



Survey article

## Cervical cancer screening in rural South Africa among HIV-infected migrant farm workers and sex workers



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## ARTICLE INFO

## Article history:

Received 1 November 2016

Accepted 31 December 2016

Available online 29 January 2017

## Keywords:

Cervical cancer

Screening

Visual inspection with acetic acid

Cryotherapy

See and treat

## ABSTRACT

At an HIV clinic in the Limpopo province of South Africa, chart reviews revealed long delays in addressing abnormal Pap smears, difficulty in referrals, poor quality and lost results, and increasing cases of cervical cancer. To address these barriers, a “see and treat” approach to screening was proposed. The objective was to integrate this method into current HIV care offered by local providers and to obtain demographic and risk factor data for use in future educational and intervention programs in the region.

A cross sectional study of HIV farm workers and at-risk sex workers attending an HIV clinic was performed with visual inspection with acetic acid (VIA). Those with positive screens were offered cryotherapy. Clinic charts were reviewed retrospectively for Pap smear results for the previous year at the time of program initiation and at 12 and 18 months post-program.

A total of 403 participants consented and underwent screening with VIA (306 Farm workers and 97 sex workers participated). 83.9% of participants (32.9% sex workers and 100% farm workers) were HIV+. VIA was positive in 30.5% of participants, necessitating cryotherapy. There was no significant difference in VIA positivity between HIV+ farm workers and sex workers. There was a positive correlation between Pap smears and VIAs results.

We demonstrate successful integration of cervical cancer screening using VIA for HIV+ farm workers and sex workers into an existing HIV treatment and prevention clinic in rural South Africa, addressing and treating abnormal results promptly.

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### 1. Introduction

The Limpopo province of South Africa is one of the most rural and poor provinces in the country. It has a population of over 5 million people, about 80% of who live below the poverty line. The unemployment rate, at 34%, is among the highest in South Africa. The agricultural and gaming industries in Limpopo are the most common source of employment, particularly for migrant workers who come for seasonal work from neighboring Zimbabwe and Mozambique as well as other areas of South Africa. Local research on farms in Hoedspruit, a town in the Limpopo province, found that the HIV prevalence was higher than that found in the general population, 29% versus 16%. Interestingly more than half of workers were unaware of their HIV status (Hlokomela-HTT, 2013). Among this vulnerable population, a number of risk factors for HIV were identified including early age of coitus and unsafe sexual practices (Hlokomela-HTT, 2013). Included in this group

of migrant workers are sex workers who represent a sub-population that is particularly vulnerable to HIV infections. Estimated prevalence of HIV infection among local sex workers is 34–69%, while prevalence of human papilloma virus (HPV) infection could exceed 30% (Hlokomela-HTT, 2013; Soohoo et al., 2013).

There is a known association that those with HIV are more susceptible to HPV. HPV prevalence rates in the HIV infected population is upward of 36%, also leading to more frequent occurrence of high-grade cervical lesions (Clifford et al., 2006). In 2010, Kuhn, Wang, Tsai, Wright, and Denny (Kuhn et al., 2010) studied HIV infected women in Cape Town, South Africa, and found higher rates of cervical intraepithelial neoplasia (CIN) grade 2 or higher in HIV positive women when compared with HIV negative women, 14.9% and 4.6% respectively. They noted the need for more effective HPV prevention programs, as HIV positive women are living longer lives with better access to treatment, and HIV treatment programs provide a potential platform for cervical cancer screening programs within ambulatory services for chronic care (Kuhn et al., 2010). National Policy for cervical cancer screening in South Africa is three lifetime Pap smears, with recommendations to screen HIV positive women annually. However, it is challenging to have effective prevention program centered solely on cytology-based screening in low-resource settings with a migratory population where HIV is prevalent,

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because of the difficulties in close follow-up and patient compliance (Kuhn et al., 2010; World Health Organization, 2013).

The prevalence of cervical cancer and precursor lesions among HIV positive and high-risk women in rural areas of South Africa, including the Limpopo province, is unknown as lack of treatment options and follow-up has severely hampered accurate data collection. In an attempt to assess the prevalence of cervical cancer precursors in this high-risk group of women, a collaboration was forged with the non-profit organization Hoedspruit Training Trust (HTT). The Hlokomela Clinic, a farm-based clinic, was established in 2006 by HTT in the Limpopo province to improve the health of migrant and permanent farm workers through service provision education and increase awareness about both chronic illnesses and communicable diseases, particularly HIV/AIDS (Hlokomela-HTT, 2013). Our preliminary assessment was that the program provided invaluable HIV prevention, screening, and treatment services to this at-risk population. However, chart reviews revealed long delays in addressing abnormal pap smears, difficulty in referrals to hospitals, poor Pap smear quality, and lost results.

To address these barriers, a “see and treat” approach to screening was proposed. The “see-and-treat” approach using visual inspection with acetic acid (VIA) and cryotherapy has been recommended by the World Health Organization as an acceptable approach to cervical cancer screening especially in populations where women may be lost to follow-up or have limited access to services (World Health Organization, 2011, 2013). Application of acetic acid on the cervix accentuates cervical abnormalities and affords the opportunity for providers to deliver immediate treatment (World Health Organization, 2011). The objective of this program was to integrate this method into current HIV care offered by local providers, obtain prevalence data on VIA positivity and to evaluate efficacy of the program, and collect demographic and risk factor data for use in future educational and intervention programs in the region.

## 2. Methods

Institutional review board approval was obtained from both the United States and South Africa for a cross sectional study of HIV farm workers and at-risk sex workers attending the Hlokomela Clinic. To obtain an acceptable estimate of prevalence in this population, power analysis estimated a minimum sample size of 323 patients (alpha = 0.5, 95% confidence interval). Selection of patients was based on purposive sampling. Female patients attending the clinic for HIV counseling, treatment, or follow up were offered cervical cancer screening as part of their routine HIV care. Participants who agreed to screening, completed questionnaires with trained health workers. Participants were subsequently screened using VIA and were offered cryotherapy for treatment if VIA examinations were positive. Five local nurses underwent a see-and-treat training workshop as described separately from this report. At the end of a 3-month supervisory period, all trainees were deemed competent to work independently after performing fifty supervised VIAs and fifteen supervised cryotherapy procedures.

Clinic charts were reviewed retrospectively for Pap smear results from the previous year. Prevalence data was collected on VIA results and cryotherapy. SPSS was used for analysis of all data. Additional follow-up programs were performed at 12 and 18 months post-initial screening. At one-year post program implementation, nurses participated in refresher trainings and were supervised and reassessed in quality and performance of conducting VIA. Clinic charts from the initial cohort of patients screened were reviewed to collect data on recent Pap smear results and one year post screening VIA results.

## 3. Results

A total of 403 participants consented and underwent screening with VIA; 75.9% of participants were farm workers (n = 306) and 24.1% identified as sex workers (n = 97).

### 3.1. HIV positivity

The overall HIV positivity rate for all participants was 83.9% (n = 338); 100% of farm workers (n = 306) and 33.0% of sex workers (n = 32) were HIV test positive. The 16.1% HIV negative participants (n = 65) were all sex workers who either refused or had no prior history of HIV testing. Additional demographics are shown in Table 1.

### 3.2. VIA positivity/cryotherapy

Thirty percent of participants were VIA positive (n = 124), and of these positive patients, 91.6% (n = 114) were treated with cryotherapy. Four participants failed to return for treatment and six participants with large lesions were referred to the hospital for cone biopsy; four of these lesions were visually suspicious for cervical carcinoma.

### 3.3. Farm workers versus sex workers

A one-way between subjects ANOVA was conducted to compare the effect of worker type on VIA results in farm workers and sex workers. There was no significant difference in VIA positivity between types of worker between the two groups ( $p < 0.05$ ,  $F(1401) = 0.514$ ,  $p = 0.474$ ) (Table 2).

### 3.4. Pap smear/VIA congruence

Reports of Pap smears completed in the year prior to VIA examination were available for 54.8% (n = 221) of participants (Table 3). There were 59 (26.7%) abnormal Pap smears reported. A Pearson's r correlations coefficient was computed to assess the correlation between VIA results and Pap smears. There was a positive correlation between VIA results and Pap smear results [ $r = 0.463$ ,  $n = 183$ ,  $p = 0.000$ ]. Positive VIAs were more likely to be present when Pap smears were reported as low grade or high grade abnormal. Conversely, participants were more likely to be VIA negative when previous Pap smears were read as negative or atypical squamous cells of undetermined significance (ASCUS) or when participants had undergone a previous excisional procedure for a high grade Pap smear.

**Table 1**  
Demographics.

	(N = 329)
Mean age in years (std. error)	36.0 (0.6)
Mean age in years at first coitus (std. error)	17.3 (0.1)
Education N (%)	
No school	47 (14.2)
Primary school	89 (26.7)
Some secondary school	124 (37.7)
Completed high school	60 (18.2)
College or more	9 (2.7)
Employment N (%)	
Farm Worker	235 (71.4)
Sex worker	94 (28.6)
Contraception Use N (%)	
None	46 (14)
Condom use	236 (71.7)
Other, no condom	47 (14.3)
	(N = 403)
Status N (%)	
HIV positive	338 (83.9)
HIV status unknown	65 (16.1)
VIA positive	124 (30.8)
VIA negative	279 (69.2)

Note: N = 329 for certain demographics listed because 74 participants gave no answer to those interview questions.

**Table 2**  
Comparison of VIA positivity between farm worker and sex worker HIV status.

	Employment Status	
	Farm Worker N (%)	Sex Worker N (%)
HIV positive	306 (100)	32 (32.9)
HIV status unknown	0 (0)	65 (67.1)
VIA positive	97 (31.7)	27 (27.8)
VIA negative	209 (68.3)	70 (72.2)

### 3.5. Program implementation

At one year post program implementation, (T3), clinic records show 193 additional patients have undergone VIA by the nurses. Of those patients, 41.4% screened VIA positive (n = 80) and 35.2% underwent cryotherapy (n = 68). Twenty-four patients were referred to the hospital for large lesions or persistent high-grade abnormal exams.

At 18 months post-program, charts of the initial cohort of patients screened were reviewed to assess if VIA was performed and results (Fig. 1). Of the available medical records reviewed, participants who had initially screened VIA positive and underwent repeat VIA after one year were largely now VIA negative, showing success with the previous cryotherapy treatment. Four patients remained VIA positive one year after treatment, two underwent a second treatment and two were referred for further evaluation and biopsy for likely high-grade lesions too extensive for cryotherapy. Eighty patients of the records able to be reviewed did not have a one year post-screening Pap smear or VIA and still require evaluation post-program.

## 4. Discussion

We demonstrated successful integration of cervical cancer screening using VIA for HIV positive farm workers and sex workers into an existing HIV treatment and prevention clinic in rural South Africa. In using the see-and-treat approach and following guidelines for triaging of positive screens, abnormal results could be readily addressed and treated promptly. However, this study was not without its challenges, particularly when referrals were needed for further testing or cancer care. Our chart review indicated that appointments for LEEP or cone biopsy were delayed by >6 months and patients with examinations consistent with invasive carcinoma were often lost to follow-up without ever being evaluated.

In the Limpopo province, resources and services for cancer care of HIV positive patients is limited and for migrant workers in this region this poses an additional layer of complexity. Because of lack of these resources in this rural area, use of VIA for screening becomes a cost effective method for cervical cancer screening, as was previously demonstrated among HIV positive women in Johannesburg (2015)

**Table 3**  
Comparison of VIA results among one-year prior history Pap smear results.

Pap smear result	N	VIA Results		VIA positive, suspicious for cancer n (%)
		VIA negative n (%)	VIA positive n (%)	
Negative	162	131 (80.9)	31 (19.1)	0
ASCUS	16	12 (75)	4 (25)	0
HGSIL followed by excision	6	6 (100)	0 (0)	0
LGSIL	26	6 (23.1)	19 (73.1)	1 (3.8)
HGSIL	11	1 (9.1)	10 (90.9)	0
Total	221	156 (70.5)	64 (29)	1 (0.5)

(Lince-Deroche et al., 2015). Chung et al. (2013) studied see-and-treat in HIV positive women in Kenya and showed a sensitivity of 62.7% and specificity of 65.9% for VIA screening in this population, similar to results in HIV negative women, suggesting VIA as a reasonable method of screening for HIV infected women in low-resource settings (Chung et al., 2013). Although data varies regarding efficacy of VIA, a meta-analysis of 26 studies on VIA in low and middle income countries showed an 80% pooled sensitivity, 92% specificity, and 99% positive predictive value (Denny and Prendiville, 2015). A study in the Philippines found that cervical cancer cases and deaths could potentially be reduced by at least 25% by performing VIA screening at least three times in a woman's lifetime at five-year intervals between ages of 35 to 45 (Guerrero et al., 2015). Increasing screening to four to six times in a lifetime has smaller incremental benefits, but did show decreasing morbidity from cervical cancer. Firnhaber et al. (2013) evaluated cervical cancer screening methods in HIV positive women in Johannesburg, by screening 1202 women with Pap smear, VIA and HPV testing for the detection of histologically confirmed CIN2, and found that using two screening methods increased sensitivity (Firnhaber et al., 2013). Given that Pap smears are routinely performed in HIV clinics across South Africa, there may be some benefit in additional screening methods that will allow the option of immediate treatment. These studies have informed our work and similarly we have found concordant findings with Pap smear and VIA, supporting single visit treatment in this migrant population. Likewise, the HIV positive migrant farm workers and at-risk sex-workers are two high-risk populations with similar VIA positivity rates and our findings support focused screening of both these populations.

The strength of this study lies in the large sample size focused on marginalized populations at high risk for cervical cancer and on the ability to demonstrate the feasibility of integration cervical cancer screening into existing HIV services to better affect care. HIV clinics, which provide comprehensive and chronic care, are in a unique position to reduce cervical cancer by providing improved screening methods. This project aimed to provide education, training, and supervision to local health care providers in performing see-and-treat cervical cancer prevention among a vulnerable population. Further, this program created community ownership of healthcare at a local level, which contributed to the project's efficacy and sustainability.

Because of the migratory nature of the study participants, >50% of participants were lost to follow-up after the initial screening program and a limited number of records were available for review (42.2%, n = 170), a problematic but common issue in documentation and data retrieval in global health and limited resource settings. Additional limitations to this study included selection bias, given that the participants previously attended an HIV wellness clinic and were largely accepting of treatment, as well as lack of pathologic confirmation of screening results due to month-long wait times and incomplete evaluations at referral centers.

In most low and middle-income countries, the morbidity and mortality from cervical cancer is increased largely due to the lack of organized screening programs (Anorlu et al., 2007). This project aimed to provide education, training, and supervision to local health care providers in performing see-and-treat cervical cancer prevention among a high-risk population. Further, this program created community ownership of healthcare at a local level, which contributed to the project's efficacy and sustainability. The most significant challenge remaining for this population is difficulty in referral for further testing and cancer care. Being a transitory population with low socioeconomic power and limited availability and resources to obtain health care, patients requiring further evaluation and treatment are still not being cared for, especially those with cryotherapy ineligible lesions. This suggests that an improved infrastructure and referral process for these rural and high risk populations is still a highly unaddressed need.

This study was supported by funding from [thewomen.org](http://thewomen.org).

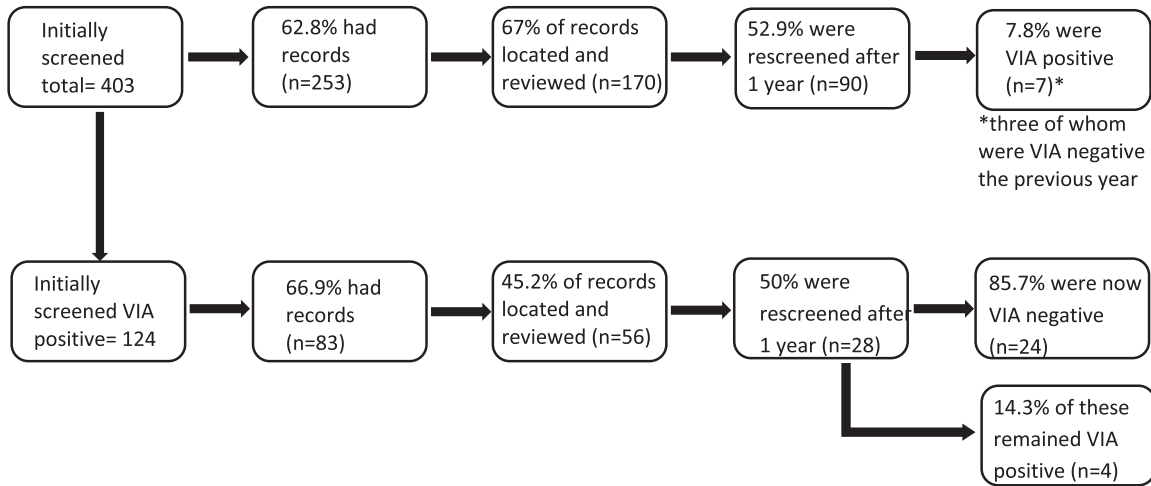


Fig. 1. Eighteen months post-program review.

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