

# Uptake and Predictors of Anal Cancer Screening in Men Who Have Sex With Men

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In the past 3 decades, anal cancer incidence has increased 39% in women and 96% in men in the United States.<sup>1–3</sup> In the general US population, anal cancer incidence remains higher among women than men (1.8 vs 1.4 cases per 100 000 annually), but the incidence is especially high among men who have sex with men (MSM; 35 per 100 000).<sup>4–6</sup> Indeed, data suggest that anal cancer incidence among MSM may be similar to or higher than incidence of cervical cancer among US women before the introduction of cervical cytology screening in the mid-1950s.<sup>1,7–13</sup> Incidence estimates for HIV-infected MSM are even higher and vary from 45.9 per 100 000 person-years<sup>14</sup> in meta-analyses to 78.2 per 100 000 person-years<sup>15</sup> for US AIDS Surveillance Epidemiology and End Results data.

Human papillomavirus (HPV) infection is the major cause of anal cancer.<sup>4,14,16,17</sup> Consistent with the increased anal cancer incidence among MSM, anal HPV prevalence and incidence are elevated among MSM compared with the general population.<sup>18,19</sup> HIV-infected MSM have even higher anal HPV prevalence, compared with non-HIV-infected MSM (98% vs 57%).<sup>20,21</sup> As effective antiretroviral therapy (ART, also referred to as HAART) helps HIV-infected individuals live longer, more may now develop anal cancer.<sup>6,22,23</sup> On the basis of initial studies, it is unclear whether ART use reduces risk of anal intraepithelial neoplasia (AIN2/3, precancer)<sup>24</sup> or anal cancer,<sup>25,26</sup> although low CD4-cell count does appear to increase risk of anal cancer.<sup>27</sup>

Recent research suggests that anal Papanicolaou (Pap) screening may have utility in preventing anal cancer<sup>9,28–30</sup> and is a cost-effective screening method for anal cancer prevention among MSM.<sup>31,32</sup> Like cervical dysplasia, anal dysplasia is slow-growing and treatable, and studies suggest that anal Pap tests can detect dysplasia with similar sensitivity

**Objectives.** We investigated attitudes about and acceptance of anal Papanicolaou (Pap) screening among men who have sex with men (MSM).

**Methods.** Free anal Pap screening (cytology) was offered to 1742 MSM in the Multicenter AIDS Cohort Study, who reported history of, attitudes about, and experience with screening. We explored predictors of declining screening with multivariate logistic regression.

**Results.** A history of anal Pap screening was uncommon among non-HIV-infected MSM, but more common among HIV-infected MSM (10% vs 39%;  $P < .001$ ). Most participants expressed moderate or strong interest in screening (86%), no anxiety about screening (66%), and a strong belief in the utility of screening (65%). Acceptance of screening during this study was high (85%) across all 4 US sites. Among those screened, most reported it was “not a big deal” or “not as bad as expected,” and 3% reported that it was “scary.” Declining to have screening was associated with Black race, anxiety about screening, and low interest, but not age or HIV status.

**Conclusions.** This study demonstrated high acceptance of anal Pap screening among both HIV-infected and non-HIV-infected MSM across 4 US sites. (*Am J Public Health.* 2013;103:e88–e95. doi:10.2105/AJPH.2013.301237)

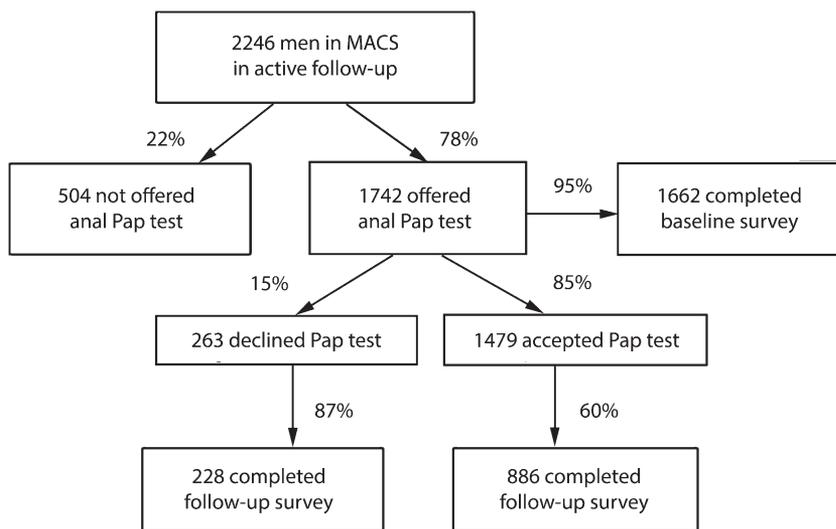
and specificity to cervical Pap tests.<sup>33–35</sup> On the basis of these data and the success of cervical Pap screening in reducing cervical cancer incidence, some have proposed routine anal Pap cytology (referred to as anal Pap screening hereafter) among MSM.<sup>9,36</sup> However, these guidelines remain preliminary as researchers have not yet conducted a randomized trial to establish whether anal Pap screening reduces anal cancer deaths. Furthermore, recent studies have suggested that anal precancers (AIN2+) are relatively common among un-screened non-HIV-infected (~4%) and HIV-infected (15%–30%) MSM, much higher than anal cancer rates, so other researchers have suggested that closer examination of the relative harms and benefits of treating all AIN 2/3 in MSM is first needed.<sup>24,35,37–40</sup>

Despite the high incidence of anal cancer among MSM and recommendations, by some, for screening, MSM currently have low awareness of, access to, and use of anal Pap screening.<sup>41,42</sup> Indeed, in our previous research, we observed a low reported prevalence of ever having anal

Pap screening among MSM.<sup>43</sup> We have expanded on these previous findings by examining acceptance of screening when offered for free. We also examined attitudes about anal Pap screening, experience with screening, and reasons for declining to have an anal Pap test.

## METHODS

All men in the Multicenter AIDS Cohort Study (MACS) were eligible to participate in the Anal Health Study. The MACS is an ongoing prospective study of HIV-infected and non-HIV-infected MSM, recruited across 4 sites (Baltimore, MD; Chicago, IL; Pittsburgh, PA; and Los Angeles, CA) over 3 separate enrollment periods (1984–1985, 1987–1991, and 2001–2003), as described previously.<sup>44,45</sup> All MACS participants who attended any of their semiannual MACS study visits between June 2010 and July 2011 were eligible to be offered a free anal Pap test by study staff. Individuals who conducted phone interviews only were not invited to participate.



Note. Pap = Papanicolaou.

**FIGURE 1—Diagram of study participation: Multicenter AIDS Cohort Study (MACS), Anal Health Study; Baltimore, MD, Chicago, IL, Pittsburgh, PA, and Los Angeles, CA; 2010–2011.**

Participants completed a computer-assisted self-interview baseline questionnaire 6 months before (52%) or just before (48%) being offered anal Pap screening. They were offered an anal Pap test after receiving an informational brochure about screening, and had an opportunity to ask study staff questions. Each participant undergoing screening provided written informed consent for the procedure. Participants completed a follow-up computer-assisted self-interview questionnaire at the next visit after they were offered anal Pap test (usually 6 months later).

### Measures

The primary outcome was Pap test acceptance or decline as documented by study staff. The baseline questionnaire included history of anal Pap screening as well as attitudes such as anxiety about, interest in, and familiarity with anal Pap screening (see appendix available as a supplement to the online version of this article at <http://www.ajph.org>). The follow-up questionnaire measured experience related to receiving the screening or reasons for decline of the anal Pap test when offered free of cost at a previous MACS visit (see appendix available as a supplement to the online version of this article at <http://www.ajph.org>). Among men who declined screening, 87% provided

a reason and 13% left this question unanswered in the questionnaire.

During each semiannual MACS visit, self-administered and computer-aided questionnaires assessed potential covariates.<sup>46</sup> Demographic factors were age (< 45, 45–54, 55–64, or ≥ 65 years), study site, education (college degree: yes, no, or unknown), individual yearly income (≥ \$60 000, \$20 000–\$59 999, ≤ \$19 999, or unknown or chose not to report), and race/ethnicity (White non-Hispanic, Black non-Hispanic, and all others). Behavioral factors were history of previous anal Pap test (yes or no) and number of anal receptive sexual partners (0, 1 or 2, or > 2) in the past 6 months (defined as the number of sexual partners with whom the participant was the receptive partner). Health status indicators were HIV status or current CD4-cell count (non-HIV-infected, HIV-infected: CD4 ≥ 500, 300–499, or < 300 cells/μL) and current use of ART. Our analyses used covariate data from the same MACS visit at which anal Pap screening was offered to participants.

### Data Analyses

We used the  $\chi^2$  test to evaluate differences in categorical variables (Fisher exact test used for small cell sizes) by HIV serostatus. We explored predictors of declining screening by

using univariate and multivariate logistic regression. We included variables that were statistically significant in the univariate model or were regarded as important in the literature (age, income, college education, and HIV status or current CD4-cell count) in multivariate models and removed them in a step-wise fashion; variables regarded as important in the literature were retained in the final multivariate models regardless of significance.

We performed all analyses with Stata version 11.0 (StataCorp LP, College Station, TX).

### RESULTS

Analyses included data for 1742 men who were offered anal Pap screening as part of their semiannual MACS visit. These men represented 78% of all MACS participants in active follow-up between June 2010 and July 2011. We excluded the other 504 men in active follow-up from this study because they were not offered screening (usually because they had reduced study visits because of time constraints or their interviews happened by phone, Figure 1). Compared with men who were offered screening, men who were not offered screening were younger, had lower current CD4-cell count, and were more likely to be HIV-infected, non-Hispanic Black or other race, and to be from the Los Angeles study site (Table 1).<sup>45,47,48</sup> Our baseline questionnaire was completed by 95% (1662 of 1742) of the men who were offered screening.

Anal Health Study participants were primarily non-Hispanic White (67%) or non-Hispanic Black (20%), with a median age of 55 years (interquartile range = 49–61; Table 1). Nearly half of participants (47%) reported having a college degree, and only 3.7% had not completed high school or equivalent. The median annual gross income was between \$40 000 and \$49 000. Among the HIV-infected men, 94% were currently taking ART, median current CD4-cell count was 586 cells per microliter (interquartile range = 425–753 cells/μL), and 80% had HIV viral load below the detectable level (≤ 40 RNA copies/mL). Of the 1742 men offered anal Pap screening (Figure 1), there were 12 men with a confirmed history of anal cancer, including 11 of 820 HIV-infected men (prevalence = 1.34%) and 1 of 922 non-HIV-infected man (prevalence = 0.11%).

**TABLE 1—Characteristics of Study Participants Offered Anal Papanicolaou Test: Multicenter AIDS Cohort Study, Anal Health Study; Baltimore, MD, Chicago, IL, Pittsburgh, PA, and Los Angeles, CA; 2010–2011**

Variable	Not Offered Pap Test (n = 504), No. (%) or Median (IQR)	Offered Pap Test (n = 1742), No. (%) or Median (IQR)	P	Declined Pap Test (n = 263), No. (%) or Median (IQR)	Accepted Pap Test (n = 1479), No. (%) or Median (IQR)	P
Age, y	51 (44–57)	55 (49–61)	<.001	51 (46–57)	55 (49–61)	<.001
Race/ethnicity						
Non-Hispanic Black	130 (26)	351 (20)		89 (33)	262 (18)	
Non-Hispanic White	237 (47)	1172 (67)		123 (47)	1049 (71)	
Other or unknown	137 (27)	219 (13)	<.001	51 (20)	168 (12)	<.001
Education						
College degree or higher	44 (9)	814 (47)		92 (35)	722 (49)	
< college degree	106 (21)	473 (27)		104 (39)	369 (25)	
Unknown or not reported	354 (70)	455 (26)	<.001	67 (25)	388 (26)	<.001
Annual income, \$						
> 40 000	32 (6)	685 (39)		66 (25)	619 (42)	
≤ 40 000	116 (23)	653 (37)		125 (47)	528 (36)	
Unknown or not reported	356 (71)	404 (23)	<.001	72 (27)	332 (22)	<.001
City of recruitment						
Baltimore	83 (16)	426 (25)		68 (26)	358 (24)	
Chicago	103 (20)	315 (18)		26 (10)	289 (20)	
Pittsburgh	82 (16)	477 (27)		123 (47)	354 (24)	
Los Angeles	236 (47)	524 (30)	<.001	46 (18)	478 (32)	<.001
No. of anal sexual partners in past 6 mo where the study participant was the receptive partner						
0	81 (16)	829 (48)		110 (42)	719 (49)	
1 or 2	111 (22)	516 (30)		57 (22)	459 (31)	
> 2	100 (20)	291 (17)		25 (10)	266 (18)	
Missing	212 (42)	106 (6)	<.001	71 (27)	35 (2)	<.001
HIV status						
Infected	282 (56)	820 (47)		123 (47)	697 (47)	
Not infected	220 (44)	922 (53)	<.001	140 (53)	782 (53)	.915
Current CD4-cell count, <sup>a</sup> cells/μL						
≥ 500	199 (67)	1383 (79)		212 (81)	1170 (79)	
300–499	62 (21)	266 (15)		36 (14)	229 (16)	
< 300	36 (12)	91 (5)	<.001	13 (5)	78 (5)	.749

Note. IQR = interquartile range; Pap = Papanicolaou.

<sup>a</sup>Among men who were not offered the anal Pap, CD4-cell count was missing for 207 men.

### Anal Health History and Attitudes Regarding Anal Pap Screening

Twenty-three percent of men (388 of 1662) reported ever having had anal Pap screening in the past, an increase from 2007 when 11% of men in the MACS cohort had ever been screened. HIV-infected men were more

likely to have been previously screened compared with non-HIV-infected men (39% vs 10%;  $P < .001$ ). Among those who reported having been screened at least once, 51% (138 of 269) of HIV-infected and 14% (11 of 76) of non-HIV-infected men reported having at least 1 abnormal Pap test result

( $P < .001$ ). Forty-four percent of the 388 men who had ever had anal Pap screening reported the year they had most recently been screened, and most (63%) of these 172 men had been screened within the past 3 years. History of genital or anal warts was reported by 24% of participants. Very few of these adult MSM reported being vaccinated with any doses of HPV vaccine (1.4%).

Although most men had never had an anal Pap test, many participants reported strong interest in screening (51%), no anxiety about screening (66%), and a strong belief in the utility of anal Pap screening (65%). Specifically, only 14% of participants reported no interest in anal Pap screening, and only 3% thought screening was not at all useful. HIV-infected men were more likely than non-HIV-infected men to be very interested in (55% vs 47%;  $P = .007$ ) and very familiar with (39% vs 14%;  $P < .001$ ) anal Pap screening. HIV-infected men were less likely than non-HIV-infected men to be not at all familiar with what is involved with having an anal Pap test (43% vs 26%;  $P < .001$ ).

Complete lack of familiarity with the anal Pap test was reported more frequently by men in Los Angeles (53%), compared with 36% of men in Baltimore, 29% of men in Chicago, and 20% of men in Pittsburgh ( $P < .001$ ). High anxiety about anal cancer screening was uncommon at all sites, ranging between 6% and 12% of men. Lack of interest (“not at all interested”) in getting the anal Pap screening, the strongest risk factor for Pap decline, was reported by 12%, 12%, 14%, and 18% of participants in Baltimore, Chicago, Pittsburgh, and Los Angeles, respectively.

### Acceptance of Anal Pap Screening

Overall, 85% of men accepted anal Pap screening when offered (Figure 1). Among those screened in the study and who responded regarding the experience ( $n = 886$ ), a majority reported that they thought it was “not a big deal” (83%) and was “not as bad as expected” (62%), although 19% of participants reported they thought the procedure was uncomfortable (Table 2). Among 214 men who reported anxiety about anal Pap tests in the prescreening questionnaire and subsequently were screened, 149 (70%) reported that the experience was “not as bad as expected.”

**TABLE 2—Reported Experience With and Reasons for Declining Anal Papanicolaou Screening: Multicenter AIDS Cohort Study, Anal Health Study; Baltimore, MD, Chicago, IL, Pittsburgh, PA, and Los Angeles, CA; 2010–2011**

Variable	All, No. or No. (%)	HIV-Infected, No. or No. (%)	Non-HIV-Infected, No. or No. (%)	P
Reported experiences among those who accepted	886	395	491	
Pap screening				
Not a big deal	734 (83)	323 (82)	411 (84)	.58
Not as bad as expected	548 (62)	254 (64)	294 (60)	.32
It was uncomfortable	164 (19)	65 (16)	99 (20)	.34
It was scary	26 (3)	16 (4)	10 (2)	.18
It was necessary	696 (79)	337 (85)	359 (73)	<.001
Main reason for declining Pap test	263	123	140	
Already get anal Pap test at other clinic	68 (26)	47 (38)	21 (15)	<.001
Do not have anal receptive sexual intercourse	51 (19)	13 (11)	38 (27)	.001
Would feel uncomfortable or physically unprepared	46 (17)	17 (14)	29 (21)	.14
Not interested	34 (13)	22 (18)	12 (9)	.03
Do not know enough about it	22 (8)	6 (5)	16 (11)	.06
Do not want to know if I have anal cancer or stress of waiting for results or cost and burden of follow-up care	7 (3)	1 (1)	6 (4)	.08
Did not report reason or did not recall why declined	35 (13)	17 (14)	18 (13)	.82

Note. Pap = Papanicolaou. Reported experience is for 886 screened participants who answered all 5 of the attitudinal items from the postscreening questionnaire regarding their Pap screening experience in the Anal Health Study. Results were similar when we included another 183 screened individuals who only partially answered the questionnaire (i.e., did not answer some questions).

Reported experience with Pap screening was also similar among men who had never been screened and men who had been previously screened, including similarly high rates reporting that it was “not a big deal” (82% vs 85%;  $P = .51$ ) or “not as bad as expected” (64% vs 58%;  $P = .22$ ) and similarly moderate levels reporting that it was uncomfortable (19% vs 18%;  $P = .91$ ).

The primary reason reported for declining screening was already getting anal Pap screening from another source or provider (68 of 263; 26%; Table 2). Other reasons for not getting screening included not having anal receptive sexual intercourse (19%), expecting discomfort during screening or physical or emotional unpreparedness (17%), not being interested in anal Pap screening (13%), feeling that they did not know enough about the screening (8%), or another reason (i.e., apprehension over waiting for or knowing result of screening or resulting referral for follow-up care; 3%).

History of anal Pap screening was similar among men in Baltimore (22%) and Los Angeles

(22%), slightly lower among those in Chicago (18%), and higher among those in Pittsburgh (31%;  $P < .001$ ). Decline of the free anal Pap screening was low at all 4 MACS sites, ranging from 8% in Chicago to 26% in Pittsburgh, where the study has an active anal dysplasia clinic, and men were more likely to have been recently screened. Getting an anal Pap test elsewhere was cited as the reason for declining to be screened in 26% to 31% of men at Pittsburgh, Los Angeles, and Baltimore, but among only 4% of men in Chicago.

### Correlates of Refusing Anal Pap Screening

Analyses of factors associated with refusing anal Pap screening excluded 61 men who decided not to be screened because they received Pap screening elsewhere. In univariate analysis, declining anal Pap screening was associated with demographic factors (younger age, non-Hispanic Black race, lower income, not having a college degree) and attitudinal factors (anxiety about screening, lack of belief in the utility of screening, and lack of interest

in Pap screening), but not with HIV status, number of recent anal receptive sexual partners, or familiarity with anal Pap screening (Table 3). Screening acceptance was as high among men who said they had never been screened before (88%) as among men who reported having been screened in the past (92%).

In multivariate analysis, anal Pap refusal remained associated with non-Hispanic Black race/ethnicity (odds ratio [OR] = 2.2; 95% confidence interval [CI] = 1.2, 3.9), reported moderate anxiety (OR = 1.7; 95% CI = 1.0, 2.8) or high anxiety (OR = 2.9; 95% CI = 1.3, 6.4) about screening, and being not at all interested (OR = 3.2; 95% CI = 1.6, 6.3) or only somewhat interested (OR = 4.5; 95% CI = 2.4, 8.4) in screening (Table 3). Correlates of Pap test decline were similar when restricted to only men expressing interest in screening (results not shown).

## DISCUSSION

In this study, we identified high acceptance of anal Pap screening when offered for free to MSM in a multicenter US study. Acceptance was equally high among both HIV-infected and non-HIV-infected men. Although they were active participants of the MACS research study, the majority of these men had never had anal Pap screening and were not very familiar with the procedure. When given the opportunity to be screened, most expressed strong interest and belief in its utility and chose to be screened. Furthermore, men who did and did not have a history of previous anal Pap screening reported a similar, positive experience after the screening suggesting that it was well-tolerated by the majority of study participants.

These findings are consistent with reports published by others. For example, 82% of HIV-infected Miami HIV-clinic attendees accepted anal cancer screening in a cross-sectional study; however, rationale for accepting or declining screening was not evaluated in that study.<sup>49</sup> Earlier MACS analyses (from 2007) showed that 29% of participants reported that they were possibly or likely to get screened outside of the study in the following 6 months.<sup>43</sup> However, our current analyses suggest that many of these men had not been

**TABLE 3—Univariate and Multivariate Predictors of Decline of Anal Papanicolaou Test When Offered Free of Cost: Multicenter AIDS Cohort Study, Anal Health Study, Baltimore, MD, Chicago, IL, Pittsburgh, PA, and Los Angeles, CA; 2010–2011**

Variable	Declined Pap, No. (%)	Univariate OR (95% CI)	Multivariate OR (95% CI)
Overall	117 /1091 (11)		
<b>Demographics</b>			
Age, y			
≥ 65	8/118 (7)	1.00 (Ref)	1.00 (Ref)
55–64	33/413 (8)	1.19 (0.54, 2.7)	0.96 (0.40, 2.3)
45–54	43/382 (11)	1.74 (0.80, 3.8)	1.17 (0.47, 2.8)
< 45	33/178 (19)	3.12* (1.39, 7.0)	1.21 (0.46, 3.2)
Race/ethnicity			
Non-Hispanic White	69/806 (9)	1.00 (Ref)	1.00 (Ref)
Non-Hispanic Black	37/185 (20)	2.67* (1.75, 4.1)	2.15* (1.18, 3.9)
All other <sup>a</sup>	11/100 (11)	1.32 (0.67, 2.6)	1.46 (0.63, 3.5)
Individual gross income, \$			
≥ 60 000	22/345 (6)	1.00 (Ref)	1.00 (Ref)
20 000–59 999	38/350 (11)	1.79* (1.03, 3.1)	1.60 (0.84, 3.0)
≤ 19 999	48/242 (20)	3.63* (2.12, 6.2)	1.70 (0.83, 3.5)
Unknown	9/154 (6)	0.91 (0.41, 2.0)	0.95 (0.35, 2.6)
≥ 4-y college degree			
Yes	56/605 (9)	1.00 (Ref)	1.00 (Ref)
No	53/316 (17)	2.00* (1.32, 3.0)	1.19 (0.71, 2.0)
Unknown	8/170 (4)	0.48 (0.23, 1.04)	0.48 (0.18, 1.30)
City of recruitment			
Los Angeles	22/308 (7)	1.00 (Ref)	1.00 (Ref)
Chicago	11/139 (8)	1.12 (0.53, 2.4)	0.90 (0.36, 2.3)
Baltimore	25/301 (8)	1.18 (0.65, 2.1)	1.93 (0.95, 4.0)
Pittsburgh	59/343 (17)	2.70* (1.61, 4.5)	3.04* (1.58, 5.9)
<b>Attitudes and behaviors</b>			
Anxious about anal Pap test			
Not at all	62/735 (8)	1.00 (Ref)	1.00 (Ref)
Somewhat	41/274 (15)	1.91* (1.25, 2.9)	1.68* (1.01, 2.8)
Very	14/82 (17)	2.23* (1.19, 4.2)	2.83* (1.27, 6.4)
Interested in anal Pap test			
Very	17/580 (3)	1.00 (Ref)	1.00 (Ref)
Somewhat	47/385 (12)	4.61* (2.60, 8.2)	4.49* (2.42, 8.4)
Not at all	53/126 (42)	24.0* (13.2, 43.7)	32.0* (16.3, 62.7)
Familiar with anal Pap test			
Very	26/261 (10)	1.00 (Ref)	...
Somewhat	40/446 (9)	0.89 (0.53, 1.5)	...
Not at all	51/384 (13)	1.38 (0.84, 2.3)	...
Belief in utility of anal Pap test			
High	60/713 (8)	1.00 (Ref)	...
Moderate	50/346 (14)	1.84* (1.23, 2.7)	...
No	7/32 (22)	3.05* (1.27, 7.3)	...
Ever had anal Pap test			
No	93/800 (12)	1.00 (Ref)	...
Yes	24/291 (8)	0.68 (0.43, 1.09)	...

Continued

screened in the interval, but screening was accepted when offered conveniently and free of charge in our study.

The proportion of MSM who reported lack of familiarity with anal Pap screening was lower in our study (35%) than 2 earlier studies, where 60% to 77% of MSM were not aware of what is involved in anal Pap screening,<sup>41,42</sup> perhaps because we had previously asked them about this topic. In one of the previous non-MACS studies, 63% of MSM reported they did not know whether doctors recommend anal Pap screening for MSM,<sup>41</sup> which may be in part because many MSM do not disclose their sexual behavior with men to their primary care providers. In this study, familiarity with Pap screening varied by study site. Men in Pittsburgh, where the study is associated with an active anal dysplasia clinic, were more likely to report familiarity with anal Pap screening and to decline anal Pap screening because they had already been recently screened. Familiarity with Pap screening at study baseline was lower in Los Angeles than the other study sites, which might represent regional differences in availability and awareness of anal Pap screening.<sup>43</sup>

Among the minority of men who declined screening, the most commonly reported reasons were related to not having anal sexual intercourse (suggesting they perceived themselves to be at lower risk), concern about discomfort related to screening, and feeling like they did not know enough about anal Pap screening. Studies evaluating barriers to anal cancer screening have also reported that patient embarrassment, fear of discomfort during the procedure,<sup>32</sup> and primary care providers giving little emphasis to anal Pap screening<sup>41,50</sup> are factors that may hinder screening acceptance. However, distribution of informational packets on anal cancer and Pap screening can improve anal Pap uptake.<sup>51</sup> Providing information may have contributed to the high acceptance of anal cancer screening in our study, in which informational brochures and knowledgeable staff were available to participants.

Although most participants were very interested in and not anxious about anal cancer screening, men who reported low interest in or high anxiety about screening were, not surprisingly, more likely to decline screening. Indeed, men who said they were not at all

TABLE 3—Continued

Anal receptive sex in past 6 mo			
Yes	50/535 (9)	1.00 (Ref)	...
No	67/556 (12)	1.33 (0.90, 2.0)	...
<b>Health status</b>			
HIV status, current CD4-cell count (cells/ $\mu$ L)			
Non-HIV-infected	71/605 (12)	1.00 (Ref)	1.00 (Ref)
HIV-infected, CD4 $\geq$ 500	28/303 (9)	0.77 (0.48, 1.21)	0.65 (0.37, 1.13)
HIV-infected, CD4 = 300–499	12/128 (9)	0.78 (0.41, 1.48)	0.60 (0.27, 1.31)
HIV-infected, CD4 < 300	6/55 (11)	0.92 (0.38, 2.2)	0.56 (0.20, 1.57)

Note. CI = confidence interval; OR = odds ratio; Pap = Papanicolaou. The results in this table are among 1091 individuals with complete covariate data, and exclude 61 men who reported receiving screening elsewhere as their reason for decline. Univariate results among all 1742 individuals offered anal Pap screening were similar to those among this group with complete data.

<sup>a</sup>All other<sup>a</sup> race includes Hispanic Black or White (n = 54), American Indian or Alaska Native (n = 4), Asian or Pacific Islander (n = 5), other non-Hispanic (n = 10), other Hispanic (n = 26), and did not report (n = 1).

\*P < .05.

interested in anal Pap screening at baseline later cited reasons for decline of the free anal Pap that mirrored this disinterest such as “I don’t have anal receptive sex” and “I don’t know enough about it.” Our findings suggest that attitudes may explain declining anal Pap screening when cost and availability needs are met. Attitudinal factors such as interest in anal cancer screening, anxiety regarding the procedure, and belief in the utility of anal cancer screening should be considerations during the development of screening programs.

Once screened, most men reported a positive experience: among men who reported anxiety about screening, the majority reported the experience was not as bad as expected. Anal Pap test familiarity and refusal varied somewhat by study site, which is likely because of better availability of Pap screening before the study started at some sites. However, other reasons for the variation may include comfort with the staff performing the examination or gender of the examiner. Sites with only a female clinician anecdotally reported some men not wanting to have an anal Pap performed by a female clinician.

Anal Pap screening, like cervical Pap testing, is known to have imperfect sensitivity and specificity<sup>29,33,52</sup> and, therefore, although it may be useful as a screening test, it cannot be used as a diagnostic test. Unfortunately, few providers have the technical expertise to perform high-resolution anoscopy, the diagnostic test for anal precancer and cancer.<sup>9,31</sup> If

screening is found to have clear benefit in this community and use increases, it will be critical to ensure an adequate supply of physicians trained to perform high-resolution anoscopy who can diagnose and treat individuals with abnormal Pap test results.

This study has several limitations as well as strengths. We did not have data on participants’ experience surrounding previous anal Pap screening or on provider motivators for offering or not offering screening. Also, screening history was self-reported and thus may reflect some recall errors. The completion rate for the follow-up survey was lower than desirable, because of missing visits by some study participants, and limited time of other participants leading to their not completing the survey.

The study had several strengths including a standardized protocol at all sites, a large well-characterized sample of non-HIV-infected and HIV-infected MSM, and detailed behavioral and biological data collection. Furthermore, the prospective study design followed participants up to 6 months before and 6 months after they were offered anal Pap screening. Participants in the MACS study might exhibit higher acceptance rates than the general MSM population attributable in part to their participation in a study on HIV and MSM health behaviors. However, the MACS cohort was recruited via standard procedures based on network theory and social marketing from bars, organizations, Web sites, and other community venues.<sup>44</sup> As in other studies, study

participants may differ from nonparticipants; therefore, the generalizability of our findings to other populations of MSM will need to be established. Nevertheless, our findings are informative among a diverse, well-characterized sample of MSM from different geographical regions in the United States.

This study provides new information about interest in and uptake of anal Pap screening, as well as factors associated with screening. This study suggests that without cost and availability barriers many MSM are interested in anal cancer screening, but modifiable attitudinal factors may hinder some MSM from being screened. Additional research is needed to clarify the benefits and harms of anal Pap screening. Because abnormal anal cytology is relatively common among MSM, it will be important to avoid overtreatment by having appropriate referral and treatment algorithms, which need to be better outlined. If screening is shown to be effective it will be important to ensure information about screening and Pap screening for MSM are both available, especially at the point of primary care. ■

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G. D’Souza and R. D. Cranston conceptualized the study. G. D’Souza and N. T. Brewer led the study survey development with valuable input from M. W. Plankey, A. Silvestre, D. G. Ostrow, and D. Wiley. G. D’Souza and N. Shah supervised study implementation. G. D’Souza, S. D. Rajan, and R. Bhatia performed the analyses. G. D’Souza, S. D. Rajan, and N. T. Brewer led the writing. All authors participated in revising the content of the article.

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## Human Participant Protection

This study was approved by the institutional review board at each study site.

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