



HHS Public Access

Author manuscript

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2018 July 01.

Published in final edited form as:

J Acquir Immune Defic Syndr. 2017 July 01; 75(Suppl 3): S370–S374. doi:10.1097/QAI.0000000000001413.

Increasing Human Papillomavirus Vaccine Coverage Among Men Who Have Sex With Men—National HIV Behavioral Surveillance, United States, 2014

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Abstract

Background—Human papillomavirus (HPV) can cause oropharyngeal and anogenital cancers among men who have sex with men (MSM). In 2011, the Advisory Committee on Immunization Practices (ACIP) extended HPV vaccine recommendations to males through age 21 and MSM through age 26. Because of this distinction, vaccination for some MSM might rely on sexual behavior disclosure to health care providers. Receipt of 1 HPV vaccination among MSM aged 18–26 in National HIV Behavioral Surveillance (NHBS) was 4.9% in 2011. We evaluated HPV vaccine coverage and associated factors among MSM in 2014.

Setting—Twenty US metropolitan statistical areas in 2014.

Methods—Coverage was calculated as percentage of MSM self-reporting 1 HPV vaccination. Adjusted prevalence ratios were calculated from Poisson regression models to estimate associations of demographic and behavioral characteristics with HPV vaccination.

Results—Among 2892 MSM aged 18–26 years, HPV vaccine coverage was 17.2%. Overall, 2326 (80.4%) reported a health care visit within 12 months, and 2095 (72.4%) disclosed MSM attraction or behavior to a health care provider. Factors associated with vaccination included self-reported HIV infection; having a health care visit within 12 months, health insurance, or a usual place of care; and disclosing MSM attraction or behavior to a health care provider.

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Presented in part as an oral abstract (#191) at the 2016 National Immunization Conference; September 14, 2016; Atlanta, GA.

The authors have no conflicts of interest to disclose.

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.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.jaids.com).

Conclusions—Since the 2011 recommendation for vaccination of males, HPV vaccine coverage among MSM increased, but remains low. Most MSM reported a recent health care visit and disclosed sexual behavior, indicating opportunities for vaccination. Potential strategies for increasing MSM coverage include improving access to recommended care, and offering education for providers and patients.

Keywords

human papillomavirus; HPV vaccines; public health; epidemiology

INTRODUCTION

Human papillomavirus, or HPV, is the most common sexually transmitted infection in the United States, with an estimated 14 million persons newly infected annually.¹ Persistent infection can cause genital warts and cervical, anogenital, and oropharyngeal cancers. HPV is estimated to have an annual direct medical cost of 1.8 billion dollars.² Among all US men, incidence of HPV-associated anal and oropharyngeal cancers has been increasing over the past 15 years.³ Among men who have sex with men (MSM), both incidence and prevalence of anal HPV infection are high.⁴ Anal cancer rates are also high in this population, similar to the incidence of cervical cancer before the introduction of national cervical cancer screening programs.⁵ HIV-positive MSM have an anal cancer incidence that is 9 times that of HIV-negative MSM.⁵ These diseases are considered largely preventable with prophylactic HPV vaccination.

Quadrivalent HPV vaccine (4vHPV), which protects against 4 types of HPV causing most HPV-related disease, was first licensed in 2006, initially for use in females. In 2009, after licensure for males, the Advisory Committee on Immunization Practices (ACIP) made a permissive recommendation, stating that the vaccine may be used for males. In late 2011, a routine recommendation was made for males at age 11 or 12, through age 21 for all males, and through age 26 for MSM and for immunocompromised persons, including those with HIV infection.⁶ In 2015, recommendations for use of the 9-valent vaccine (9vHPV) were made for the same populations.⁷

Several studies have evaluated HPV vaccine coverage among MSM since the routine recommendation for males in 2011. Baseline coverage among US MSM was calculated using 2011 data from National HIV Behavioral Surveillance (NHBS), since most of these data were collected before the routine ACIP recommendation for males. The analysis showed that 4.9% of 3221 MSM aged 18–26 years reported receiving 1 dose of HPV vaccine, with 13.4% coverage among 224 HIV-positive MSM.⁸ Four studies of online survey data have published point estimates of HPV vaccine coverage among MSM aged 18–26 years after the 2011 policy. In December 2011, coverage for 1 dose of HPV vaccine was 6.8% among 1457 MSM using a website for men seeking other men.⁹ Among 1098 participants aged 18–26 years in a large online survey for US MSM at-risk for HIV in 2012, 14.0% reported receiving 1 dose of HPV vaccine.¹⁰ An online survey conducted in late 2013 found that 1 dose coverage was 13.1% among 428 men aged 18–26 years who self-identified as gay or bisexual.¹¹ In 2014–2015, 1 dose coverage was 20.8% among 336 aged

18–26 years young men using a smartphone dating application for MSM and identifying as gay, bisexual, queer, or questioning or report ever having anal sex with a male.¹² These studies, however, were relatively small, conducted primarily among internet-using MSM, and are not directly comparable to each other. More recent survey data from NHBS can be directly compared with previous NHBS vaccination coverage estimates to assess changes over time in HPV vaccine coverage in this population across the United States.

The objective of this study was to evaluate 1 HPV vaccine coverage and associated factors among a large population of vaccine-eligible MSM aged 18 years and older in the United States in 2014, 3 years after HPV vaccine was recommended routinely for males.

MATERIALS AND METHODS

NHBS is a multicity surveillance system conducted among groups considered at high risk for HIV infection in the United States. MSM are surveyed every third year–long cycle. The surveillance system is designed to monitor HIV seroprevalence, risk behaviors, testing, treatment, and prevention and in 2014, was conducted in 20 metropolitan statistical areas (MSAs) with a high HIV/AIDS burden. Detailed methods have been reported elsewhere,^{13,14} as have characteristics of the overall sample.¹⁵ NHBS uses venue-based sampling methods that are briefly described here. First, staff identified venues frequented by MSM (eg, bars, clubs, gyms, parks, street locations, and social organizations) and days and times when men frequented those venues. Venues in which at least 50% of men attending were MSM were eligible for inclusion. Site staff determined venue eligibility through secondary data review, interviews, focus groups, or observations. Second, venues and corresponding day/time periods were selected randomly for recruitment events. Third, staff members systematically approached men at recruitment events to screen for eligibility (aged 18 years, reside in MSA surveyed, assigned male sex at birth and currently identify as male, report ever had sex with another man, and able to complete the interview in English or Spanish). Interviews were conducted by trained interviewers using a standardized, anonymous questionnaire about demographics, sexual behavior, HPV vaccination history, HIV or other sexually transmitted disease (STD) testing, and other health care use, and offered a nominal incentive, with amounts determined locally. Responses from the fourth MSM cycle, conducted from January through December 2014, are used in this analysis. NHBS activities were approved by local institutional review boards in each participating city. NHBS activities were determined to be research in which the Centers for Disease Control and Prevention (CDC) were not directly engaged and, therefore, did not require separate review by the CDC institutional review board.

The percentage of all MSM self-reporting 1 dose of HPV vaccine was evaluated; further analyses were limited to MSM aged 18–26 years, within the target age range for HPV vaccination. Bacterial sexually transmitted infections were defined as syphilis, chlamydia, or gonorrhea. We calculated descriptive frequencies and performed bivariate analyses using Pearson χ^2 tests to assess associations between self-reported receipt of HPV vaccine and demographic characteristics, behavioral risk factors, and other sexual health characteristics. In addition, we assessed health care use, including recent health care visits and disclosure of same-sex sexual attraction or behavior to a health care provider. Prevalence ratios with 95%

confidence intervals (CIs) were calculated from separate Poisson regression models with generalized estimating equations to estimate associations of each demographic and behavioral characteristic with HPV vaccination. All models were clustered on venue-based sampling recruitment event. Adjusted prevalence ratios (aPRs) are presented for the associations between select health care-associated covariates and HPV vaccination. Separate models were built for each association. Initially, each model was adjusted for age, race, education, insurance status, census region, self-reported HIV status, and sexual identity; backward elimination was then used to reduce models, based on an alpha of 0.05, until only significant covariates remained in the models. When characteristics were reported, results from the South and Territories census regions were combined because of standard NHBS reporting procedures; however, each census region was considered separately in all models presented. Statistical analyses were performed using SAS software, version 9.3 (SAS Institute, Cary, NC).

RESULTS

Of 10,369 consenting NHBS participants with valid surveys, 10,161 (98.0%) provided a response when asked about HPV vaccination. Of those, a total of 860 (8.5%) reported ever receiving 1 dose of HPV vaccine (Table 1). The proportion of MSM reporting any HPV vaccination was lower among older age groups. Of 1654 MSM who were HIV positive by self-report, 228 (13.2%) reported receiving 1 dose of HPV vaccine. In every age group, HIV-positive MSM had higher vaccination coverage than HIV-negative MSM.

Among young MSM aged 18–26 years, there were 2982 consenting NHBS participants with valid surveys, and 2892 (97.0%) provided a response about HPV vaccination. Among these men, 497 (17.2%) reported ever receiving 1 dose of HPV vaccine. Of 277 self-reported HIV-positive MSM, 103 (37.2%) reported ever receiving 1 dose of HPV vaccine; 242 (87%) reported having a usual place of care, 266 (96%) reported that they have visited a health care provider within 12 months, and 262 (95%) reported disclosure of same-sex sexual attraction or behavior to a health care provider.

In bivariate analysis among MSM aged 18–26 years, HPV vaccine coverage was significantly associated with several demographic characteristics, health care use, and sexual behaviors (Table 2). Coverage was higher among the younger age group, men aged 18–21 years, compared with those aged 22–26 years. Coverage was also higher among non-Hispanic white MSM, those with at least some college education, and those residing in the Northeast or West regions of the United States. Having health insurance, a usual place of health care, a health care visit within the last 12 months, and having been tested or diagnosed with an STD were all associated with higher reported HPV vaccine coverage. There was a trend toward higher coverage among men reporting more sex partners in the previous 12 months.

In multivariable analysis, reporting a positive HIV test (aPR 2.60; CI: 2.19 to 3.08), a physician visit to healthcare provider in the past 12 months (aPR 2.35; CI: 1.69 to 3.28), any health insurance (aPR 1.69; CI: 1.35 to 2.12), a usual place of care (aPR 1.56; CI: 1.24 to 1.98), and disclosure of same-sex sexual attraction or behavior to a health care provider

(aPR 1.42; CI: 1.14 to 1.76) were associated with receipt of 1 dose of HPV vaccine (Table 3).

Most young men reported opportunities for vaccination. Of all young vaccine-eligible MSM, 2142 (74.6%) reported having some form of health insurance. In addition, 2326 (80.4%) reported visiting a health care provider within the past 12 months and 2095 (72.4%) reported disclosing male attraction or behavior to their health care provider.

DISCUSSION

Three years after a national recommendation for HPV vaccination of men, HPV vaccine coverage among MSM aged 18–26 years was 17.2%. Coverage among HIV-positive MSM in this age range was 37.2%, and 15.1% among those who did not report a positive HIV test. Most young MSM had a recent health care visit and disclosed sexual behavior to their health care provider, suggesting opportunities for vaccination. Access to health care was significantly associated with vaccination.

Compared with a similar analysis using NHBS data in 2011,⁸ coverage increased 12.3 percentage points, from 4.9% to 17.2% among all young vaccine-eligible MSM, and 23.8 percentage points, from 13.4% to 37.2%, among those who report being HIV-positive. Coverage in our sample was higher than that among young men aged 19–26 in the general US population, according to an estimate from the National Health Interview Survey, which found that 8.2% reported 1 dose of HPV vaccine in 2014.¹⁶ Of note, among boys aged 13–17 years, an estimated 49.8% received 1 dose of HPV vaccine in 2015, according to the National Immunization Survey-Teen.¹⁷ As coverage increases in adolescents, coverage will increase over time as men vaccinated as adolescents age into the older groups, such as the MSM surveyed in NHBS.

In this analysis, the highest vaccine coverage was reported among young HIV-positive MSM. This group is at particularly high risk for HPV-related diseases⁵; higher coverage might represent increased access to routine preventive or sexual health care and/or health care professionals who are more likely to adhere to current immunization guidelines for this population. CDC's STD Treatment Guidelines¹⁸ specify elements of recommended care for all sexually active MSM, including testing for HIV and other STDs, and vaccination against hepatitis A and B and HPV.

HPV vaccines are ideally administered before exposure to HPV,^{19–21} and studies of incident infections demonstrate that first HPV infection usually occurs within a few years of becoming sexually active.²² However, a recent study among 922 vaccine-eligible gay, bisexual, and other MSM aged 18–26 years in 2 US cities demonstrated that while 90.9% of HIV-positive young MSM and 62.9% of other MSM were seropositive for any 4vHPV types, only 29.5% of HIV-positive MSM and 8.5% of other MSM were seropositive for all four 4vHPV types of HPV.²³ These findings suggest that sexually active young MSM can benefit from vaccination.

Our analysis is subject to several limitations. Survey results are self-reported, and may be subject to social desirability bias or recall error. Given the anonymous nature of the survey,

receipt of vaccination could not be confirmed with medical records. In addition, total number of doses of HPV vaccine was not assessed, so completion of the vaccine series could not be evaluated. Finally, venue-attending MSM in large MSAs may not be representative of all MSM in the MSAs, or of all US MSM.

HPV vaccination coverage has increased among US MSM since ACIP's routine recommendation for males in 2011 but remains low. It is important to offer HPV vaccine for all unvaccinated MSM through age 26 years. This study demonstrated that most young MSM regularly seek health care and disclose sexual behavior to their health care providers. Given these opportunities to provide recommended health care, potential strategies for increasing HPV vaccine coverage include strengthening education for health care providers and patients about current vaccination policies and national recommendations, and improving access to recommended care among this at-risk population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We thank the NHBS participants.

For the full list of NHBS Study Group participants, please see Supplemental Digital Content, <http://links.lww.com/QAI/B40>.

Supported by the Centers for Disease Control and Prevention.

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TABLE 1

MSM Reporting 1 Dose of HPV Vaccine, by Age and Self-Reported HIV Status—National HIV Behavioral Surveillance, United States, 2014

Age Group, yr	All Participants, N	Received 1 Dose of HPV Vaccine, Among All Participants, n (%)	Self-Reported Positive HIV Test, Among All Participants, n (%)	Received 1 Dose of HPV Vaccine, Among Participants Reporting a Positive HIV Test, n (%)
18–26	2892	497 (17.2)	277 (9.6)	103 (37.2)
27–30	1581	164 (10.4)	208 (13.2)	39 (18.8)
31–40	2426	111 (4.6)	393 (16.2)	46 (11.7)
>40	3262	88 (2.7)	776 (23.8)	40 (5.2)
Total	10,161	860 (8.5)	1654 (16.3)	228 (13.8)

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TABLE 2

HPV Vaccine Coverage Among Young Men Aged 18–26 Years Who Have Sex With Men, by Characteristic—
National HIV Behavioral Surveillance, United States, 2014

Characteristic	Participants, N	Reported 1 Dose of HPV Vaccine, n (%)	Prevalence Ratio (95% Confidence Interval)
Total	2892	497 (17.2)	
Age group, yr			
18–21	683	139 (20.4)	1.26 (1.05 to 1.50)
22–26	2209	358 (16.2)	Ref
Race/ethnicity			
White	761	151 (19.8)	Ref
Black	972	165 (17.0)	0.86 (0.69 to 1.07)
Hispanic/Latino *	883	123 (13.9)	0.70 (0.56 to 0.88)
Other †	260	56 (21.5)	1.09 (0.83 to 1.41)
Education			
Up to high school	1058	149 (14.1)	Ref
Some college or higher	1834	348 (19.0)	1.35 (1.11 to 1.63)
Sexual identity			
Homosexual/Gay	2271	413 (18.2)	Ref
Bisexual	550	73 (13.3)	0.73 (0.57 to 0.93)
Heterosexual/straight	56	6 (10.7)	0.59 (0.28 to 1.23)
Census Region			
South and Territories	1216	125 (10.3)	Ref
Northeast	779	206 (26.4)	2.57 (2.07 to 3.19)
West	601	127 (21.1)	2.06 (1.62 to 2.61)
Midwest	296	39 (13.2)	1.28 (0.88 to 1.87)
Current health insurance			
None	729	74 (10.2)	Ref
Any	2142	420 (19.6)	1.93 (1.53 to 2.44)
Usual place of care			
None	696	68 (9.8)	Ref
Any	2195	429 (19.5)	2.00 (1.59 to 2.52)
Usual place of care ‡			
Hospital ED	435	51 (11.7)	Ref
Clinic or health center	753	158 (21.0)	1.79 (1.34 to 2.39)
Doctor's office or HMO	1249	249 (19.9)	1.70 (1.29 to 2.24)
Other	63	9 (14.3)	1.22 (0.62 to 2.36)
Visited HCP in past 12 months			
No	566	33 (5.8)	Ref
Yes	2326	464 (20.0)	3.42 (2.45 to 4.78)
Disclosed same-sex sexual attraction or behavior to a HCP			
No	797	87 (10.9)	Ref

Characteristic	Participants, N	Reported 1 Dose of HPV Vaccine, n (%)	Prevalence Ratio (95% Confidence Interval)
Yes	2095	410 (19.6)	1.80 (1.45 to 2.23)
Tested for HIV in past 12 months			
No	789	104 (13.2)	Ref
Yes	2081	389 (18.7)	1.42 (1.17 to 1.72)
HIV test result, self-reported			
Negative or unknown	2615	394 (15.1)	Ref
Positive	277	103 (37.2)	2.45 (2.08 to 2.93)
Tested for a bacterial STD in past 12 months			
No	1231	115 (9.3)	Ref
Yes	1656	381 (23.0)	2.46 (1.99 to 3.04)
Told had a bacterial STD in past 12 months			
No	2424	395 (16.3)	Ref
Yes	468	102 (21.8)	1.34 (1.10 to 1.63)
Ever told had genital warts			
No	2787	472 (16.9)	Ref
Yes	105	25 (23.8)	1.41 (0.98 to 2.01)
Number sex partners in past 12 months [§]			
1	420	58 (13.8)	Ref
2–3	882	147 (16.7)	1.19 (0.91 to 1.56)
4–5	534	94 (17.6)	1.26 (0.93 to 1.69)
>5	980	184 (18.8)	1.34 (1.03 to 1.75)

* Persons identifying as Hispanic or Latino can be of any race.

[†] Includes Asian, Pacific Islander, American Indian, other race, or multiple races.

[‡] Among participants reporting 1 usual place of care.

[§] Among participants reporting 1 sex partner in past 12 months.

ED, Emergency Department; HCP, Health care provider; HMO, Health maintenance organization.

TABLE 3

Adjusted Prevalence Ratios for Self-Reported Receipt of HPV Vaccine Among Young Men Aged 18–26 Years Who Have Sex With Men—National HIV Behavioral Surveillance, United States, 2014

Characteristic	Adjusted Prevalence Ratio, (95% Confidence Interval)
Self-reported HIV test result	
Negative or unknown	Ref
Positive	2.60 (2.19 to 3.08) [*]
Visited health care provider in past 12 months	
No	Ref
Yes	2.35 (1.69 to 3.28) [†]
Health insurance	
None	Ref
Any	1.69 (1.35 to 2.12) [†]
Usual place of care	
None	Ref
Any	1.56 (1.24 to 1.98) [†]
Disclosed same-sex sexual attraction or behavior to a health care provider	
No	Ref
Yes	1.42 (1.14 to 1.76) [†]

^{*} Separate models built for each association; the final model adjusted for age, education, insurance status, and region.

[†] Separate models built for each association; the final model adjusted for age, education, insurance status, region, and self-reported HIV test result.