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Nancy L Czaicki, Emory University
Jonathan Davitte, Emory University
Bella Siangonya, Emory University
Randee Kastner, Emory University
Nurilign Ahmed, Emory University
Naw Htee Khu, Emory University
Wan Hsuan Kuo, Emory University
Joseph Abdallah, Emory University
Kristin Wall, Emory University
Amanda Tichacek, Emory University

Only first 10 authors above; see publication for full author list.

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Predictors of First Follow-Up HIV Testing for Couples’ Voluntary HIV Counseling and Testing in Ndola, Zambia


Rwanda Zambia HIV Research Group, Department of Pathology and Laboratory Medicine, School of Medicine, Emory University, Atlanta, GA, USA

†Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA

**Program for Appropriate Technology in Health (PATH), Washington, DC, USA

Abstract

Introduction—We describe predictors of first follow-up testing for concordant negative and discordant couples seeking joint voluntary HIV counseling and testing in Ndola, Zambia, where cohabiting couples account for an estimated two-thirds of incident HIV infections.

Methods—Demographic and serostatus data were collected from couples’ voluntary HIV testing and counseling (CVCT) and follow-up testing services implemented in government clinics. We calculated follow-up testing rates by serostatus and compared rates before and after the introduction of a Good Health Package (GHP).

Results—The follow-up testing rate from May 2011 to December 2012 was 12.2% for concordant negative (M−F−) couples and 24.5% for discordant (M+F− or M−F+) couples. Significant predictors of follow-up testing in multivariate analyses included increasing man’s (aOR=1.02 per year) and woman’s (aOR=1.02) age, the man being HIV+ (aOR=2.57), and the woman being HIV+ (aOR=1.89). The man (aOR=1.29) and the couple (aOR=1.22) having been previously tested for HIV were predictive of follow-up testing among concordant negative couples. Introduction of a GHP increased follow-up testing among discordant (aOR=2.93) and concordant negative (aOR=2.06) couples.

Conclusion—A low-cost GHP including prevention, screening, and treatment for common causes of morbidity and mortality resulted in increased follow-up testing rates among HIV discordant and concordant negative couples. Overall follow-up testing rates remain low and efforts to increase these rates are necessary in order to ensure linkage to combination prevention, reduce HIV transmission within couples and identify seroconversions promptly. Further investigation of...
low-cost sustainable incentives and other factors influencing follow-up HIV testing for couples is needed.

**Keywords**

HIV; CVCT; Follow-Up; HIV Testing; Concordant negative and Discordant couples; Zambia

**Introduction**

The 22.5 million people living with HIV in Sub-Saharan Africa account for 68% of the global HIV prevalence. Within this region, Zambia has one of the most concentrated epidemics. Specifically, Zambia’s Copperbelt Province has an adult HIV prevalence of 17% while the national adult HIV prevalence stands at 14%. Cohabiting couples in Sub-Saharan Africa currently represent the world’s largest HIV risk group. The majority of HIV transmission in this region occurs through heterosexual transmission with 60–95% of incident heterosexual transmitted cases occurring in cohabiting couples. This high rate of transmission is especially prominent in discordant couples who are unaware that only one partner is HIV positive (HIV+). The rates of discordance within couples vary across African countries from 23–54%. In Lusaka, the capital of Zambia, the proportion of couples with discordant results was found to be 23%, which is similar to that found in couples’ voluntary HIV counseling and testing (CVCT) centers in the past. In Ndola, a city in the industrialized Copperbelt region of northern Zambia, 12% of couples are HIV serodiscordant.

CVCT has been shown to be a cost-effective intervention to reduce the transmission of HIV in this large risk group with evidence showing a two-thirds reduction in HIV transmission. Additional studies have demonstrated that CVCT leads to an increase in preventative sexual behaviors and the World Health Organization advocates CVCT due to its effectiveness in reducing HIV transmission. Furthermore, a cross-sectional household survey in Lusaka, Zambia showed a majority of adults sampled believed CVCT is “good”, and nearly half of them were willing to test jointly with their spouses, though very few couples have been tested together. In addition, there has been demand for more support for those individuals testing HIV negative (HIV-) in the form of education and empowerment to remain negative.

Outside of the research setting, little focus has been placed on follow-up testing of HIV negative persons. In context, this includes the negative partner in a discordant couple or both partners in a concordant negative couple. As part of an expansion of CVCT services throughout government clinics in the Copperbelt province, follow-up of discordant and concordant negative couples for further counseling and repeat HIV testing was established.

We were unable to find literature on follow-up testing for discordant or concordant negative couples identified during routine services in government clinics in high prevalence areas. Previously, we observed a follow-up HIV testing rate of 65% for couples with indeterminate results in government clinics and a rate of 72% for Zambian discordant couples who completed enrollment in a research study. The results of multiple studies suggest that retention in care after testing HIV+ and not being initially eligible for ARV is less than 33%, suggesting that follow-up rates of individuals of known serostatus outside of a research setting may be low and warrant further investigation and intervention.

We present here the progress of initiating a follow-up CVCT regimen for discordant and concordant negative couples identified through CVCT services at government clinics. Follow-up testing rates of discordant and concordant negative couples are presented with an
analysis of first follow-up predictors to inform future efforts to promote and increase retention among heterosexual couples.

Methods

Initial CVCT Visit

CVCT services staffed by government clinic nurses and counselors are currently provided in 15 government clinics in Ndola and one mobile testing unit. Training, quality control, monitoring and evaluation, and data reporting and analysis are provided by the Zambia Emory HIV Research Project (ZEHRP). Couples completing CVCT procedures as described elsewhere receive an incentive, as CVCT is not yet a routine integrated health service in government clinics. In other areas of Zambia, transportation cost is given as an incentive. Couples in Ndola receive chitenge, a traditional cotton wrap costing less than 5 USD as an incentive for completing their initial visit.

Follow-up procedure

Participating clinics offered CVCT every weekend and follow-up testing one weekend per month. Following the initial CVCT visit, concordant negative and discordant couples were referred for their first follow-up appointments 3–8 weekends after CVCT, depending on the follow-up testing schedule at their clinic. This timing was chosen to identify individuals in the window period, those who may be infected with HIV but not have detectable antibodies at the time of the initial visit. A subset of discordant couples who were eligible for research were referred to the ZEHRP site for an enrollment visit through August 31, 2011; this counted as their first follow-up visit. To ensure that couples were afforded ample flexibility for attendance, they were offered follow-up appointments between 8am-3pm on either Saturday or Sunday. Couples were informed that the first follow-up visit would be much shorter than the initial CVCT visit, consisting of an HIV rapid test for the HIV− partner(s) and post-test counseling based on the follow-up results. This follow-up counseling is similar to the first visit CVCT counseling described elsewhere and covers the issues of monogamy, condom use, and serostatus-related health issues. Discordant couples were encouraged to attend together, though only the HIV− partner was retested. Data used for this analysis included three distinct programmatic time periods: (1) May 1, 2011-Aug 31, 2011, when eligible discordant couples were also referred for ZEHRP research; (2) Sept 1 2011 – prior to a Good Health Package (GHP) start date (which differed by clinic); and (3) after the GHP start date through December 2012. During the first two time periods, couples did not receive any incentive for attending follow-up visits at the government clinics. In time period (1) eligible discordant couples attending a research enrollment visit as their follow-up did receive an incentive according to the study protocol in which they were enrolled. The GHP was implemented during the third time period and allowed couples to choose one item from a package which included soap, chlorine, deworming medication, screening and treatment for urinary schistosomiasis, and blood pressure and diabetes screening. This served as the follow-up incentive during this last time period.

Data Collection and Analysis

Data on age, cohabitation length, prior testing for HIV individually or together, and current antiretroviral (ARV) use were collected on each couple during the initial CVCT visit. Identifiers were not collected. A unique couple identification number linked the initial visit data to the follow-up visit and paper-ink fingerprints were used to confirm that the correct individuals were followed over time. Data for analysis was limited to couples attending their first CVCT visit from May 2011 through October 2012, and follow-up data were used through December 2012 in order to capture all of those who attended their first follow-up visit. Analysis was completed with SAS 9.2 (Cary, NC).
Attending follow-up was defined as a dichotomous variable with “yes” encompassing a government clinic follow-up or research referral attendance. Descriptive analyses of predictors of interest (Table 1) and the proportion of couples completing follow-up by time interval (Table 2) were evaluated, both stratified by couple serostatus. The association between predictors of interest and CVCT follow-up were also examined in bivariate analysis with crude odds ratios and p-values (Table 3).

Four clinics (Dola Hill, Kavu, Kaniki, Ndola Mobile) were defined as rural with all other clinics being urban. The proportion of couples completing their first CVCT follow-up by clinic and catchment area was calculated (Table 4). Prior to model development, clinic catchment size was divided into quartiles. A backwards elimination strategy was used to create a multivariate logistic regression model since all predictors of interest could be considered exposures. Variables showing significance levels of \( p < 0.05 \) in bivariate analyses were retained in the model. For these models, time period, clinic catchment size quartiles, and month were all used as class variables. Multi-collinearity between final model variables was assessed. Final models including all couples and stratified by concordant HIV negative and discordant couples were used to calculate adjusted odds ratios (aORs) to identify predictors of follow-up (Table 5).

### Results

#### Demographic Data and Follow-up Rates

Table 1 presents the demographic characteristics of couples by serostatus. Concordant negative couples make up 88% of the analysis cohort with the remaining 12% representing discordant couples. During this same period, an additional 1,511 concordant positive couples were screened and referred to care and treatment. Among discordant couples, 47% had an HIV+ man and 53% had an HIV+ woman. Though a majority of the women (70%) had been previously tested for HIV, the rate was lower for men (48%), and few couples had been previously tested together (12%). Interestingly, a higher percentage of concordant negative couples (12%) had been previously tested together than discordant couples (8%).

The age distribution and mean cohabitation duration in this cohort align with previously reported demographic data on larger CVCT cohorts \(^7\) and were similar across serostatus.

As shown in Table 2, 10,806 couples with at least one HIV− partner received CVCT services at government clinics in Ndola from May 2011 to December 2012. Overall, 13.6% of these couples returned to the clinic or their research referral for a first follow-up appointment. Discordant couples had a follow-up rate (24.5%) twice that of concordant negative couples (12.2%). The overall follow-up rate fluctuated slightly over time, but remained in the 12–15% range (Table 2). Prior to the introduction of the GHP, follow-up rates were higher in M+F− couples (27.1% and 28.8%) compared with M−F+ couples (22.2% and 20.6%). After the introduction of the GHP, M+F− and M−F+ had similar follow-up rates (24.9% and 24.4% respectively) though this difference was not statistically significant (Breslow-Day \( p=0.17 \)).

Significant (\( p<0.05 \)) predictors of follow-up in bivariate analyses included urban clinic location, larger clinic catchment size, time period, either or both partners previously tested for HIV, older age, and more years cohabiting (Table 3). Additionally, either partner being HIV+ and using ARV were significant (\( p<0.05 \)) predictors of follow-up representing exclusive characteristics of discordant couples.

Variations across individual test sites were examined (Table 4). The three test sites with the most CVCT couples, Chipulukus, Kaloko, and Mushili, did not have the highest rates of follow-up. Lubuto and Chipokota Mayamba made up a small percentage of the total couples.
tested, but had the highest rates of follow-up (27% and 28%). Kawama, Kansenshi Prisons, Kabushi, and New Masala all had follow-up rates in the 20% range, with contributions to total couples tested all less than 10%.

In the final multivariate models, multi-collinearity was observed between man’s age, woman’s age, and age difference and the latter variable was thus excluded. In the model including all couples, age (men: aOR = 1.02, 95% CI 1.01–1.03 and women: aOR = 1.02, 95% CI 1.00–1.03); GHP (aOR = 2.16, 95% CI 1.65–2.83); the man being HIV+ (aOR = 2.57, 95% CI 2.11–3.12) or the woman being HIV+ (aOR = 1.89, 95% CI 1.55–2.31); and man’s (aOR = 1.27, 95% CI 1.13–1.43) or couples’ (aOR = 1.21, 95% CI 1.02–1.45) prior testing for HIV were significant predictors of follow-up testing controlling for clinic catchment size and month (Table 5).

The same analysis stratified by serostatus in Table 5 shows several differences in the relationships between covariates and follow-up. Man’s increasing age remained predictive in both discordant and concordant negative couples while woman’s age was predictive only in the latter group. Discordant couples had a greater increase in odds ratios after the introduction of the GHP (aOR 2.93 compared with aOR 2.06 among concordant HIV negative couples), though this interaction was not significant in the model containing all couples. Prior testing remained predictive only among concordant HIV negative couples. Among discordant couples, those with HIV+ men were more likely to have follow-up testing than those with HIV+ women, and the HIV+ partner being on ARV was associated with a borderline significant increase in follow-up testing (aOR 1.37, p=0.07).

Discussion

The majority of new HIV infections occur in cohabiting heterosexual couples, the world’s largest risk group for incident HIV infection. While initial HIV testing and counseling for couples has received increased attention since the publication of WHO guidelines in April 2012, little consideration has been given to follow-up testing and counseling. Our study confirmed that the addition of a Good Health Package of low-cost prevention, screening and treatment services for common causes of morbidity and mortality increased follow-up testing rates and identified several predictors that help inform strategies for improvement in Zambia and other settings.

Follow-up counseling and repeat testing is critical for discordant couples since the negative partner has a known, constant infection risk from the HIV+ partner. Though individual risk is comparatively lower among concordant HIV− couples, they are the largest group of couples and thus contribute to a substantial number of new and preventable infections. The proportion of discordant couples and the distribution of gender of the HIV+ partners in this cohort is consistent with previously published literature and increases the generalizability of these findings.

We have previously published our experience with CVCT in a research setting in Ndola and here we present transfer of these procedures from a research setting to an implementation setting in government clinics in the same city. We examined initial CVCT follow-up rates and predictors of follow-up in government clinics for both concordant negative and discordant couples for the 18-month period following full implementation of follow-up procedures. Since CVCT is not yet an institutionalized service, promotion and incentives are necessary to increase the number of those attending the first CVCT visit. Unlike participants in research projects, couples attending follow-up at the government clinics were not given incentives prior to the introduction of the GHP. It is thus not surprising that follow-up numbers were comparatively low.
This study confirmed that follow-up testing rates in government clinic settings were lower than those reported by research projects. After implementing the GHP program which included modest public health related incentives that could be sustainable in government clinics, follow-up was higher relative to a pre-GHP time period suggesting that this particular incentive package had a positive effect, but longer-term research is needed and a greater impact is desired.

Older age, the GHP, and having an HIV+ man or (to a lesser extent) an HIV+ woman partner remained predictive of follow-up testing in multivariate and stratified analyses, while the man or couple having been previously tested were associated with higher follow-up rates only among concordant HIV negative couples.

Follow-up rates may increase with older age due to social or cultural constructs, maturity, health seeking behaviors, or more stable relationship status. However, years of cohabitation was only significantly associated with follow-up in the bivariate analysis. We are unable to give a definitive explanation for this relationship.

Several couple-level predictors significantly influenced the rate of follow-up among this cohort. Though follow-up rates overall were low, discordant couples had a follow-up rate twice that of concordant negative couples. This result is not surprising, since discordant couples likely perceive themselves at higher risk than concordant negative couples, and higher perceived risk is associated with seeking testing. It is possible that many discordant negative couples perceive themselves at minimal to no risk of HIV acquisition and thus do not pursue the follow-up appointment. The differences observed between M+F− and M−F+ couples may be due to gender-power relations where the man may have a greater say in health care decisions or HIV+ women may instead be receiving services through PMTCT or ANC, and not use CVCT as a main source of care. There may also be differences in perceived risks of male to female versus female to male transmission of HIV.

Follow-up was also higher among couples that had previously been tested together, though stratified analyses showed this association was limited to discordant HIV negative couples. The first CVCT visit was in itself a form of self-imposed follow-up, so it follows that they would have higher follow-up rates. Since nearly twice as many concordant negative couples had previously tested together compared to discordant couples, the first follow-up testing could have been motivated by knowledge of risky behavior for at least one partner, and thus motivation for additional follow-up confirmatory testing may have been more desirable. Such behavior may also indicate a higher level of comfort with the health care system or lower levels of fear of stigma or other social barriers to seeking care.

Limitations

In addition to the predictors explored here, couples’ attitudes and perceptions such as fear, gender differences in motivation and power, stigma, perceptions of the health care system, relationship dynamics, and incongruity between perceived and actual risks may have also played a role in attending follow-up. We were unable to incorporate additional demographic and structural characteristics such as education, literacy, income, and distance to the health facility. Notably, stigma, fear of partner reaction, distance to clinic, cost, and other logistical issues have previously been cited as barriers to CVCT, and are also likely barriers to follow-up testing. In a research setting in Zambia, we found several context-level characteristics which address barriers to stigma (including delivering CVCT invitations to couples versus individuals, the couple being acquainted with the community worker delivering the CVCT invitation, and home invitation delivery versus delivery in other settings) were significantly predictive of CVCT uptake in multivariate models.
these attributes were not measured in this study, interpretations of our findings incorporate them.

The variation in follow-up rates observed between clinics suggests that the social and structural factors discussed above along with other facility or community-level characteristics likely play an important role beyond couple-level characteristics. Similar to our findings in Zambia, previous research in Rwanda found that CVCT uptake was significantly associated with factors that reduced stigma (including the couple being acquainted with the community worker delivering the CVCT invitation and delivering invitations after public endorsement of CVCT) and logistical barriers (including the presence of mobile testing units). These factors associated with uptake of CVCT are likely also associated with CVCT follow-up rates.

In this study, follow-up in the first time interval was inclusive of a subset of discordant couples referred to research and couples referred to basic clinic follow-up, thus some couples received research-related incentives while others did not receive incentives at their follow-up appointment. We attempted to control for this natural programmatic variation by including indicators of these time periods in the analysis as well as significant interactions of clinic-level variables with these periods in the final model.

The distinction between rural and urban clinics was based on geographic location of the clinics and knowledge of clinic accessibility based on experience working in this area, and catchment populations were divided into quartiles for ease of modeling interactions. Potential misclassification among these variables is a limitation of the predictive ability of these covariates. Lastly, this study only concerns data collected in the first eighteen months after full implementation of follow-up procedures, and further analysis will be done as evidence-based improvements are made to this protocol.

Conclusions

Follow-up testing and counseling of discordant and concordant negative couples is an important initiative to ensure reduced transmission of HIV between partners and to facilitate linkage to combination prevention and care. Our aim is to inform other CVCT implementers about the importance of CVCT follow-up, specifically for discordant and concordant negative couples, and to provide insight into what factors significantly influence follow-up rates. The Good Health Package is an innovative strategy that integrates HIV prevention through CVCT with other affordable public health interventions. We believe that these findings are generalizable to couples in similar areas seeking CVCT services from public clinics. The GHP, discordancy, and previous HIV testing were significantly associated with attending follow-up. Leveraging these predictors, future investigation should be directed towards low-cost sustainable incentives, methods of increasing acceptability of HIV testing, streamlining clinic logistics, and targeting discordant and concordant negative couples to increase follow-up rates.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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