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Patient-provider communication with HIV-positive women about abnormal Pap test results

Lisa T. Wigfall, PhD[a,b], **Shalanda A. Bynum, MPH, PhD**[c], **Daniela B. Friedman, PhD**[d,e], **Heather M. Brandt, PhD, CHES**[d,e], **Donna L. Richter, FAAHB, EdD**[d], **Saundra H. Glover, MBA, PhD**[a,b], and **James R. Hébert, ScD**[d,f]

[a]Institute for Partnerships to Eliminate Health Disparities, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

[b]Department of Health Services Policy and Management, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

[c]Department of Preventive Medicine and Biometrics, F. Edward Hébert School of Medicine, Uniformed Services University of the Health Sciences, Bethesda, Maryland, USA

[d]South Carolina Statewide Cancer Prevention and Control Program, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

[e]Department of Health Promotion, Education, and Behavior, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

[f]Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

Abstract

In this article, the authors examine communication between women living with human immunodeficiency virus (WLH) and health care providers (HCPs) regarding abnormal Pap tests. During the period of March 2011 through April 2012, 145 WLH were recruited from Ryan White funded clinics and community-based AIDS service organizations located in the southeastern United States. WLH who had an abnormal Pap test (69%, n = 100/145) were asked if their HCP shared and explained information about abnormal Pap tests. The authors performed chi-square tests and multivariable logistic regression analyses using Stata I/C 13. HCPs shared information about abnormal Pap tests with 60% of participants, and explained the information they shared to 78% of those. Health literate participants were more than three times as likely to have read the information received about abnormal Pap tests (adjusted odds ratio [aOR] = 3.49, 95% confidence interval [CI] 1.19–10.23), and almost five times as likely to have understood the cancer information they read (aOR = 4.70, 95% CI 1.55–14.24). Knowing other women who had had an abnormal Pap test was not significantly associated with cancer information seeking or processing after controlling for confounding factors. The present findings underscore the need to increase

CONTACT Lisa T. Wigfall, PhD lisa.wigfall@sc.edu Institute for Partnerships to Eliminate Health Disparities, Arnold School of Public Health, University of South Carolina, 220 Stoneridge Drive, Suite 103, Columbia, SC 29210-8018, USA.

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WLH's health literacy as an intermediate step to improving patient–provider communication among WLH. Lay sources of cancer information for WLH warrant further study.

Keywords

Cervical cancer; health literacy; HIV; HPV; information seeking

Introduction

Infection with human immunodeficiency virus (HIV) weakens a person's immune system, thereby increasing their risk of developing certain cancers (e.g., cervical cancer; Engels et al. 2008). Immunosuppression decreases a woman's ability to "clear" human papillomavirus (HPV) infection, which results in persistent infection and increased risk of cervical cancer (Chaturvedi et al. 2009; Grulich et al. 2007; Walboomers et al. 1999). Because of this increased cancer risk, it is recommended that newly diagnosed HIV-positive women have two Pap tests in the first year after HIV diagnosis and annually thereafter if both Pap test results are normal (Kaplan et al. 2009). Recommendations for increased surveillance of HIV-positive women were implemented when cervical cancer was added to the list of acquired immune deficiency syndrome (AIDS) defining illnesses in 1993 (Centers for Disease Control and Prevention [CDC] 1992). The addition of cervical cancer was in response to a growing number of women being diagnosed with HIV/AIDS and the observed link between HIV infection and cervical disease (CDC 1992).

Cervical cancer is one of three AIDS-defining cancers (ADCs). The other two ADCs are Kaposi's sarcoma and non-Hodgkin lymphoma. The incidence rates of Kaposi's sarcoma and non-Hodgkin lymphoma have decreased significantly since highly active antiretroviral therapies (HAART) were introduced in 1996 (Engels et al. 2009). Findings have been mixed regarding whether HAART has affected the incidence of cervical cancer (Ahdieh-Grant et al. 2004; Barbaro and Barbarini 2007; De Vuyst et al. 2008; Engels et al. 2009). In addition, the incidence of other HPV-associated cancers (e.g., anal cancer) has increased in the post-HAART era (Bower et al. 2004). Unfortunately, the link between HIV infection and HPV-related disease remains unclear (Pinzone et al. 2012).

Cervical cancer is one of only a few cancers that are amenable to primary prevention through routine screening and follow-up of abnormal Pap test results. Routine Pap testing allows for detection and removal of abnormal cervical cells before they become cancerous. The key to the prevention and control of cervical cancer is the early detection of cervical intraepithelial neoplasia (CIN; i.e., precancerous cells) and adherence to abnormal Pap test follow-up recommendations (Saslow et al. 2012). Despite increased cervical cancer risk and known benefits of early detection of CIN, 19%–23% of HIV-positive women do not receive annual Pap tests as recommended (Bynum et al. 2013; Oster, Sullivan, and Blair 2009). These early detection failures are increased among older HIV-positive women, an age group disproportionately diagnosed with AIDS within one year of an initial HIV-positive diagnosis (Duffus et al. 2012; Zapka et al. 2003).

Patient–provider communication has the potential to reduce health system failures that contribute to the disproportionate burden of cervical disease and cancer among HIV-positive women. Some have reported that provider communication is lowest among patients with low health literacy and low socioeconomic status (SES; National Cancer Institute [NCI] 2009; Servellen et al. 2005; Williams et al. 2002). Others have suggested that lay sources of health information (e.g., friends, family members) may play a vital role in health decision making among disadvantaged populations (Smith et al. 2009). Thus, improving patient–provider communication has the potential to improve cervical health outcomes among HIV-positive women. To this end, the Structural Influence Model (SIM) of Communication Inequality was used to conceptualize this study (Viswanath, Shoba, and Kontos 2007).

The SIM of Communication Inequality suggests that improved health communication outcomes, such as information seeking and processing, and health literacy may produce positive health behavior outcomes, such as adherence to abnormal Pap test follow-up care in the context of social determinants of health (Viswanath, Shoba, and Kontos 2007). We examined the relationships among patient information seeking and processing, health literacy, and social networks. These formative data can inform the development of effective health communication strategies focused on promoting health literacy and disseminating cancer information via social networks in an effort to reduce the disproportionate burden of cervical cancer among WLH.

Methods

Study design

This study was part of a larger cross-sectional study where researchers examined HPV and cervical cancer prevention knowledge, attitudes, beliefs, and behaviors (KABB) among 145 urban and rural dwelling, largely medically-underserved, HIV-positive women. Participants were recruited from Ryan White funded clinics and community-based AIDS service organizations located in the southeastern United States. Eligibility criteria for the parent study included being an 18+-year-old female diagnosed with HIV infection. However, only the responses of HIV-positive women who had ever had an abnormal Pap test were included in this study (see the next subsection). Study recruitment and enrollment took place between March 2011 and April 2012. Clinic staff told patients who met the inclusion criteria about the study at intake and then again at check out. Interested HIV-positive women were referred to study staff to complete an in-person, interviewer-administered online survey that was developed using Qualtrics® software. Research staff confirmed eligibility and provided additional details about the study. All study participants provided written, signed informed consent. The response rate was 86.3% (145/168). The main reasons given for not participating in this study were: “I don’t have time” ($n = 9$); “I’m not interested” ($n = 6$); other ($n = 6$); “I don’t feel like it” ($n = 1$); “I’m already in a research study” ($n = 1$). The study protocol was approved by the University of South Carolina’s Institutional Review Board.

Sample selection

All participants who completed the survey were asked: "Have you ever been told by a doctor, nurse, or other health-care provider that your Pap test results were not normal?" Only participants who responded "yes" were included in this study (69%, $n = 100/145$). WLH who had an abnormal Pap test history were selected because this study examined patient–provider communication about abnormal Pap test results and adherence to provider's abnormal Pap test follow-up recommendations. About one-third of participants were excluded because they either had not (30%, $n = 44/145$) or did not know/were not sure (1%, $n = 1/145$) if they ever had an abnormal Pap test result. No other exclusion criteria were used.

Measures

Adherence to provider's abnormal Pap test follow-up recommendations— Participants were asked: "What did your doctor, nurse, or health-care provider recommend that you do after they told you that your Pap test result was not normal?" We asked participants if the following abnormal Pap test followup procedures were recommended: a repeat Pap test, HPV test, colposcopy, biopsy, or hysterectomy (yes/no). Participants were also asked if they completed the recommended abnormal Pap test follow-up procedure(s) (yes/no).

Patient–provider communication outcomes—Participants were asked: "Did your doctor, nurse, or other health-care provider give you information to read about abnormal Pap test results? (yes/no), and explain (or had someone else explain) to you what an abnormal Pap test result meant?" (yes/no) Participants who were given information to read about abnormal Pap test results were asked, "Did you read this information?" (yes/no). Those to whom someone explained what an abnormal Pap test result meant were asked, "How much did you understand what they explained to you?" (a lot/some/a little/not at all). The four-level responses were recoded dichotomously "as a lot" versus "some/a little." None of the participants responded "not at all." These variables were recoded to create two patient–provider communication variables that were used to assess participants' seeking and processing (i.e., understanding) of cancer information about abnormal Pap test results. Information seeking was coded as "read information" versus "did not read or receive information." Information processing was coded as "understood information a lot" versus "understood information some/a little" or "information was not explained."

Health literacy—Health literacy was measured using the Single Item Literacy Screener (Morris et al. 2006), which asked, "How often do you need to have someone to help you understand information that you get from your doctor, nurse, or health-care provider?" The five-level responses were recoded dichotomously as recommended by Morris and colleagues to categorize participants as having high health literacy (never/rarely) or low health literacy (sometimes/often/all the time) (Morris et al. 2006).

Social networks—The National Cancer Institute's Health Information National Trends Survey (HINTS) asked participants, "Do you have friends or family members that you talk to about your health?" (yes/no) (NCI n.d.). To assess the prevalence of potential lay sources

of cancer information among members of the participant's social networks (i.e., family members and friends) we adapted the HINTS question and asked, "Have any women that you know ever been told that their Pap test result was not normal?" (yes/no). The question that we used in this study assumed that participants had talked to members of their social networks about their Pap test results for the participants in our study to have known that their family members and friends had ever had an abnormal Pap test.

Social determinants of health—The following sociodemographic characteristics and socioeconomic position variables were included in our analyses: age (<50years, 50+ years), race/ethnicity (non-Hispanic Black, other); marital status (married/living as married, not married/other); sexual orientation (heterosexual, lesbian/gay/bisexual/transgender); annual household income (<$10,000, $10,000 or more); education (high school/general education diploma [GED] or less, at least some college); housing status (own/rent, other); public assistance (food/AIDS medications/housing, no public assistance).

Risk factors and behaviors

Risky sexual behaviors: We used a question from the Behavioral Risk Factor Surveillance System survey to assess engagement in sexual behaviors that might increase a person's risk for developing cervical cancer (CDC 2015a). Participants were asked if they have: had unprotected vaginal, oral, or anal sex; been treated for one or more sexually transmitted diseases; given or received money or drugs in exchange for sex; been forced to have sex with someone against your will in the past year. Response options were: yes, no, don't know/not sure, or refused. This variable was recoded dichotomously to indicate whether the respondent engaged in risky sexual behaviors (yes/no) with refused considered missing and therefore excluded ($n = 1$). None of the participants responded don't know/not sure.

Cigarette smoking status: We asked two questions to assess smoking status. All participants were asked, "Have you smoked at least 100 (or 5 packs of) cigarettes in your entire life?" (yes/no). Smokers were asked, "Do you now smoke cigarettes every day, some days, or not at all?" Participants were categorized as a current smoker, former smoker, or never smoker.

Body mass index (BMI) category: BMI was calculated (weight/height^2 × 703) and then categorized as underweight/normal (≤24.9) versus overweight/obese (≥25.0).

Other: We also asked about alcohol use in the past month and the use of illegal substances (including marijuana) in the past year. The CDC defines heavy drinking for women as consuming eight or more alcoholic beverages per week (CDC 2015b). We assessed both number and frequency of drinking alcoholic beverages in the past month. Because none of the participants in our study reported drinking more than eight alcoholic beverages per week, we coded alcohol use as any or none. Illegal drug use was coded as current/former user or non-user. Participants who either reported that they did not know/were not sure or refused to tell us about alcohol consumption and drug use status (i.e., current or former drug user) were coded as missing.

Statistical analyses

The HPV and cervical cancer prevention KABB survey data were analyzed using Stata I/C 13 software (College Station, TX, USA). Our primary outcome of interest was patient–provider communication (i.e., information seeking and processing). Chi-square and Cramer's *V* tests were performed to examine the statistical significance of bivariate associations, as well as the effect sizes of these relationships. Multivariable logistic regression analyses were also performed and *p* values, Phi-values, odds ratios (OR), and 95% confidence intervals (CI) are reported. Two-tailed Fisher's exact tests were used as appropriate when more than 25% of expected cell counts were less than five (Fleiss 1981; Ludbrook 2008). Four multivariable logistic regression models were performed using forward stepwise addition to examine the relationship between each of these patient–provider communication outcomes and our main independent variables (i.e., health literacy and potential lay sources of cancer information). We modeled information seeking = read information with health literacy (Model 1) and potential lay sources of cancer information (Model 2) as the exposures (i.e., main independent variables). We also modeled information processing = understood information "a lot" with health literacy (Model 3) and potential lay sources of cancer information (Model 4) as the exposures. Covariates were added to the full model one by one. The odds ratios of the exposures were examined at each step for all four models. Variables were included in each of the full models as potential confounders if the effect size was at least weak (i.e., Phi ≥ 0.10) with the outcome or exposure variable, and the addition resulted in a greater than 5% increase or decrease in the crude odds ratio for the exposure variable. Goodness of fit for each of the full models was assessed using the Hosmer-Lemeshow (HL) test. The HL test statistic for all four of the models were >0.05, which suggests that each of these models adequately fit the data.

Results

Sample characteristics

Most (66%) of the participants who had an abnormal Pap test were <50 years (mean age = 45.5 ± 10.4 years; range: 20–68 years), non-Hispanic Black (87%), heterosexual (90%), had an annual household income <$10,000 (56%), owned/rented their place of residence (71%), and received public assistance for food, housing, or AIDS medications (81%) (Table 1). Only 27% were married, including 14 (52%) who were living with a partner as an unmarried couple. About half (46%) had a high school education or less. Some (25%) reported engaging in risky sexual behavior in the past year. More than half were current or former smokers (59%) and overweight or obese (69%), both of which are risk factors for cervical cancer. Less than half reported alcohol use in the past month (42%) and current/former drug use in the past year (18%).

Abnormal Pap test history and adherence to abnormal follow-up care recommendations

Almost half (42%) of the study participants had received an abnormal Pap test result within the past year. About half (51%) had had more than one abnormal Pap test in the past 5 years. Among those who reported multiple abnormal Pap tests within the past 5 years, most (65%) had repeat (i.e., back-to-back) abnormal Pap tests. The most frequently reported abnormal follow-up procedure that providers recommended was a repeat Pap test (80%) (Figure 1).

Less frequent abnormal followup care included: HPV test (33%), colposcopy (48%), biopsy (52%), and hysterectomy (11%). The majority of our study participants had a repeat Pap test (85%), an HPV test (76%), a colposcopy (83%), and/or a biopsy (90%) as recommended by their HCP, and 64% had a hysterectomy as recommended by their HCP.

Patient–provider communication

Providers shared information about abnormal Pap tests with most (70%) participants, of which the majority (87%) said that they read the information. Similarly, providers explained what an abnormal Pap test meant to most participants (80%). However, only 58% of study participants reported understanding the information "a lot."

Information seeking

In unadjusted analyses, information seeking had a moderate, statistically significant, positive association with health literacy ($p = .04$; $\varphi = 0.2119$) and potential lay sources of health information ($p = .02$; $\varphi = 0.2290$; see Table 1). The relationships between information seeking and marital status, cigarette smoking status, BMI category, and illegal drug use status were weak and not statistically significant. The relationships between information seeking and other social determinants of health (i.e., age, race/ethnicity, sexual orientation, annual household income, education, housing status, public assistance), cervical cancer risk factors (i.e., risky sexual behaviors), and other behaviors (i.e., alcohol use) were negligible and not statistically significant.

Information processing

In unadjusted analyses, information processing also had a moderate, statistically significant positive association with health literacy ($p < .001$; $\varphi = 0.3562$). The relationship between information processing and social networks was negligible and not statistically significant. Social networks were moderately but statistically significantly associated negatively with education ($p = .01$; $\varphi = -0.2475$). The association between social networks and cigarette smoking status was weak and not statistically significant. The relationships between information processing and other social determinants of health (i.e., age, race/ethnicity, marital status, sexual orientation, annual household income, housing status, public assistance), cervical cancer risk factors (i.e., risky sexual behaviors, BMI category), and other behaviors (i.e., alcohol use, illegal drug use status) were negligible and not statistically significant. See Table 1.

Health literacy

More than half (65%) of our participants had high health literacy, which in unadjusted analyses had a moderate, statistically significant, negative association with education ($p < .0001$; $\varphi = -0.3564$) and illegal drug use status ($p = .04$; $\varphi = -0.2079$) (Table 2). The associations between health literacy and annual household income, risky sexual behaviors, and BMI category were weak and not statistically significant. The relationships between health literacy and the other social determinants of health (i.e., age, race/ethnicity, marital status, sexual orientation, housing status, public assistance), cervical cancer risk factors (i.e.,

cigarette smoking status), and other behaviors (i.e., alcohol use) were negligible and also not statistically significant.

Social networks

Almost half (45%) of our participants knew at least one other woman who had received an abnormal Pap test diagnosis (Table 2). Most of the women in these social networks were family members ($n = 23$) and friends ($n = 26$). Some (32%) of these social network members who had received an abnormal Pap test diagnosis were other WLH. Having these potential lay sources of health information had, in unadjusted analyses, a moderate, statistically significant, positive association with cigarette smoking status ($p = .03$; $\varphi = 0.2147$). Having social networks was weakly and not statistically significantly associated with marital status, education, housing status, risky sexual behaviors, and alcohol use. The relationships between social networks and the other social determinants of health (i.e., age, race/ethnicity, sexual orientation, annual household income, public assistance), cervical cancer risk factors (i.e., BMI category), and other behaviors (i.e., illegal drug use) were negligible and also not statistically significant.

Multivariable logistic regression

Participants with high health literacy were more than three times as likely to have read the information that their HCP shared with them about abnormal Pap tests (aOR = 3.49 [95% CI 1.19–10.23]), and almost five times as likely to have understood the cancer information that their providers explained to them “a lot” (aOR = 4.70 [95% CI 1.55–14.24]; (Table 3) after controlling for potential confounders.

Although participants who knew other women who had an abnormal Pap test were almost three times as likely to have read the information that their HCP shared with them about abnormal Pap tests (crude OR = 2.65 [95% CI 1.13–6.21]), this association was no longer significant after controlling for potential confounders. The crude and adjusted associations between potential lay sources of health information and information processing were not statistically significant (crude OR = 1.35 [95% CI 0.60–3.00]; aOR = 1.16 [95% CI 0.47–2.87]).

Discussion

In this study, we examine adherence to provider recommendations for abnormal Pap test follow-up care, as well as the relationship between provider communication and patient information seeking and processing. These health communication and behavior outcomes were examined from the perspectives of WLH. Overall, we found that WLH were adherent to their provider’s recommendations for abnormal Pap test follow-up care. We also found that providers did a reasonable job sharing and explaining cancer information to WLH following an abnormal Pap test diagnosis. However, our findings suggest that WLH with high health literacy benefited most from these patient–provider interactions. Others have also found a positive association between health literacy and patient–provider communication (Servellen et al. 2005; Williams et al. 2002).

Having family members or friends who have/had cervical cancer can contribute to increased awareness and influence health behaviors, such as adherence to recommendations for screening and abnormal follow-up care (Lerman et al. 1990). Although many of the HIV-positive women in our study had women (many of whom were also HIV-positive) in their social networks that have had an abnormal Pap test, these potential lay sources of health information did not improve information seeking and processing after controlling for other factors. These findings are not surprising, given the fact that the Internet and providers have been reported as the preferred and most trusted sources of cancer information (NCI 2009). Although we believe like others (Kontos et al. 2011; NCI 2009) that interpersonal sources of health information have the potential to reduce cancer and other health disparities (especially among vulnerable populations), it is important to note that we only assessed the prevalence of abnormal Pap tests among social network members. Additional research is needed for a more in-depth examination of cancer communication among WLH and members of their social networks.

Improving health literacy and patient–provider communication are important to reduce health system failures that contribute to poor adherence to abnormal Pap test follow-up care (Schoenberg et al. 2010). Our findings are aligned with those from previous studies that have concluded that provider communication is lowest among patients with low health literacy and lower SES (NCI 2009; Servellen et al. 2005; Williams et al. 2002). This is unfortunate because this population bears a disproportionate burden of adverse cervical cancer health outcomes. WLH with high health literacy are more likely to benefit from the patient–provider communication.

It is important to note the limitations of our study. First, our reporting of patient–provider communication behaviors were only from the perspectives of the WLH in our study, a major limitation for generalizability. Second, due to the inherent nature of this study's cross-sectional study design, we were only able to describe associations and not the temporal or causal relationship between variables. Third, self-report and recall bias may have occurred and must also be taken into account when interpreting these and other reported patient–provider communication behaviors. Another study limitation included the small sample size, which may have limited our ability to detect other meaningful associations as statistically significant. Further, our findings also may not be generalizable to a general population of women because our sample included a very specific population of women who were HIV-positive, predominantly non-Hispanic Black, poor, and largely medically underserved. Finally, although we used several questions from population-based surveys, such as the HINTS and BRFSS, we also had to develop some questions specific for our study and target population. Thus, the use of unstandardized questions could be seen as another study limitation that could have resulted in misclassification of information and/or may have made our findings non-comparable to those of other studies that did use a standard instrument.

HCPs are a main and trusted source of health information including information about cancer (NCI 2009). Our findings underscore the need for improving health literacy as a part of efforts to improve patient–provider communication. These formative data will be used to inform the development of effective, culturally appropriate health communication strategies

that will be used in future cervical cancer prevention programs aimed at reducing the burden of cervical cancer and disease among vulnerable populations of WLH.

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References

Ahdieh-Grant L, Li R, Levine AM, Massad LS, Strickler HD, Minkoff H, Moxley M, et al. Highly active antiretroviral therapy and cervical squamous intraepithelial lesions in human immunodeficiency virus–positive women. JNCI: Journal of the National Cancer Institute. 2004; 96:1070–1076. [PubMed: 15265968]

Barbaro G, Barbarini G. HIV infection and cancer in the era of highly active antiretroviral therapy (review). Oncology Reports. 2007; 17:1121–1126. [PubMed: 17390054]

Bower M, Powles T, Newsom-Davis T, Thirlwell C, Stebbing J, Mandalia S, Nelson M, Gazzard B. HIV-associated anal cancer: Has highly active antiretroviral therapy reduced the incidence or improved the outcome? Journal of Acquired Immune Deficiency Syndromes. 2004; 37:1563–1565. [PubMed: 15577408]

Bynum SA, Wigfall LT, Brandt HM, Richter DL, Glover SH, Hébert JR. Assessing the influence of health literacy on HIV-positive women's cervical cancer prevention knowledge and behaviors. Journal of Cancer Education. 2013; 28:352–356. [PubMed: 23564430]

Centers for Disease Control and Prevention (CDC). 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. The MMWR Recommendations and Reports. 1992; 41:1–19.

Centers for Disease Control and Prevention (CDC). Behavioral risk factor surveillance system (BRFSS) questionnaires. 2015a. http://www.cdc.gov/brfss/questionnaires/index.htm

Centers for Disease Control and Prevention (CDC). Alcohol and public health. 2015b. http://www.cdc.gov/alcohol/faqs.htm#heavyDrinking

Chaturvedi AK, Madeleine MM, Biggar RJ, Engels EA. Risk of human papillomavirus-associated cancers among persons with AIDS. Journal of the National Cancer Institute. 2009; 101:1120–1130. [PubMed: 19648510]

De Vuyst H, Lillo F, Broutet N, Smith JS. HIV, human papillomavirus, and cervical neoplasia and cancer in the era of highly active antiretroviral therapy. European Journal of Cancer Prevention. 2008; 17:545–554. [PubMed: 18941376]

Duffus WA, Davis HT, Byrd MD, Heidari K, Stephens TG, Gibson JJ. HIV testing in women: Missed opportunities. Journal of Women's Health. 2012; 21:170–178.

Engels EA, Biggar RJ, Hall HI, Cross H, Crutchfield A, Finch JL, Grigg R, et al. Cancer risk in people infected with human immunodeficiency virus in the United States. International Journal of Cancer. 2008; 123:187–194. [PubMed: 18435450]

Engels EA, Pfeiffer RM, Goedert JJ, Virgo P, McNeel TS, Scoppa SM, Biggar RJ. Trends in cancer risk among people with AIDS in the United States 1980–2002. AIDS. 2009; 20:1645–1654. [PubMed: 16868446]

Fleiss, JL. Statistical methods for rates and proportions. Hoboken, NJ: John Wiley and Sons; 1981.

Grulich AE, Van Leeuwen MT, Falster MO, Vajdic CM. Incidence of cancers in people with HIV/AIDS compared with immunosuppressed transplant recipients: A meta-analysis. Lancet. 2007; 370:59–67. [PubMed: 17617273]

Kaplan JE, Benson C, Holmes KH, Brooks JT, Pau A, Masur H. Centers for Disease Control and Prevention (CDC), National Institutes of Health, and HIV Medicine Association of the Infectious Diseases Society of America. Guidelines for prevention and treatment of opportunistic infections in HIV-infected adults and adolescents: Recommendations from CDC, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. The MMWR Recommendations and Reports. 2009; 58:1–207.

Kontos EZ, Emmons KM, Puleo E, Viswanath K. Determinants and beliefs of health information mavens among a lower-socioeconomic position and minority population. Social Science & Medicine. 2011; 73:22–32. [PubMed: 21683493]

Lerman C, Rimer B, Trock B, Balshem A, Engstrom PF. Factors associated with repeat adherence to breast cancer screening. Preventive Medicine. 1990; 19(3):279–290. [PubMed: 2377590]

Ludbrook J. Analysis of 2 × 2 tables of frequencies: Matching test to experimental design. International Journal of Epidemiology. 2008; 37:1430–1435. [PubMed: 18710887]

Morris NS, MacLean CD, Chew LD, Littenberg B. The Single Item Literacy Screener: Evaluation of a brief instrument to identify limited reading ability. BMC Family Practice. 2006; 24:7–21.

National Cancer Institute (NCI). HINTS: Health Information National Trends Survey. n.d., http://hints.cancer.gov/

National Cancer Institute (NCI). Brief 14: Social context of influences interpersonal health communication. 2009. http://hints.cancer.gov/docs/Briefs/HINTS_Brief_14.pdf

National Cancer Institute (NCI). Brief 16: Trends in cancer information seeking. 2010. http://hints.cancer.gov/docs/Briefs/HINTS_Brief_16.pdf

Oster AM, Sullivan PS, Blair JM. Prevalence of cervical cancer screening of HIV-infected women in the United States. Journal of Acquired Immune Deficiency Syndromes. 2009; 51:430–436. [PubMed: 19474756]

Pinzone MR, Fiorica F, Di Rosa M, Malaguarnera G, Malaguarnera L, Cacopardo B, Zanghì G, Nunnari G. Non-AIDS-defining cancers among HIV-infected people. European Review for Medical and Pharmacological Sciences. 2012; 16:1377–1388. [PubMed: 23104654]

Saslow D, Solomon D, Lawson HW, Killackey M, Kulasingam SL, Cain J, Garcia FAR, et al. American cancer society, American society for colposcopy and cervical pathology, and American society for clinical pathology screening guidelines for the prevention and early detection of cervical cancer. American Journal of Clinical Pathology. 2012; 137(4):516–542. [PubMed: 22431528]

Schoenberg N, Baltisberger J, Bardach S, Dignan M. Perspectives on Pap test follow up care among rural Appalachian women. Women & Health. 2010; 50:580–597. [PubMed: 20981638]

Servellen GV, Nyamathi A, Carpio F, Pearce D, Garcia-Teague L, Herrera G, Lombardi E. Effects of a treatment adherence enhancement program on health literacy, patient-provider relationships, and adherence to HAART among low-income HIV-positive Spanish-speaking Latinos. AIDS Patient Care and STDS. 2005; 19:745–759. [PubMed: 16283835]

Smith S, Dixon A, Trevena L, Nutbeam D, McCaffery K. Exploring patient involvement in healthcare decision making across different education and functional health literacy groups. Social Science & Medicine. 2009; 69:1805–1812. [PubMed: 19846245]

Viswanath, K.; Shoba, R.; Kontos, EZ. Mass media. In: Galea, S., editor. Macrosocial determinants of population health. New York: Springer; 2007. p. 275-294.

Walboomers JM, Jacobs MV, Manos MM, Bosch FX, Kummer JA, Shah KV, Snijders PJ, Peto J, Meijer CJ, Muñoz N. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. The Journal of Pathology. 1999; 189:12–19. [PubMed: 10451482]

Williams MV, Davis T, Parker RM, Weiss BD. The role of health literacy in patient-physician communication. Family Medicine. 2002; 34:383–389. [PubMed: 12038721]

Zapka JG, Taplin SH, Solberg LI, Manos MM. A framework for improving the quality of cancer care: The case of breast and cervical cancer screening. Cancer Epidemiology, Biomarkers and Prevention. 2003; 12:4–13.

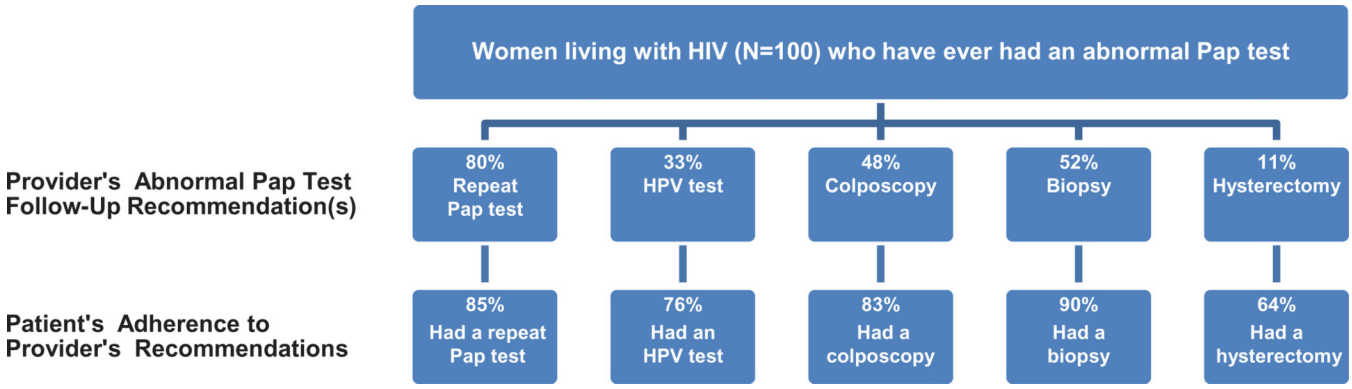

Figure 1.
Adherence to recommendations for abnormal Pap test follow-up care.

Table 1

Seeking and processing information about abnormal Pap tests among women living with HIV ($N = 98$).

		Seeking = Read information (n = 60/98)			Processing = Understood "a lot" (n = 44/98)		
Sample characteristics	***N***	***N* (%)**	***p* value**	**Cramer's *v***	***N* (%)**	***p* value**	**Cramer's *v***
Health literacy			.04	0.2119		<.001	0.3562
High (never/rarely)	64	44 (73)			37 (84)		
Low (sometimes/often/all of the time)	34	16 (27)			7 (16)		
Social networks							
Family/friends ABN Pap test history			02	0.2290		.46	0.0739
Family/friends had an ABN Pap	45	33 (55)			22 (50)		
No family/friends had an ABN Pap	53	27 (45)			22 (50)		
Sociodemographics							
Age category (years)			.73	−0.0353		.94	−0.0080
<50	65	39 (65)			29 (66)		
≥50	33	21 (35)			15 (34)		
Race/ethnicity (missing = 1)			.76 *(f)*	−0.0450		.54 *(f)*	0.0832
Non-Hispanic Black	85	51 (86)			39 (91)		
Other	12	8 (14)			4 (9)		
Marital status (missing = 1)			.10	0.1686		.64	0.0477
Married/partnered	27	20 (34)			13 (30)		
Unmarried	70	39 (66)			30 (70)		
Sexual orientation (missing = 1)			.73 *(f)*	0.0345		.73 *(f)*	0.0708
Heterosexual	88	54 (92)			40 (93)		
LGBT	9	5 (8)			3 (7)		
Socioeconomic position							
Annual household income (missing = 8)			.66	0.0465		.50	0.0714
<$10,000	55	34 (63)			26 (65)		
$10,000+	35	20 (37)			14 (35)		
Education (missing = 1)			.88	−0.0157		.01	−0.2475
High school/GED or less	45	27 (46)			14 (33)		
At least some college	52	32 (54)			29 (67)		

		Seeking = Read information (*n* = 60/98)			Processing = Understood "a lot" (*n* = 44/98)		
Sample characteristics	***N***	***N* (%)**	***p* value**	**Cramer's *v***	***N* (%)**	***p* value**	**Cramer's *v***
Housing status (missing = 1)			.79	−0.0272		.17	−0.1403
Own/rent	70	42 (71)			28 (65)		
Other	27	17 (29)			15 (35)		
Public assistance (missing = 3)			.67	0.0443		.54	−0.0622
Food/AIDS medications/housing	79	49 (84)			33 (80)		
No public assistance	16	9 (16)			8 (20)		
Risk factors and behaviors							
Cervical cancer							
Risky sexual behaviors (missing = 1)			.92	−0.0100		.61	−0.0514
Risky sexual behaviors	25	15 (25)			10 (23)		
No risky sexual behaviors	72	44 (75)			33 (77)		
Cigarette smoking status (missing = 1)			.28	0.1628		.58	0.1055
Current	44	31 (52)			20 (46)		
Former	14	8 (13)			8 (18)		
Non-smoker	39	21 (35)			16 (36)		
BMI category (missing = 4)			.48	0.1249		.15 *(f)*	0.2064
Under/normal weight (<25.0)	26	18 (31)			14 (33)		
Overweight (25.0–29.9)	14	9 (16)			3 (7)		
Obese (≥30.0)	54	30 (53)			25 (60)		
Other							
Alcohol use (past month) (missing = 4)			.95	0.0061		.74	0.0348
Yes	41	25 (44)			20 (45)		
No	53	32 (56)			24 (55)		
Illegal drug use status (past year)			.29	0.1071		.57	−0.0573
Current/former user	18	13 (22)			7 (16)		
Non-user	80	47 (78)			37 (84)		

Note.

(f) Two-sided Fisher's exact test; abnormal (ABN); general education diploma (GED); lesbian/bisexual/gay/transgender (LGBT).

Table 2

Health literacy and social network members who had an abnormal Pap test among women living with HIV ($N = 98$).

		High health literacy (n = 64/98)			Family/friends ABN Pap test (n = 45/98)		
Sample characteristics	***N***	***n* (%)**	***p* value**	**Cramer's *v***	***n* (%)**	***p* value**	**Cramer's *v***
Sociodemographics							
Age category (years)			.49	.0704		.95	0.0066
<50	65	44 (69)			30 (67)		
≥50	33	20 (31)			15 (33)		
Race/ethnicity (missing = 1)			.53[f]	−0.0792		.73	−0.0350
Non-Hispanic Black	85	54 (86)			38 (86)		
Other	12	9 (14)			6 (14)		
Marital status (missing = 1)			.83	0.0224		.21	0.1272
Married/partnered	27	18 (29)			15 (34)		
Unmarried	70	45 (71)			29 (66)		
Sexual orientation (missing = 1)			.72[f]	0.0630		1.000 [f]	0.0059
Heterosexual	88	58 (92)			40 (91)		
LGBT	9	5 (8)			4 (9)		
Socioeconomic position							
Annual household income (missing = 8)			.09	−0.1773		.94	0.0077
<$10,000	55	33 (55)			24 (62)		
$10,000+	35	27 (45)			15 (38)		
Education (missing = 1)			<.0001	−0.3564		.32	−0.1002
High school/GED or less	45	21 (33)			18 (41)		
At least some college	52	42 (67)			26 (59)		
Housing status (missing = 1)			0.47	0.0741		0.31	0.1038
Own/rent	70	47 (75)			34 (77)		
Other	27	16 (25)			10 (23)		
Public assistance (missing = 3)			0.80	0.0261		0.89	0.0137
Food/AIDS medications/housing	79	52 (84)			36 (84)		
No public assistance	16	10 (16)			7 (16)		
Risk factors and behaviors							

		High health literacy (n = 64/98)			Family/friends ABN Pap test (n = 45/98)		
Sample characteristics	***N***	***n* (%)**	***p* value**	**Cramer's *v***	***n* (%)**	***p* value**	**Cramer's *v***
Cervical cancer							
Risky sexual behaviors (missing = 1)			0.28	−0.1105		0.26	0.1135
Risky sexual behaviors	25	14 (22)			14 (31)		
No risky sexual behaviors	73	49 (78)			31 (69)		
Cigarette smoking status (missing = 1)		0.88 *(f)*	0.0700			0.03	0.2147
Current	44	29 (46)			32 (71)		
Former	14	10 (16)					
Non-smoker	39	24 (38)			13 (29)		
BMI category (missing = 4)			0.13	0.2081		0.86	0.0562
Under/normal weight (<25.0)	26	19 (30)			11 (26)		
Overweight (25.0–29.9)	14	6 (10)			6 (14)		
Obese (≥30.0)	54	37 (60)			26 (60)		
Other							
Alcohol use (past month) (missing = 4)							
Yes			.86	0.0177		.33	−0.1001
No	41	27 (44)			16 (38)		
Illegal drug use status (past year)	53	34 (56)			26 (62)		
Current/former user	18	8 (13)			8 (18)		
Non-user	80	56 (87)			37 (82)		

Note.

(f) Two-sided Fisher's exact test; abnormal (ABN); general education diploma (GED); lesbian/bisexual/gay/transgender (LGBT).

Table 3

Multivariable logistic regression models.

		Seeking = Read information			Processing = Understood information "a lot"	
		Model 1	Model 2		Model 3	Model 4
	cOR (95% CI)	aOR (95% CI)	aOR (95% CI)	cOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Health literacy[a]						
Health literacy (REF = Low health literacy)	2.47*	3.49*	—	5.28**	4.70**	—
High health literacy	(1.05–5.82)	(1.19–10.23)		(2.01–13.92)	(1.55–14.24)	
Potential lay sources of cancer information[a]						
Social networks (REF = No family members or friends had an abnormal Pap test)	2.65*	—	2.21	1.35	—	1.16
Family members or friends who had an abnormal Pap test	(1.13–6.21)		(0.91–5.39)	(0.60–3.00)		(0.47–2.87)
Sociodemographics						
Age category (years) (REF = ≥50)	0.86	—	—	0.97	—	—
<50	(0.36–2.04)			(0.42–2.24)		
Race/ethnicity (REF = Other)	0.75	—	—	1.69	—	—
Non-Hispanic Black	(0.21–2.69)			(0.47–6.06)		
Marital status (REF = Unmarried)	2.27	—	2.00	1.24	—	1.51
Married/partnered	(0.85–6.06)		(0.73–5.51)	(0.51–3.02)		(0.54–4.26)
Sexual orientation (REF = LGBT)	1.27	—	—	1.67	—	—
Heterosexual	(0.32–5.06)			(0.39–7.09)		
Socioeconomic position						
Annual household income (REF = ≥$10,000)	1.21	—	—	1.34	1.99	0.30
<$10,000	(0.51–2.88)			(0.57–3.17)	(0.76–5.21)	(0.12–0.73)
Education (REF = At least some college)	0.94	1.35	—	0.36*	0.43	—
High school/GED or less	(0.41–2.12)	(0.51–3.58)		(0.15–0.82)	(0.16–1.11)	
Housing status (REF = Other)	0.88	—	—	0.53	—	—
Own/rent	(0.35–2.20)			(0.22–1.31)		
Public assistance (REF = No public assistance)	1.27	—	—	0.72	—	—
Food/AIDS medications/housing	(0.43–3.77)			(0.24–2.11)		
Cervical cancer risk factors/behaviors						

		Seeking = Read information			Processing = Understood information "a lot"	
		Model 1	Model 2		Model 3	Model 4
	cOR (95% CI)	aOR (95% CI)	aOR (95% CI)	cOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Risky sexual behaviors (REF = No behaviors/refused)	0.95	—	—	0.79	—	—
Risky sexual behaviors	(0.38–2.42)			(0.31–1.99)		
Cigarette smoking status (REF = Non-smoker)						
Current	2.04	1.58	1.70	1.20	—	1.02
	(0.83–5.04)	(0.55–4.47)	(0.66–4.35)	(0.50–2.86)		(0.39–2.63)
Former	1.14	0.91	0.93	1.92	—	1.72
	(0.33–3.92)	(0.24–3.51)	(0.26–3.40)	(0.56–6.60)		(0.44–6.75)
BMI category (REF = under/normal weight) (<25.0)						
Overweight (25.0–29.9)	0.80	1.56	—	0.23	—	—
	(0.20–3.16)	(0.34–7.10)		(0.05–1.04)		
Obese (≥30.0)	0.55	0.74	—	0.74	—	—
	(0.21–1.50)	(0.25–2.23)		(0.29–1.89)		
Other						
Alcohol use (past month) (REF = No)	1.02	—	—	1.15	—	1.13
Yes	(0.44–2.36)			(0.51–2.60)		(0.45–2.81)
Current/former illegal drug use	1.82	1.88	—	0.74	—	—
REF = No illegal drug use	(0.59–5.61)	(0.51–6.98)		(0.26–2.10)		
Hosmer-Lemeshow goodness-of-fit tests	—	$p = .1016$	$p = .3626$	—	$p = .8040$	$p = .4422$

[a]Exposures (i.e., main independent variables).

Abbreviations: cOR (crude odds ratio); aOR (adjusted odds ratio); REF (referent level).

Note. Model 1: Seeking = read information (outcome) with health literacy (exposure); Model 2: Seeking = read information (outcome) with potential lay sources of cancer information (exposure); Model 3: Processing = understood information "a lot" (outcome) with health literacy (exposure); Model 4: Processing = understood information "a lot" (outcome) with potential lay sources of cancer information (exposure).

*$p < .05$,

**$p < .01$,

***$p < .001$.