Administering the HPV Vaccine to People Living with HIV: Providers' Perspectives

Abstract

HIV-positive patients suffer disproportionate burden of anal cancer, a disease which is primarily caused by persistent infection with human papillomavirus (HPV) and is potentially preventable with the completion of the HPV vaccine series. Past research qualitatively explored HIV-positive patients' perspectives about the HPV vaccine. However, little is known about their healthcare practitioners' vaccine recommendation behaviors, the strongest influence on vaccine uptake. This study reports on in-depth interviews conducted with 25 healthcare practitioners who provide care for HIV-positive patients. Qualitative themes that emerged from the study included clinicians' HPV vaccination behaviors, HIV patient's willingness to get the HPV vaccine, the role of HIV-positive patients' immune functioning in terms of timing of HPV vaccine administration, and vaccinating HIV-positive patients over age 26. The majority of providers offered the vaccine at their healthcare facility. Participants varied in their opinions related to the importance of patients' CD4 count in terms of timing of HPV vaccine administration; some believed that patients' immune functioning should first be stabilized to receive the most benefit from the vaccine series. They also differed in the perceived benefit of offering the vaccine to patients over age 26. In light of the U.S. Food and Drug Administration's recent approval to extend HPV vaccination to adults up to age 45 years, more HIV-positive adults may benefit by receiving this vaccine series. Future efforts should ensure that providers regularly promote the HPV vaccine to their adult HIV-positive patients. Vaccinating HIV-positive patients may help reduce the burden of HPV-related cancers, particularly anal cancer.

INTRODUCTION

Anal cancer, although rare in the general population, is a cancer disparity among HIV-positive patients, particularly HIV-positive men who have sex with men (MSM) (Machalek et al., 2012). HIV-positive MSM are more than 80 times more likely to develop this cancer and HIV-positive men who have not had sex with men are 26 times more likely to develop anal cancer as opposed to HIV-negative men (Silverberg et al., 2012). Research has also found that HIV-positive women are at greater risk for developing this cancer as compared to HIV negative women (Heard et al., 2015; Silverberg et al., 2012).

Roughly 90% of anal cancers are caused by persistent infection of the anal canal with cancerous strains of human papillomavirus (HPV) (Saraiya et al., 2015), particularly with HPV Type 16 (Hoots, Palefsky, Pimenta, & Smith, 2009). HPV is the same virus responsible for the majority of cervical, vulvar, vaginal, oropharyngeal, and penile cancers. Whereas most people's immune systems easily clear an HPV infection, people with compromised immune systems, including HIV-positive patients, are at increased risk for persistent HPV infection (de Pokomandy et al., 2009). They are half as likely to produce sufficient natural antibodies to clear HPV infection as compared to non-HIV-infected populations and are at greater risk for infection of multiple HPV strains, both of which are risk factors for developing anal cancer (Looker et al., 2018).

A 9-valent HPV vaccine is available, and it can protect individuals who have received the vaccine from the two non-cancerous HPV strains which cause 90% of genital warts and seven cancerous strains (HPV 16, 18, 31, 33, 45, 52, 58) which are responsible for 96% of anal cancer cases (de Martel, Plummer, Vignat, & Franceschi, 2017; Petrosky, 2015; Saraiya et al., 2015). Among HIV-positive patients, the vaccine is safe, well-tolerated, and it is effective in eliciting

seroconversion against the HPV strains covered by the vaccine (Kahn et al., 2018). The Center for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP) recommends that HIV-positive patients receive three doses of the HPV vaccine (Petrosky, 2015). Recent research has demonstrated HIV-positive patients' enhanced anti-body responses (memory B-cell and T-cell) to HPV upon the receipt of a fourth HPV vaccine dose (Ellsworth et al., 2018; Weinberg, Huang, Moscicki, Saah, & Levin, 2018).

Given their increased risk for developing HPV-related cancers, HIV-positive patients should be a priority population to receive the HPV vaccine series. However, data from the National HIV Behavioral Surveillance survey showed that in 2014 only 37% of HIV-positive MSM between ages 18-26 years old received the HPV vaccine (Oliver et al., 2017). When exploring potential barriers to vaccinating against HPV, past qualitative research with diverse HIV-positive gay and bisexual men found a lack of awareness about HPV, the HPV vaccine, and anal cancer (Koskan, Leblanc, & Rosa-Cunha, 2016; Koskan & Fernandez-Pineda, 2018a; Koskan & Fernandez-Pineda, 2018b). Another study found that HIV-positive gay and bisexual men living with HIV were unaware of the health outcomes and their increased risk for cancers caused by HPV infection (Grace et al., 2018). Further, HIV-positive MSM noted lack of provider recommendation was their main reason for not vaccinating against this virus (Koskan & Fernández-Pineda, 2018b). This highlights the need to further explore healthcare practitioners' current practices, barriers, and facilitators to offering the HPV vaccine to their HIV-positive patients.

Methods

This research is a part of a larger study in which we interviewed healthcare practitioners who provide care for HIV-positive patients about both HPV vaccination and anal cancer screening practices (Koskan, Brennhofer, & Helitzer, 2019). From November 2017 until July 2018 we recruited and conducted in-depth semi-structured interviews with various healthcare practitioners in Arizona who provide care for HIV-positive patients and who are traditionally involved with procedures aimed at preventing and controlling anal cancer (e.g. HPV vaccination for primary prevention; anal Papanicolaou smear, digital rectal examination, and high resolution anoscopy-guided biopsy for secondary prevention). To identify potential participants, we reviewed the websites of local non-profit and service organizations that provide resources and care for people living with HIV. We then contacted the providers' office managers via phone, described the study, and asked for an email address or fax number in order to send more information about the study to potential participants. To recruit participants, we also attended meetings for the local efforts of a nationwide initiative (Fast Track Cities Initiative) that aims to increase HIV testing and retention in treatment and care.

When providers expressed interest in taking part in the study, we scheduled a time for the in-depth interview. We gave providers the option of participating in the interview either in person or via phone, and only one provider was interviewed at a time. Prior to conducting the interview, we reviewed a verbal informed consent form with research participants and obtained informed consent from all individual participants included in the study. Upon gaining consent, we used an in-depth interview guide to lead the interview discussion. Table 1 lists the interview guide questions that specifically relate to the HPV vaccine. Upon completing the interview, we

gave all study participants a $20 Amazon e-gift card as compensation for their time and shared expertise. On average, interviews lasted 30 minutes.

We sent all interview audio files (MP3s) to a professional transcription company and paid for interviews to be transcribed verbatim. We reviewed all transcribed files, verifying accuracy of the transcribed data and audio recordings. Using an inductive open coding approach (Strauss & Corbin, 1990), we separately read the first four interview transcripts to begin generating codes for a preliminary coding guide. We met and, together, reviewed the coded transcripts together, and updated the coding guide. Next, we each coded an additional three interview transcripts separately and later met to compare codes. We resolved their coding differences, and merged and added new codes as needed (Miles, Huberman, Huberman, & Huberman, 1994). Using constant comparison method, we re-reviewed previously coded data any time a new theme arose from the data or after we agreed to merge one or more themes (Miles et al., 1994). We uploaded the separately coded interview files to ATLAS.ti, a qualitative software program used for organizing hand-coded qualitative data that also has the capability of calculating intercoder agreement scores. The program calculated an acceptable percent agreement of coding similarities (Krippendorff $\alpha = 0.736$)(Lombard, Snyder-Duch, & Bracken, 2004). We split the remaining transcripts that previously had not been coded, separately coded them, entered all codes into the software program, and summarized the codes for the results of the study.

After conducting 25 in-depth interviews, we agreed that no new codes emerged from the data and that we had reached data saturation (Ando, Cousins, & Young, 2014). To analyze the coded data, using a thematic analysis approach, we synthesized the patterns and themes that emerged from healthcare practitioners' interviews (Aronson, 1995). We also selected quotes which best exemplified these themes (Sutton & Austin, 2015).

Results

Most participants were primary care physicians (PCP), followed by other medical specialists who treated HPV-related malignancies (e.g. colorectal surgeons who treat anal intraepithelial lesions, dermatologists who treat genital warts), nurse practitioners (NP, master's prepared nurses), and physician assistants (PA). Healthcare providers worked in a variety of settings, ranging from private practice to a non-profit organization's (which provides services to HIV-positive populations) on-site clinic. Of providers, 72% (n=18) regularly treated HIV-positive patients on a daily/weekly basis. Four providers worked in settings that specialized in pediatric care (e.g. pediatric department, hospital), and the remaining 21 providers regularly treated patients of all ages. Nine of the providers specialized in infectious disease. Table 2 lists study participants' additional professional and personal demographic information.

Qualitative themes that emerged from the study included the following: 1) clinicians' HPV vaccination behaviors; 2) HIV patient's willingness to get the HPV vaccine, 3) the role of HIV-positive patients' immune functioning in terms of timing of HPV vaccine administration, and 4) vaccinating HIV-positive patients over age 26.

Clinicians' HPV Vaccination Behaviors

Of the providers, 19 administered the vaccine at their healthcare practices. Among those who did not offer the vaccine at their practice, two described prescribing the vaccine to be filled at community retail pharmacies. One NP who specialized in infectious disease described writing a prescription for patients to receive the vaccine with their local community retail pharmacist. Similarly, another nurse practitioner instructed HIV-positive patients over age 26 years old to purchase the vaccine at their local pharmacy and return to the clinic for vaccine administration:

> What happens is they go to the pharmacy, and the pharmacy gives them the vial of the vaccine and an ice pack [to transport the vial]. They [the patients] have to agree that they're going to come right here and get the vaccination. So, they go from the pharmacy to me [and I administer the vaccine]. (Nurse practitioner who works at a non-profit organization's clinic)

This provider described overcoming the structural barriers of clinic access to the vaccine by recommending that patients pay for the vaccine out-of-pocket for her to administer it to them at her healthcare facility.

The medical specialists (e.g. colorectal surgeons, dermatologist) interviewed in this study (who often treat patients over age 26 for HPV-related malignancies) all held positive views about the HPV vaccine; however, they did not administer the HPV vaccine. The specialists were unsure of how effective the vaccine would be for patients who tested positive for high-risk strains of HPV. Nevertheless, they still believed that patients should discuss HPV vaccination with their PCPs:

> I don't administer it [the HPV vaccine]…If people have coexistent HPV disease, I've tried to recommend it. I test them for high-risk strains of HPV. We have cobas [diagnostic tool used for immunochemistry testing] HPV risk assessment, and it looks at [HPV types] 16/ 18 [high-risk HPV strains], and then, all other high-risk DNA, and tells you what's positive [for which strains the patient is positive]. And, you know, if I have somebody who is positive for 16 or 18, I don't know if it [the vaccine] is much benefit, but I'll have them go talk to their administering doctor. (Colorectal surgeon, public hospital clinic)

HIV Patient's Willingness to get the HPV vaccine

Providers discussed the types of conversations they have with patients to encourage them to receive the HPV vaccine. Little coaching to receive the vaccine was needed, given HIV-positive patients' general willingness to receive the HPV vaccine. Numerous providers indicated never experiencing an HIV-positive patient refuse the HPV vaccine. They stated that patients receiving treatment for HIV were generally enthusiastic about opportunities to prevent other infections:

> I'm taking care of people with HIV. Bad stuff happens. They want to have less bad stuff if they can. Usually, by the time they've come to me, they've already had some kind of issue with an STD, so they're usually pretty open about discussing treatments and prevention and things like that. (PCP, community health center)

When asked about instances when patients demonstrated hesitancy to receive the vaccine, one PCP replied, "No, actually. No. [Patients have not refused the vaccine.] Actually, a lot of people now actually know about it [the HPV vaccine] and ask for it." Another PCP described how their HIV-positive patients generally trusted their health-related recommendations without questioning their medical advice:

> Basically, if I say, 'Oh, gosh, you really need this…' most of them just get it. They don't ask too many questions. (PCP, public hospital)

Three of the colorectal surgeons discussed how they approached talking about the HPV vaccine with their patients after treating them for pre-cancerous high-grade lesions. One specifically described:

> The patient will come in with – if they come in already with the diagnosis of AIN [anal intraepithelial neoplasia, cellular changes caused by persistent HPV infection]. The discussion would be HPV-related. We talk about the natural history of the virus, the risk, long-term risk of anal cancer, and then discuss the success rates with the vaccine as far as reduction of the cancer risk, et cetera. We just approach it clinically. Most patients are open to the discussion. I would say by and large, 90% of the patients are willing to at least listen to the spiel about the vaccine. (Colorectal surgeon, private practice)

HIV-positive patients' Immune Functioning and HPV Vaccine Administration

The majority of providers described how the HPV vaccine is safe for HIV-positive populations, and that they regularly recommend they receive it, regardless of immune functioning and CD4 count:

> It's not considered a live vaccine so yeah, there's no reason to really defer that based on how immunosuppressed they are. But, I think again, time is passing, so waiting for their CD4 cells to come up may be more risk than benefit. We might want to revaccinate them again at a later point, but I think it's not a reason to delay it. (PCP, private hospital)

However, some providers discussed instances where they may delay administering the HPV vaccine to HIV-positive patients, especially if the patient's CD4 count was low, and the patient was severely immunosuppressed. For example, one provider described waiting to

administer the vaccine until patients' immune systems stabilized because, due to immunosuppression, the vaccine would be less effective:

> I would delay [vaccination] only if they are very, very immunosuppressed. And not because I think there's a risk of the vaccine causing them harm, but if they have very, very low T-cell counts, if their immune system is not functional, they're not likely to gain any immunity from any vaccine. (Nurse practitioner, medical group clinic)

This provider noted that the HPV vaccine series is safe for HIV-positive populations. (This vaccine does not contain a live or killed virus. Instead, the vaccine utilizes a protein that looks similar to virus particles.) However, according to this provider, the HIV-positive patient may not have an immune response to the vaccine and seroconvert to protect against the virus if his or her immune system is overly suppressed.

Other providers noted delaying HPV vaccination, prioritizing the patient's sustained use of antiretroviral therapy in order to avoid overwhelming the patient with medical treatments:

> If I am going to put somebody on antiretroviral therapy, I sometimes wait and get them on medicines first before I give them the vaccine. I also think there is only so much a person can take in at one visit. And it is more important to me to get them on antiretroviral therapy, which is lifesaving, than to get them vaccinated. So, it is kind of how much can a person take in one day. (Primary care physician, academic hospital)

One provider expressed concern with delaying HPV vaccine administration. The provider wanted to offer her HIV-positive patients as many treatments and prevention resources as possible during their medical visits:

> If somebody is severely immunocompromised, I might wait until they've been on [antiretroviral] treatment for a while, but no, not normally. I just give it. If they need stuff, I start giving it because they usually need a lot of stuff, and if you wait, then you get behind. Understanding that maybe there's some diminution in effectiveness – nobody really knows. There's no recommendation to withhold it for any reason, so we just give it. (Primary care physician, public hospital)

Vaccinating Patients over age 26 Years

Many providers mentioned that HIV-positive patients over age 26 years had previously requested the vaccine. (It is important to note that when these interviews were conducted, the FDA had not yet approved HPV vaccination for individuals up to age 45 years old.) However, one major barrier to HPV vaccination with this population was insurance coverage for the vaccine. One NP who worked at a medical group's clinic stated,

> I do have patients occasionally over 26 that ask about the HPV vaccine, and I explain to them I think it would be worthwhile for them - but that they would have to pay for it because their insurance will not.

Another provider described how the vaccine cost was a prohibitive factor in patients' abilities to receive the vaccine.

> And I tell them, I will do so [administer the HPV vaccine], but you need to check with your insurance company on the cost. For pretty much all of the patients, the insurance company would not approve it. And there's actual evidence [of health benefits] that vaccinating people who are over age 26…it does have some evidence. But they [health insurance companies] rejected it. So, pretty much nobody over the age of 26 gets vaccinated because they can't afford the cost. (PCP, medical group clinic)

Some providers were hesitant to recommend the vaccine to patients over 26 years old because they were not sure of how effective or beneficial the vaccine would be:

> It probably wouldn't hurt them to have it, but it probably wouldn't benefit them, either. And so, I kind of talk to them about that a little bit. But it's sort of something I don't really know that much about, and I usually just go by the recommendations of getting it sooner because if you get it later in life, it's probably not going to benefit you that much. That's my impression. (NP, public hospital clinic)

This provider described how HIV-infected populations, especially those over age 26 years old, were often already infected with HPV. Therefore, these patients may not benefit from receiving HPV vaccine doses. The provider was hesitant to recommend the vaccine to her older HIV-positive patients due to potential lack of effectiveness of the vaccine paired with vaccine cost.

Discussion

This study explored the HPV vaccine administration behaviors and perceptions among healthcare practitioners who provide care for HIV-positive patients. Findings from this study showed that the majority of providers discuss and administer the HPV vaccine to their HIV-positive patients at their healthcare facility. Similarly, a recent study which surveyed 33 primary care providers working in a Boston community clinic that provides care for a large HIV population found that 31 (94%) of the providers said that they "almost always" recommend the vaccine (Apaydin, Fontenot, Shtasel, Mayer, & Keuroghlian, 2018). However, in another study which surveyed infectious disease physicians, roughly 60% of providers regularly recommended the HPV vaccine (Lakshmi, Beekmann, Polgreen, Rodriguez, & Alcaide, 2018). It is critical to ensure that primary care providers of HIV-positive patients, high-risk populations for HPV-related malignancies, promote and, when possible, administer the HPV vaccine series to reduce the risk of patients' development of HPV-related cancers and genital warts. Health care specialists of HIV-positive patients such as dermatologists and colorectal surgeons, should recommend that their HIV-positive patients discuss HPV vaccination with their primary care providers.

In this study, some providers who did not offer the HPV vaccine at their clinical site ordered prescriptions for patients (including patients over age 26) to obtain the HPV vaccine series from their community retail pharmacists. This highlights the potential of engaging pharmacists to administer HPV vaccine doses, a strategy which is useful for clinics that do not stock the HPV vaccine. Receiving HPV vaccine doses with pharmacists may prove to be a more convenient method of ensuring vaccine initiation and adherence due to pharmacies' extended hours (compared to PCP clinics) and lack of required appointment (Goad & Bach, 2015;

Hohmeier, Randolph, Smith, & Hagemann, 2016). Future research should explore the potential role of pharmacy professionals in increasing HPV vaccination, particularly among high-risk populations whose traditional primary care providers do not stock the HPV vaccine, potentially due to low demand for this high-cost vaccine. Such research could inform interventions which promote HPV vaccination at community pharmacies.

Providers reported that HIV-positive patients and their caregivers often had positive attitudes about the HPV vaccine. This finding aligns with past research that found positive perceptions and desire to receive the HPV vaccine among HIV-positive gay and bisexual men, the population at greatest risk for developing anal cancer (Koskan & Fernández-Pineda, 2018b). Barriers to HPV vaccination, specifically among HIV-positive men, is more often due to lack of patient awareness of the HPV vaccine, and perceiving the HPV vaccine as a cancer prevention resource for women only as opposed to both men and women (Gilbert, Brewer, & Reiter, 2011).

Providers differed in their opinion of the effect of CD4 count, immune system functioning, and sustained use of antiretroviral therapy on timing of HPV vaccine administration, some prioritizing other medical needs (e.g. regaining immune functioning) as a reason to postpone vaccination. Of note, HIV-positive patients who are severely immunosuppressed (CD4 count <200 cells/mm3) are at increased risk for developing anal cancer (Guiguet et al., 2009; Reekie et al., 2010). Past studies showed safety of the HPV vaccine among HIV-positive patients. However, inclusion criteria for study participation was CD4 cell counts > 200 cells/μL (Hidalgo-Tenorio et al., 2017), and, in another study > 500 cells/μL (Fontes et al., 2016). Another study demonstrated reduced effectiveness of the vaccine among HIV-positive patients with a CD4 count <200 μL (Kojic et al., 2014). These findings suggest the need for clearer

guidelines for providers regarding the administration to immunosuppressed HIV-positive individuals.

Another difference in providers' opinions related to whether it was worthwhile to administer the HPV vaccine to HIV-positive patients over age 26 years. Some providers believed that all populations, especially HIV-positive patients, should be able to receive the vaccine while others questioned vaccine effectiveness after age 26. Vaccinating HIV-positive adults over age 26 years is critical to prevent HPV infection populations because they are at increased risk for developing HPV-related cancers. Vaccinating HIV-positive adults, even among those previously infected with HPV, will reduce re-infection (Kojic et al., 2014) and also prevent them from acquiring additional HPV strains for which they are naive. Further, some research has found that post-exposure vaccination can provide therapeutic benefit for patients previously treated for active (HPV-related) clinical disease (Dion et al., 2017). For example, one study reported reduced recurrence of anal HSIL (high-grade squamous intraepithelial lesions, the believed precursor to cancer) among HIV-negative MSM previously treated for HSIL after HPV vaccine completion (Swedish, Factor, & Goldstone, 2012). In this study, decreased risk of potentially precancerous high-grade anal intraepithelial neoplasia recurrence lasted for at least two years [28]. Another study demonstrated reduced risk of developing oral HPV infections (but not for treating active cases of anal HSIL infections) among HIV-positive individuals over age 26 years (Wilkin et al., 2018). Finally, a study that utilized Markov modeling to simulate anal cancer development demonstrated that, among HIV-positive MSM (age 38 years and older), the most cost-effective means to preventing anal cancer is to treat existing anal HSIL followed by administering the HPV vaccine (Deshmukh et al., 2017). A current intervention study, Vaccine to Interrupt Progression of Vulvar and Anal Neoplasia (the VIVA trial, ClinicalTrials.gov

Identifier: NCT03051516), is testing whether vaccinating patients (including HIV-positive patients) against HPV after treating HSIL does, in fact, reduce HSIL recurrence.

Providers described how, without insurance coverage, it is unlikely that HIV-positive patients over age 26 years will be able to access the HPV vaccine. Similarly, another qualitative study conducted with physicians of HIV-positive patients also identified financial burden of the vaccine (for patients whose insurance did not cover it) as a barrier for their provision of a strong recommendation to vaccinate against HPV (Grace et al., 2019). Each dose of the HPV vaccine costs roughly $250 (Planned Parenthood, 2019), and national guidelines recommend HIV-positive patients receive three doses (Meites, 2016). A targeted literature review described how vaccinating MSM, more specifically HIV-positive MSM, up to age 40 years old is cost effective (Lin et al., 2016). This supports the need to extend insurance coverage for the HPV vaccine for HIV-positive patients older than age 26 years. In October 2018, the US Food and Drug Administration approved offering the HPV vaccine to individuals up to age 45 years (U.S. Food and Drug Administration, 2018). However, currently, not all insurance plans provide coverage for individuals over age 26 to receive the vaccine. It is critical for the Center for Disease Control and Prevention Advisory Committee on Immunization Practices to support routine recommendation (instead of shared decision-making) of HPV vaccination for HIV-positive adults between ages 26-45 years. This would increase the likelihood of these critical conversations that could lead to increased vaccination among people living with HIV. Further, it could lead to the expansion of health insurance coverage, particularly for this population at high-risk for developing HPV-related cancers.

This qualitative study has limitations. First, interviewer variability may have affected study outcomes since two study authors conducted the in-depth interviews. To reduce this

potential variability, the first author conducted an in-depth training with the second author, which included a mock interview. Another limitation could be that we interviewed a limited number of certain provider types, particularly medical specialists such as surgeons and dermatologists. More specialists were invited to participate in the study; however, they declined or did not respond to the invitation. Therefore, findings may not reflect the views of those who did not take part in the study. We interviewed participants both in-person and via the phone. Results may have differed by modality; however, past research which compared qualitative interview transcripts of both in-person and phone-based interviews found no significant differences in interview quality (Sturges & Hanrahan, 2004). When conducting intercoder agreement analyses, we received an acceptable score (any Krippendorff α greater than 0.667) of 0.736. The differences between our coded materials (each team members' materials) were minor. For example, authors differed in whether they included interviewer remarks as opposed to missing important codes. We therefore believed we were ready to code the remaining interview transcripts. One member of our team entered the checked both her and the other team member's coded materials as she entered the codes into Atlas.TI, ensuring that important codes were not missed or overlooked. Finally, given that providers in this study worked in more urban areas of one southwestern state in the United States, study findings may not be generalizable to other regions (e.g. other states, rural regions within the state).

Conclusions

Healthcare practitioners who provide for HIV-positive patients understand the importance of vaccinating their patients against HPV, and many are currently administering the vaccine at their healthcare facilities. The majority of providers in our study understood that the HPV vaccine is

safe for their HIV-positive patients and would only delay vaccinating those patients who are severely immunosuppressed. They were also favorable of vaccinating HIV-positive patients over age 26, a behavior that may increase given the recent U.S. Food and Drug Administration approval to vaccinate adults up to age 45 years old. Future efforts should ensure that providers regularly promote the HPV vaccine to their adult HIV-positive patients. Vaccinating HIV-positive patients may help reduce the burden of HPV-related cancers, particularly anal cancer.

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