

# Gay and Bisexual Men's Willingness to Receive Anal Papanicolaou Testing

Alison C. Reed, MPH, Paul L. Reiter, PhD, Jennifer S. Smith, PhD, Joel M. Palefsky, MD, and Noel T. Brewer, PhD

Rates of anal cancer among men have nearly doubled over the past 3 decades in the United States, making it an increasingly important public health concern.<sup>1</sup> The observed increase in anal cancer is a particular concern for gay and bisexual men, who are at substantially greater risk for the disease than are heterosexual men.<sup>2</sup> Furthermore, the risk of anal cancer is much higher among HIV-positive men who have sex with men than it is among HIV-negative men who have sex with men.<sup>3</sup> The incidence of anal cancer among HIV-positive gay and bisexual men may be up to 10 times greater than are current rates of cervical cancer among women in the United States.<sup>4</sup>

In addition to HIV infection, risk factors for anal cancer include receptive anal intercourse, a high number of lifetime sexual partners, rectal drug use, smoking, and certain sexually transmitted infections, including human papillomavirus (HPV).<sup>2,5-8</sup> These factors may help explain the high rates of anal cancer observed among gay and bisexual men, because this population has been shown to have high rates of risky sexual behavior (including receptive anal intercourse with multiple partners), smoking and other drug use, and sexually transmitted infections (including HPV infection).<sup>6,9-13</sup>

Research indicates that HPV may cause most anal cancers.<sup>4,5,8</sup> A systematic review found that HPV DNA was present in more than 70% of anal cancer cases, with HPV type 16 being the most common.<sup>14</sup> HPV DNA is found in 97.7% of anal tumors in men who are not exclusively heterosexual.<sup>5</sup> If approved for use in males, HPV vaccination may offer substantial protection against anal cancer for males.<sup>4</sup> However, HPV vaccination against oncogenic HPV types 16 and 18 is unlikely to prevent all anal cancers.<sup>14</sup> Furthermore, many gay and bisexual men who have initiated sexual activity may already be infected with HPV by the time they present for vaccination. Thus, anal cancer screening could play a role in anal cancer prevention for gay and bisexual men,

**Objectives.** We assessed the willingness of gay and bisexual men, who have high rates of anal cancer that might be prevented through regular screening, to receive anal Papanicolaou tests.

**Methods.** We surveyed a national sample of men aged 18 to 59 years who self-identified as gay (n=236) or bisexual (n=70).

**Results.** Most respondents were willing to accept free screening (83%), but fewer would pay for the test (31%; McNemar's  $\chi^2=158.02$ ;  $P<.001$ ). Willingness to pay for screening was higher among men who reported greater worry about getting anal cancer (OR [odds ratio]=1.70; 95% confidence interval [CI]=1.06, 2.72), higher perceived likelihood of anal cancer (OR=1.88; 95% CI=1.18, 2.99), and higher income (OR=2.17; 95% CI=1.18, 3.98), in adjusted analyses. Only 33% (17 of 51) of HIV-positive respondents, who have the highest risk for anal cancer, had received anal Papanicolaou tests.

**Conclusions.** Anal cancer screening was highly acceptable to gay and bisexual men, although cost was a major barrier. Efforts to reduce anal cancer disparities should target beliefs about anal cancer and barriers to anal Papanicolaou testing in this population. (*Am J Public Health.* 2010;100:1123-1129. doi:10.2105/AJPH.2009.176446)

regardless of whether they receive HPV vaccination.

Statistical models suggest that regularly screening gay and bisexual men for anal cancer through anal Papanicolaou (Pap) testing (also called anal cytology) would increase life expectancy similarly to other accepted prevention measures, such as cervical cancer screening, and would be cost effective.<sup>15</sup> Cost-effectiveness analyses suggest screening HIV-positive gay and bisexual men annually<sup>16</sup> and HIV-negative gay and bisexual men every 2 to 3 years.<sup>15</sup> Although no national organizations yet offer guidelines for screening with anal Pap tests, the Gay and Lesbian Medical Association encourages gay and bisexual men to talk with their health care providers about anal cancer.<sup>17</sup> The absence of national screening guidelines may be a reason that health insurance reimbursements for anal cancer screening tests are limited.<sup>18</sup>

Studies of anal cancer screening behavior have focused on low rates of uptake and intentions,<sup>19,20</sup> but they have not examined many constructs known to motivate other screening behaviors, such as worry and perceived risk, that could help inform future

intervention programs. We examined beliefs of gay and bisexual men about anal cancer and anal cancer screening, as well as correlates of willingness to receive anal Pap tests. In exploratory analyses, we also examined whether HIV-positive gay and bisexual men, who are at especially high risk for anal cancer, differed from HIV-negative gay and bisexual men in these beliefs and attitudes.

## METHODS

In January 2009, we interviewed men aged 18 to 59 years who were members of an existing national panel of US households maintained by Knowledge Networks (Menlo Park, CA), oversampling for our study men who self-identified as gay or bisexual. Knowledge Networks identified panel members through list-assisted, random-digit dialing. Panel members received free Internet access or small cash payments for completing multiple Internet-based surveys each month.

Of 874 men invited to participate in our study, 609 (70%) completed the online survey.<sup>21</sup> We did not ask heterosexual participants

about anal cancer screening, because their risk of anal cancer is much lower than that of gay and bisexual men and the cost-effectiveness of anal cancer screening has not yet been examined for heterosexual men.<sup>2,5,22</sup> We report data from 306 men who self-identified as either gay or bisexual. We excluded 12 men whose sexual orientation we could not definitively categorize as either gay or bisexual. Most men in the final sample self-identified as gay (77%) and were HIV negative (83%; Table 1). Their mean age was 46.4 years (SD=9.0). Most were non-Hispanic White (81%), had college degrees (56%), reported annual household incomes of \$60 000 or higher (60%), had health insurance (86%), and lived in urban areas (93%). Approximately one half were living with a partner or were married (48%); similar percentages of gay (47%) and bisexual (50%) men reported this type of relationship.

**Measures**

The survey is available online at <http://www.unc.edu/~ntbrewer/hpv.htm>. We drew on our previous work on HPV-related diseases<sup>23–25</sup> and others' work on anal Pap tests<sup>19,20</sup> in developing our survey items. We cognitively tested the survey with 28 gay and bisexual men and further refined it with 8 additional men prior to beginning the study.

**Anal cancer.** The survey first presented basic information about anal cancer, because pilot testing showed that men had low familiarity with the disease: "Anal cancer forms in the tissues of the anus. The anus is the opening of the rectum (last part of the large intestine) to the outside of the body. Anal cancer is different from colon cancer and rectal cancer." The survey then assessed perceived knowledge about anal cancer, perceived severity of anal cancer, concern about anal cancer, perceived likelihood of getting anal cancer, and how men thought HIV affects the chances of getting anal cancer.

**Anal Pap tests.** We measured awareness of anal Pap tests and then presented basic information about this test, because pilot testing showed that most men were unfamiliar with the procedure. The survey then assessed history of anal Pap testing by asking men when their most recent test occurred, whether they had ever tried unsuccessfully to get an anal Pap test (including the main reason they were unsuccessful), where they would go to get an anal

Pap test if they decided to get one, barriers that they believed would prevent them from getting an anal Pap test, perceived effectiveness of anal Pap testing, whether anal Pap testing is only needed for people who have anal intercourse, how often men who have sex with men should get an anal Pap test, and whether they thought doctors recommend anal Pap tests for men who have sex with men.

**Willingness.** We assessed how willing men would be to get an anal Pap test (1) if it were free, and (2) if it cost \$150 out of pocket. Response options for willingness items were "definitely not willing," "probably not willing," "not sure," "probably willing," and "definitely willing." We recoded responses into 2 categories, willing (definitely or probably willing) and not willing (all other responses).

**Demographic characteristics.** Men indicated their sexual orientation as "gay or homosexual [attracted to men]" or "bisexual [attracted to men and women]," as well as their age, race/ethnicity, education, income, health insurance status, urbanicity (according to Metropolitan Statistical Area criteria<sup>26</sup>), and relationship status. The survey also assessed men's sexual and medical history, including history of sexually transmitted infections, anal or penile lesions, and oral, anal, and penile cancer (cancer at these anatomic sites shows consistent associations with high-risk HPV types<sup>27</sup>).

**Analyses**

We used McNemar's test to compare willingness to receive an anal Pap test if it were free or cost \$150. We used logistic regression to examine bivariate correlates of willingness to receive an anal Pap test if it cost \$150. We chose this willingness measure as the primary study outcome, instead of willingness if testing were free, because in current clinical practice, reimbursement for anal screening tests is often limited.<sup>18</sup> We entered statistically significant bivariate correlates ( $P < .05$ ) into a multivariate model.

Post hoc exploratory analyses compared HIV-positive gay and bisexual men to HIV-negative gay men and HIV-negative bisexual men on variables that analyses identified as bivariate correlates of willingness. These post hoc analyses used 1-way analysis of variance for continuous variables and logistic regression for categorical variables. We analyzed data

**TABLE 1—Demographic Characteristics of Participants in Survey of Gay and Bisexual Men's Knowledge and Attitudes Toward Anal Cancer Screening: United States, January 2009**

Participant characteristics (n=306)	No. (%)
Age, y	
20-39	59 (19)
40-49	124 (41)
50-59	123 (40)
Race/ethnicity	
Non-Hispanic White	247 (81)
Non-Hispanic Black	14 (5)
Hispanic	29 (9)
Other	16 (5)
Education	
No college degree	136 (44)
College degree	170 (56)
Annual household income, \$	
< 60 000	122 (40)
≥ 60 000	184 (60)
Health insurance	
Yes	262 (86)
No	44 (14)
Urbanicity	
Rural	20 (7)
Urban	286 (93)
Sexual orientation	
Bisexual	70 (23)
Gay	236 (77)
Relationship status	
Not living with partner and not married	160 (52)
Living with partner or married	146 (48)
HIV status	
Negative	255 (83)
Positive	51 (17)
Ever diagnosed with cancer (oral, anal, penile) or lesions (anal, penile)	
No	301 (98)
Yes	5 (2)

with SPSS version 16.0 (SPSS Inc, Chicago, IL) and Intercooled Stata version 10.1 (StataCorp LP, College Station, TX). All statistical tests were 2-tailed, with a critical  $\alpha$  of 0.05.

RESULTS

Only 23% (71 of 306) of gay and bisexual men had heard of anal Pap tests prior to the survey. Even fewer men reported ever having received an anal Pap test (14%; 44 of 306). Five men indicated that they had tried to get an anal Pap test but were unsuccessful because their doctor or health care provider did not usually give the test (n=2), their doctor or health care provider told them they did not need an anal Pap test (n=2), or their doctor or health care provider told them the cost of doing the test was too high to justify doing it (n=1).

Willingness to Receive an Anal Pap Test

Fewer than one third (31%; 95 of 306) of men were willing to get an anal Pap test if it cost \$150. A much larger percentage (83%; 255 of 306) were willing if the test were free (McNemar's  $\chi^2=158.02$ ;  $P<.001$ ). To receive anal Pap testing in the future, most men indicated they would go to their primary care provider (83%; 252 of 305), a gay health center (7%; 20 of 305), or a sexual health clinic (5%; 14 of 305). The most common reasons men reported for unwillingness to get an anal Pap test, even if a local doctor or clinic performed them, were cost (39%; 120 of 306), not knowing enough about the test (28%; 87 of 306), embarrassment about requesting or getting the test (13%; 41 of 306), concern about the test being inaccurate (7%; 20 of 306), and concern that testing information would be recorded in medical records (5%; 16 of 306).

Bivariate analyses found that men were more willing to get anal Pap tests if they reported greater perceived knowledge about anal cancer, greater worry about getting anal cancer, or higher perceived likelihood of developing anal cancer (all,  $P<.05$ ; Table 2). Other correlates of willingness included being aware of anal Pap testing prior to our study, having had an anal Pap test, knowing the best frequency for anal Pap testing (1 to 3 years, according to cost-effectiveness modeling), not believing anal Pap tests are only necessary for people who have anal intercourse, and having had a digital rectal exam. Men were also more willing to undergo anal Pap testing if they were gay, were HIV positive, or had an

TABLE 2—Bivariate Correlates of Willingness to Get an Anal Papanicolaou Test Among Gay and Bisexual Men: United States, January 2009

	Not Willing (n=211), Mean (SD) or No. (%)	Willing (n=95), Mean (SD) or No. (%)	OR (95% CI)
<b>Anal cancer and screening</b>			
Perceived knowledge of anal cancer <sup>a</sup>	1.36 (0.61)	1.84 (0.90)	2.32** (1.65, 3.25)
Worry about anal cancer <sup>b</sup>	1.29 (0.59)	1.83 (0.96)	2.47** (1.76, 3.46)
Perceived severity of anal cancer <sup>b</sup>	3.58 (0.76)	3.64 (0.68)	1.12 (0.80, 1.58)
Belief that HIV status affects likelihood of anal cancer <sup>c</sup>	2.84 (0.30)	2.77 (0.41)	0.61 (0.31, 1.20)
Perceived likelihood of anal cancer <sup>d</sup>	2.09 (0.62)	2.43 (0.68)	2.23** (1.51, 3.30)
Perceived effectiveness of anal Pap test <sup>e</sup>	2.18 (0.84)	2.06 (0.81)	0.83 (0.62, 1.13)
Belief that only people who have anal intercourse need anal Pap tests <sup>e</sup>	3.53 (1.11)	3.81 (1.15)	1.26* (1.01, 1.58)
Awareness of anal Pap test			
No (Ref)	175 (74)	60 (26)	1.00
Yes	36 (51)	35 (49)	2.84** (1.64, 4.92)
Had anal Pap test			
No (Ref)	192 (73)	70 (27)	1.00
Yes	19 (43)	25 (57)	3.61** (1.87, 6.96)
Unsuccessfully attempted to get anal Pap test			
No (Ref)	209 (69)	92 (31)	1.00
Yes	2 (40)	3 (60)	3.41 (0.56, 20.74)
Belief that doctors recommend anal Pap tests for men who have sex with men			
No (Ref)	40 (67)	20 (33)	1.00
Yes	72 (64)	40 (36)	1.11 (0.57, 2.15)
Did not know	99 (74)	35 (26)	0.71 (0.37, 1.37)
Knew cost-effective frequency for anal Pap testing (1-3 y)			
No (Ref)	123 (75)	40 (25)	1.00
Yes	88 (62)	55 (38)	1.92* (1.18, 3.14)
Had digital rectal exam			
No (Ref)	64 (81)	15 (19)	1.00
Yes	147 (65)	80 (35)	2.32* (1.24, 4.34)
<b>Sexual identity and behavior</b>			
Sexual orientation			
Bisexual (Ref)	58 (83)	12 (17)	1.00
Gay	153 (65)	83 (35)	2.62* (1.33, 5.16)
Disclosed sexual behavior with men to primary care provider			
Yes (Ref)	116 (62)	70 (38)	1.00
Not applicable/missing	33 (85)	6 (15)	0.30* (0.12, 0.76)
No	62 (77)	19 (23)	0.51* (0.28, 0.91)
Age at first sexual intercourse (oral, anal, or vaginal), y			
<16 (Ref)	72 (67)	36 (33)	1.00
≥16	139 (70)	59 (30)	0.85 (0.52, 1.40)

Continued

TABLE 2—Continued

No. of lifetime sexual partners <sup>f</sup>			
≤4 (Ref)	28 (80)	7 (20)	1.00
≥5	183 (68)	88 (33)	1.92 (0.81, 4.58)
No. of male partners (anal or oral intercourse) in past year			
≤4 (Ref)	160 (71)	67 (29)	1.00
≥5	51 (65)	28 (35)	1.31 (0.76, 2.26)
Diagnosis of cancer (oral, anal, penile) or lesions (anal, penile)			
No (Ref)	209 (69)	92 (31)	1.00
Yes	2 (40)	3 (60)	3.41 (0.56, 20.73)
HIV status			
Negative (Ref)	186 (73)	69 (27)	1.00
Positive	25 (49)	26 (51)	2.80* (1.52, 5.18)
Other STI diagnosis			
No (Ref)	150 (72)	59 (28)	1.00
Yes	61 (63)	36 (37)	1.50 (0.90, 2.50)
<b>Demographic characteristics</b>			
Health insurance			
No (Ref)	35 (80)	9 (20)	1.00
Yes	176 (67)	86 (33)	1.90 (0.87, 4.13)
Current smoker			
No (Ref)	158 (72)	61 (28)	1.00
Yes	53 (61)	34 (39)	1.66 (0.99, 2.80)
Race/ethnicity			
Non-Hispanic White (Ref)	172 (70)	75 (30)	1.00
Other	39 (66)	20 (34)	1.18 (0.64, 2.15)
Age, y			
50–59 (Ref)	83 (67)	40 (33)	1.00
40–49	85 (69)	39 (31)	0.95 (0.56, 1.63)
20–39	43 (73)	16 (27)	0.77 (0.39, 1.53)
Annual household income, \$			
<60 000 (Ref)	94 (77)	28 (23)	1.00
≥60 000	117 (64)	67 (36)	1.92* (1.15, 3.23)
Education			
No college degree (Ref)	96 (71)	40 (29)	1.00
College degree	115 (68)	55 (32)	1.15 (0.70, 1.87)
Urbanicity			
Rural (Ref)	14 (70)	6 (30)	1.00
Urban	197 (69)	89 (31)	1.05 (0.39, 2.83)
Relationship status			
Not living with partner and not married (Ref)	116 (73)	44 (27)	1.00
Living with partner or married	95 (65)	51 (35)	1.42 (0.87, 2.30)

Note: CI = confidence interval; OR = odds ratio; Pap = Papanicolaou; STI = sexually transmitted infection.

<sup>a</sup>On a 4-point scale: 1 (nothing at all), 2 (a little), 3 (a moderate amount), 4 (quite a lot).

<sup>b</sup>On a 4-point scale: 1 (not at all), 2 (a little), 3 (a moderate amount), 4 (quite a lot).

<sup>c</sup>On a 3-point scale: 1 (decreases chances), 2 (has no effect), 3 (increases chances).

<sup>d</sup>On a 5-point scale: 1 (no chance), 2 (low chance), 3 (moderate chance), 4 (high chance), 5 (certain I will get anal cancer).

<sup>e</sup>On a 5-point scale: 1 (strongly agree), 2 (somewhat agree), 3 (neither agree nor disagree), 4 (somewhat disagree), 5 (strongly disagree).

<sup>f</sup>This was a categorical variable.

\**P* < .05; \*\**P* < .001.

annual household income of \$60 000 or higher. Men were less willing to undergo anal Pap testing if they had not disclosed their sexual behavior with men to their primary health care provider.

Multivariate analyses (Table 3) found that men were more willing to get an anal Pap test if they reported greater worry about getting anal cancer (odds ratio [OR]=1.70; 95% confidence interval [CI]=1.06, 2.72). We dichotomized worry to characterize this association, although our regression analyses examined both worry and perceived likelihood as continuous. Men who worried a moderate amount or quite a lot about anal cancer were more likely to report a willingness to get an anal Pap test (70%; 21 of 30) than were respondents who were not at all or a little worried (27%; 74 of 276). Participants who perceived a greater likelihood of developing anal cancer (OR=1.88; 95% CI=1.18, 2.99) were more willing to get an anal Pap test. More men who perceived their chances of getting anal cancer as moderate, high, or certain (48%; 38 of 79) than men who perceived their chance as low or none (25%; 57 of 227) were willing to get an anal Pap test. Men who reported household incomes of \$60 000 or more were more willing than were those who reported earning less to get an anal Pap test (OR=2.17; 95% CI=1.18, 3.98).

### Sexual Orientation and HIV Status

Exploratory analyses examined differences between HIV-positive gay and bisexual men, HIV-negative gay men, and HIV-negative bisexual men (Table 4). Few HIV-negative gay and bisexual men reported ever having received an anal Pap test (11%; 27 of 255). Of HIV-negative gay and bisexual men who had received an anal Pap test, 89% (24 of 27) reported that their most recent test was within the past 3 years, the cost-effective testing interval for this population.<sup>15</sup> Only 33% (17 of 51) of HIV-positive gay and bisexual men had received an anal Pap test. Of these men, only 53% (9 of 17) reported that their most recent test was within the previous year, the cost-effective interval for this population.<sup>16</sup>

HIV-positive gay and bisexual men were more likely than were HIV-negative gay and bisexual men to have disclosed their sexual behavior with men to their primary health care

**TABLE 3—Multivariate Correlates of Willingness to Get an Anal Papanicolaou Test Among Gay and Bisexual Men: United States, January 2009**

	OR (95% CI)
Perceived knowledge of anal cancer	1.38 (0.86, 2.21)
Worry about anal cancer	1.70* (1.06, 2.72)
Perceived likelihood of anal cancer	1.88* (1.18, 2.99)
Awareness of anal Pap test	
No (Ref)	1.00
Yes	0.84 (0.37, 1.91)
Had anal Pap test	
No (Ref)	1.00
Yes	2.15 (0.91, 5.09)
Knew cost-effective frequency for anal Pap testing (1-3 y)	
No (Ref)	1.00
Yes	1.61 (0.91, 2.83)
Belief that only people who have anal intercourse need anal Pap tests	1.15 (0.89, 1.48)
Sexual orientation	
Bisexual (Ref)	1.00
Gay	1.72 (0.74, 4.02)
Had digital rectal exam	
No (Ref)	1.00
Yes	1.71 (0.83, 3.52)
Disclosed sexual behavior with men to primary care provider	
Yes (Ref)	1.00
Not applicable/missing	0.67 (0.23, 1.96)
No	0.76 (0.36, 1.61)
HIV status	
Negative (Ref)	1.00
Positive	1.44 (0.67, 3.09)
Annual household income, \$	
< 60 000 (Ref)	1.00
≥ 60 000	2.17* (1.18, 3.98)

Note. CI = confidence interval; OR = odds ratio; Pap = Papanicolaou. Multivariate model contained only the variables displayed in this table. \**P* < .05.

provider, to have been aware of anal Pap testing before completing the survey, to have had an anal Pap test, and to report higher levels of worry about getting anal cancer. HIV-positive gay and bisexual men also reported greater

**TABLE 4—Effects of HIV Status and Sexual Orientation on Bivariate Correlates of Willingness to Get an Anal Papanicolaou Test Among Gay and Bisexual Men: United States, January 2009**

	HIV-Positive Participants <sup>a</sup> (n = 51), Mean (SD) or No. (%)	HIV-Negative Gay Participants (n = 186), Mean (SD) or No. (%)	HIV-Negative Bisexual Participants (n = 69), Mean (SD) or No. (%)
Perceived knowledge of anal cancer <sup>b</sup>	1.76 (0.97)	1.51 (0.74)	1.33 <sup>c</sup> (0.50)
Worry about anal cancer <sup>d</sup>	1.80 (1.06)	1.38 <sup>e</sup> (0.67)	1.40 <sup>c</sup> (0.69)
Perceived likelihood of anal cancer <sup>f</sup>	2.39 (0.80)	2.19 (0.57)	2.08 <sup>c</sup> (0.73)
Belief that only people who have anal intercourse need anal Pap tests <sup>g</sup>	3.76 (1.19)	3.68 (1.07)	3.33 (1.20)
Awareness of anal Pap test			
No	23 (45)	149 <sup>e,h</sup> (80)	63 <sup>c</sup> (91)
Yes	28 (55)	37 (20)	6 (9)
Had anal Pap test			
No	34 (67)	164 <sup>e</sup> (88)	64 <sup>c</sup> (93)
Yes	17 (33)	22 (12)	5 (7)
Knew cost-effective frequency for anal Pap testing (1-3 y)			
No	22 (43)	103 (55)	38 (55)
Yes	29 (57)	83 (45)	31 (45)
Had digital rectal exam			
No	11 (22)	46 (25)	22 (32)
Yes	40 (78)	140 (75)	47 (68)
Disclosed sexual behavior with men to primary care provider			
No <sup>i</sup>	4 (8)	62 <sup>e,h</sup> (33)	54 <sup>c</sup> (78)
Yes	47 (92)	124 (67)	15 (22)
Annual household income, \$			
< 60 000	21 (41)	68 (37)	33 (48)
≥ 60 000	30 (59)	118 (63)	36 (52)

Note: Pap = Papanicolaou. Table contains variables bivariately associated with willingness to receive an anal Pap test. Sexual orientation and HIV status were not examined because they were used to create the 3 comparison groups.

<sup>a</sup>HIV-positive cohort comprised 50 gay men and 1 bisexual man.

<sup>b</sup>On a 4-point scale: 1 (nothing at all), 2 (a little), 3 (a moderate amount), 4 (quite a lot).

<sup>c</sup>Difference between HIV-positive participants and HIV-negative bisexual men, *P* < .05.

<sup>d</sup>On a 4-point scale: 1 (not at all), 2 (a little), 3 (a moderate amount), 4 (quite a lot).

<sup>e</sup>Difference between HIV-positive participants and HIV-negative gay men, *P* < .05.

<sup>f</sup>On a 5-point scale: 1 (no chance), 2 (low chance), 3 (moderate chance), 4 (high chance), 5 (certain I will get anal cancer).

<sup>g</sup>On a 5-point scale: 1 (strongly agree), 2 (somewhat agree), 3 (neither agree nor disagree), 4 (somewhat disagree), 5 (strongly disagree).

<sup>h</sup>Difference between HIV-negative gay and bisexual men, *P* < .05.

<sup>i</sup>Included not applicable/missing (n = 39).

perceived knowledge of anal cancer and perceived greater likelihood of developing anal cancer than did HIV-negative bisexual men. HIV-negative gay men were more likely than were HIV-negative bisexual men to have disclosed their sexual behavior with men to their primary health care provider and to have been aware of anal Pap testing before completing our survey.

## DISCUSSION

Although gay and bisexual men have notably high rates of anal cancer, it is promising that potential benefits of anal cancer screening for these men are comparable to observed benefits of cervical cancer screening for women.<sup>15</sup> However, only 1 in 7 gay and bisexual men in our national sample had received an anal Pap

test, a rate comparable to those measured in previous studies conducted primarily among convenience samples of gay and bisexual men (11%–14%).<sup>19,20</sup> Furthermore, only one third of HIV-positive gay and bisexual men in our study reported having had an anal Pap test, with even fewer indicating their most recent test was within the past year, the cost-effective screening interval for this population.<sup>16</sup> It is encouraging that more than half of HIV-positive gay and bisexual men were willing to pay for anal Pap tests in the future.

We identified important modifiable beliefs associated with willingness to get anal cancer screening tests that have not been extensively studied among gay and bisexual men. Multivariate analysis revealed that men who reported greater worry about getting anal cancer and higher perceived likelihood of getting anal cancer were more willing to undergo future anal Pap testing. Many health behavior theories posit that risk perception prompts protective health behaviors, a proposition that is well supported for many different behaviors, including cancer screening.<sup>28–30</sup> Some health behavior theorists also suggest that affect, such as worry, is important to motivating health behavior, including cancer screening.<sup>31,32</sup> Our findings support these relationships.

HIV status may affect gay and bisexual men's attitudes and beliefs about anal Pap testing. HIV-positive participants were more likely than were HIV-negative participants to be aware of anal Pap testing, to report having had an anal Pap test, and to report more worry about getting anal cancer. Previous research also has found greater concern about anal cancer among HIV-positive men who have sex with men.<sup>19</sup> Because HIV-positive gay and bisexual men are at higher risk of anal cancer, these differences are unsurprising.

Gay and bisexual men differed in their knowledge, beliefs, and behaviors related to anal Pap testing. For example, gay men were more likely than were bisexual men to have heard of anal Pap testing and to have disclosed their sexual orientation to their primary health care provider. Gay men were also more willing to undergo anal Pap testing regardless of cost than were bisexual men (in bivariate analyses). Interventions to increase anal cancer screening may need to be tailored to differing beliefs of gay and bisexual men.

### Implications for Practice

Awareness and cost are substantial barriers to gay and bisexual men initiating anal cancer screening. Few men had heard of anal Pap tests, making awareness a straightforward target for campaigns to boost screening. Less easily addressed is the large impact that cost had on willingness to get anal Pap tests. Half of our sample was willing to get anal Pap tests only if they did not have to pay out of pocket. Men with lower incomes were also less willing to pay for anal Pap tests. Our results for income were similar to those previously reported: uninsured men who have sex with men were less likely to seek anal Pap testing.<sup>19</sup> Furthermore, abnormal anal Pap tests may entail substantial additional costs for follow-up and treatment that may not be covered by health insurance. Education campaigns may be beneficial, but they must be accompanied, or preceded, by policy changes that ensure that anal Pap testing and follow-up are more affordable and widely available.

Most men indicated that they would go to their primary care providers if they wanted to get anal Pap tests. This finding suggests that primary care physicians should be educated about the importance of anal cancer screening for HIV-negative and HIV-positive gay and bisexual men. No published data we are aware of address whether doctors discuss anal cancer screening with gay and bisexual men patients or perform such tests.<sup>33</sup> In our study, 5 men reported being unsuccessful in obtaining an anal Pap test. If primary care physicians are to be the medical home for gay and bisexual men, they may require additional training about anal cancer and anal Pap tests to meet this need. For men who do not have access to clinicians who can provide anal Pap tests, home screening by mailed tests may be a viable alternative.<sup>34</sup>

Another important issue is the availability of clinicians knowledgeable and skilled in the follow-up of abnormal anal cytology results, including high-resolution anoscopy and biopsy.<sup>22</sup> Future research is needed to address these issues, as well as the acceptability of follow-up tests, among gay and bisexual men.

More than 25% of our respondents indicated that they had not disclosed that they have sex with men to their health care providers. This finding indicates a greater need for health care providers to create environments that facilitate patient disclosure of their sexual behaviors to

allow providers to identify men most likely to benefit from anal cancer prevention services. The Gay and Lesbian Medical Association recommends providing this type of medical environment.<sup>35</sup> For example, it encourages providers to post nondiscrimination statements in their clinics and to use gender-neutral language about sexual or relationship partners.<sup>35</sup> When taking a sexual history, practitioners should ask patients if they have ever been sexually active with men, women, or both.<sup>36</sup> By discussing sexual history with all adult male patients, primary health care providers will be able to identify gay and bisexual men who are at high risk of anal cancer and to discuss anal cancer screening with them.

### Strengths and Limitations

Our national sample yielded a high participation rate, enough bisexual men to enable exploration of differences from other participants, and enough respondents to enable examination of many novel correlates of willingness to receive an anal Pap test. We focused on populations at higher risk for anal cancer than the general population.

Limitations included a cross-sectional design and reliance on self-report for screening history. We also did not assess condom use or the frequency of receptive anal intercourse. The main outcome, willingness to obtain an anal Pap test, may have overstated behavior that we would observe if the test were more easily obtained; hypothetical statements can fail to anticipate barriers to action. Additional costs of follow-up and potential treatment required by abnormal screening tests could also affect willingness and are a topic for future research. Although our sample was drawn from a study panel known to closely resemble the US population,<sup>37</sup> most participants were non-Hispanic Whites, had high socioeconomic status, and resided in urban areas. The generalizability of the findings to other gay and bisexual men is not yet known. The financial and informational barriers to anal Pap screening that we observed may be even more prevalent among a more diverse sample of gay and bisexual men.

### Conclusions

Few gay and bisexual men in our sample had undergone anal Pap testing or even heard of it. This is a concern for this high-risk group and especially for those who are HIV positive.

Correlates of willingness to undergo anal cancer screening offer potentially modifiable targets for future interventions designed to increase anal Pap testing among this high-risk population. Cost strongly affected men's willingness to undergo anal Pap tests, suggesting the need for policy changes that make anal cancer screening more affordable. ■

### About the Authors

At the time of the study, Alison C. Reed was with the Gillings School of Global Public Health, University of North Carolina, Chapel Hill. Paul L. Reiter, Jennifer S. Smith, and Noel T. Brewer are with the Gillings School of Global Public Health and Lineberger Comprehensive Cancer Center, University of North Carolina, Chapel Hill. Joel M. Palefsky is with the University of California, San Francisco.

Correspondence should be sent to Noel T. Brewer, Department of Health Behavior and Health Education, Gillings School of Global Public Health, University of North Carolina, 325 Rosenau Hall, CB#7440, Chapel Hill, NC, 27599 (e-mail: ntb1@unc.edu). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints/Eprints" link. This article was accepted October 18, 2009.

### Contributors

A. C. Reed performed data analysis and wrote the initial article draft. P. L. Reiter and J. S. Smith provided direction for the data analysis and writing. J. M. Palefsky assisted with conceptualizing and writing the article. N. T. Brewer originated the study, supervised its implementation, provided guidance, and assisted with the writing. All authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

### Acknowledgments

This study was supported in part by the Investigator-Initiated Studies Program of Merck & Co, Inc, the American Cancer Society (grant MSRG-06-259-01-CPFB), and the National Cancer Institute (grant R25 CA57726).

**Note.** The opinions expressed in this paper are those of the authors and do not necessarily represent those of Merck & Co, Inc.

### Human Participant Protection

The institutional review board at the University of North Carolina approved the study.

### References

- Johnson LG, Madeleine MM, Newcomer LM, Schwartz SM, Daling JR. Anal cancer incidence and survival: the surveillance, epidemiology, and end results experience, 1973–2000. *Cancer*. 2004;101(2):281–288.
- Holly EA, Whittemore AS, Aston DA, Ahn DK, Nickoloff BJ, Kristiansen JJ. Anal cancer incidence: genital warts, anal fissure or fistula, hemorrhoids, and smoking. *J Natl Cancer Inst*. 1989;81(22):1726–1731.
- D'Souza G, Wiley DJ, Li X, et al. Incidence and epidemiology of anal cancer in the multicenter AIDS cohort study. *J Acquir Immune Defic Syndr*. 2008;48(4):491–499.
- Palefsky J. Human papillomavirus and anal neoplasia. *Curr HIV/AIDS Rep*. 2008;5(2):78–85.
- Daling JR, Madeleine MM, Johnson LG, et al. Human papillomavirus, smoking, and sexual practices in the etiology of anal cancer. *Cancer*. 2004;101(2):270–280.
- Palefsky JM, Holly EA, Ralston ML, Jay N. Prevalence and risk factors for human papillomavirus infection of the anal canal in human immunodeficiency virus (HIV)-positive and HIV-negative homosexual men. *J Infect Dis*. 1998;177(2):361–367.
- Holmes F, Borek D, Owen-Kummer M, et al. Anal cancer in women. *Gastroenterology*. 1988;95(1):107–111.
- Ryan DP, Compton CC, Mayer RJ. Carcinoma of the anal canal. *N Engl J Med*. 2000;342(11):792–800.
- Crosby R, Holtgrave DR, Stall R, Peterson JL, Shouse L. Differences in HIV risk behaviors among Black and White men who have sex with men. *Sex Transm Dis*. 2007;34(10):744–748.
- Johnson CV, Mimiaga MJ, Reisner SL, et al. Health care access and sexually transmitted infection screening frequency among at-risk Massachusetts men who have sex with men. *Am J Public Health*. 2009;99(suppl 1):S187–S192.
- Stall RD, Greenwood GL, Acree M, Paul J, Coates TJ. Cigarette smoking among gay and bisexual men. *Am J Public Health*. 1999;89(12):1875–1878.
- Greenwood GL, Paul JP, Pollack LM, et al. Tobacco use and cessation among a household-based sample of US urban men who have sex with men. *Am J Public Health*. 2005;95(1):145–151.
- Greenwood GL, White EW, Page-Shafer K, et al. Correlates of heavy substance use among young gay and bisexual men: The San Francisco Young Men's Health Study. *Drug Alcohol Depend*. 2001;61(2):105–112.
- Hoots BE, Palefsky JM, Pimenta JM, Smith JS. Human papillomavirus type distribution in anal cancer and anal intraepithelial lesions. *Int J Cancer*. 2009;124(10):2375–2383.
- Goldie SJ, Kuntz KM, Weinstein MC, Freedberg KA, Palefsky JM. Cost-effectiveness of screening for anal squamous intraepithelial lesions and anal cancer in human immunodeficiency virus–negative homosexual and bisexual men. *Am J Med*. 2000;108(8):634–641.
- Goldie SJ, Kuntz KM, Weinstein MC, Freedberg KA, Welton ML, Palefsky JM. The clinical effectiveness and cost-effectiveness of screening for anal squamous intraepithelial lesions in homosexual and bisexual HIV-positive men. *JAMA*. 1999;281(19):1822–1829.
- Silenzio V. Top ten things gay men should discuss with their health care providers. Available at: [http://www.gma.org/\\_data/n\\_0001/resources/live/Top%20Ten%20Gay%20Men.pdf](http://www.gma.org/_data/n_0001/resources/live/Top%20Ten%20Gay%20Men.pdf). Accessed March 2, 2009.
- Knight D. Health care screening for men who have sex with men. *Am Fam Physician*. 2004;69(9):2149–2156.
- D'Souza G, Cook RL, Ostrow D, Johnson-Hill LM, Wiley D, Silvestre T. Anal cancer screening behaviors and intentions in men who have sex with men. *J Gen Intern Med*. 2008;23(9):1452–1457.
- Pitts MK, Fox C, Willis J, Anderson J. What do gay men know about human papillomavirus? Australian gay men's knowledge and experience of anal cancer screening and human papillomavirus. *Sex Transm Dis*. 2007;34(3):170–173.
- Brewer NT, Ng TW, McRee AL, Reiter PL. Men's beliefs about HPV-related disease [published online ahead of print February 17, 2010]. *J Behav Med*. doi: 10.1007/s10865-010-9251-2.
- Palefsky JM, Rubin M. The epidemiology of anal human papillomavirus and related neoplasia. *Obstet Gynecol Clin North Am*. 2009;36(1):187–200.
- Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: a theory-informed, systematic review. *Prev Med*. 2007;45(2–3):107–114.
- Fazekas KI, Brewer NT, Smith JS. HPV vaccine acceptability in a rural Southern area. *J Womens Health (Larchmt)*. 2008;17(4):539–548.
- Reiter PL, Brewer NT, Gottlieb SL, McRee AL, Smith JS. Parents' health beliefs and HPV vaccination of their adolescent daughters. *Soc Sci Med*. 2009;69(3):475–480.
- Office of Management and Budget. Standards for defining metropolitan and micropolitan statistical areas; notice. *Fed Regist*. 2000;65(249):82227–82238. Available at: <http://www.whitehouse.gov/omb/fedreg/metroareas122700.pdf>. Accessed March 14, 2009.
- Gillison ML, Chaturvedi AK, Lowy DR. HPV prophylactic vaccines and the potential prevention of non-cervical cancers in both men and women. *Cancer*. 2008;113(suppl 10):3036–3046.
- Brewer NT, Chapman GB, Gibbons FX, Gerrard M, McCaul KD, Weinstein ND. Meta-analysis of the relationship between risk perception and health behavior: the example of vaccination. *Health Psychol*. 2007;26(2):136–145.
- Vernon SW. Risk perception and risk communication for cancer screening behaviors: a review. *J Natl Cancer Inst Monogr*. 1999(25):101–119.
- Weinstein ND. Testing four competing theories of health-protective behavior. *Health Psychol*. 1993;12(4):324–333.
- McCaul KD, Tulloch HE. Cancer screening decisions. *J Natl Cancer Inst Monogr*. 1999(25):52–58.
- Moser RP, McCaul K, Peters E, Nelson W, Marcus SE. Associations of perceived risk and worry with cancer health-protective actions: data from the Health Information National Trends Survey (HINTS). *J Health Psychol*. 2007;12(1):53–65.
- Boehmer U, Bowen DJ. *Health promotion and disease prevention*. In: Makadon HJ, Mayer KH, Potter J, Goldhammer H, eds. *Fenway Guide to Lesbian, Gay, Bisexual, and Transgender Health*. Philadelphia, PA: American College of Physicians; 2008:159–185.
- Chin-Hong PV, Berry JM, Cheng SC, et al. Comparison of patient- and clinician-collected anal cytology samples to screen for human papillomavirus-associated anal intraepithelial neoplasia in men who have sex with men. *Ann Intern Med*. 2008;149(5):300–306.
- Gay and Lesbian Medical Association. Guidelines for care of lesbian, gay, bisexual, and transgender patients. Available at: [http://www.gma.org/\\_data/n\\_0001/resources/live/Welcoming%20Environment.pdf](http://www.gma.org/_data/n_0001/resources/live/Welcoming%20Environment.pdf). Accessed November 27, 2008.
- McGarry K. Taking a comprehensive history and providing relevant risk-reduction counseling. In: Makadon HJ, Mayer KH, Potter J, Goldhammer H, eds. *Fenway Guide to Lesbian, Gay, Bisexual, and Transgender Health*. Philadelphia, PA: American College of Physicians; 2008:419–439.
- Dennis JM. Description of within-panel survey sampling methodology: the Knowledge Networks approach. Available at: <http://www.knowledge-networks.com/ganp/docs/KN%20Within-Panel%20Survey%20Sampling%20Methodology.pdf>. Accessed April 12, 2009.