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SHORT REPORT



Human papillomavirus vaccination coverage among young, gay, bisexual, and other men who have sex with men and transgender women — 3 U.S. cities, 2016–2018

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ABSTRACT

Gay, bisexual, and other men who have sex with men (MSM) and transgender women are disproportionately affected by human papillomavirus (HPV). HPV vaccination is routinely recommended for U.S. adolescents at age 11–12 years, with catch-up vaccination through age 26 years. We assessed HPV vaccination coverage and associated factors among young MSM and transgender women. The Vaccine Impact in Men study enrolled MSM aged 18–26 years from clinics in Seattle, Chicago, and Los Angeles, during February 2016–September 2018. Participants self-reported socio-demographic information and HPV vaccination status. Among 1416 participants, 673 (47.5%) reported ≥ 1 HPV vaccine dose. Among vaccinated participants, median age at first dose was 19 years and median age at first sex was 17 years; 493 (73.3%) reported that their age at first dose was older than their age at first sex. There were significant differences in HPV vaccination coverage by city (range 33%–62%), age, race/ethnicity, and gender identity. Coverage was highest in Seattle, where younger age was the only factor associated with vaccination. Differences in coverage by city may be due to variation in vaccination practices or enrollment at study sites. Increasing both routine and catch-up vaccination will improve coverage among MSM and transgender women.

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Human papillomavirus (HPV) is a common sexually transmitted infection. Gay, bisexual, and other men who have sex with men (MSM) and transgender women are disproportionately affected by HPV, particularly those who are living with human immunodeficiency virus (HIV). A pooled analysis found that anal prevalence of high-risk HPV was high among MSM (74.3% among HIV-positive, 41.2% among HIV-negative) compared to men who have sex with women (26.9% among HIV-positive, 6.9% among HIV-negative).¹ A 2012 systematic review reported that among HIV-positive MSM, anal cancer incidence was 46 per 100,000, compared to 5 per 100,000 among HIV-negative MSM.² Among transgender women, HPV prevalence has been reported as even higher than among MSM.³

HPV vaccines are effective in preventing new infections with HPV types that cause most HPV-related diseases, including cervical, anal, oropharyngeal, and other cancers. Quadrivalent HPV vaccine (4vHPV; Gardasil, Merck) targets four HPV types (HPV 16/11/16/18) and has been licensed for use in the United States since 2006. Data from the pivotal 4vHPV clinical trial in men found that among young men with ≤ 5 lifetime sex partners, 4vHPV was effective at preventing new anal infection and genital lesions associated with

4vHPV types.⁴ A substudy of participating MSM showed that 4vHPV was effective for prevention of anal intraepithelial neoplasia associated with 4vHPV types.⁵ In 2015, HPV vaccine distribution in the United States changed to 9-valent HPV vaccine (9vHPV, Gardasil 9, Merck) targeting these same four HPV types as well as five additional types (HPV 31/33/45/52/58).⁶

Since 2011 in the United States, HPV vaccination has been routinely recommended for both girls and boys at age 11–12 years (or can start at age 9 years), with catch-up vaccination recommended for women, MSM, and transgender people through age 26 years.^{6–8} In 2019, shared clinical decision-making was recommended for some adults aged 27–45 years who might be at risk for new HPV infection and might benefit from vaccination.⁶ These nationally recommended vaccinations are covered by most health insurance plans and, for those eligible, by the Vaccines for Children program.⁷ Nationally, HPV vaccination coverage has been increasing steadily since vaccine introduction; in 2019, 69.8% of males aged 13–17 years reported receipt of ≥ 1 dose of HPV vaccine.⁹ Among young adult males, this proportion was lower; in 2018, HPV vaccination coverage was 26.3% for males aged 19–26 years.¹⁰ Among young adult MSM, HPV vaccination

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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. A portion of these data were presented as a poster at the 2021 National LGBTQ Health Conference, held virtually in May 2021.

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Table 1. HPV vaccination coverage* among participating gay, bisexual, and other men who have sex with men, by participant characteristics – 3 U.S. cities, 2016–2018.

Characteristic	Overall N (column %)	Vaccinated against HPV* n (row %)	P value
Total	1416 (100.0)	673 (47.5)	
City			<.01
Chicago	525 (37.1)	229 (43.6)	
Seattle	518 (36.6)	322 (62.2)	
Los Angeles	373 (26.3)	122 (32.7)	
Age, years			<.01
18–21	490 (34.6)	262 (53.5)	
22–26	926 (65.4)	411 (44.4)	
Race/ethnicity			<.01
White, NH	444 (31.4)	259 (58.3)	
Hispanic/Latino	426 (30.1)	193 (45.3)	
Black/African American, NH	221 (15.6)	70 (31.7)	
Asian, Native Hawaiian/Pacific Islander, NH	107 (7.6)	64 (59.8)	
Multiple race/ethnicity, NH	106 (7.5)	51 (48.1)	
Other race/ethnicity**	112 (7.9)	36 (32.1)	
Gender identity			.01
Male	1342 (94.8)	640 (47.7)	
Female/transgender female	39 (2.8)	11 (28.2)	
Other or unknown gender identity	35 (2.5)	22 (62.9)	
Sexual orientation			.20
Gay	1014 (71.6)	486 (47.9)	
Bisexual, queer, or other sexual orientation	298 (21.1)	131 (44.0)	
Straight, unsure, or unknown sexual orientation	104 (7.3)	56 (53.9)	
Self-reported HIV status			.22
HIV-positive	113 (8.0)	60 (53.1)	
HIV-negative or unknown HIV status	1303 (92.0)	613 (47.1)	

Abbreviations: HPV, human papillomavirus; NH, non-Hispanic/Latino; PrEP, pre-exposure prophylaxis; HIV, human immunodeficiency virus.

*Self-reported receiving ≥ 1 dose of HPV vaccine at age ≥ 9 years.

**Includes American Indian/Alaska Native, NH; other race/ethnicity; unknown race/ethnicity.

coverage reported in different studies and surveys has ranged from 7% in 2011, when the national recommendation was first made, to 38% in 2017.^{11–22} These surveys and studies also explored factors associated with vaccination; while some reported that vaccination coverage was significantly associated with race/ethnicity,^{12,13,15,19} others did not,^{14,16} and several reported no significant associations between coverage and any demographic characteristics.^{11,18,20} The objective of this analysis was to assess HPV vaccination coverage and associated characteristics among young gay, bisexual, and other MSM and young transgender women using data from a study conducted in three U.S. cities in 2016–2018.

The cross-sectional Vaccine Impact in Men (VIM) study enrolled gay, bisexual, and other MSM and transgender women aged 18–26 years during February 2016 through September 2018. Detailed methods have been reported elsewhere.^{23,24} Participants were enrolled from three urban centers/clinics serving primarily lesbian, gay, bisexual, transgender, queer (LGBTQ) and other sexual minority populations, specifically a community center in Chicago, Illinois, a sexually transmitted disease (STD) clinic and a community testing site in Seattle, Washington, and an LGBTQ clinic in Los Angeles, California.

Participants were eligible if they met the following three criteria at time of enrollment: (1) aged 18–26 years; (2) assigned male sex at birth, regardless of current gender identity or expression; and (3) ever having oral or anal sex with a male partner, currently identifying as gay or bisexual, and/or intending to have sex with a male partner in the future. Written

informed consent was obtained from all study participants. The research study protocol was reviewed and approved by institutional review boards at each participating institution and at the Centers for Disease Control and Prevention.

Participants self-reported demographic characteristics, sexual behavior, and health information (including HIV status and HPV vaccination history) through a survey (on paper or electronically via Qualtrics). In Seattle, additional data were collected from clinic records.²⁵ Most participants were enrolled and completed all study elements on the same day during a visit for another purpose (e.g., clinic visit or participation in an ongoing cohort study).²⁶ Each participant was assigned a unique study identification code; no personally identifiable information was shared with CDC.

For this analysis, participants were considered vaccinated if they self-reported receiving ≥ 1 dose of HPV vaccine at an eligible age (age ≥ 9 years) and unvaccinated if they self-reported never receiving HPV vaccine. Descriptive statistics were calculated: count and proportion for categorical variables, and median and interquartile range (IQR) for continuous variables. We analyzed HPV vaccination status by participant characteristics and conducted chi-square or Fisher's exact tests to identify associations between them, overall and stratified by city. A *p* value of <0.05 was considered significant. All calculations were performed using SAS 9.4 (SAS Institute, Cary, NC).

Of 1881 young gay, bisexual, and other MSM and young transgender women study participants, 1416 were included in this analysis (Table 1) and 456 were excluded (226 did

Table 2. HPV vaccination coverage* among participating gay, bisexual, and other men who have sex with men, by city and participant characteristics – 3 U.S. cities, 2016–2018.

Characteristic	Vaccinated against HPV								
	Chicago			Seattle			Los Angeles		
	N	n (%)	P value	N	n (%)	P value	N	n (%)	P value
All participants	525	229 (43.6)		518	322 (62.2)		373	122 (32.7)	
Age, years			.01			.01			.08
18–21	296	144 (48.7)		124	89 (71.8)		70	29 (41.4)	
22–26	229	85 (37.1)		394	233 (59.1)		303	93 (30.7)	
Race/ethnicity			<.01			.95			.25
White, NH	139	82 (59.0)		266	164 (61.7)		39	13 (33.3)	
Hispanic/Latino	151	65 (43.1)		103	67 (65.1)		172	61 (35.5)	
Black/African American, NH	181	53 (29.3)		31	17 (54.8)		9	-	
Asian, Native Hawaiian/Pacific Islander, NH	13	6 (46.2)		93	58 (62.4)		<5	-	
Multiple race/ethnicity, NH	30	20 (66.7)		16	10 (62.5)		60	21 (35.0)	
Other race/ethnicity**	11	3 (27.3)		9	6 (66.7)		92	27 (29.4)	
Gender identity			.02			.28			.02
Male	480	205 (42.7)		504	316 (62.7)		358	119 (33.2)	
Female/transgender female	26	10 (38.5)		<5	-		10	-	
Other or unknown gender identity	19	14 (73.7)		11	5 (45.5)		5	-	

Where >20% of cells had expected counts <5, Fisher's exact test was used; other results are from chi-square test. Cell counts <5 were suppressed to protect participant privacy.

Abbreviations: HPV, human papillomavirus; NH, non-Hispanic/Latino; STD, sexually transmitted disease; IQR: interquartile range.

*Self-reported receiving ≥ 1 dose of HPV vaccine at age ≥ 9 years.

**Includes American Indian/Alaska Native, NH; other race/ethnicity; unknown race/ethnicity.

Table 3. Characteristics of participating gay, bisexual, and other men who have sex with men who reported receiving ≥ 1 dose of HPV vaccine* overall and by city – 3 U.S. cities, 2016–2018.

Characteristic	Overall N (%) or median (IQR)	Chicago n (%) or median (IQR)	Seattle n (%) or median (IQR)	Los Angeles n (%) or median (IQR)
Total	673	229	322	122
Age at first dose of HPV vaccine, years	19 (16, 22)	17 (15, 20)	21 (18, 23)	19.5 (16, 22)
Age at first sex, years	17 (15, 18)	16 (15, 17)	17 (15, 18)	17 (15, 18)
Age at first dose of HPV vaccine relative to age at first sex**				
Age at first dose < age at first sex	139 (20.7)	69 (30.1)	39 (12.1)	31 (25.4)
Age at first dose \geq age at first sex	533 (79.2)	159 (69.4)	283 (87.9)	91 (74.6)
Location for first dose of HPV vaccine				
Public health/STD clinic	225 (33.4)	45 (19.7)	158 (49.1)	22 (18.0)
Pediatrician's office	185 (27.5)	107 (46.7)	44 (13.7)	34 (27.9)
Family/internal medicine clinic	182 (27.0)	56 (24.5)	81 (25.2)	45 (36.9)
Other location***	81 (12.0)	21 (9.2)	39 (12.1)	21 (17.2)

Abbreviations: HPV, human papillomavirus; STD, sexually transmitted disease; IQR: interquartile range

*Eligible age for HPV vaccine was age ≥ 9 years.

**Numbers may not add to total due to missing data.

***Other, hospital or emergency room, pharmacy, unknown.

not respond to a question about HPV vaccination, 168 were unsure if they had been vaccinated, 52 did not report an age at first dose, and 19 reported an ineligible age at first dose). Similar proportions of participants were included in the analysis from Chicago (37.1%) and Seattle (36.6%), with fewer from Los Angeles (26.3%). Overall, two-thirds of participants were aged 22–26 years (65.4%); non-Hispanic White (31.4%) and Hispanic/Latino (30.1%) persons represented the largest racial/ethnic groups. Most participants identified as male (94.8%) and as gay (71.6%); few disclosed being HIV-positive (8.0%). Overall, 673 (47.5%) reported receiving ≥ 1 dose of HPV vaccine. There were significant differences in HPV vaccination coverage by city, age, race/ethnicity, and gender identity. To further examine these differences, we stratified data by city (Table 2). Among Chicago participants, coverage differed significantly by age, race/ethnicity, and gender identity. Among Seattle

participants, coverage differed significantly only by age. Among Los Angeles participants, coverage differed significantly only by gender identity.

We also examined characteristics of 673 vaccinated participants (Table 3). Median age at first dose of HPV vaccine was 19 years overall, and by city was 17 years in Chicago, 21 years in Seattle, and 19.5 years in Los Angeles. Overall, 20.7% reported an age at first dose before their age at first sex; however, this differed by city and was highest among Chicago participants (30.1%) and lowest among Seattle participants (12.1%). Location for first dose of HPV vaccine also varied by city; Chicago participants most frequently reported receiving HPV vaccine at a pediatrician's office (47.6%), Seattle participants most frequently at a public health/STD clinic (49.1%), and Los Angeles participants most frequently at a family/internal medicine clinic (36.9%). Of those who initiated vaccination, 324 (48.1%)

reported completing the 3-dose HPV vaccination series: 99 (43.2%) in Chicago, 170 (52.8%) in Seattle, and 55 (45.1%) in Los Angeles.

This analysis reports HPV vaccination coverage among young, gay, bisexual, and other MSM and young transgender women in three U.S. cities in 2016–2018. Overall, almost half of participants reported receiving ≥ 1 dose of HPV vaccine; coverage ranged from 33%–62% by city. Among vaccinated participants, median age at first dose (19 years) was older than the recommended age for routine vaccination (11–12 years), and most participants did not receive their first HPV vaccine dose until after having sex for the first time. Of note, all study participants were within the recommended age range for catch-up vaccination, but most would have been older than age 12 years in 2011, when the national recommendation was first made for routine HPV vaccination of males.⁷

HPV vaccination coverage differed significantly by characteristics including city, age, race/ethnicity, and gender identity. After stratifying by city, differences by age remained in Chicago and Seattle, with higher coverage among the younger age group. Significant differences by race/ethnicity remained only in Chicago, where coverage was nearly 30 percentage points lower among non-Hispanic Black/African American participants compared with non-Hispanic White participants. Significant differences by gender identity remained in Chicago and Los Angeles, with lower coverage among participants identifying as female/transgender female (Los Angeles results suppressed).

Differences in HPV vaccination coverage by city may be attributable to different vaccination practices in the three cities as well as differences in enrollment venues – the Chicago enrollment site is a community center, the Seattle sites are an STD clinic and a community testing site, and the Los Angeles site is an LGBTQ clinic. While all serve LGBTQ populations, the different services provided may have attracted different types of study participants. We also observed differences among vaccinated participants by city; Chicago participants reported a younger age at vaccination and a high proportion were vaccinated at a pediatrician's office. In contrast, Seattle participants reported an older age at vaccination and almost half were vaccinated at a public health/STD clinic; this, along with higher coverage at this site, may be due to a local health department campaign that occurred during the study period to promote HPV vaccination among gay men, bisexual men, transgender people, and straight men who have sex with men,²⁷ as well as the site being proactive in providing HPV vaccination for adult MSM and transgender people.

In this analysis, HPV vaccination coverage overall (47.5%) was higher than reported in earlier similar studies, suggesting that coverage is continuing to increase over time. Data from the National HIV Behavioral System, conducted in approximately 20 U.S. cities annually among people at high risk for HIV, and among MSM every three years in approximately 20 U.S. cities, have shown HPV vaccination coverage increasing among young MSM, from 5% in 2011 to 33% in 2017.^{11–13} Other large multi-site surveys, such as the National Health Interview Survey and the National College

Health Assessment, respectively showed coverage among males aged 18–26 years who identify as gay at 18% in 2013–2015²¹ and increasing from 24% in 2011 to 32% in 2012.²² Online surveys of young MSM in the United States have reported coverage ranging from 7% in 2011 to 38% in 2017,^{14–18} while a 2-city study we previously conducted reported coverage of 14% in 2012–2014,¹⁹ and a different single-site study reported uptake of 42% in 2015.²⁰ A 2020 meta-analysis including most of these studies reported an average HPV vaccination uptake of 38%.²⁸

Our findings are subject to at least three limitations. First, data collected from enrollment sites were not population-based and thus are not necessarily representative of all MSM or transgender women in the three cities. Second, HPV vaccination history was self-reported, and a quarter of VIM study participants were unsure, did not respond to this survey question, or reported an ineligible age at first dose; thus, data from this analysis may over- or under-estimate true vaccination coverage. Third, some numbers for participant characteristic categories are small, limiting interpretation of some differences in vaccination coverage.

Although most effective when administered at younger ages (i.e., before first sex),⁹ HPV vaccination is recommended for all MSM and transgender people through age 26 years. Encouragingly, about half of young, gay, bisexual, and other MSM and young transgender women in our analysis had received ≥ 1 dose of HPV vaccine, and coverage varied by enrollment site in three U.S. cities. However, most vaccinated participants reported that they already had sex for the first time before receiving their first dose of HPV vaccine. Health care providers play an important role in providing education about HPV and promoting vaccination for this population; a health care provider recommendation is a strong predictor for HPV vaccine uptake among young MSM and adolescents in general.^{15,19,29,30} Recently, mobile app and web-based platforms have been developed to increase awareness and facilitate HPV vaccination among young MSM.^{31–33} While routine vaccination for all adolescents at age 11–12 years is expected to provide the best protection against HPV infection and related diseases, increasing both routine and catch-up vaccination will improve HPV vaccination coverage among MSM and transgender people.

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