Feasibility of Incorporating Self-Collected Rectal Swabs Into a Community Venue-Based Survey to Measure the Prevalence of HPV Infection in Men Who Have Sex With Men

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Background: Inclusion of self-collected rectal swabs (SCRS) into existing community venue-based HIV surveillance systems for men who have sex with men (MSM) may provide a feasible method for monitoring human papillomavirus (HPV) vaccine-related outcomes in this population. We measured the prevalence of HPV and anal dysplasia through incorporating SCRS into ManCount, the Vancouver site of the M-Track HIV surveillance system.

Methods: Participating MSM were provided with a self-collection kit for collection on-site or at a follow-up venue. Swabs were subject to polymerase chain reaction amplification for HPV detection, and cytology slides were reviewed for anal dysplasia. Factors associated with participation were identified through multivariate logistic regression.

Results: Of 766 men completing ManCount, 268 (35%) agreed to participate, self-collecting 252 specimens (247 on-site). Of 239 complete specimens, 33.5% did not have detectable β-globin; in the remainder (159 specimens) the prevalence of HPV infection was 62.3% (23.3% HPV type 16 or 18; 38.4% HPV type 6, 11, 16, or 18). In the 62.3% (149) of specimens adequate for cytology, the prevalence of anal dysplasia was 42.3% (HSIL 11.4%, LSIL 18.8%, ASC-US 6.7%, ASC-H 5.4%). Participation was associated with venue type, availability of on-site collection, and other characteristics.

Conclusions: SCRS can be feasibly integrated within existing community venue-based HIV surveillance systems for MSM, and may be a suitable method for monitoring the impact of HPV vaccination in this population. However, participation may be influenced by venue type and availability of on-site collection, and adequacy of SCRS specimens may be lower in community venues as compared with clinical settings.

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Among males, gay, bisexual, and other men who have sex with men (MSM) are disproportionately affected by human papillomavirus (HPV) infection with an estimated prevalence of high-risk HPV infection of 40% to 88% and 22% to 34% among HIV-positive and HIV-negative MSM, respectively.[1–7] The annual incidence of anal cancer among HIV negative MSM is estimated at 13 to 37 per 100,000[8] (and 75 to 137 per 100,000 among HIV-positive MSM),[9,10] compared with overall annual incidence rates of 2 per 100,000 among all males.[11] HPV infection has also been associated with HIV acquisition among MSM.[12] The HPV vaccine offers potential benefit among MSM, and has been established to have efficacy against anogenital HPV type 6, 11, 16, and 18 infections and external genital warts in young men.[13] Recent evidence of efficacy of the quadrivalent vaccine against anal intraepithelial neoplasia in young MSM will likely provide additional rationale for use of the HPV vaccine in males or for targeted programs to young MSM.[14]

Assessing the effect of HPV vaccine programs on vaccine-preventable outcomes in MSM will not be easy due to challenges in obtaining representative population samples. Most studies of HPV and anal dysplasia prevalence are clinic-based, and although traditional population sampling approaches have been performed,[6] these are costly and likely unsustainable. Furthermore, routine anal cytology screening programs do not exist wherein changes in HPV type or anal cytology among MSM can be monitored. However, many countries do have second-generation HIV surveillance systems

to measure trends in infection of HIV, sexually transmitted infections, and behavior among MSM.[15] Most of these systems use a venue-based sampling approach (using community businesses or locations frequented by MSM), as is done in Canada through M-Track, a second-generation HIV surveillance system for MSM coordinated by the Public Health Agency of Canada and implemented in several cities since 2005.[16]

Incorporating testing for HPV infection and anal dysplasia into existing HIV or other health surveillance systems for MSM may be a cost-effective and sustainable option for ongoing monitoring of these vaccine-related outcomes. Self-collected rectal swabs (SCRS) to test for HPV and anal dysplasia in MSM have demonstrated acceptability and validity in clinical settings.[6,17–19] Our objective with this study was to measure the prevalence of HPV infection and anal dysplasia among a representative sample of MSM in Vancouver, through incorporation of SCRS in the ManCount survey (the Vancouver site of M-Track).[20] Therefore, we assessed the feasibility of incorporating self-collected rectal specimens into an existing venue-based HIV surveillance system for MSM.

MATERIALS AND METHODS

ManCount Survey

We used time-space sampling to recruit MSM from community venues in Vancouver between August 2008 and February 2009. Through discussion with community representatives, we developed an inventory of possible venues frequented by MSM including bars, festivals, associations, community events, bathhouses, and businesses. Venues agreeing to participate in the survey were included in monthly lists of all potential sampling events from which a random selection was chosen. During sampling events, survey staff approached all or a systematic sample of men present in the venue depending on venue characteristics; men were eligible to participate if they were identified as a man who has ever had sex with men, were $\geq$19 years of age, and were able to complete the survey in English. Consenting participants were provided with CDN$10 as compensation for time, and asked to complete a self-administered behavioral questionnaire. Survey staff then collected a fingerstick blood specimen which was used to prepare a dried blood spot (DBS) for testing for HIV, hepatitis C, and syphilis antibodies.

HPV Substudy

All participants completing the ManCount questionnaire and DBS collection between September 9 2008 and February 28 2009 were invited to participate in a substudy which involved self-collection of a rectal swab for HPV typing and anal cytology. The methods for this study were based on a previously validated clinic-based self-collection method,[18,19] adapted based on feedback from community representatives and 2 MSM focus groups. Consenting participants were provided with 2 options for contributing a sample: self-collection in an on-site bathroom (recommended when available) or following up at a later date at 8 community agencies and clinics, where self-collection kits were available. Participants were provided with an envelope containing a clinical specimen swab, a PreservCyt ThinPrep (Hologic, Inc, Marlborough, United States) specimen container, alcohol wipes and a biohazard specimen transport bag, and were directed to follow an enclosed instruction guide which illustrated the self-collection method. Participants were provided with an additional CDN$10 for compensation. Reasons for nonparticipation were collected from all nonparticipants during the final 6 weeks of the study period.

Laboratory Methods

Specimen containers containing SCRS were processed at the Provincial Health Services Authority Laboratory. A total volume of 4 mL was removed of which 3 mL was sent to the National Microbiology Laboratory for testing by polymerase chain reaction (PCR) amplification and the Linear Array HPV Genotyping Test (Roche Diagnostics, Basel, Switzerland), according to manufacturer instructions. The Linear Array kit identifies 37 HPV genotypes by amplification with the general primers PGMY and detection by reverse line blot.[21] The housekeeping gene β-globin, an indicator of the suitability of the specimen for PCR amplification, was also detected by the Linear Array kit. As the Linear Array probe for HPV 52 cross-reacts with several other HPV types, HPV 52 results were confirmed by a specific PCR amplification.[22]

Cytology slides were prepared from the remaining specimen according to the ThinPrep 2000 Processor Operator's Manual and reviewed by cytotechnologists at the British Columbia Cancer Agency for specimen adequacy and the initial cytology result. A single pathologist reviewed all initial abnormal cytology findings to provide the final diagnosis. Anal cytology specimens adequate for evaluation were classified using the Bethesda criteria for cervical cytology as negative for intraepithelial lesion or malignancy, low-grade squamous intraepithelial lesion, high-grade squamous intraepithelial lesion, or atypical squamous cells (including atypical squamous cells [ASC] of unknown significance and ASC–cannot exclude high-grade squamous intraepithelial lesions).

Statistical Analysis

We conducted a bivariate analysis of questionnaire data comparing participants and nonparticipants in the HPV substudy, using Pearson's Chi-square and Fisher exact tests, and tests for trend as appropriate. Characteristics of interest included demographic variables, and behaviors or other factors that may be associated with HPV-related outcomes or willingness to participate. Variables that were significantly associated with participation at $P < 0.1$ were included in a multivariate logistic regression model using backward selection. The variables for seeking sex in community venues were not entered due to independent associations with recruitment venue types (e.g., seeking sex in bars, with recruitment in bars).

We used sample proportions with 95% confidence intervals (CI) to estimate the prevalence of anal HPV infection and anal dysplasia (restricted to samples with detectable β-globin and adequate for evaluation, respectively) stratified by HIV DBS result with calculation of odds ratios (OR); the classification of Bouvard et al. was used to classify HPV types.[23] The correlation between globin results (present, absent) and cytology specimen adequacy (adequate, inadequate) was assessed through a κ statistic.

Ethics

Ethics approval for both studies was obtained from research ethics boards at Health Canada, the University of British Columbia, Providence Health Care, and Vancouver Coastal Health.

RESULTS

Participation

Between September 9, 2008 and February 28, 2009, 766 men completed the ManCount survey and DBS collection, of whom 268 (35%) consented to participate in the HPV substudy.

Participation varied by venue type, with the greatest participation in a bathhouse (31/44, 70.5%) followed by community organizations (21/37, 56.8%), a bookstore (53/118, 44.9%), bars or pubs (155/527, 29.4%), and at community events (8/40, 20.0%). Reasons for nonparticipation from 132 nonparticipants were being uncomfortable with the self-collection method (59.1%), not having enough time or concern that the process would take too long (17.4%), onsite washroom or follow-up

TABLE 1. Comparison of Participants and Nonparticipants in HPV Substudy

Variable	Nonparticipants (n = 498)	Participants (n = 268)	*P*
Age			
<25 yr	108/468 (23.1%)	53/251 (21.1%)	0.243*
25–34 yr	162/468 (34.6%)	84/251 (33.5%)	
35–44 yr	105/468 (22.4%)	51/251 (20.3%)	
45+ yr	93/468 (19.9%)	63/251 (25.1%)	
Greater than high school education	423/495 (85.5%)	178/262 (67.9%)	**0.000**
Income			
<$20,000	101/478 (21.1%)	98/262 (37.4%)	**0.000**
>$20,000	377/478 (78.9%)	164/262 (62.6%)	
Ethnic origin			
European, North America	357/498 (71.7%)	199/268 (74.3%)	0.216
Aboriginal	13/498 (2.6%)	14/268 (5.2%)	
South, Southeast or East Asian	34/498 (6.8%)	17/268 (6.3%)	
Latin, Central, or South America	11/498 (2.2%)	6/268 (2.2%)	
Other ethnicity	17/498 (3.4%)	4/268 (1.5%)	
Unclassified ethnicity	66/498 (13.3%)	28/268 (10.4%)	
Sexual identity			
Gay or homosexual	405/488 (83.0%)	199/263 (75.7%)	**0.047**
Bisexual	47/488 (9.6%)	39/263 (14.8%)	
Other identity	36/488 (7.4%)	25/263 (9.5%)	
Received money, drugs or other goods/services in exchange for sex (past 6 mo)	60/457 (13.1%)	48/248 (19.4%)	**0.028**
Injected drugs past 6 mo (excluding steroids)	23/481 (4.8%)	25/255 (9.8%)	**0.009**
Seek sex in venues (past 6 mo)			
Gay bars	266/485 (54.8%)	145/261 (55.6%)	0.852
Saunas or bathhouses	132/475 (27.8%)	98/255 (38.4%)	**0.003**
Sex parties	53/469 (11.3%)	32/250 (12.8%)	0.553
Parks	68/473 (14.4%)	56/254 (22.0%)	**0.009**
Internet	229/474 (48.3%)	127/254 (50.0%)	0.664
Drug use before or during sex (past 6 mo)			
Crystal meth	37/470 (7.9%)	29/246 (11.8%)	0.085
Poppers	134/470 (28.5%)	89/248 (35.9%)	**0.042**
Recreational drugs†	126/472 (26.7%)	72/247 (29.1%)	0.484
Any unprotected receptive anal sex (past 6 mo)	137/483 (28.4%)	72/259 (27.8%)	0.870
No. casual sex partners (past 6 mo)			
None	107/441 (24.3%)	50/237 (21.1%)	0.351
One or more	334/441 (75.7%)	187/237 (78.9%)	
Self-reported diagnosis of STI‡ (past 12 mo)	53/459 (11.5%)	32/247 (13.0%)	0.583
HIV status (based on DBS result)	61/476 (12.8%)	64/266 (24.1%)	**0.000**
Smoking (current)	164/487 (33.7%)	121/264 (45.8%)	**0.001**
Diagnosis of genital or anal warts (ever diagnosed)	74/456 (16.2%)	48/242 (19.8%)	0.232
Lifetime number receptive anal sex partners			
None	38/438 (8.7%)	15/231 (6.5%)	**0.002***
1	44/438 (10.0%)	20/231 (8.7%)	
2–5	131/438 (29.9%)	50/231 (21.6%)	
6–19	113/438 (25.8%)	61/231 (26.4%)	
20–49	55/438 (12.6%)	42/231 (18.2%)	
50 or more	57/438 (13.0%)	43/231 (18.6%)	
Recruitment venue type			
Bar	372/498 (74.7%)	155/268 (57.8%)	**0.000**
Bathhouse	13/498 (2.6%)	31/268 (11.6%)	
Event	32/498 (6.4%)	8/268 (3.0%)	
Association	16/498 (3.2%)	21/268 (7.8%)	
Business	65/498 (13.1%)	53/268 (19.8%)	
Ever heard of HPV	323/433 (74.6%)	153/236 (64.8%)	**0.008**
Previous anal Pap test (ever)	107/432 (24.8%)	75/236 (31.8%)	0.052
On-site specimen collection available	354/498 (71.1%)	247/268 (92.2%)	**0.000**

Significant results ($P < 0.5$) in bold font.
*Test for trend.
†Ecstasy, ketamine, crystal meth, GHB, LSD, amphetamines.
‡Gonorrhea, chlamydia, syphilis, genital herpes, genital warts.

site was inaccessible (12.1%), not comfortable with self-collection at the venue (11.4%), or another reason (12.1%).

The characteristics of participants and nonparticipants are presented in Table 1. On multivariate analysis (Table 2), participation was more likely among men having an income <$20,000 (adjusted OR [AOR]: 2.00 [95% CI: 1.24, 3.22]), men recruited at a bathhouse (compared to bar or pub, AOR: 4.36 [95% CI: 1.77, 10.75]), men reporting having had a previous anal Papanicolaou test (AOR: 1.67 [95% CI: 1.05, 2.67]), and men in a venue where on-site specimen collection was available (AOR: 3.48 [95% CI: 1.91, 6.34]). Men less likely to participate had greater than high school education (AOR: 0.54 [95% CI: 0.32, 0.89]), were recruited at community events (compared to bar or pub, AOR 0.22 [95% CI: 0.06, 0.76]), or were men who had previously heard of HPV (AOR 0.54 [95% CI: 0.34, 0.87]).

Specimen Results

Of the 268 substudy participants, 252 (94.0%) specimens were collected (from all 247 participants choosing on-site specimen collection, and from 5/21 men choosing self-collection at a follow-up site). In total, of the 252 specimens collected, 239 (94.8%) were complete and appropriate for testing.

We found that of 239 specimens, 159 (66.5%) had detectable β-globin and were included in the HPV prevalence analysis. Overall, 99 of 159 (62.3%, 95% CI: [54.2%–69.8%]) participants were infected with any HPV type, with prevalence being significantly higher in HIV-positive (78.6%, 95% CI: [63.2%–89.7%]) than in HIV negative (56.9%, 95% CI: [47.4–66.1]) participants. The breakdown of results by HPV types (including vaccine-preventable types) is presented in Table 3.

On anal cytology testing, 149 of 239 (62.3%) specimens were adequate for evaluation and were included in the analysis of anal dysplasia prevalence. Inadequate specimens consisted mainly of anucleated squamous cells (54/90, 60.0%), were obscured by debris (27/90, 30.0%), had scanty or too few cells for interpretation (9/90, 10.0%), or poor cell preservation (8/90, 8.9%). Overall, 63 of 149 participants (42.3%, 95% CI: [34.4%–50.2%]) had evidence of anal dysplasia, with prevalence being significantly higher in HIV-positive (64.3%, 95% CI: [49.8%–78.8%]) than in HIV-negative (33.6%, 95% CI: [24.7%–42.6%]) participants. The breakdown of anal dysplasia by high-grade squamous intraepithelial lesion, low-grade squamous intraepithelial lesion, ASC of unknown significance, and ASC that cannot exclude high-grade squamous intraepithelial lesions is presented in Table 4.

We only found fair agreement between the presence of β-globin and the adequacy of specimens for cytologic interpretation with 163/239 (68.2%) of specimens demonstrating concordance (i.e., present/adequate or absent/inadequate; κ 0.31). Of 76 discordant specimens, 33 did not have detectable β-globin yet were adequate for cytology. Upon recognizing midway through the study that a high proportion of specimens were inadequate for interpretation, study staff began reviewing the self-collection instruction sheet with each participant, explaining each step. However, this did not have a demonstrable impact on specimen adequacy (data not shown).

TABLE 2. Variables Associated With Participation in the HPV Substudy

Variable*	Crude OR [95% CI]	Adjusted OR [95% CI]
Greater than high school education	**0.36 [0.25, 0.52]**	**0.54 [0.32, 0.89]**
Income <$20,000	**2.23 [1.60, 3.11]**	**2.00 [1.24, 3.22]**
Sexual identity		
Gay or homosexual	1.0	—
Bisexual	**1.69 [1.07, 2.67]**	
Other identity	1.41 [0.83, 2.42]	
Received money, drugs or other goods/ services in exchange for sex (past 6 mo)	**1.59 [1.05, 2.41]**	—
Injected drugs past 6 mo (excluding steroids)	**2.16 [1.20, 3.90]**	—
Drug use before or during sex (past 6 mo)		
Crystal Meth	1.56 [0.94, 2.61]	—
Poppers	**1.40 [1.01, 1.95]**	—
HIV status (based on DBS result)	**2.16 [1.46, 3.18]**	—
Smoking (current)	**1.67 [1.23, 2.26]**	—
Lifetime no. receptive anal sex partners		
None	1.0	1.0
1	1.15 [0.52, 2.56]	1.10 [0.41, 2.96]
2–5	0.97 [0.49, 1.91]	1.11 [0.47, 2.63]
6–19	1.37 [0.70, 2.68]	2.18 [0.92, 5.16]
20–49	1.94 [0.94, 3.98]	2.35 [0.94, 5.87]
50 or more	1.91 [0.93, 3.91]	1.90 [0.71, 5.12]
Recruitment venue type		
Bar	1.0	1.0
Bathhouse	**5.72 [2.92, 11.23]**	**4.36 [1.77, 10.75]**
Event	0.60 [0.27, 1.33]	**0.22 [0.06, 0.76]**
Association	**3.15 [1.60, 6.20]**	0.55 [0.18, 1.67]
Business	**1.96 [1.30, 2.94]**	1.08 [0.60, 1.92]
Ever heard of HPV	**0.63 [0.45, 0.89]**	**0.54 [0.34, 0.87]**
Previous anal Pap test (ever)	**1.42 [1.00, 2.01]**	**1.67 [1.05, 2.67]**
On-site specimen collection available	**4.79 [2.94, 7.78]**	**3.48 [1.91, 6.34]**

Significant results ($P < 0.5$) in bold font.
*Logistic regression model (backward selection) and variables from Table 1 that were significantly associated with participation at $P < 0.1$ were entered (Note: variables related to seeking sex in venues were not included in the model due to association with recruitment venue type).
OR indicates odds ratio; CI, confidence interval.

DISCUSSION

We have demonstrated that SCRS can be integrated within an existing venue-based HIV surveillance system for MSM to measure the prevalence of HPV infection and anal dysplasia. As recent vaccine efficacy data providing additional support for the benefits of HPV vaccine in males and MSM may lead to recommendations for use of the vaccine in MSM, this method provides a sustainable and practical method for monitoring trends in these vaccine-related outcomes. Participation in our HPV substudy was reasonable and the main reason for nonparticipation was discomfort with the self-collection method, which may become less important over time as self-collection of clinical specimens becomes more widely accepted. Our measured prevalence of HPV infection and anal dysplasia was within the range of values reported by studies in other jurisdictions[6,7,24] and is likely representative of MSM

TABLE 3. Prevalence of HPV Infection (Restricted to Specimens With Detectable β-Globin)

	Total (n = 159)		HIV Positive by DBS (n = 42)		HIV Negative by DBS (n = 116)		
Classification	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	OR (95% CI)*
Any HPV	99	62.3 [54.2–69.8]	33	78.6 [63.2–89.7]	66	56.9 [47.4–66.1]	**2.8 [1.2–6.3]**
Group 1 (any)†	68	42.8 [35.1–50.5]	29	69.0 [55.1–83.0]	39	33.6 [25.0–42.2]	**4.4 [2.1–9.4]**
Group 2A‡	8	5.0 [1.6–8.4]	5	11.9 [2.1–21.7]	3	2.6 [0.0–5.5]	**5.1 [1.2–22.3]**
Group 2B (any)§	39	24.5 [17.8–31.2]	16	38.1 [23.4–52.8]	23	19.8 [12.6–27.1]	**2.5 [1.1–5.4]**
Group 3 (any)¶	35	22.0 [15.6–28.5]	16	38.1 [23.4–52.8]	19	16.4 [9.6–23.1]	**3.1 [1.4–6.9]**
Not classified (any)‖	52	32.7 [25.4–40.0]	20	47.6 [32.5–62.7]	32	27.6 [19.5–35.7]	**2.4 [1.1–4.9]**
Any vaccine-preventable							
HPV 16, 18	37	23.3 [16.9–30.6]	17	40.5 [25.6–56.7]	20	17.2 [10.9–25.4]	**3.3 [1.5–7.1]**
HPV 6, 11, 16, 18	61	38.4 [30.8–46.4]	23	54.8 [38.7–70.2]	38	32.8 [24.3–42.1]	**2.5 [1.2–5.1]**

Significant results ($P < 0.5$) in bold font.
*HIV positive compared with HIV negative.
†Group 1 HPV: Most potent HPV type known to cause cancer at several sites: 16 (18.9%), and others with sufficient evidence for cervical cancer: 18 (7.5%), 31 (9.4%), 33 (3.8%), 35 (5.0%), 39 (6.3%), 45 (5.0%), 51 (4.4%), 52 (8.8%), 56 (2.5%), 58 (6.3%), 59 (7.5%).
‡Group 2A HPV: Limited evidence in humans and strong mechanistic evidence for cervical cancer: 68 (5.0%).
§Group 2B HPV: Limited evidence in humans for cervical cancer and those classified by phylogenetic analogy to HPV types with sufficient or limited evidence in humans: 26 (1.3%), 53 (10.7%), 66 (4.4%), 67 (3.8%), 69 (3.1%), 70 (5.7%), 73 (3.1%), 82 (3.8%).
¶Group 3 HPV: Associated with genital warts: 6 (11.3%) and 11 (11.9%).
‖Not classified: Other HPV types included in the Linear Array HPV Genotyping Test (Roche Diagnostics, Basel, Switzerland) but not in this classification: 40 (2.5%), 42 (6.9%), 44 (0.0%), 54 (3.1%), 61 (5.0%), 62 (7.5%), 71 (0.0%), 72 (2.5%), 81 (1.9%), 83 (3.1%), 84 (9.4%), 87 (0.6%), 89 (10.7%).
OR indicates odds ratio; CI, confidence interval.

visiting venues in Vancouver. Being able to link SCRS results to behavioral and biologic data collected for the same individual is an additional advantage of this approach.

However, there may be important limitations to this method inherent to self-collection of specimens in community venues. We observed a higher proportion (37.7%) of self-collected specimens that were inadequate for cytologic interpretation than using the same technique in a clinic setting (17%) or with home self-collection.[6,19] Similarly, 33.5% of self-collected specimens did not have detectable β-globin, a marker of cellular adequacy considered when interpreting HPV typing results. Given that the majority of inadequate specimens were found to have squamous cells only, we postulate that these findings may be related to limited insertion of swabs into the anal canal. We hypothesize that other factors which may affect specimen adequacy include the following: varying environmental conditions for on-site bathrooms (e.g., privacy, lighting, counter space, cleanliness), interference due to recent use of lubricant or douching, and study fatigue (as self-collection occurred at the end of questionnaire administration and DBS collection). Even as obviously intoxicated men were not approached or permitted to participate in the study, recruitment occurred in social venues such as bars or pubs and some participants likely had consumed alcohol or drugs, which may have affected their ability to self-collect a specimen. We were surprised to note that only 68.2% of collected specimens were in concordance about β-globin and adequacy findings, which may suggest that β-globin (which reflects specimen adequacy for PCR) is not a reliable marker of specimen adequacy for cytology. While it would seem intuitive that there should be

TABLE 4. Prevalence of Anal Dysplasia (Restricted to Specimens Adequate for Cytologic Evaluation)

	Total (n = 149)		HIV Positive by DBS (n = 42)		HIV Negative by DBS (n = 107)		
Classification	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	OR (95% CI)*
NILM	86	57.7 [49.8–65.6]	15	35.7 [21.2–50.2]	71	66.4 [57.4–75.3]	0.3 [0.1–0.6]
Anal dysplasia (any)	63	42.3 [34.4–50.2]	27	64.3 [49.8–78.8]	36	33.6 [24.7–42.6]	**3.6 [1.7–7.5]**
HSIL	17	11.4 [6.3–16.5]	13	31.0 [17.0–44.9]	4	3.7 [0.1–7.3]	**11.5 [3.5–38.1]**
LSIL	28	18.8 [12.5–25.1]	11	26.2 [12.9–39.5]	17	15.9 [9.0–22.8]	1.9 [0.79–4.4]
ASC-US	10	6.7 [2.7–10.7]	1	2.4 [0–7.0]	9	8.4 [3.2–13.7]	0.27 [0.03–2.2]
ASC-H	8	5.4 [1.8–9.0]	2	4.8 [0–11.2]	6	5.6 [1.3–10.0]	0.84 [0.16–4.3]

Significant results ($P < 0.5$) in bold font.
*HIV positive compared with HIV negative.
NILM indicates negative for intraepithelial lesion or malignancy; HSIL, high-grade squamous intra-epithelial lesion; LSIL, low-grade intraepithelial lesion; ASC-US, atypical squamous cells of unknown significance; ASC-H, atypical squamous cells–cannot exclude high-grade squamous intraepithelial lesions; OR, odds ratio; CI, confidence interval.

better correlation between the two, there may be reasons that a specimen may be inadequate for PCR amplification in the presence of adequate cytology; for example, degraded genetic material or the presence of PCR inhibitors (such as lubricants). The incorporation of SCRS at multiple cities within a national HIV surveillance system may help to overcome issues related to small sample size due to specimen adequacy issues.

We found that men who participated in the HPV substudy differed from nonparticipants on several key variables including risk factors for rectal HPV infection or associated disease (e.g., lifetime number of receptive anal sex partners, smoking, HIV infection). We suspect that these differences were largely related to differences between men in different venues versus true predictors of participation, which appeared to be confirmed on multivariate analysis, where variables such as whether on-site specimen collection was available and type of recruitment venue remained significant. Men who reported an annual income of less than $20,000 were more likely to participate, which may be due to motivation by the additional honorarium. Men having higher education or knowledge of HPV were less likely to participate; however, men reporting previously having had an anal Papanicolaou test were more likely to participate, which may be due to familiarity with the use of swabs for cytology testing. Having questionnaire data for self-collection participants and nonparticipants permit characterization of these differences and possible stratification or adjustment particularly with multiple iterations of a survey over time.

This is the first known study to make use of self-collected rectal specimens in community venues to measure the prevalence of HPV infection and anal dysplasia in MSM and it demonstrates a feasible method for monitoring the impact of HPV vaccine programs in MSM. This study also demonstrates the value of self-collected specimens for MSM in general and outside of traditional clinical settings as a strategy for reaching MSM and other populations with a high prevalence of sexually transmitted infections.[6,25,26] As few participants visited a follow-up site to provide a specimen, we would recommend offering only on-site self-collection for optimal participation. Our findings also support recommendations that during survey planning, consideration be given to the environment of potential venues (e.g., sanitation, lighting, and privacy of bathrooms)[25] and to consider alternative options (i.e., a trailer or van) where an adequate environment can be provided or develop nested sampling strategies based on venues with adequate facilities.

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