Anal Cancer Screening Behaviors and Intentions in Men Who Have Sex with Men

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BACKGROUND: The incidence of anal cancer has increased in the past decade, especially among men who have sex with men (MSM) and HIV-infected individuals. There is controversy about whether to routinely screen for anal cancer in MSM.

OBJECTIVES: To determine whether current anal cancer screening behaviors, intention, and concern differ by HIV serostatus and to identify characteristics of men who intend to seek anal cancer screening.

DESIGN AND PARTICIPANTS: Cross-sectional analysis of data collected from 901 HIV-infected and 1,016 HIV-uninfected MSM from the Multicenter AIDS Cohort Study (MACS) in 2005–2006.

MEASUREMENTS: Self-reported anal cancer screening history, attitudes, and intentions.

RESULTS: A history of anal warts was relatively common in these men (39%), whereas having a recent anal Pap test (5%), intention to seek anal cancer screening in the next 6 months (12%), and concern about anal cancer (8.5%) were less common. Intention to seek anal cancer screening was associated with enabling factors (screening availability, health insurance), need factors (HIV-infection, history of anal warts), concern about anal cancer, and recent sexual risk taking. Among four large US cities, there was significant regional variability in anal cancer screening behaviors, intention, and concern (all $p < 0.001$). Most MSM (76%) indicated they would go to their primary care physician for an anal health problem or question.

CONCLUSIONS: This study demonstrates a low rate of anal cancer screening and intention to screen among MSM. As more evidence emerges regarding screening, primary care physicians should be prepared to discuss anal cancer screening with their patients.

KEY WORDS: anal cancer; screening; health seeking behavior; MSM; HIV infection; intention.

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INTRODUCTION

The incidence of anal cancer has increased in the past decade¹, particularly in certain population subgroups. Both HIV-infected men and men who have sex with men (MSM) are at increased risk of anal cancer compared to the general population^{2–4}. In fact, the rates of anal cancer among HIV-infected men are similar to the rates of cervical cancer prior to the initiation of the Pap smear screening program⁵. As HIV-infected men are living longer, anal cancer poses a larger long-term health issue for this population.

Human papillomavirus (HPV) infection is strongly associated with anal cancer, and those who engage in unprotected receptive anal sex are at increased risk of anal HPV infection and anal cancer^{6,7}. Because the development of anal cancer passes through similar stages as cervical cancer, some experts recommend a similar screening strategy using anal Papanicolaou (Pap) smears to identify pre-cancerous cells and to treat them prior to the development of invasive cancer^{8,9}. Initial model-based studies suggest that regular screening for anal cancer would increase the quality-adjusted life expectancy of HIV-infected⁹ and HIV-uninfected⁸ MSM and would be cost-effective. However, no major prevention guideline currently provides clear guidance regarding anal cancer screening, and little is known about the current proportion of men who have sought or intend to seek anal cancer screening, or from which type of health providers men will seek these services.

Identification of factors related to anal cancer screening will help inform future targeted screening efforts for high-risk men. We could identify only one study of anal cancer screening awareness in men: a report that Australian MSM had little awareness of anal cancer, anal cancer screening, or HPV¹⁰. That study was conducted at a single site in 2005 and included a small proportion (6.4%) of HIV-infected men. For this study, we surveyed men enrolled in the Multicenter AIDS Cohort Study (MACS), a large longitudinal study of HIV-infected and HIV-uninfected MSM in the US.

The study objectives were to (1) determine the prevalence of current health-care experiences related to anal cancer screening, (2) determine whether these vary by HIV serostatus, and

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(3) to identify factors associated with intention to seek anal cancer screening in the next 6 months among these men.

METHODS

Study Population

Participants include all men enrolled in the MACS as of visit 43 (March 2005), including 901 HIV-infected and 1,016 HIV-uninfected men. The MACS has been described in detail elsewhere^{11,12}. In brief, the study has sites in Baltimore/Washington D.C., Los Angeles, Chicago, and Pittsburgh. Beginning in 1984, a total of 6,972 men were enrolled in three separate enrollment waves, of whom 30% were still in active follow-up at the time of analysis. Participants no longer in the study at visit 43 included those who had died (30%), been lost to follow-up (15%), or been administratively censored when the number of HIV-negative participants followed was intentionally reduced in 1993 (26%). While the vast majority of men in the study have sex with men, ~7% of the men in the study are heterosexual. IRB approval was obtained for this study at each site, and all men provided written informed consent.

Data Collection

Detailed data were collected from participants every 6 months in interviewer-administered and audio computer-assisted self interview (ACASI) format. For these analyses, we used data collected at visits 43–45 (March 2005–October 2006).

Measures Related to Anal Cancer Screening. Beginning in March 2005 (visit 43), specific questions about anal cancer screening were added to the MACS surveys. Anal wart history was measured by the question: “Have you had anal warts (condylomata acuminata) since your last visit?” and “have you ever had anal warts?” Presence or absence of anal warts was also specifically noted at each biannual physical exam. Individuals were considered to have a history of anal warts if they self reported a history and/or anal warts were observed during the physical exam. Anal Pap history was measured by the questions: “Since your last visit, have you undergone an anal Pap smear? (An anal Pap smear is collecting a sample of cells with a small brush or cotton swab to check for signs of an abnormality).” History of ever having an anal Pap smear was also collected at visit 43.

Concern about anal cancer was assessed by the question: “How concerned are you about developing anal cancer at some point in your lifetime?” Response options for this question included a five-point Likert-like scale, with responses ranging from very likely to very unlikely. Intention to seek screening for anal cancer was measured by the question: “How likely is it that you will be screened for anal cancer, anal warts, or another anal health problem in the next 6 months?”, with similar response options. Perceived screening availability was assessed by the question: “Is anal cancer screening (testing involving an anal Pap smear, collection of a swab, or possible anal biopsy) available in your community?” Responses to these questions were evaluated at visit 43–45. As no trends were apparent in screening intention or concern across visits, responses at these three semi-annual visits were averaged for this analysis. Averaged intention to seek anal cancer screening was coded into categories defined as “unlikely” (1.0–2.5),

“possible” (2.6–3.5), and “likely” (3.5–5.0). Similarly, averaged concern about anal cancer was coded into categories defined as “not concerned” (1.0–2.5), “moderate” concern (2.6–3.5), and “very” concerned (3.5–5.0).

Additional Measures. We hypothesized that men's intentions would be influenced by a broad range of factors as posited by the Anderson Model of HealthCare Utilization^{13,14}. This model posits that use of preventive health services vary according to predisposing factors (e.g., demographics, family and social structure, health beliefs, and attitudes), enabling factors (e.g., family and community resources, access to care, insurance), and need factors (e.g., previous illness and individual's response to illness)¹⁴. At visit 43, participants also completed a Men's Attitude Survey (MAS), which assessed personal attitudes and included 20 statements that assess HAART-related attitudes, safer sex burn-out, and sexual sensation seeking¹⁵.

Study Statistics

We used chi-square tests to evaluate differences in categorical variables according to HIV serostatus and study sites. We then used logistic regression analyses to identify independent predictors of intention to seek screening in the next 6 months. The results were similar when intention to seek screening was considered as a binary (data not shown) or categorical outcome, and we present the findings from the categorical outcome here. All variables significant in univariate analysis were included in a multivariate model and removed in a step-wise fashion retaining variables that were statistically significant and those known to be important in the literature, to achieve a final model. All analyses were performed using SAS 9.1.

RESULTS

Men in this analysis were primarily non-Hispanic White (63%) or non-Hispanic Black (26%) and employed full-time (57%) or part-time (11%). Median individual gross income was \$35,000 [interquartile range (IQR)=\$10,000–“≥\$60,000”] and median age was 48 years (IQR=42–55). Among HIV-infected men, the median CD4 cell count was 728 cells/μl (IQR=346–701), and the median HIV viral load was undetectable (IQR=undetectable–2313 RNA copies/ml).

Anal Health History and Attitudes

Over a third of participants reported a history of anal warts (Table 1). A history of anal warts was significantly more common in HIV-infected (47%) than HIV-uninfected (32%) MSM ($p<0.001$). A much smaller proportion of men had anal warts in the past 6 months (3.3%). During semi-annual MACS physical exams, anal warts were directly observed at least once during follow-up in 26% of HIV-positive and 17% of HIV-negative men.

Anal Pap screening was relatively uncommon; 89% of this high-risk population reported never having had an anal Pap test (Table 1). HIV-infected men were significantly more likely than HIV-uninfected men to ever have had an anal Pap test (15.7% vs. 6.9%, $p<0.001$) or an anal Pap in the past 6 months (8.7% vs. 1.8%, $p<0.001$). Abnormal results were reported by 16% of men who ever had an anal Pap test and 29% of men who

Table 1. Anal Cancer Screening History and Attitudes about Anal Screening, Stratified by HIV Status

	All subjects		HIV-infected		HIV-uninfected		p-value*
	N	%	N	%	N	%	
Number of men	1,917		901		1,016		
Screening history							
Ever had anal warts [^]							
No	1166	61%	479	53%	687	68%	<0.0001
Yes, but not in the past 6 months	687	36%	373	41%	314	31%	
Yes, in the past 6 months	64	3.3%	49	5.4%	15	1.5%	
Ever had anal Pap							
No	1,705	89%	759	84%	946	93%	<0.0001
Yes (all normal)	178	9.3%	111	12%	67	6.6%	
Yes (≥1 abnormal)	34	1.8%	31	3.4%	3	0.3%	
Anal Pap in the past 6 months							
No	1,821	95%	823	91%	998	98%	<0.0001
Yes (normal)	68	3.5%	52	5.8%	16	1.6%	
Yes (abnormal)	28	1.5%	26	2.9%	2	0.2%	
Attitudes about screening, perceived vulnerability							
How concerned are you about anal cancer?							
Not concerned	1,518	79%	641	71%	877	86%	<0.0001
Moderately concerned	231	12%	145	16%	86	8.5%	
Very concerned	163	8.5%	113	13%	50	4.9%	
How likely are you to be screened for anal cancer or anal warts in the next 6 months?							
Unlikely	1,358	71%	545	61%	813	80%	<0.0001
Possible	328	17%	190	21%	138	14%	
Likely	224	12%	164	18%	60	5.9%	
If you suspected an anal health problem where would you go for diagnosis and treatment?							
Primary physician	1,462	76%	681	76%	781	77%	0.001
STD clinic	43	2.2%	10	1.1%	33	3.2%	
Gay clinic or health center	80	4.2%	23	2.6%	57	5.6%	
Anal specialist (proctologist)	66	3.4%	35	3.9%	31	3.1%	
Dermatologist	15	0.8%	8	0.9%	7	0.7%	
HIV specialist	110	5.7%	110	12.2%	NA	NA	
Other	136	7.1%	32	3.6%	104	10.2%	
Aware of anal cancer screening available in your community							
No	980	51%	408	45%	572	56%	<0.0001
Yes	932	49%	491	54%	441	43%	

*P-values test the difference between HIV-positive and HIV-negative participants for each exposure

[^]Anal wart exposure based on self-reported history and/or observed presence of anal warts during semi-annual physical exam

had received an anal Pap test in the past 6 months. Among those tested, rates of abnormal anal Pap results were significantly higher in HIV-infected than in HIV-uninfected men for both ever (22% vs. 4.3%, $p=0.001$) and recent (33% vs. 11%, $p=0.06$) Pap testing (Table 1).

When participants were asked about their level of concern about anal cancer, more than three-fourths were unconcerned and only 8.5% reported being very concerned (Table 1). HIV-infected men were more likely than HIV-uninfected men to report being very concerned about anal cancer (12.5% vs. 4.9%, $p<0.0001$). Similarly, the proportion of men reporting likely intention to get anal cancer screening was higher in HIV-infected than HIV-uninfected men (18.2% vs. 5.9%, $p<0.001$). An additional 17% of MSM reported “possible” intention to seek screening, suggesting screening rates might be increased by motivating these individuals or providing ready access to screening for these men.

Most men (76%) reported they would go to their primary physician if they suspected they had an anal health problem (Table 1), and this proportion was similar in HIV-infected and HIV-uninfected men. Only a small proportion of men said they would go to a STD clinic, HIV specialist, or gay health center for treatment of an anal health problem (Table 1). About half

(49%) of men reported they were aware of anal cancer screening available in the community.

Predictors of Intention to Seek Screening

In multivariable analyses, predictors of intention to seek anal cancer screening included predisposing factors, enabling factors, and need factors (Table 2). Predisposing factors associated with an increased intention to screen included Black race (OR=1.4 95% CI=1.1–1.9), previous history of anal cancer screening (OR=1.9 95% CI=1.4–2.6), having three or more anal receptive sexual partners in the past 6 months (OR=1.8 95% CI=1.3–2.4, p -trend=0.003), and being very concerned about anal cancer (OR=4.7 95% CI=3.3–6.7, p -trend<0.001) (Table 2). Attitudes such as safer sex fatigue (OR=1.3 95% CI=1.0–1.7) and reduced HIV concern (OR=1.6 95% CI=0.98–2.5) were marginally associated with intention to get screened.

Enabling factors significantly associated with increased intention to seek screening included awareness of available screening in community (OR=2.2 95% CI=1.7–2.8) and current possession of health insurance (OR=1.9 95% CI=1.3–2.6). Need-related factors associated with increased intention to seek screening included current HIV infection (OR=1.9 95% CI=1.5–2.5) and a

Table 2. Multivariable Analysis of Factors Associated with Intention to get Anal Cancer Screening in the Next 6 Months

Risk factors	N or mean (SD)	OR (95% CI)	
		Univariate	Multivariate*
Demographic factors and screening history (predisposing)			
Age (per 5 year increase in age)	48.3 (10.1)	0.98 (0.93–1.04)	1.04 (0.97–1.12)
Race			
White	1,202	1.0	1.0
Hispanic	184	1.01 (0.72–1.4)	0.91 (0.59–1.5)
Black	504	1.72 (1.34–2.1)	1.42 (1.06–1.9)
Other	27	0.82 (0.33–2.0)	0.74 (0.28–2.0)
City of study recruitment			
Baltimore	371	1.0	1.0
Chicago	502	0.83 (0.63–1.09)	0.89 (0.66–1.2)
Pittsburgh	528	0.27 (0.20–0.37)	0.47 (0.34–0.66)
Los Angeles	516	0.66 (0.51–0.85)	0.67 (0.50–0.90)
Ever have an anal Pap test			
No	1,647	1.0	1.0
Yes	270	4.2 (3.3–5.4)	1.9 (1.4–2.6)
Behavioral and attitudinal (predisposing) factors			
Anal receptive male sex partners (past 6 months)			
0	999	1.0	1.0
1–2	554	1.2 (0.91–1.5)	1.3 (0.97–1.6)
≥3	364	2.0 (1.5–2.6)	1.8 (1.4–2.5)
How concerned are you about anal cancer?			
Not concerned	1,523	1.0	1.0
Moderately concerned	231	4.3 (3.3–5.7)	2.9 (2.2–3.9)
Very concerned	163	6.5 (4.7–8.8)	4.7 (3.3–6.7)
Safer sex fatigue			
No	1,358	1.0	1.0
Yes	558	1.5 (1.2–1.8)	1.3 (1.0–1.7)
Perceive HIV as less of a health threat			
No	1,478	1.0	1.0
Yes	439	1.4 (1.1–1.7)	1.6 (0.98–2.5)
Enabling factors			
Anal cancer screening available in your community			
No or unsure	985	1.0	1.0
Yes	932	3.2 (2.6–4.0)	2.2 (1.7–2.8)
Have health insurance			
No	328	1.0	1.0
Yes	1,589	1.6 (1.2–2.1)	1.9 (1.3–2.6)
Biological (need) factors			
HIV status			
HIV uninfected	1,016	1.0	1.0
HIV infected	901	2.8 (2.3–3.5)	1.9 (1.5–2.5)
CD4 (per 100 cell decrease)	539 (288)	0.93 (0.85–1.00)	0.92 (0.84–1.05)
Log ₁₀ viral load, number of HIV RNA copies per mm	5.6 (2.9)	0.99 (0.94–1.04)	1.0 (0.95–1.06)
Ever have anal warts			
No	1,282	1.0	1.0
Yes	635	1.9 (1.5–2.3)	1.4 (1.1–1.8)

*Reported odds ratios (OR) based on a multivariable final logistic regression model adjusted for all other variables in the multivariate column

history of any anal warts (OR=1.4 95% CI=1.1–1.8), especially those with anal warts in the past 6 months (OR=2.8 95% CI=1.8–4.4). Among men who were HIV-infected, neither current CD4 count or HIV viral load were significantly associated with intention to seek screening (Table 2). When we conducted similar analyses stratified by HIV status, we found the predictors of intention to seek anal cancer screening to be similar among HIV-infected and HIV-uninfected men (data not shown).

Regional Variability

Intention to seek anal cancer screening varied between MACS study sites. In multivariable analysis, men in Pittsburgh (4.4%) and Los Angeles (12.6%) were significantly less likely to report intention to be screened than men in Baltimore (17.3%) (OR=0.47, 95% CI=0.34–0.66 and OR=0.67, 95% CI=0.50–0.90,

respectively). Men in Chicago (13.5%) reported intermediate rates of intention to screen that were non-significantly different than men in Baltimore (p=0.13) or Los Angeles (p=0.69) and significantly higher than men in Pittsburgh (p<0.001) (Fig. 1). Recent anal screening history was similar in Chicago (7.0%), Baltimore (6.8%), and Los Angeles (5.8%), but significantly lower in Pittsburgh (1.1%, p<0.001). The proportion of men with moderate or high concern about anal cancer was also similar in Chicago (23%), Baltimore (29%), and Los Angeles (24%), and significantly lower in Pittsburgh (9%, p<0.001).

Availability of anal cancer screening, as reported by participants, also varied among cities (Fig. 1). Notably, only half as many participants in Pittsburgh (27%) reported awareness of available community screening as participants in the other MACS cities (51–62%). Intention to seek screening was proportional to the perceived availability of screening in each city (Fig. 1).

Figure 1. Regional variation in anal cancer screening awareness, concern, intention, and testing by MACS study site.

DISCUSSION

This study presents recent experiences related to anal cancer prevention in MSM. We found that a relatively small proportion of men had previous experience with anal cancer screening and that a small but clinically significant proportion of these men intend to seek screening in the next 6 months. These rates may be driven by low overall rates of concern about anal cancer among these men. Interest in and use of screening were higher in those MSM at increased risk because of their HIV infection, but even among these men, less than a quarter expressed concern about anal cancer or a stated intention to seek anal cancer screening. We also report that use of anal Pap screening varies substantially among cities and was associated with perceived availability of screening in those communities.

MSM and HIV-infected persons are at increased risk for anal cancer and anal cancer precursors due to a higher prevalence of anal HPV infections due to anal intercourse^{6,7} and HIV-related immunosuppression¹⁶⁻¹⁸. In fact, the rate of anal cancer in these populations (35–100 cases per 100,000 persons) is similar to the rates of cervical cancer before routine cervical cancer screening was introduced⁵. However, in the absence of clear clinical guidelines for anal cancer screening among MSM, it is unclear whether primary care practitioners should be discussing anal cancer risk or suggesting routine anal Pap testing to MSM. Although mathematical models suggest that routine anal cancer screening of MSM is cost-effective and will improve quality-adjusted life expectancy⁹, clinical trials have not been completed. Anal cancer screening has good sensitivity among HIV-positive subjects, but the benefits of early treatment have not been well evaluated¹⁹. Although relatively few men stated an intention to seek anal cancer screening, the great majority indicated they would go to their primary care physician if they suspected they had an anal health problem. This finding underscores the need for internists and other primary care providers to be able to discuss HPV and anal cancer risk with their patients.

We focused our analysis on intention to seek anal cancer screening to better understand the current needs of this population. In other studies, intention to seek health care is a strong predictor of subsequent use of men's preventive health services^{20,21}. Screening for other diseases (e.g., mam-

mography, Pap test, and prostate-specific antigen testing) has been associated with both physician recommendations and individual patient factors²²⁻²⁵. Consistent with this and the Anderson Model of HealthCare Utilization¹⁴, intention to seek anal cancer screening in this study was related to individual predisposing factors, biological need factors, and community and individual resource enabling factors. The findings from this study thus identify potential barriers to and motivators for anal cancer screening that will need to be addressed if the recommendations to screen for anal cancer become more routine.

The study findings of relatively low rates of anal cancer screening may be a reason for concern among proponents of increased anal cancer screening as many of the men clearly had risk factors, including previous anal warts, sexual risk behaviors, and HIV infection. While HAART has reduced the risk of many HIV-associated morbidities and has dramatically increased survival²⁶, studies suggest that HAART does not decrease risk of HPV-associated (anal, genital, and oropharyngeal) cancers^{2,16,26,27}. Indeed, by providing sufficient time for development of invasive anal disease, longer survival times may lead to continued increases in anal cancer rates in these men. Additional research about the benefits of early detection of anal dysplasias with anal cancer screening is needed to better inform screening recommendations. Another factor to consider is that a vaccine for HPV types 6, 11, 16, and 18, Gardasil, is now licensed for prevention of cervical HPV infections in 9- to 27-year-old females²⁸, and vaccine trials for anal HPV infection in men are currently in progress. However, as Gardasil is a preventive and not a therapeutic vaccine²⁸, it is unlikely that HPV vaccination will be useful in reducing anal cancer incidence in sexually experienced MSM.

Although general attitudinal and psychosocial measures associated with HIV infection were not associated with intention to seek anal cancer screening, concern about anal cancer was strongly associated with increased screening intention. This suggests that if health-care providers discuss anal cancer risk, more individuals may be motivated to seek screening due to increased concern or perceived vulnerability^{20,21}. The fact that enabling factors such as presence of screening programs and ability to pay for screening were strongly associated with intention to seek anal cancer screening underscores that accessible anal cancer screening programs will be important if the goal is to increase rates of screening overall. For example, the regional variation in perceived screening availability closely mirrored intention to screen in those regions. Anecdotally, several investigators involved with the study noted that there does appear to be significant difference in the availability of health-care providers that provide anal cancer screening services, such as an anal Pap smear. Without such expert providers or services, it will be very difficult for men to receive anal cancer screening even if recommended by primary care providers. If anal cancer screening is to become more routine, primary care providers will likely need to play a greater role in the initial screening process.

A few study limitations should be noted. We did not have information on the history of physician discussions with participants regarding anal cancer screening and are unable to distinguish whether lower perceived screening availability reflected actual availability of screening programs in a community. Although the MACS study includes a large number of men from each city, the study participants are unlikely to be representative of all MSM in each city, and thus actual regional

rates of anal cancer screening and screening intention in the larger communities might vary from that observed. In addition, screening history and intention to seek screening were collected by self-report and thus may suffer from the potential inaccuracies of all self-reported data. However, the MACS has a long history of collecting valid personal information from its study participants, and sensitive information was obtained via computer rather than face-to-face interview.

In summary, this study provides new information on the current use of anal cancer screening and factors associated with screening in a high-risk sample of men. Although anal cancer is a relatively uncommon cancer in the general population, the incidence among certain populations, such as MSM and HIV-infected individuals, constitutes a considerable risk and may warrant consideration of routine screening^{29,30}. This study suggests that most MSM rely on their primary care physicians for anal health care. Therefore, primary care physicians should be prepared to counsel their patients about the pros and cons of anal cancer screening and be familiar with anal health services in their local communities.

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