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The effect of partner HIV status on motivation to take antiretroviral and isoniazid preventive therapies: a conjoint analysis

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Abstract

Antiretroviral therapy (ART) and isoniazid preventive therapy (IPT) are important to reduce morbidity and mortality among people newly diagnosed of HIV. The successful uptake of ART and IPT requires a comprehensive understanding of patients' motivation to take such therapies. Partners also play an important role in the decision to be initiated and retained in care. We quantified patients' motivation to take preventive therapies (ART and IPT) and compared by partner HIV status among people newly diagnosed of HIV. We enrolled and surveyed adults (18 years) with a recent HIV diagnosis (<6 months) from 14 public primary care clinics in Matlosana, South Africa. Participants received eight forced-choice tasks comparing two mutually exclusive sub-sets of seven possible benefits related to preventive therapies. A linear probability model was fitted to estimate the probability of prioritizing each benefit. Tests of concordance were conducted across partner HIV status (no partner, HIV– or unknown, or HIV+). A total of 424 people completed surveys. At the time of interview, 272 (64%) were on ART and 334 (79%) had a partner or spouse. Keeping themselves healthy for their family was the most important motivator to take preventive therapies ($p < 0.001$). Preventing HIV transmission to partners was also highly prioritized among participants with current partners independent of partner's HIV status ($p < 0.001$), but it was least prioritized among those without current partners ($p = 0.72$). Keeping

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themselves healthy was less prioritized. We demonstrate that social responsibility such as supporting family and preventing HIV transmission to partners may pose greater motivation for ART and IPT initiation and adherence compared to individual health benefits. These messages should be emphasized to provide effective patient-centered care and counseling.

Keywords

HIV; tuberculosis; patient preference; conjoint analysis; South Africa

Introduction

HIV continues to be a major global health challenge affecting 37 million people worldwide (UNAIDS, 2017). HIV co-infection with tuberculosis (TB) worsens tuberculosis epidemic in South Africa where there were 6.3 million people living with HIV (PLWH) and 0.5 million new active TB cases accounting for 24% of all HIV-associated TB incidences worldwide in 2015 (World Health Organization, 2016). The prevalence of latent TB infection (LTBI) among adults reaches more than 70% in some area of South Africa (Wood et al., 2010), putting them at 5-15% lifetime risk of developing active TB disease (World Health Organization, 2016). Such risk increases by 20-fold among people co-infected with HIV (Getahun, Gunneberg, Granich, & Nunn, 2010).

It is well documented that antiretroviral therapy (ART) substantially reduces the risk of HIV transmission to susceptible partners (Cohen et al., 2011) and HIV-associated morbidity, especially active TB (Grinsztejn et al., 2014). Isoniazid preventive therapy (IPT) can further decrease the risk of reactivation of LTBI up to 90% among PLWH when taken together with ART (Akolo, Adetifa, Shepperd, & Volmink, 2010). Thus the current South African guidelines recommend PLWH to receive (1) lifelong ART if CD4 count <500 cells/ μ l or at the advanced disease status and (2) IPT for 12–36 months (National Department of Health, Republic of South Africa, 2015).

Despite the nationwide scale-up of HIV services and freely available drugs, the initiation of ART and IPT and adherence to these therapies have been suboptimal. About 56% of PLWH in South Africa have received ART in 2016 (UNAIDS, 2017). The estimated rate of retention on ART in low- and middle-income countries at 36 months is around 70% (Fox & Rosen, 2015) and approximately only half of those initiated on ART were retained in care after eight years in South Africa (Fox et al., 2016). Another study in South Africa showed that only 59% of patients who initiated IPT completed 6 months of IPT (Golub et al., 2009).

There are many factors associated with poor adherence to ART and IPT such as lack of counseling and low social support (Carrieri et al., 2006; Holtzman, Brady, & Yehia, 2015; Reda & Biadgilign, 2012). Motivational interviewing or counseling among PLWH has been used as an important tool to emphasize individual health benefits of ART and to encourage comprehensive HIV prevention (Hill & Kavookjian, 2012; Safren et al., 2001, 2009). Qualitative studies have shown that individuals who perceive the benefits of ART as “life-giving” and providing better overall health tend to have higher adherence (Kumarasamy et al., 2005; Loggareberg et al., 2015). Partners also play an important role in determining

ART initiation or retention in care but such influence may differ by partner's HIV status (Morton et al., 2017). While preventing HIV transmission to partners was one of the key motivations for early initiation of ART in HIV sero-discordant couples (Curran et al., 2014), sero-concordant couples were less concerned about HIV transmission, had increased bonding and supported each other to achieve better ART adherence (Conroy et al., 2017; Rogers et al., 2016). It is crucial to understand patients' priorities and motivations to take preventive therapies to optimize counseling and patient support and achieve better health outcomes among PLWH.

Conjoint analysis is a widely used method to elicit preferences in healthcare settings (Bridges et al., 2011). It allows respondents to compare different attributes simultaneously and quantify the degree of importance associated with each attribute. The objective of this study was to quantify the relative importance of potential motivators for taking preventive therapies such as ART and IPT among people newly diagnosed with HIV and how these are affected by partnership status and partner's HIV status.

Methods

Participants

This study was conducted at 14 public primary care clinics in the Dr. Kenneth Kaunda health district in North West province, South Africa from November 2014 to December 2015. These 14 clinics were selected to utilize the existing study structure and enroll similar population with an ongoing cluster randomized trial, which compares the proportion with known TB infection status and IPT initiation among newly diagnosed HIV patients in clinics using two different diagnostic tests for latent TB infection (Golub et al., 2015; Tudor et al., 2015). Clinics were chosen to cover a range of patient volumes, urban vs rural setting, geography, and clinic hours. Patients were eligible for enrollment if they were 18 years old, newly diagnosed with HIV in the preceding six months, and able to demonstrate the ability to read either English, Xhosa, Setswana, or Zulu. We sought to enroll all eligible patients during the study period. All participants gave written informed consent. The study was approved by the institutional review board at the Johns Hopkins School of Medicine and at the University of Witwatersrand (Approval No 130609).

Study design

We conducted a cross-sectional survey using a conjoint analysis to elicit patients' motivation for IPT and ART. Conjoint analysis refers to the methods that elicit respondents' preferences by allowing them to make choices over sets of hypothetical alternatives, where each alternative is described by several characteristics (i.e., Attributes) related to health services or goods of interest (Bridges et al., 2011; Louviere, Hensher, & Swait, 2000). It has been applied to measuring preferences for a wide range of health applications including condom use (Bridges, Selck, Gray, McIntyre, & Martinson, 2011), HIV prevention (Newman, Cameron, Roungrprakhon, Tepjan, & Scarpa, 2016) and treatment (Kruk et al., 2016), and delivery services (Kruk, Paczkowski, Mbaruku, de Pinho, & Galea, 2009). The advantage of conjoint analysis is the ability to quantify patients' preferences among different attributes

thus helping to design patient-centered interventions and health services (Bridges et al., 2011).

Data from individual in-depth interviews, a literature review, and expert consultations was used to identify seven benefits of preventive therapies that could matter most to patients. We focused on examining positive benefits to inform health promotion messages that could be directly incorporated into counseling and interventions such as SMS text messages (Finitsis, Pellowski, & Johnson, 2014; Tudor et al., 2015). The seven possible benefits of preventive therapies we identified were: (1) Keeps me healthy for my family; (2) Keeps me from giving HIV to my partner; (3) Keeps my HIV disease under control; (4) Keeps me healthy from and working; (5) Keeps my CD4 high; (6) Prevents me from getting sick from infections; (7) Prevents me from getting TB (Table 1).

Participants were provided with a standardized narrative describing the choice task. For each task, they were presented with 2 different people's reasons for taking preventive therapies. An example of one of the paired comparison conjoint analysis tasks is shown in Figure 1. All conjoint tasks were forced choices (i.e., Respondent could not opt out or choose neither option). In addition to completing the conjoint analysis, individuals were also asked to provide age, gender, ethnicity, and other sociodemographic variables.

We used a main effects orthogonal design where seven possible benefits were systematically allocated across eight choice tasks and each item appeared eight times per respondent (Johnson et al., 2013; Montgomery, 2017). There are no standard sample size calculations for conjoint analysis, but a general Choice-Based Conjoint rule [$n > 500 * c / (ta)$] is often used, where n is the number of respondents, t is the number of conjoint tasks, a is the number of alternatives per tasks and c is the largest number of levels for any one attribute (Orme, 2010). Using this rule, our study required a sample size of at least 63. We had about 100–150 individuals per stratum, suggesting adequate power to run the analysis.

Statistical analysis

Choice task data was analyzed using a linear probability model (LPM) (Hauber et al., 2016). The primary outcome was modeled as the probability of selecting the second of two options (i.e., Right-hand option) in each given choice task. The outcome was regressed on all seven potential benefits as following:

$$\text{Prob}[Y = 1] = \beta_1 \text{Transmission} + \beta_2 \text{Supporting family} + \beta_3 \text{Overall health} + \beta_4 \text{High CD4} + \beta_5 \text{Disease control} + \beta_6 \text{Infection Prevention} + \beta_7 \text{Prevention TB} + \varepsilon$$

where Y is the dependent variable equaling one if the right-side option was chosen, β is the difference in probability (or proportion) of choosing the right-side option with vs. without the attribute presented in the option, and ε is the random error term. If people are completely indifferent to an attribute, the probability of choosing the attribute would be same independent of the attribute shown in the option thus its beta coefficient would be zero. Parameter estimates of the LMP can be interpreted as absolute probabilities or the average marginal effect of choosing the benefit, holding the distribution of other covariates constant.

We report results from testing two hypotheses: first, whether each of the 7 identified benefits are considered as important motivators for taking preventive therapies (i.e., the probability of choosing the attribute is significantly greater than zero) and second, whether this importance differs by having a partner and the partner's HIV status (no current partner, HIV-positive status of current partner, and HIV-negative or unknown status of current partner). The Wald statistic was used to test for concordance of parameter estimates across the subgroups. Differences in demographic characteristics were tested using F-statistics from an analysis of variance (ANOVA) for normally distributed variables and Kruskal–Wallis test for variables not normally distributed.

Results

Study participants

A total of 424 participants were enrolled and completed the questionnaire (Table 2). At the time of the interview, 79% ($n = 334$) currently had a partner or spouse; of these, 55% ($n = 185$) knew the HIV status of their partners and 42% ($n = 141$) had an HIV-positive partner. The median CD4 count was 276 (149, 437), and 64% ($n = 272$) were on ART. The mean age was $33(\pm 10)$ years. The mean time since initial HIV diagnosis was $48(\pm 60)$ days.

The median age was significantly higher for those with no current partner compared to those with HIV-negative/unknown or HIV-positive partners. Those without current partners had significantly higher numbers of adults and children living in the household. Among those with current partners, individuals with HIV-positive partners were more likely to be living with their partners compared to those with HIV-negative/unknown partners (p -value < 0.001).

Overall motivators

Figure 2 presents the LPM coefficients stratified by partner's HIV status with a 95% confidence interval and the overall estimate of each motivator with standard error. Supporting family had the highest probability of being chosen ($23.7 \pm 1.4\%$, $p < 0.001$), followed by preventing HIV transmission to partners ($18.3 \pm 1.5\%$, $p < 0.001$). Preventing TB or getting sick from other infections were moderately ranked. Keeping high CD4 counts was least prioritized ($9.5 \pm 1.5\%$).

Stratified analyses by partner's HIV status

Pair-wise comparisons revealed significant differences between those without and with current partners, independent of partner's HIV status. Among those without current partners, the probability of choosing preventing HIV transmission to partners was $1.1 \pm 3.1\%$ and it did not statistically differ from zero ($p = 0.72$). The probability was much higher among those with current partners, independent of partner's HIV status ($23.0 \pm 2.2\%$ in those with HIV-negative/unknown partners and $22.7 \pm 2.7\%$ in those with HIV-positive partners) compared to those without current partners ($p < 0.001$). It did not significantly differ by partner's HIV status among those with current partners ($p = 0.94$).

The probability of choosing remaining healthy for family was significantly higher among participants without current partners ($34.4 \pm 3.4\%$) than those with current partners ($23.7 \pm 2.0\%$ in those with HIV-negative/unknown partners and $16.7 \pm 2.5\%$ in those with HIV-positive partners) ($p < 0.001$). For all other motivators, there were no significant differences across three groups.

Discussion

We evaluated patients' motivations to take preventive therapies and compared the results by partnership and partner's HIV status. Our data indicates that people newly diagnosed with HIV prioritized supporting family as the key motivator to take ART and IPT compared to benefits for their own health. Preventing HIV transmission to partners was also highly prioritized among those with current partners regardless of partner's HIV status. Some variation existed by partnership status but we found that social responsibility related to family or partners was more valued compared to other individual health benefits.

Other works support that taking care of children and "a sense of obligation to family" are strong motivators for remaining healthy and taking ART upon HIV diagnosis (Bezabhe et al., 2014; Lake Snell Perry & Associates Inc, 2003; Watt et al., 2009; Wondiye, Fentahun, Limaye, Kote, & Girma, 2017), especially among pregnant women or women with children (Watt et al., 2009). About two-third (64%) of registered households in South Africa are headed by single mothers (Statistics South Africa, 2014) who often bear financial burden and tend to live with other extended family members for social support (Lippmann & Wilcox, 2015), potentially explaining the higher number of adults and children living in the household in those without current partners in our study population. Despite the perceived importance of such social roles, HIV counseling sessions and motivational interviews are mostly focused on individual health benefits such as living longer and staying healthy among patients initiating and continuing on life-long ART (Watt et al., 2009). A study in Kenya reported that only one out of six nurses interviewed at ART clinics mentioned family obligations as to encourage patients' adherence during counseling sessions (Watt et al., 2009). Understanding and communicating social roles of HIV patients as part of health promotion messages can be an effective way to support and enhance patients' adherence and retention in care.

Preventing HIV transmission to partners was also a major motivator among those who had current partners as shown in other studies (Patel et al., 2016; Persson, 2008). We found that it was still highly prioritized among participants with HIV-positive partners. Previous studies reported that HIV sero-concordant and sero-disconcordant couples had similar levels of sexual risk behaviors and relationship quality (Mark et al., 2007; Vamos et al., 2013), and concerns for HIV transmission persisted even after knowing HIV-positive status of a partner in sero-concordant couples (Eaton, West, Kenny, & Kalichman, 2009). The benefit of ART to prevent HIV transmission to sexual partners should be emphasized along with promotion for safe sexual practice. It is not surprising that participants without partners at the time of interview did not perceive preventing HIV transmission to partners as an immediate benefit and least prioritized among all attributes. The majority of such participants were single

mothers in older age with lower socioeconomic status and rather prioritized supporting family.

Previous studies have shown that positive attitudes towards ART and the immediate effect of gaining strength upon taking ART facilitated patients' adherence and further reinforced their desire to live long and healthy (Kumarasamy et al., 2005; Loggarenberg et al., 2015; Penn, Watermeyer, & Evans, 2011; Reda & Biadgilign, 2012; Watt et al., 2009). We found that other motivators such as disease control, preventing infections or TB was moderately ranked and similarly valued among those with and without current partners. Although TB is one of the most common coinfections among PLWH, the perceived benefit of ART and IPT to prevent TB seems to be low and did not differ by TB treatment history or IPT status; however, participants with HIV-positive partners more highly prioritized prevention from TB or infections than attributes focused on general health. This might be explained by that people who have known someone with AIDS or HIV infection are more likely to be aware of adverse health outcomes and fear falling sick from HIV infection (Loggarenberg et al., 2015).

There are several limitations in our study. As a crosssectional study there could be no assessment of how these motivations affect patients' actual adherence to preventive therapies or the continuum of HIV care in real settings. We also did not ask about the history of relationships or other information on sexual activity. Second, our samples were restricted to patients recruited from selected clinics in Dr. Kenneth Kaunda health district and may not be generalizable to other settings in sub-Saharan Africa. However, we believe that our population represents different range of underlying characteristics and neighborhoods and the findings from this study provides important information to design and deliver effective support to PLWH. The refusal rate was quite low in this study. All interviews and questionnaires were offered in four different languages although most of participants (~90%) were able and preferred to read in English. Third, the instrument did not include opt-out option, which requires much more complex design and may reduce the ability to estimate underlying preferences (Bridges et al., 2011). It is possible that participants may have had other motivation but we believe the seven motivators well capture general concerns and thoughts of patients to be on ART. No opt-out option allows participants to think and make choices in the given options at their best ability, providing good estimates of underlying preferences of choices. Lastly, it is possible that respondents may have simply preferred options with more attributes than making choices based on preferred attributes. However, given that participants were asked same questions regardless of partner's HIV status, the observed values likely reflect the true differences in patients' motivations besides any potential systematic bias.

Conclusion

Our findings provide valuable information about motivators to take preventive therapies, as perceived by patients newly diagnosed of HIV in South Africa. To provide better patient support and promote adherence, social roles of patients such as supporting family and preventing HIV transmission to partners besides individual health benefits need to be understood.

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We asked some people with HIV to describe the reasons why they drink medications to prevent disease. In each question, I will show you what two people said, and ask you which person's statements BEST describe the way YOU think about why to take preventive medications

Person 1:

Keeps my CD4 high
Keeps my HIV disease under control
Keeps me healthy for my family
Prevents me from getting TB

☐ I am more like this person

Person 2:

Keeps me healthy and working
Prevents me from getting sick from infections
Keeps me from giving HIV to my partner

☐ I am more like this person

Figure 1.

Example of a conjoint analysis task with seven motivations related to preventive therapies among HIV-positive individuals.

Figure 2.

LPM regression estimates with standard errors for seven motivators to take preventive therapies as aggregate and stratified by partner's HIV status (no current partner, HIV-negative/unknown, or HIV-positive partner) among HIV-infected individuals in South Africa ($N = 425$). The estimates refer to the probability of choosing each motivator. The bar in the left graph represents 95% confidence intervals. The p -values are calculated from Wald tests to compare the three different groups for partnership and HIV status.

Table 1.

Baseline characteristics of study population by partner's HIV status^a.

Characteristic	No Partner (N = 90)	HIV- or Unknown (N = 193)	HIV+ (N = 141)	p-value
Age (years), Median (Q1, Q3)	37 (28, 45)	29 (24, 35)	31 (25, 39)	<0.001
Time since HIV diagnosis (days), Mean ($\pm$ SD)	51 $\pm$ 73	42 $\pm$ 56	54 $\pm$ 54	0.16
CD4 cell count (cells/mm ³) ^b Median (Q1, Q3)	241 (144, 401)	280 (170, 438)	291 (140, 467)	0.37
Currently on ART				
Yes	51 (56.7)	129 (67.5)	92 (66.7)	0.18
No	39 (43.3)	62 (32.5)	46 (33.3)	
Currently on IPT				
Yes	35 (38.9)	64 (33.2)	43 (30.5)	0.42
No	55 (61.1)	129 (66.8)	98 (69.5)	
Gender				
Male	26 (28.9)	41 (21.2)	58 (41.4)	<0.001
Female	64 (71.1)	152 (78.8)	82 (58.6)	
Marital status				
Married	N/A	14 (7.3)	12 (8.6)	<0.001
Living with partner		72 (37.7)	84 (60.0)	
Not living with partner		105 (55.0)	44 (31.4)	
Employment status				
Work full time	19 (21.1)	30 (15.6)	29 (20.6)	0.13
Work part time or piece jobs	16 (17.8)	30 (15.6)	34 (24.1)	
Unemployed	55 (1.1)	132 (68.8)	78 (55.3)	
Number of adults living in the household				
1	29 (32.2)	88 (45.6)	60 (42.6)	0.10
2+	61 (67.8)	105 (54.4)	81 (57.4)	
Number of children living in the household				
0-1	58 (64.4)	152 (79.6)	117 (83.0)	<0.01
2+	32 (35.6)	39 (20.4)	24 (17.0)	
Transportation to clinic				
On foot	71 (79.8)	136 (70.8)	88 (62.4)	0.04

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Characteristic	No Partner (N = 90)	HIV- or Unknown (N = 193)	HIV+ (N = 141)	p-value
Public taxi or bus	17 (19.1)	51 (26.6)	44 (31.2)	
Private car or motorbike	1 (1.2)	5 (2.6)	9 (6.4)	
TB treatment history				
Yes	14 (15.6)	14 (7.3)	8 (5.7)	0.02
No	76 (84.4)	179 (92.7)	133 (94.3)	

^aPearson χ^2 test (discrete variables), one-way analysis of variance (mean comparison for continuous variables) and Kruskal-Wallis test (median comparison for continuous variables) were used.

^bThe variable has missing data: $n = 82$ in those with no partners, $n = 154$ in HIV or unknown HIV status, and $n = 120$ in HIV+ status.

Table 2.

List of seven potential motivations for taking preventive therapies.

Label	Motivator
Preventing HIV transmission	Keeps me from giving HIV to my partner
Supporting family	Keeps me healthy for my family
Overall health	Keeps me healthy and working
Disease control	Keeps my HIV disease under control
High CD4	Keeps my CD4 high
Preventing infections	Prevents me from getting sick from infections
Preventing TB	Prevents me from getting TB