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Transgender Women Have Higher Human Papillomavirus Prevalence Than Men Who Have Sex With Men—Two U.S. Cities, 2012–2014

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Abstract

Background: Human papillomavirus (HPV) prevalence is high among men who have sex with men (MSM), yet little is known about HPV among transgender women (TGW). We assessed HPV prevalence and knowledge among TGW compared with MSM.

Methods: We enrolled TGW and MSM aged 18 to 26 years from clinics in Chicago and Los Angeles during 2012 to 2014. Participants self-reported gender identity, HIV status, HPV knowledge, and vaccination status. Self-collected anal and oral specimens were tested for HPV DNA (37 types); serum was tested for HPV antibodies (4 vaccine types). Prevalence among unvaccinated TGW and MSM was compared using prevalence ratios (PRs) and 95% confidence intervals (CIs). Participants without DNA or serologic evidence of HPV were considered naïve.

Results: Among 1033 participants, 49 were TGW. Among 44 TGW and 855 MSM who were unvaccinated, any HPV DNA was detected in anal specimens from 39 (88.6%) TGW and 606 (70.9%) MSM (PR, 1.3; 95% CI, 1.1–1.4), and oral specimens from 4 (9.1%) TGW and 81 (9.5%) MSM (PR, 1.0; 95% CI, 0.4–2.5). Antibodies were detected among 37 (84.1%) TGW and 467 (54.6%) MSM (PR, 1.5; 95% CI, 1.3–1.8). Most participants were naïve to 1 or more HPV vaccine

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type/s, including 29 (65.9%) TGW and 775 (90.6%) MSM (PR, 0.7; 95% CI, 0.6–0.9). Most TGW (55.1%) had never heard of HPV vaccine.

Conclusions: Among TGW, HPV prevalence was high and knowledge was low. Most were still naïve to 1 or more HPV vaccine type. Although vaccination ideally occurs prior to exposure, findings support existing national recommendations to vaccinate TGW and MSM, and suggest additional outreach might increase vaccination.

Human papillomavirus (HPV) is the most common sexually transmitted infection. Among sexually experienced 14- to 59-year-olds in the United States, prevalence of any genital HPV was 45.8% among men and 40.1% among women during 2013 to 2014.[1] A recent meta-analysis found prevalence of any HPV is 2 to 5 times higher among men who have sex with men (MSM), compared with men who have sex exclusively with women (MSW); any anal HPV prevalence was highest among HIV-positive MSM (81%) and lowest among HIV-negative MSW (12%).[2] However, little is known about HPV prevalence among transgender women (TGW).

Vaccines against HPV were first introduced in 2006; all protect against HPV types 16 and 18, which cause the majority of HPV-related cancers. Quadrivalent and 9-valent HPV vaccines (Gardasil and Gardasil 9; Merck & Co., Inc., Kenilworth, NJ) protect against low-risk HPV types that cause anogenital warts and also high-risk HPV types that can cause anal, cervical, oropharyngeal, penile, vaginal, and vulvar cancers.[3] The 9-valent HPV vaccine was first licensed in 2015 and has been the only vaccine distributed in the United States since late 2016.

The Advisory Committee on Immunization Practices has recommended U.S. HPV vaccination for females since 2006 and males since 2010 and has explicitly included transgender people since 2016.[3,4] Vaccination is routinely recommended for all U.S. adolescents at age 11 or 12 years (can start at age 9 years), and catch-up vaccination is recommended through age 26 years. Vaccination is recommended for special populations including MSM and transgender persons.[3,4]

Transgender people face a unique set of health challenges, including barriers and lack of access to health care.[5] In a 30-year population-based study in Sweden, overall mortality was significantly higher among sex-reassigned persons than controls of the same sex at birth (adjusted hazard ratio, 2.8; 95% CI, 1.8—4.3).[6] Transgender women also face extremely high rates of other sexually transmitted infections, including HIV. A study at 26 U.S. clinics providing STD services reported that among 506 TGW, 13.1% tested positive for chlamydia and 12.6% tested positive for gonorrhea at 1 or more anatomic sites.[7] In contrast, estimated national prevalence is 1.7% for chlamydia and 0.32% for gonorrhea among cisgender men aged 15 to 24 years in the United States,[8] and among MSM tested at STD clinics, 11.1% were positive for urogenital gonorrhea, 10.2% for rectal gonorrhea, 7.9% for pharyngeal gonorrhea, 8.4% for urogenital chlamydia, 14.1% for rectal chlamydia, and 2.9% for pharyngeal chlamydia.[9] A systematic review suggested HIV prevalence is 28% among all TGW and 56% among black TGW in the United States.[10] HIV infection is of particular importance to HPV epidemiology; a 2018 meta-analysis found that with HIV coinfection,

risk of HPV acquisition is approximately doubled and the rate of HPV clearance is approximately halved.[11]

Because TGW are not often specifically included in epidemiological studies, data are lacking on prevalence and risk factors for many health conditions in this population, potentially hampering the application of effective interventions.[12] To address the lack of information about HPV epidemiology among TGW, we assessed HPV prevalence and vaccine knowledge among TGW compared with cisgender MSM.

METHODS

Between July 2012 and August 2014, the Young Men's HPV (YMHPV) cross-sectional study enrolled 1033 participants, including TGW and gay, bisexual, and other MSM, from 2 community health clinics serving lesbian, gay, transgender, and bisexual (LGBT) populations in Los Angeles, CA and Chicago, IL. Detailed methods for the YMHPV study have been described previously.[13,14] The study protocol was reviewed and approved by institutional review boards at the participating institutions.

Eligible participants met the following criteria at enrollment: (1) aged 18 to 26 years; (2) assigned male sex at birth, regardless of current gender identity or expression; and (3) ever had a male sex partner and/or identified as gay/homosexual or bisexual. Most participants were enrolled and completed all study components during their usual clinic visit; HPV vaccine was not provided as part of the study.

A computer-assisted self-interview collected data on demographic characteristics including gender identity (cisgender male, TGW, or other), sexual behavior, and other risk factors for persistent HPV infection including self-reported HIV status and smoking, vaccinations, and knowledge and attitudes regarding HPV and HPV vaccine. Survey data were collected using Qualtrics (Qualtrics, Provo, UT). Each participant was assigned a unique study ID code, and no personally identifying information was collected.

Each participant submitted 3 biological specimens, including a self-collected oral rinse, self-collected anal swab, and blood drawn by clinician or phlebotomist. After handwashing, anal specimens were self-collected by inserting a sterile swab 1 inch into the anus and rotating it 360 degrees at least twice. Oral specimens were self-collected by swishing and gargling 10 mL of sterile saline for 30 seconds. Illustrated schematics were provided to aid specimen self-collection.[13] Specimens were shipped to the HPV laboratory at CDC for processing. Testing for HPV DNA was conducted on the oral and anal specimens by Linear Array Genotyping Assay (Roche Diagnostics, Indianapolis, IN) for detection of 37 HPV types (6, 11, 16, 18, 26, 31, 33, 35, 39, 40, 42, 45, 51, 52, 53, 54, 55, 56, 58, 59, 61, 62, 64, 66, 67, 68, 69, 70, 71, 72, 73, 81, 82, 83, 84, 89, and IS39). Serum specimens were tested for presence of antibodies to quadrivalent HPV types (6, 11, 16, and 18) using multiplex direct virus-like particle ELISA on a Meso Scale Discovery electrochemiluminescent platform.[15] A participant was considered to have current infection if HPV DNA was detected from the oral or anal specimen, and past exposure if HPV antibody was detected from the serum specimen.

Among all participants who completed the study, we analyzed data from those who identified as transgender, compiling descriptive statistics regarding demographics, health care use, sexual behavior, and HPV knowledge. For study participants who were considered unvaccinated (ie, did not report receipt of any HPV vaccine), we assessed characteristics and then compared HPV prevalence and seroprevalence among TGW compared with cisgender MSM, by calculating prevalence ratios (PR) and 95% confidence intervals (CI) using 2-tailed Fisher exact test and log binomial regression, with SAS 9.4 (SAS Institute Inc., Cary, NC). A *P* value less than 0.05 was considered significant. The HPV prevalence and seroprevalence outcomes were stratified by HIV status, but multivariate analysis was not conducted given the lack of variability in HPV exposure to support modeling parameters. For this analysis, "any HPV" refers to any of the 37 types detected by Linear Array, and "vaccine type HPV refers to any of the 4 HPV types protected against by quadrivalent HPV vaccine. Participants with no DNA or serologic evidence of HPV were considered naïve to that HPV type.

RESULTS

Of 1033 participants, a total of 49 identified as TGW. Most TGW were aged 22 to 26 years (63.3%), non-Hispanic black (61.2%), from the Chicago site (89.8%), and had completed high school (63.3%) (Table 1). Many identified as gay/homosexual or bisexual (67.4%). Most reported having ever had sex (89.8%), with a median age at first sex of 15 years, and median number of 6 (interquartile range [IQR], 2–12) lifetime sex partners. Over a quarter (26.5%) reported being HIV-positive. Less than half of participants had health insurance (44.9%), but the majority had visited a health care provider in the past 12 months (81.6%). Most had discussed their sexual orientation or sexual behavior with their usual health care provider (67.4%), and an even greater proportion felt that they could disclose such information if important to their health (79.6%). Five (10.2%) reported receiving any HPV vaccination; 3 reported being vaccinated as a young adult in the 22- to 26-year-old age range, and the other 2 were vaccinated at a younger age.

Among 899 unvaccinated participants, 44 were TGW and 855 were cisgender MSM. Compared with unvaccinated MSM, unvaccinated TGW were significantly more likely to be non-Hispanic black race/ethnicity, less educated, enrolled from the Chicago site rather than the Los Angeles site, and to report being HIV-positive (Table 2). Compared with unvaccinated MSM, unvaccinated TGW were significantly less likely to have ever had sex, and they had significantly fewer lifetime sex partners; they were also significantly less likely to identify as gay/homosexual or to have smoked 12 or more cigarettes in the past year. No significant difference was found in age group, age at first sex, health insurance status, health care provider visits, or disclosure.

Among unvaccinated participants, HPV prevalence was high. In total, 43 (97.7%) of 44 unvaccinated TGW had evidence of current infection with or past exposure to any HPV type, significantly higher than the 80.8% prevalence of any HPV among MSM (PR, 1.2; 95% CI, 1.1–1.3); any vaccine type was detected in 90.9% of TGW and 64.0% of MSM (PR, 1.4; 95% CI, 1.3–1.6) (Table 3). In anal specimens, HPV prevalence was significantly higher in TGW versus MSM, with any HPV detected in 88.6% versus 70.9% (PR, 1.3; 95% CI, 1.1–

1.4), and any vaccine type detected in 50.0% versus 36.4% (PR, 1.4; 95% CI, 1.0–1.9), respectively. In oral specimens, HPV prevalence was lower overall, and there was no significant difference between TGW and MSM, with any HPV detected in 9.1% versus 9.5% (PR, 1.0; 95% CI, 0.4–2.5), and any vaccine type detected in 2.3% versus 3.0% (PR, 0.7; 95% CI, 0.1–5.4), respectively. Serum antibody to any HPV vaccine type was detected in 84.1% of TGW compared with 54.6% of MSM (PR, 1.5; 95% CI, 1.3–1.8). Although most participants were naïve to at least 1 HPV vaccine type, including 29 (65.9%) TGW and 775 (90.6%) MSM, TGW were significantly less likely than MSM to be naïve to an HPV vaccine type (PR, 0.7; 95% CI, 0.6–0.9). Transgender women were also significantly less likely than MSM to be naïve to HPV type 16 (36.4% vs. 67.8%; PR, 0.5; 95% CI, 0.4–0.8). Significant differences in anal HPV and seropositivity were maintained after stratification by HIV status.

Human papillomavirus knowledge was low among TGW. Less than half were aware that multiple sex partners can increase the risk of acquiring HPV, that HPV can be transmitted during oral, anal, or vaginal sex, that HPV can cause oropharyngeal cancer, or that HPV can cause anal cancer. More than half (55.1%) reported that before participating in the study, they had never heard of HPV vaccine. Some (38.8%) indicated an intent to get HPV vaccine in the future. Many were not at all sure (40.8%) that they would be able to get an HPV vaccine if they wanted (Table 4).

DISCUSSION

In this study conducted at LGBT clinics in 2 cities in the United States, prevalence of HPV infection was even higher among TGW than among MSM, a group with known high prevalence of HPV and HPV-related diseases. This can be partly but not fully explained by the significantly higher HIV prevalence among TGW, even though TGW had significantly fewer lifetime sex partners than MSM in this study. Human immunodeficiency virus prevalence is known to be high among TGW worldwide, with a pooled HIV prevalence of 21.7% (95% CI, 18.4–25.1) reported in 1 meta-analysis,[16] in line with the HIV prevalence self-reported by TGW participating in this study. However, studies have noted discrepancies between self-reported HIV prevalence and laboratory-confirmed HIV prevalence, suggesting that some TGW may be unaware of their HIV status.[17] Undiagnosed HIV among TGW might help explain the higher HPV prevalence that we observed among TGW compared with MSM. Additionally, the high HPV prevalence among young TGW might be further explained by factors not assessed in this study, such as sexual networks or sexual assault, reported by 47% of transgender people in a U.S. national survey.[18]

HPV vaccination is most effective when administered prior to exposure to HPV vaccine types. In our study, most TGW had evidence of current infection with or past exposure to HPV. Many participants had been previously infected with HPV type 16, as only 36.4% of TGW and 67.8% of MSM were naïve to this HPV type. Evidence of so many current and past HPV infections in the 18- to 26-year age group highlights the importance of vaccination at younger ages. Nevertheless, the majority of TGW were still naïve to at least 1 of the 4 quadrivalent HPV vaccine types.

Low uptake of HPV vaccine was found in both TGW and MSM and may reflect the fact that the study was conducted within a few years of the change in vaccine recommendations to include men as well as women.[14] However, this study sheds light on the very low knowledge base among TGW regarding HPV and HPV vaccine. Transgender people through age 26 are explicitly included among the groups for whom HPV vaccine is routinely recommended.[4] Additional outreach and education for this population might increase awareness and uptake of public health interventions, such as HPV vaccination, HIV screening, and other recommended health care.

Only a few other studies of HPV prevalence among TGW have been conducted, all outside the United States: 3 studies assessed anal HPV and 1 study assessed neovaginal HPV. Prevalence varied by anatomical site examined and HIV prevalence among participants. In a study of sex workers in Argentina, among 273 TGW with a median age of 29 years, 97.4% tested positive for any anal HPV.[19] In Peru, a study of 68 TGW aged 18 to 40 years found anogenital prevalence was 95.6% for any HPV and 35.3% for quadrivalent vaccine types.[20] In Indonesia, Thailand, and Malaysia, any anal HPV was detected in 80.6% of participants in a cohort including 344 MSM and 48 TGW aged 18 years and older; data were not reported separately for TGW and MSM.[21] In the Netherlands, 1 study of neovaginal HPV among 54 TGW aged 19 to 60 years reported a prevalence of high-risk HPV types of 20% after a median postoperative time of 2.4 years.[22] The prevalence of 88.6% for any HPV in anal specimens among TGW in the YMHPV study is in line with these studies, and, as expected, slightly lower than the prevalence reported in studies that did include TGW older than 26 years.

This analysis is subject to several limitations. First, participants probably are not representative of all TGW in the United States, particularly those in rural areas or who do not attend LGBT health clinics. Because having a male sex partner was an inclusion criterion for the study, our study participants might have been more likely to have male sex partners relative to TGW in general. We did not assess gender confirmation surgery. Second, self-reported data may be affected by social desirability bias, especially for stigmatized information, such as HIV status or sexual behavior, although this type of bias should be minimized by computer-assisted self-interview. Third, self-collected specimens can be challenging, but our results support the feasibility of self-collected anal swabs among transgender people.[23] Also, we did not assess HPV sero-prevalence for the nine 9-valent HPV vaccine types; presumably an even greater proportion of TGW and MSM are naïve to at least 1 of the 9-valent vaccine types than were found to be naïve to the quadrivalent vaccine types assessed in this study. Genital HPV prevalence was not assessed in this study. Finally, due to small sample size, we were unable to identify factors to fully explain the high HPV prevalence observed among TGW in this sample.

Our study identified high rates of HPV infection among both TGW and MSM, reinforcing the importance of routine vaccination before onset of sexual activity. Although vaccination ideally occurs prior to HPV exposure, most TGW were still naïve to at least 1 HPV vaccine type; these results support national recommendations to vaccinate TGW and MSM who are within the recommended target age range for vaccination, even if they are already sexually active. Gender-neutral routine and catch-up vaccination policies may be helpful to increase

HPV vaccination uptake among TGW. In addition, TGW may benefit from reducing structural barriers to health care and gender-affirming approaches.[5,18] Further evidence is needed to develop recommendations regarding appropriate screening and treatment for HPV-related diseases among TGW.

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TABLE 1.

Characteristics of Participating Transgender Women

	n	%
Total	49	100.0
Age, y		
18–21	18	36.7
22–26	31	63.3
Race/ethnicity		
Non-Hispanic white	0	0.0
Non-Hispanic black	30	61.2
Non-Hispanic Asian/Pacific Islander	1	2.0
Hispanic /Latino (any race)	8	16.3
Other/unknown	10	20.4
Education		
Less than high school	3	6.1
High school diploma or equivalent	31	63.3
Some college/2-year or technical degree	7	14.3
4-year degree or equivalent/higher	4	8.2
Other/unknown	4	8.2
City, state		
Chicago, IL	44	89.8
Los Angeles, CA	5	10.2
Sexual orientation		
Gay/homosexual	19	38.8
Bisexual	14	28.6
Heterosexual/straight	8	16.3
Other/unknown	8	16.3
Ever had sex		
Yes	44	89.8
No/unknown	5	10.2
Lifetime sex partners		
Median (interquartile range)	6	2–12
Lifetime sex partners		
0	4	8.2
1–5	14	28.6
6–10	8	16.3
>10	11	22.5
Other/unknown	12	24.5
Age at first sex	15	12–18
Median (interquartile range)		
HIV status, self-reported		
HIV-positive	13	26.5

	n	%
HIV-negative	24	49.0
Other/unknown	12	24.5
Smoking		
Never	15	30.6
Smoked ≥12 cigarettes in past year	3	6.1
Smoked <12 cigarettes in past year	27	55.1
Other/unknown	4	8.2
Health insurance		
Any	22	44.9
None or unknown	27	55.1
Visited health care provider in past 12 mo		
Yes	39	79.6
No or unknown	10	20.4
Discussed sexual orientation/behavior with usual health care provider		
Yes	33	67.4
No or unknown	16	32.7
Ever received any HPV vaccination		
Yes	5	10.2
No or unknown	44	89.8

TABLE 2.

Characteristics of All Unvaccinated Participants, by Gender Identity

	TGW		MSM		
	n	**%**	**n**	**%**	***P***
Total	44	100.0	855	100.0	
Age, y					0.08
18–21	17	38.6	217	25.4	
22–26	27	61.4	638	74.6	
Race/ethnicity					<**0.01**
Non-Hispanic white	0	0.0	220	25.7	
Non-Hispanic black	27	61.4	144	16.8	
Hispanic/Latino (any race)	7	15.9	335	39.2	
Other/unknown	10	22.8	238	18.3	
Education					<**0.01**
Less than high school	3	6.8	7	0.8	
High school diploma or equivalent	29	65.9	373	43.6	
Some college/2-year or technical degree	6	13.6	172	20.1	
4-year degree or equivalent/higher	2	4.6	256	30.0	
Other/unknown	4	9.1	47	5.5	
City, state					<**0.01**
Chicago, IL	40	90.9	231	27.0	
Los Angeles, CA	4	9.1	624	73.0	
Sexual orientation					<**0.01**
Gay/homosexual	17	38.6	613	71.7	
Bisexual	13	29.6	181	21.2	
Heterosexual/straight	6	13.6	18	2.1	
Other/unknown	8	18.2	43	5.0	
Ever had sex					<**0.01**
Yes	39	88.6	844	98.7	
No/unknown	5	11.4	11	1.3	
Lifetime sex partners					

	TGW		MSM		
	n	%	n	%	*P*
Median (interquartile range)	5	1–11	16	6–32	**<0.01**
Lifetime sex partners					**<0.01**
0	4	9.1	11	1.3	
1–5	14	31.8	157	18.4	
6–10	6	13.6	118	13.8	
>10	9	20.5	424	49.6	
Other/unknown	11	25.0	145	17.0	
Age at first sex					0.06
Median (interquartile range)	16	12–18	16	14–18	
HIV status, self-reported					**<0.01**
HIV-positive	11	25.0	76	8.9	
HIV-negative	22	50.0	673	78.7	
Other/unknown	11	25.0	106	12.4	
Smoking					**<0.01**
Never	14	31.8	237	27.7	
Smoked <12 cigarettes in past year	25	56.8	305	35.7	
Smoked ≥12 cigarettes in past year	1	2.3	271	31.7	
Other/unknown	4	9.1	42	4.9	
Health insurance					0.54
Any	20	45.5	434	50.8	
None or unknown	24	54.6	421	49.2	
Visited health care provider in past 12 mo					1.00
Yes	34	77.3	660	77.2	
No or unknown	10	22.7	195	22.8	
Discussed sexual orientation/behavior with usual health care provider					0.12
Yes	29	65.9	455	53.2	
No or unknown	15	34.1	400	46.8	

Bold indicates significance.

TGW indicates transgender women; MSM, men who have sex with men.

TABLE 3.

HPV Prevalence Among All Unvaccinated Participants (N = 899), by Body Site and Gender Identity

	TGW		MSM		
	n	%	n	%	PR (95% CI)
Any site					
Any HPV*	43	97.7	691	80.8	**1.2 (1.1–1.3)**
Vaccine type/s†	40	90.9	547	64.0	**1.4 (1.3–1.6)**
Anal					
Any HPV*	39	88.6	606	70.9	**1.3 (1.1–1.4)**
Vaccine type/s†‡	22	50.0	311	36.4	1.4 (1.0–1.9)
Oral					
Any HPV*	4	9.1	81	9.5	1.0 (0.4–2.5)
Vaccine type/s†	1	2.3	26	3.0	0.7 (0.1–5.4)
Serum					
Vaccine type/s†	37	84.1	467	54.6	**1.5 (1.3–1.8)**
Naïve‡					
Naïve to ≥1 vaccine type†‡	29	65.9	775	90.6	**0.7 (0.6–0.9)**
Naïve to HPV type 16‡	16	36.4	580	67.8	**0.5 (0.4–0.8)**

*Any of 37 HPV types (6, 11, 16, 18, 26, 31, 33, 35, 39, 40, 42, 45, 51, 52, 53, 54, 55, 56, 58, 59, 61, 62, 64, 66, 67, 68, 69, 70, 71, 72, 73, 81, 82, 83, 84, 89, IS39).

†At least 1 quadrivalent vaccine type (HPV 6, 11, 16, 18).

‡Participants were considered naïve if they had no anal, oral, or serologic evidence of infection with that HPV type.

Bold indicates significance.

TGW indicates transgender women; MSM, men who have sex with men.

TABLE 4.

HPV Knowledge and Attitudes Among Participating Transgender Women

	n	%
Total	49	100.0
Believe any of the following to be true or mostly true:		
Having multiple sex partners can increase the risk of getting HPV	23	46.9
There is a vaccine that can protect against certain types of HPV	23	46.9
HPV can be passed between people during oral, anal or vaginal sex	24	49.0
HPV can cause oral and throat cancer	12	24.5
HPV can cause anal cancer	15	30.6
Before today, had you ever heard of HPV vaccine (or “Gardasil”)?		
Yes	14	28.6
No	27	55.1
Do not know/not sure/no answer	8	16.3
Do you intend to get any HPV vaccine in the future?		
Yes	19	38.8
No	6	12.2
Do not know/not sure/no answer	24	49.0
How sure are you that you could get an HPV vaccine if you wanted?		
Extremely sure	12	24.5
Sure	10	20.4
Somewhat sure	6	12.2
Not at all sure/no answer	21	42.8