

# Measuring Knowledge of Cancer Screening and Prevention Strategies in HIV Healthcare Professionals

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**Objective:** Due to advances in the care of people living with HIV/AIDS (PLWHA), life expectancy significantly increased, putting this group vulnerable to age-related comorbidities, such as cancer. The objective of this study was to describe the knowledge of cancer screening (cervical, breast, anal, colon, prostate) and other cancer prevention strategies (HPV vaccination, HPV testing) among HIV care professionals in Puerto Rico (PR).

**Methods:** Cross-sectional study using a sample of 104 HIV healthcare professionals in PR. Descriptive analyses were used to characterize the study sample. Logistic regression analysis was used to determine the relation of sociodemographic and work-related factors with cancer screening knowledge.

**Results:** On average, the healthcare professionals interviewed had been working for more than 10 years with the HIV/AIDS population (11.5±7.6 years). Multivariate analysis showed that physicians had a higher likelihood of having extensive knowledge of cervical (OR=3.96; 95% CI=1.23, 12.77) and anal cancer (OR=9.4; 95% CI=2.2, 41.0) screening than other healthcare professionals. For anal cancer in particular, as the number of years a given participant had been working with people living with HIV/AIDS increased, the likelihood that this participant would have extensive knowledge of anal cancer screening significantly increased (10% year).

**Conclusion:** Health education interventions, tailored to healthcare professionals who recently finished their formal education should be developed in HPV-related cancers. Such training would improve cancer prevention and control efforts, thereby benefitting the HIV population in Puerto Rico. [*P R Health Sci J* 2016;35:147-153]

*Key words:* HIV/AIDS, Quantitative Methods, Workforce Development, Cancer Prevention & Screening, Community Health

**H**uman papillomavirus (HPV) is one of the most commonly diagnosed sexually transmitted infections worldwide (1). HPV has been associated with cancer of the cervix, anus, vulva, vagina, penis, oral cavity, and oropharynx, accounting for 5.2% of all cancers worldwide (2). For people living with HIV/AIDS (PLWHA), a higher risk of HPV infection and HPV-related cancers are observed as compared to the general population (2, 3, 4, 5, 6, 7, 8).

According to a report from the Centers for Disease Control and Prevention, in 2013, Puerto Rico (PR) was one of the 10 states and territories that had the highest cumulative number of AIDS cases, HIV incidence, and prevalence of infection (9). As of July 2014, the PR HIV/AIDS Surveillance System reported that there were 46,152 cases of HIV infection in PR and 19,883 persons living with HIV (10). In addition, disproportionately higher burden of HIV, as well as of certain infection-related and non-infection related cancers have been observed among minority populations in PR and the US (4, 11, 12, 13).

Since delayed screening practices will have an impact on early detection, and given the high burden of HPV-related cancers on PLWHA in PR (4), it is important to understand the knowledge related to cancer screening practices among healthcare professionals who provide direct services to this population. Therefore, the objective of this study was to create a general profile of these individuals and determine the correlates

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associated with their levels of knowledge of cancer screening tests and other cancer prevention strategies.

### Study methodology

This cross-sectional study recruited 104 HIV healthcare professionals in PR. Participants were recruited through invitation letters and a brochure given at scientific meetings that gathered healthcare professionals who provide direct services to PLWHA in PR. Those healthcare professionals interested in forming part of the study, were asked to provide their contact information. Potential participants were contacted by phone or email in order to determine their availability to participate in the study interview. Since these healthcare professionals had very busy schedules but were interested in participating on the study, we provided them with various alternatives in terms of setting up the interview survey. The most common method of data collection was a personal face-to-face interview, in which trained interviewers visited the work place of interested participants and interviewed them; the second was a telephone interview, in which the interviewers called the healthcare professionals outside of work hours and administered the survey.

The administration of the survey took approximately 15 minutes. This survey included sociodemographic characteristics, work-related factors (profession, years working as a healthcare professional, years working with HIV+), and type of workplace (public hospital, private clinic, immunology clinic, and the academia). A profile of the population to which the participant attended and the types of services provided (e.g. psychological services and case management) were also gathered. The survey also include questions related to the screening services to which they referred their HIV patients as well as their perception of their knowledge of selected cancer prevention services (cervical, anal, colorectal, prostate, breast, HPV infection, and vaccine).

At the end of the study, the participants received a thank-you note (sent by email) and an invitation to participate in an educational forum. Those who attended the forum, received information about the burden of HPV-related cancers in PR and learned about the preliminary results of some focus-group interviews that were done to evaluate the levels of knowledge about HPV-related cancer possessed by PLWHA; in addition, the results of the study in which they had participated were shared at the forum (14). The forum was held at the University of Puerto Rico (UPR) Comprehensive Cancer Center. The study described herein was approved by the UPR Medical Sciences Campus Institutional Review Board (IRB).

### Knowledge of cancer screening

The participating healthcare professionals' self-perceived knowledge of cervical, breast, anal, oral, colon, and prostate cancer, as well as of the HPV test and of the HPV vaccine, was assessed. The following is a sample of the questions used:

“How do you perceive your clinical knowledge in the following areas: a) cervical cancer screening, b) breast, c) colorectal, d) anal and e) prostate cancer screening? Possible responses to all these questions were a) extensive, b) adequate, and c) poor. An answer of adequate or poor was given a score of 0 (zero). If the study participant answered that he or she possessed extensive knowledge, a score of 1 (one) was assigned.

### Statistical analysis

Frequency distributions and descriptive statistics were used to characterize the study sample. Univariate logistic regression was used to determine the correlation of sociodemographic and work-related factors with extensive cancer screening knowledge. Seven separate logistic regression models were analyzed using the self-perceived levels of extensive knowledge of cervical, breast, anal, colon, and prostate screening as the outcomes of interest. Furthermore, two additional models were constructed to evaluate the correlates of the self-perceived levels of knowledge of the HPV test and of the HPV vaccine.

Univariate logistic regression models and adjusted logistic regression models for years working with HIV+ were then performed to identify factors within this group that were independently associated with having an adequate knowledge of cancer screening tests and other cancer prevention practices. All statistical analyses were performed using the statistical package SAS (Version 9.1; Cary, NC).

## Results

The mean age of the healthcare professionals interviewed was 44.3 ( $\pm 11.3$ ) years; more than two thirds of them were females (70.2%). Most of the professionals were either physicians (26.9%) or nurses (25.0%). The other professionals interviewed were case workers (13.5%), health educators (6.7%), or social workers (3.9%). On average, the healthcare professionals interviewed had been working at their chosen professions for more than 15 years ( $15.2 \pm 9.2$  years). Their mean time working specifically with PLWHA was 11.5 ( $\pm 7.6$ ) years (data not shown).

The most common clinical services offered in their clinics or organizations were part of the usual medical care for HIV/AIDS or related comorbidities, such as case management (90.4%), psychological services (85.6%), and nutritional interventions (62.5%). Regarding cancer screening and prevention practices for cancer control, the most common service offered was HPV testing (57.7%). Furthermore, the clinical services that these healthcare professionals recommended most commonly to PLWHA were colorectal (67.7%) and breast cancer screening (64.7%), followed by oral health services (60.7%) (Table 1). Of the healthcare professionals interviewed, 48.9% were unaware of the existence of any resources/programs in their regions that provided cancer prevention and control services for PLWHA. All of them (100%) expressed their interest in further training in the area of cancer screening.

**Table 1.** Health services provided and those referred by HIV healthcare professionals serving PLWHA in Puerto Rico (n = 104).

Frequencies of service provision/referral	Service provision N (%)	Referral N (%)
Cervical cancer screening	34 (32.7)	49 (48.0)
Evaluation and management of abnormal Pap test	46 (44.2)	53 (56.5)
Breast cancer screening	43 (41.4)	66 (64.7)
Anal cancer screening	34 (32.7)	55 (53.9)
Colorectal cancer screening	22 (21.2)	69 (67.7)
Prostate cancer screening	35 (33.7)	59 (57.8)
Nutritional program	65 (62.5)	39 (38.2)
Physical-conditioning program	17 (16.4)	47 (46.1)
Oral health	32 (30.8)	62 (60.7)
Psychological services	89 (85.6)	34 (33.3)
Case management	94 (90.4)	22 (21.6)
Weight management	57 (54.8)	38 (37.3)
Tobacco-cessation program	37 (35.6)	42 (41.2)
HPV testing	60 (57.7)	38 (37.3)
HPV vaccination	41 (39.4)	40 (39.2)

**Healthcare professionals’ knowledge of the health services available to people living with HIV**

A high percentage of the professionals interviewed indicated that they had extensive knowledge of HIV-related services such as HIV counseling (75.0%) and sexual education (60.6%). Regarding knowledge of cancer screening, 28.9% reported having extensive knowledge of breast cancer screening, while 21.2% claimed to have like knowledge with regard to cervical cancer screening, 20.2% did so with regard to prostate cancer screening, 16.4% for anal cancer screening, and 14.4% for colorectal cancer screening. Less than 20% of the sample members claimed to have extensive knowledge of oral health. In addition, less than a third of the healthcare professionals interviewed reported having extensive knowledge of HPV testing (27.9%) or of the HPV vaccine (30.8%). Levels of knowledge with regard to other health services are presented in Table 2.

**Table 2.** HIV healthcare professionals’ perceived levels of knowledge of the types of cancer screening available to PLWHA (n = 104).

Knowledge of health services	Frequency (N)	Percent (%)
Cervical cancer screening		
Extensive	22	21.2
Adequate	73	70.2
Poor	9	8.7
Breast cancer screening		
Extensive	30	28.9
Adequate	68	65.4
Poor	6	5.8
Anal cancer screening		
Extensive	17	16.4
Adequate	51	49.0
Poor	36	34.6
Colorectal cancer screening		
Extensive	15	14.4
Adequate	54	51.9
Poor	35	33.7

Prostate cancer screening		
Extensive	21	20.2
Adequate	60	57.7
Poor	23	22.1
Nutritional Programs		
Extensive	26	25.0
Adequate	73	70.2
Poor	5	4.8
Physical-Conditioning Programs		
Extensive	19	18.5
Adequate	60	58.3
Poor	24	23.3
Sexual Education		
Extensive	63	60.6
Adequate	69	37.5
Poor	2	1.9
HIV Counseling		
Extensive	78	75.0
Adequate	26	25.0
Poor	--	--
Oral Health		
Extensive	16	15.5
Adequate	72	69.9
Poor	15	14.6
Psychological Services		
Extensive	32	30.8
Adequate	59	56.7
Poor	13	12.5
Case Management		
Extensive	45	43.7
Adequate	43	41.8
Poor	15	14.6
Weight Management		
Extensive	21	20.4
Adequate	68	66.0
Poor	14	13.6
Tobacco-Cessation Programs		
Extensive	23	22.5
Adequate	52	51.0
Poor	27	26.5
HPV Testing		
Extensive	29	27.9
Adequate	55	52.9
Poor	20	19.2
HPV Vaccination		
Extensive	32	30.8
Adequate	55	52.9
Poor	17	16.4
Knowledge of Cancer Prevention Programs for HIV Population		
All programs and resources	42	44.7
Some programs or resources	43	45.7
None	9	9.6

**Factors associated with extensive knowledge of cervical cancer screening**

Table 3 shows the association of demographic and profession-related factors with extensive knowledge of cervical cancer screening. Univariate logistic regression models showed that physicians were up to 4 times more likely to report having extensive knowledge of cervical cancer screening compared to other healthcare professionals (OR = 4.07; 95% CI = 1.29, 12.88). Meanwhile, the multivariate logistic regression model showed that, physicians were more likely than nurses and other healthcare professionals to report adequate levels

**Table 3.** Univariate logistic regression models of factors associated with extensive knowledge of cancer screening and of HPV-related services among HIV healthcare professionals in Puerto Rico

	Cancer screening					HPV-related services	
	Cervical OR (95% CI)	Breast OR (95% CI)	Anal OR (95% CI)	Colon OR (95% CI)	Prostate OR (95% CI)	Test OR (95% CI)	Vaccine OR (95% CI)
<i>Sex</i>							
Women	0.68 (0.25, 1.84)	0.64 (0.26, 1.58)	0.30 (0.10, 0.88)	0.42 (0.14, 1.29)	0.62 (0.23, 1.70)	1.16 (0.45, 3.01)	0.60 (0.25, 1.45)
Men	1.00	1.00	1.00	1.00	1.00	1.00	1.00
<i>Profession</i>							
Nurse	2.20 (0.63, 7.67)	1.05 (0.36, 3.07)	2.04 (0.38, 10.92)	0.61 (0.11, 3.27)	1.25 (0.36, 4.29)	1.58 (0.48, 5.15)	2.03 (0.67, 6.10)
Physician	4.07 (1.29, 12.88)	1.58 (0.58, 4.29)	10.14 (2.52, 40.78)	2.44 (0.73, 8.18)	2.10 (0.69, 6.41)	6.06 (2.1, 17.48)	5.26 (1.87, 14.80)
Other*	1.00	1.00	1.00	1.00	1.00	1.00	1.00
<i>Years working with HIV population</i>	1.01 (0.94, 1.07)	1.01 (0.95, 1.07)	1.10 (1.02, 1.19)	1.08 (1.01, 1.17)	1.03 (0.97, 1.1)	1.02 (0.96, 1.08)	1.03 (0.97, 1.10)

\*Other healthcare professionals include occupational therapists, HIV-prevention counselors, program directors, epidemiologists, clinical psychologists, pharmacists, pharmaceutical technicians, health educators, and nutritionists

of knowledge about cervical cancer screening (OR=3.9; 95% CI=1.2, 12.8), regardless of the number of years working with this population (Table 4). No other factors were shown to be associated with extensive cervical cancer screening knowledge in this sample.

**Factors associated with extensive knowledge of anal cancer screening**

Univariate logistic regression models showed that female healthcare professionals were, compared to their male counterparts, 70% less likely to report having extensive knowledge of anal cancer screening (OR = 0.30; 95% CI = 0.10, 0.88). Moreover, physicians were up to 10 times more likely to report having extensive knowledge of anal cancer screening, compared to other healthcare professionals (OR = 10.14; 95% CI = 2.52, 40.78) (Table 3). Univariate analysis also showed that the length of time that healthcare professionals reported they had been working with the HIV+ was significantly associated with possessing extensive knowledge of anal cancer screening. That is, as the number of years working with PLWHA increased, the likelihood of such professionals having extensive knowledge of anal cancer screening increased, as well (by 10%) (OR = 1.10; 95% CI = 1.02, 1.19). Multivariate analysis showed that physicians had a higher likelihood of reporting having extensive knowledge about anal cancer screening, compared to nurses and other healthcare professionals (OR = 9.44; 95% CI = 2.17, 41.03), after adjusting for sex and years working with HIV+ (Table 4). Furthermore, a statistically significant association between the number of years working with HIV+

and having extensive knowledge of anal cancer remained, upon multivariate analysis.

**Factors associated with extensive knowledge of colon cancer screening**

A marginal association between the number of years working with PLWHA and a healthcare professionals’ extensive knowledge of colon cancer screening was observed in univariate logistic regression models. As the number of years that these individuals had worked with PLWHA increased, the likelihood that they would have extensive knowledge of colon cancer screening also increased (by 8%) (OR = 1.08; 95% CI = 1.01, 1.17). No other factors were associated with this outcome in the multivariate analysis.

**Factors associated with extensive knowledge of the HPV test and the HPV vaccine**

Univariate logistic regression models showed that physicians were up to 5 times more likely to report having extensive knowledge of the HPV vaccine, compared to other healthcare

**Table 4.** Multivariate logistic regression models of factors associated with adequate knowledge of cancer screening and of HPV-related services among HIV healthcare professionals in Puerto Rico.

	Cancer screening		HPV-related services	
	Cervical OR (95% CI)	Anal OR (95% CI)	HPV Testing OR (95% CI)	HPV Vaccination OR (95% CI)
<i>Sex</i>				
Women	-	0.30 (0.10, 0.88)	-	-
Men	-	1.00	-	-
<i>Profession</i>				
Nurse	2.30 (0.65, 8.15)	2.27 (0.39, 13.28)	1.55 (0.47, 5.11)	1.96 (0.65, 5.92)
Physician	3.96 (1.23, 12.77)	9.44 (2.17, 41.03)	5.98 (2.06, 17.33)	5.10 (1.80, 14.40)
Other*	1.00	1.00	1.00	1.00
<i>Years working with HIV+</i>	0.99 (0.93, 1.06)	1.10 (1.01, 1.19)	1.01 (0.95, 1.07)	1.02 (0.96, 1.08)

\*\*Other healthcare professionals include occupational therapists, HIV-prevention counselors, program directors, epidemiologists, clinical psychologists, pharmacists, pharmaceutical technicians, health educators, and nutritionists.



professionals (OR = 5.26; 95% CI = 1.87, 14.80). A similar strength was observed when examining the association between healthcare professionals and having extensive knowledge of the HPV test (Table 3).

Regarding HPV testing, in models adjusted for the number of years working with HIV+, physicians continued to be more likely to have extensive knowledge of such testing, compared to other healthcare professionals (OR = 5.98; 95% CI = 2.06, 17.33). Adjusted regression models also showed that, regardless of the number of years working with HIV+, a higher likelihood of having extensive HPV-vaccine knowledge was observed among physicians (OR = 5.10; 95% CI = 1.80, 14.40) (Table 4). No other factors were shown to be associated with having extensive HPV vaccine knowledge in this sample.

### Factors associated with extensive knowledge of breast and prostate cancer screening

No factors were significantly associated with having extensive knowledge of breast or prostate cancer screening in this study.

## Discussion

This study describes for the first time knowledge needs of HIV treaters in Puerto Rico; particularly in areas related to cancer prevention and control for PLWHA. According to the findings of this study, in over 50% of the cases, the patients who required any kind of cancer screening other than cervical cancer screening were referred. Although this practice of referral is expected, it is important to determinate the need for including cancer screening services as important components of health maintenance in HIV clinical practice (15). Another important finding is that 48.9% of the healthcare professionals interviewed reported that they were not aware of any resources/programs in their regions providing cancer prevention and control services for PLWHA. This particular finding underscores the need to better promote current cancer prevention programs on the island among healthcare professionals working with HIV+ individuals.

Over the past decade, expanded global access to HAART has extended the lifespans of HIV+ women and men (16). However, this increased access to therapeutic interventions has not been accompanied by an increased focus on preventing and treating the chronic diseases associated with HIV, including cancer (with the exception of the widespread recommending of cervical cancer screening) (17). This study highlights the importance of developing comprehensive cancer screening programs among PLWHA in order to achieve earlier diagnosis and, thereafter, promptly initiate treatment, this not only for HPV-related cancers (17) but also for breast (18), colorectal (19), and prostate cancers (20).

In this study, a higher likelihood of having extensive cervical cancer screening knowledge was observed in physicians than it was in nurses and other healthcare professionals. Although invasive cervical cancer is an AIDS-defining cancer (21), 78.9%

of the healthcare professionals indicated that their knowledge of cervical cancer is adequate or poor, which accentuates the need for capacity-building opportunities to train HIV healthcare professionals in the various aspects of cervical cancer.

For anal and colon cancer screening knowledge, individuals with more years of education and those who were physicians continued to have extensive knowledge, according to multivariate analysis. For anal cancer in particular, incidence rates have increased 26.7% in Puerto Rican men, although continue to be higher in women as compared to men (22). An excess risk of anal cancer has also been documented for men and women living with AIDS in PR, as compared to the general population. Thus, these prior documented estimates show that increased training regarding the pathogenesis of anal cancer is necessary for healthcare professionals in PR. Healthcare professionals during their early training years will, in particular, benefit from understanding the role of anal cancer in terms of morbidity and mortality in PLWHA. These trainings should focus not only on physicians but also on the other healthcare professionals who have direct involvement with HIV/AIDS patients, in which professionals our study found there to be a lower likelihood of extensive knowledge, compared with physicians. This is particularly important in a condition such as HIV/AIDS, for which a comprehensive, multidisciplinary healthcare approach is imperative if patients are to attain good clinical outcomes.

Among the study's limitations is the fact that the results cannot be generalizable to the entire population of healthcare professionals working with HIV+ individuals in PR. Another is that information on the frequency on how often they refer these services to PLWHA was not assessed. Moreover, not having identified whether or not a given healthcare professional worked in a clinical setting that received Ryan White funding, also constitutes a limitation to our study and might impact the results. The Ryan White program provides intensive comprehensive surveillance (as per the HIV/AIDS Bureau performance indicators), which provides a diversity of preventive services, including annual cervical cancer screening (23). Healthcare professionals that work within Ryan White funded programs have constant access to these services and hence, one of the reasons that the perceived knowledge in this area is so high. Moreover, and of major importance, is that the information collected is based on self-reported perceived knowledge, which may not be correlated with true knowledge or performance measures. The results of the study could also reflect the level of comfort of these providers with the specific topics in the present survey. Since HIV counseling and risk reduction are part of their main responsibilities, it is expected that these areas represent increased levels of comfort, knowledge, or both. Future studies need to use knowledge scales in these areas and measure specific criteria related to the guidelines for cancer screening and prevention established by the United States Preventive Services Task Force (24) as well as the screening guidelines of the American Cancer Society (25) and other professional organizations. In addition, such studies need to take into account

new emerging topics and practices in order to more precisely measure specific knowledge.

Despite these limitations, findings from this study indicate that healthcare professionals are greatly interested in capacity-building activities in the area of cancer. As can be seen, then, this study provides formative information on clinical practices related to cancer prevention and control among HIV healthcare professionals in PR. Given the importance of cancer-prevention awareness (specifically—in the context of our study—in HIV+ in PR), future studies should measure the pertinent knowledge of healthcare professionals not specializing in HIV patients and, having done so, compare what is learned to the existing data. Given the high burden of cancer among PLWHA in PR and worldwide, behavioral research in this area is warranted, as well as behavioral interventions that increase physicians' and patients' cancer-related knowledge and preventive behaviors.

## Resumen

**Objetivo:** La expectativa de vida en personas viviendo con VIH/SIDA (PLWHA) ha incrementado debido a los avances en los cuidados ofrecidos; convirtiéndolos en un grupo vulnerable a comorbilidades asociadas a la edad como el cáncer. El objetivo de este estudio es describir el conocimiento sobre pruebas de cernimiento de cáncer (cervical, mama, anal, colon, próstata) y estrategias de prevención (vacunación y prueba para VPH) en diversos profesionales de VIH en Puerto Rico (PR). **Métodos:** Estudio transversal con una muestra de 104 profesionales de la salud en PR. Análisis de regresión logística fue utilizado para determinar la correlación entre las características sociodemográficas y factores laborales con el conocimiento sobre cernimiento de cáncer. **Resultados:** Los participantes habían trabajado con la población VIH/SIDA por un promedio de más de 10 años (11.5±7.6 años). Análisis multivariado demostró que en comparación con otros profesionales de la salud, los médicos tienen mayor posibilidad de tener conocimiento extenso sobre el cernimiento de cáncer cervical (OR=3.96; 95% CI=1.23, 12.77) y anal (OR=9.4; 95% CI=2.2, 41.0). La posibilidad de que el participante tuviese conocimiento extenso sobre cáncer anal aumentaba significativamente a medida que aumentaban los años trabajando con PLWHA (10% anual). **Conclusión:** Dado al interés reportado, intervenciones educativas sobre temas relacionados al cáncer, en especial los relacionados con el Virus del Papiloma Humano, deben ser dirigidos a quienes han terminado su educación formal recientemente. El proveer estos entrenamientos podrían contribuir a los esfuerzos de prevención y control del cáncer y a su vez beneficiar a los PLWHA en PR.

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