampled family was selected randomly and asked to complete the sample adult questionnaire. In 2008, the final response rate for the sample adult core was 62.6%.[15]

The 2008 sample adult core survey included questions on adult immunizations.[15] Question regarding shingles vaccination included the following: *Shingles is an outbreak of a rash or blisters on the skin that may be associated with severe pain. The pain is generally on one side of the body or face. Shingles is caused by the chicken pox virus. A vaccine for shingles has been available since May 2006. Have you ever had the Zoster (ZOSS-ter) or Shingles vaccine, also called Zostavax®?* The study population for this analysis was limited to people aged ≥60 years and the data were analyzed in 2010. In the 2008 NHIS, a total of 5751 individuals

aged ≥60 years were included in the analysis. In all, 3.3% of individuals (199) did not know or refused to report their HZ vaccination status in 2008; they were excluded from analysis.

SUDAAN software, release 10.0, was used to calculate point estimates and 95% CIs.[16] Analyses of HZV coverage were conducted for people aged ≥60 years; overall coverage among people aged 50–59 years also was assessed. All analyses were weighted to reflect the age, gender, and race/ethnicity of the U.S. non-institutionalized civilian population. Univariable analysis was used to assess coverage by demographic and access-to-care variables among people aged ≥60 years. A test for linear trend was conducted for coverage by the calendar quarter of the interview. The adjusted percentages (i.e., predictive margins) are a type of direct standardization that averages the predicted values from the logistic model, controlling for the confounding factors in the population.[17–19] Coverage was adjusted by all demographic and access-to-care variables. Variables were determined to be significant at $p<0.05$.

Results

Table 1 shows the baseline demographic characteristics and HZV coverage for the study population. Among people aged ≥60 years, HZV coverage was 6.7% (95% CI=5.9%, 7.6%) overall in 2008; coverage levels did not increase by calendar quarter during the course of the year (test for trend, $p>0.05$). The coverage level was significantly lower among people aged 60–64 years (4.7%, 95% CI=3.5%, 6.2%) compared to those aged 65–74 years (7.4%, 95% CI=6.1%, 8.9%); 75–84 years (7.6%, 95% CI=6.1%, 9.4%); and ≥85 years (8.2%, 95% CI=5.8%, 11.5%) (Table 1). Among people aged ≥60 years, coverage was significantly higher for women (8.2%, 95% CI=7.1%, 9.5%) than men (4.8%, 95% CI=3.8%, 6.1%) and non-Hispanic whites (7.6%, 95% CI=6.7%, 8.7%) compared with non-Hispanic blacks (2.5%, 95% CI=1.5%, 4.1%) and Hispanics (2.1%, 95% CI=1.2%, 3.7%).

Marital status, educational level, and poverty status were associated with receipt of HZV as well. Age, gender, race/ethnicity, marital status, and education remained predictive of vaccination in the fully adjusted model; an association of coverage with the number of physician contacts and influenza vaccination status in the past year was seen in the univariable analysis but in the fully adjusted analysis it remained significant only for influenza vaccination status (Table 1).

Among people aged 50–59 years, the baseline demographic characteristics were different from those for people aged ≥60 years except the poverty level (data not shown). HZV coverage was 3% among people aged 50–59 years, an age cohort for which the vaccine is not

Table 2. Percentages of people aged ≥60 years who reported never receiving herpes zoster vaccination by selected healthcare access characteristics, NHIS 2008

Characteristic	Sample *n* (%)	Non-Hispanic white	Non-Hispanic black	Hispanic
Doctor visits				
None	387 (6.9)	6.3	8.2	13.0*
1	544 (11.1)	10.8	10.9	15.0
2–3	1243 (25.4)	26.3	21.4	20.3
4–9	1885 (37.0)	36.8	41.2	32.8
≥10	1001 (19.6)	19.8	18.3	18.9
Hospitalization in past year				
Yes	840 (15.7)	15.9	15.5	14.3
No	4280 (84.3)	84.1	84.5	85.7
ER visit				
0	3956 (78.1)	78.6	75.1	75.3
1	737 (13.7)	13.5	13.5	16.7
≥2	424 (8.2)	7.9	11.4	8.0
Influenza vaccination in the past year				
Yes	3061 (60.5)	63.0	46.6*	50.6*
No	2057 (39.5)	37.0	53.4	49.4
At least one possible missed opportunity				
Yes[a]	4828 (95.1)	95.7	93.3*	90.4*
No	278 (4.9)	4.3	6.8	9.6

Note: Data represent potential missed opportunities for herpes zoster vaccination
[a]People who reported one or more of the following: had at least one doctor visit, hospitalized in the past year, had at least one ER visit, or had influenza vaccination in the past year.
*$p<0.05$ (χ^2 test for association between race/ethnicity, non-Hispanic white is the reference group).
NHIS, National Health Interview Survey

licensed or recommended. Factors independently associated with an increased likelihood of vaccination were having a regular physician and having received influenza vaccination in the past year (data not shown).

Among unvaccinated people aged ≥60 years, 95.1% experienced potential missed opportunities during the prior year that could have served as opportunities for HZ vaccination, including 93.1% with one or more outpatient physician visits (Table 2).

Discussion

We previously showed that in the U.S. during 2007, soon after HZV was licensed and recommended for people aged ≥60 years, vaccination coverage in this target population was just 1.9%. Lack of patient awareness and of physician recommendations were identified as barriers to vaccination.[14] HZV coverage has improved since, but remains only 6.7%. Although it is still early in the HZV program, vaccine uptake for new vaccines can be more rapid. For instance, during 2008, national coverage with the human papillomavirus vaccine three-dose series among targeted adolescents was 37.2% even though this vaccine also was licensed during June 2006.[20] It is likely that both provider and patient barriers are preventing a more robust uptake of HZ vaccination.[21]

Regarding providers, introduction of a new prevention strategy usually involves start-up time until clinicians become familiar with the policy, particularly for adult providers who must attend to the acute care needs and disease management for their older patients. HZV is also associated with specific barriers that would affect providers: It is expensive to stock, with stringent storage and handling requirements; reimbursement through Medicare Part D is cumbersome; and supply shortages may have limited promotion by the manufacturer and provider interest.[21] Finally, ACIP recommendations for HZV were not available in published form until May 2008, which may have hindered uptake. Out-of-pocket expenses, lack of availability, and modest manufacturer promotion also may have limited patient awareness and interest in the vaccine, particularly if their providers were not actively recommending it.

Demographic factors independently were associated with coverage, including age, race/ethnicity, gender, marital status, and educational level. However, these cannot explain the overall low level of vaccine uptake. Nonetheless, racial and ethnic disparities at this stage of the HZV program provide early warning of potential problems, particularly because disparities have been reported for other adult vaccines.[22,23–27]

The findings in this study are subject to limitations; in particular, the data were collected by self-report, and vaccination was not verified by medical records so they may be subject to recall bias. However, previous studies[28,29] have found that self-report of adult influenza vaccination was reliable compared with reviews of medical records. In addition, because the NHIS exclude institutionalized and homeless populations, the results may not be completely representative of the entire U.S. populations.

If all eligible people received HZV in accordance with ACIP recommendations, the vaccination could prevent a quarter of a million cases of HZ annually.[30,31] However, it was found that 2 years after HZV became available, coverage levels remain low. Nonetheless, the increase in vaccination coverage compared to 2007 is encouraging, and the amount of proprietary data from the manufacturer of HZV suggests that coverage continues to increase. This study underscores the need to monitor HZV coverage in order to provide early indications of developing problems so that they can be explored and addressed.

The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of the CDC.

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