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Healthcare providers' understanding of HIV serodiscordance in South Africa and Uganda: implications for HIV prevention in sub-Saharan Africa

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HIV transmission within stable heterosexual HIV serodiscordant couples accounts for almost half the new incident infections in South Africa and Uganda. Advances in HIV prevention provide opportunities to reduce transmission risk within serodiscordant partnerships (e.g., antiretroviral treatment (ART), pre-exposure prophylaxis (PrEP), medical male circumcision, and couples-based HIV counselling and testing). These interventions require a clinical encounter with a provider who recognises prevention opportunities within these partnerships. We explored healthcare provider understanding of HIV serodiscordance in a reproductive counselling study with providers in eThekweni district, South Africa, and Mbarara district, Uganda. In eThekweni, in-depth interviews (29) and focus group discussions (2) were conducted with 42 providers (counsellors, nurses and doctors) from public sector clinics. In Mbarara, in-depth interviews were conducted with 38 providers (medical officers, clinical officers, nurses, peer counsellors and village health workers). Thematic analysis was conducted using NVivo software. In eThekweni, many providers assumed HIV seroconcordance among client partners and had difficulty articulating how serodiscordance occurs. Mbarara providers had a better understanding of HIV serodiscordance. In the two countries, providers who understood HIV serodiscordance were better able to describe useful HIV-prevention strategies. Healthcare providers require training and support to better understand the prevalence and mechanisms of HIV serodiscordance to implement HIV-prevention strategies for HIV serodiscordant couples.

Keywords: antiretroviral treatment, HIV counselling, HIV knowledge, HIV transmission, reproductive health

Introduction

Most incident HIV infections in sub-Saharan Africa occur through heterosexual transmission (Case et al., 2012). An estimated 25% of stable, long-term heterosexual couples in South Africa are HIV serodiscordant (Lingappa et al., 2008) and mathematical models estimate serodiscordant couples contribute up to 30% of total HIV incidence, with most of these incident infections occurring through the transmission of HIV to the uninfected partner of a serodiscordant relationship (Chemaitelly, Awad, Shelton, & Abu-Raddad, 2014). In Uganda, specifically, HIV transmission within mutually monogamous heterosexual relationships accounts for nearly 43% of all new infections, while a national survey conducted in 2011 showed that 6% of all cohabiting couples who underwent an HIV test were in a serodiscordant relationship (Uganda Ministry of Health, 2012; UNAIDS, 2009). Given the risk of transmission of HIV among serodiscordant couples and the demonstrated effectiveness of anti-retroviral treatment (ART) (Cohen et

al., 2011; Rodger et al., 2016) and pre-exposure prophylaxis (PrEP) as prevention (Baeten et al., 2012, 2016), this is a priority group for prevention efforts as indicated by the World Health Organization (WHO) guidelines (WHO, 2012a, 2012b, 2016).

Most HIV prevention opportunities for HIV serodiscordant couples in South Africa and Uganda are accessed via the public healthcare system including ART, voluntary medical male circumcision, behaviour change interventions, condom use, couples-based HIV counselling and testing, and PrEP. The underlying assumption for prevention efforts among this population is that healthcare providers (HCPs) understand the epidemiology of HIV serodiscordance and the rationale for emphasising prevention among these couples (WHO, 2012b). However, misunderstanding among HCPs regarding serodiscordance emerged as a key theme when analysing data from a qualitative reproductive health counselling study with providers in these two countries. Confusion about the mechanisms of HIV serodiscordance has been demonstrated among men and women living with HIV

(Bunnell et al., 2005; Kaida et al., 2014; Matthews et al., 2013). A recently published study in South Africa has added to the body of literature which illustrates the misconceptions HCPs hold regarding serodiscordance, such as the uninfected partner in serodiscordant partnership harbouring a “latent” HIV infection (West et al., 2016). We present data which spans two African countries and adds to this further, by demonstrating that a lack of knowledge and resultant confusion among HCPs may have an impact on efforts to reduce HIV transmission within serodiscordant couples.

Methods

Setting

This study investigated current knowledge, attitudes and practices of HCPs towards reproductive counselling for HIV discordant couples in resource-limited, HIV-endemic settings and was conducted across two sites: eThekweni district (South Africa) and Mbarara district (Uganda) (Matthews, Milford, et al., 2014; Matthews et al., 2016). As part of the qualitative component we conducted in-depth interviews and focus group discussions with HCPs from 6 public sector clinics between April and May 2012, in eThekweni district, South Africa, where regional HIV prevalence was estimated at 28% in 2012 (Shisana et al., 2014). Between May and December 2013, we conducted in-depth interviews with HCPs from 5 clinics in Mbarara District in south-western Uganda, where regional HIV prevalence was estimated at 8% in 2011 (Uganda AIDS Commission, 2014).

Sampling and recruitment

Block randomisation of HCPs working in primary healthcare facilities in eThekweni and Mbarara, Uganda was used to select study participants for the qualitative component of the study. Once study sites were selected (at random), the person in charge at the clinic provided lists of all providers working at the clinics. For nurses and counsellors, the list of providers was stratified by professional role and randomised. Providers were then approached in order of randomisation. All physicians at the sites were approached due to small numbers. Interviews were conducted until saturation or until no new major themes were identified. In eThekweni, in-depth interviews were conducted with 42 HCPs (15 counsellors, 22 nurses and 5 doctors) recruited from public sector clinics in the district. Two focus group discussions were conducted in addition to the in-depth interviews in South Africa to explore group norms and themes, one with counsellors ($n = 6$) and one with professional nurses ($n = 7$). In South Africa, professional nurses are responsible for most patient HIV consultations including ART initiation and management, antenatal care, and prevention of mother-to-child transmission programmes (PMTCT) (Dohrn, Nzama, & Murrman, 2009). Doctors see patients referred for more complex problems and for ART initiation. Lay counsellors are responsible for most of the counselling (Sprague, Chersich, & Black, 2011; van Rooyen, Durrheim, & Lindegger, 2011).

In Mbarara, in-depth interviews were conducted with 38 HCPs (5 medical officers, 7 clinical officers, 14 nurses, 7 peer counsellors and 5 village health workers) from local clinics and regional referral centres. In Uganda, medical officers are fully-trained doctors, while clinical officers provide health services up to and including minor surgeries

(Mullan & Frehywot, 2007; Saswata, Omar, Aubery, Jaffer, & Michael, 2005). Nurses are typically the first contact for patients at Health Care (HC) level III facilities through hospitals, and the primary care facilitators at HCIIIs (Walusimbi & Okonksy, 2004). Counsellors play an active role at all health centres through the provision of support, advice and health promotion.

Data collection

Data were collected using semi-structured in-depth interviews and focus group discussions. Interview and discussion guides were developed with input from local HCPs and focused on knowledge, attitudes and practices towards reproductive counselling for people living with HIV. The Mbarara interview guide was developed after the eThekweni data were collected. Given our findings that HCPs in eThekweni rarely thought about or encountered HIV serodiscordance and had challenges articulating how it happened (Matthews, Milford, et al., 2014), additional questions were included in the Mbarara interview guide to probe understanding of HIV serodiscordance. The frequency with which HCPs consulted with HIV-infected clients reporting uninfected sexual partner(s) and how HCPs explained HIV serodiscordant status to clients were directly explored. Interviews and focus groups were conducted in English and isiZulu (in eThekweni) or in English and Runyankole (in Mbarara); sessions were audio recorded and lasted approximately an hour.

Data analysis

Interviews/discussions were transcribed and translated (where necessary) into English. Thematic analysis was used to explore understanding of serodiscordance and any influence on reproductive counselling practices. An iterative process of transcript review and analysis was performed using techniques described by Silverman (2001).

Transcript coding teams identified themes through independent review of a subset of transcripts. Coding was then performed to structure data into categories and create groups. Themes were re-examined and discussed to ensure validity. To ensure reliability, multiple coders (five in total) analysed the data independently. Results from each phase of analyses were compared and discrepancies were discussed until a resolution was reached. NVivo10 software was used to organise the analysis.

Coding was done separately for the eThekweni and Mbarara data, but with overlapping coding team members (LTM, CM, RR). Over-arching themes between the two data sets were explored in a face-to-face meeting involving the study teams from both sites.

Ethical considerations

Ethical approval was obtained from the University of the Witwatersrand Human Research Ethics Committee (Johannesburg, South Africa), Mbarara University of Science and Technology (Mbarara, Uganda), Partners Healthcare (Boston, USA), and Simon Fraser University (Burnaby, Canada). All participants provided voluntary written informed consent before study procedures.

Results

Socio-demographic characteristics

Socio-demographic characteristics of the study participants are presented in Table 1. Most participants at both sites were female, and, on average, HCPs in South Africa were older (mean age of 41 years) than those in Uganda (mean age of 34 years). HCP workload and consultation length with patients were similar at both sites.

Data are presented for each location in accordance with major themes derived from the analysis. Some of the categories were identified *a priori* and some emerged from the data. We first describe and explore HCPs knowledge of HIV serodiscordance among their clients, including *HCP assumptions of seroconcordance in clients* (emergent in both sites), *explanations for serodiscordance* (emergent in eThekweni, *a priori* in Mbarara) and finally, *how understanding of serodiscordance impacts HIV prevention information passed on to clients* (emergent in both sites). For context, quotes from HCPs include their country location, age, gender and level of profession.

HCP assumptions of HIV seroconcordance in clients

HCPs in eThekweni and Mbarara displayed differing beliefs regarding the prevalence of HIV serodiscordance among their clinic population. However, HCPs at both sites did not spontaneously acknowledge the occurrence of HIV serodiscordance among their clients. HCPs at all levels in eThekweni described their experiences regarding the existence of HIV serodiscordance among their clients, but struggled to explain how this could occur.

I have heard about it, people talking about that [serodiscordance], but when I tried to listen carefully, I could not understand how it really happens that I can be positive and my husband is negative. How does it happen? I always ask myself that question (SA07, 29 years old, female, doctor, eThekweni).

In some instances HCPs who had encountered clients who disclosed that they were in a serodiscordant relationship did not believe them:

Because now, they sleep together, you see that? They don't even use protection...they don't even use condoms. But the man just says that "I'm negative," and the woman said, "Yes, I'm positive." They do

come, but we don't believe. They do come (SA02, 52 years old, female, professional nurse, eThekweni).

If serodiscordance was acknowledged, HCPs assumed that the uninfected partner would soon sero-convert:

Interviewer: Have you ever thought of, [...] the virus transmission, that she can infect the one she is in a relationship with, [...] having sex with?

Participant: She has infected him already anyway (SA05, 44 years old, female, counsellor, eThekweni).

Contrary to the lack of understanding displayed by eThekweni providers, HCPs in Mbarara were familiar with serodiscordance among their clinic population:

It's really, I think it's common, because I, for one, I'm concerned with ... I mean the discordant couples... So far among the... close to 6 000 clients we have in the clinic, I have registered like 300+ discordant, people living in a discordant relationship (UG11, 37 years old, female, counsellor, Mbarara).

Furthermore, HCPs at multiple facilities in Mbarara reported support groups targeted at serodiscordant couples:

Um yeah it is [clients who are HIV-positive and report an HIV-negative partner], it is less um, it is less common. But there are, there are, there are discordant couples, they have even formed a group. Yeah once in a while they, they have a meeting at our clinic. Yeah we have a discordant couple's association. Yeah, they are not very many but they are there (UG07, 46 years old, female, counsellor, Mbarara).

How providers explain serodiscordance

HCPs in both eThekweni and Mbarara provided a range of explanations for the occurrence of HIV serodiscordance. These included innate immunity, viral suppression and thus reduced infectiousness of the infected partner, the HIV window period, God's will, "good blood", and chance.

Some HCPs had some understanding of the biological explanations for the occurrence of HIV serodiscordance and explained that viral suppression could explain this. HIV serodiscordance as a result of a low or suppressed viral load in the positive partner was cited by several HCPs in Mbarara and by one HCP in one focus group discussion in eThekweni:

[I]f the person who is HIV positive has a high viral

Table 1: Socio-demographic characteristics of the study participants

	Total providers		Nurses		Counsellors		Doctors/medical & clinical officers		Village health workers
	eThekweni	Mbarara	eThekweni	Mbarara	eThekweni	Mbarara	eThekweni	Mbarara	Mbarara
Sample size	42	38	22	14	15	7	5	12	5
IDI participants	29	38	15	14	9	7	5	12	5
FGD participants	13	–	7	–	6	–	–	–	–
Proportion women	93%	73%	96%	100%	94%	71%	83%	58%	60%
Median age (range), years	41 (28–60)	34 (24–37)	42 (28–60)	31 (24–38)	41 (30–57)	42 (34–57)	34 (29–53)	33 (26–51)	33 (24–45)
Median years worked as a healthcare provider (range)	12 (4–37)	5.5 (2–29)	15 (4–37)	5.5 (2–21)	9 (7–12)	5 (5–29)	11 (8–16)	8.5 (2–25)	4 (4–6)
Median no. patients seen in work day (range)	27 (5–140)	30 (2–80)	45 (8–140)	30 (2–80)	15 (5–50)	12 (7–30)	21 (17–98)	53 (10–75)	6 (2–15)
Median minutes spent in typical client encounter in last workday (range)	16 (3–52)	19 (3–120)	10 (2–60)	18 (3–60)	38 (5–60)	23 (18–120)	10 (5–40)	11 (5–30)	60 (12.5–90)

load then they have high chances of transmitting. So if my partner is HIV positive but their viral load is low, then they can infect me but the chance of them infecting is low (UG08, 37 years old, female, medical officer, Mbarara).

And the other thing that reduces the transmission, like, if the woman is on ARVs [antiretroviral drugs] and the viral load is suppressed — as much as she can also infect her partner — but the chances are reduced if the viral load is suppressed (SA08, 38 years old, female, professional nurse, eThekwini).

Some HCPs at both sites described HIV serodiscordance as a rare phenomenon attributable to receptor mutations in the uninfected partner:

There is this thing that is called, GP120... These are people that the doctors talk about...When you find a person [who] does not have that kind of a receptor, ... HIV does not invade his cells (SA01, 43 years old, female, professional nurse, eThekwini).

[T]he researchers say [...] all human beings they have what is called [...] a CD4 and some people have receptors on their CD4 and those receptors are the ones which help the HIV [...] to attach the cells of the CD4, the receptors. And there are those who do not have receptors [...], it doesn't become easy for HIV to infect those people who do not have receptors on their CD4 (UG10, 45 years old, female, professional nurse, Mbarara).

Returning an HIV-negative result due to the window period before the HIV infection becomes evident was an explanation for serodiscordance offered by HCPs in eThekwini and Mbarara:

I haven't had a case like that where the woman was uninfected. We had a case once where the one partner was uninfected but it was sort of a window period, they'd just had one test (SA09, 29 years old, female, doctor, eThekwini).

[T]here is the window period. I first talk about the window period. That may be true that the other partner is negative today and the other one is positive. The other one who is positive will remain positive. But it isn't true that the other one who is negative will, may remain negative... It could be the window period (UG02, 42 years old, female, professional nurse, Mbarara).

Chance was another reason put forward by some HCPs in Mbarara to explain serodiscordance among couples:

[T]hat one, it's chance. But [...] being a chance we tell them to keep on using condoms because [...] when you use it correctly and rightly, [...] it saves you a hundred per cent. And again we give them this information that it is chance. And the more they misuse this chance the negative partner will one day find him or herself positive. (UG07, 46 years old, female, counsellor, Mbarara).

So with discordancy there are some simple basic explanations; one it could be just by chance. Not every time you have sex with somebody who has HIV do you get infected. So it maybe that you have just not gotten the infection by chance; and for that

reason that's why we always advise that if you are discordant today, put in mechanisms to avoid catching the infection (UG08, 37 years old, female, medical officer, Mbarara).

Some HCPs attributed HIV serodiscordance to God or to blood type:

There is a couple, the woman is negative and the man is positive, they are continuing having children and the woman is still negative. So maybe it is God who protects them because they are there you can see they are having children and the woman is still okay (UG10, 45 years old, female, professional nurse, Mbarara).

[I]n the community they say "yeah I've been with her for a long time we have not been protecting ourselves" so we say "even the research is still going on to find out why this happens" [...], we hear rumours that blood group O they are better off [...], they don't usually get such infections so easy (UG06, 42 years old, female, professional nurse, Mbarara).

How understandings of serodiscordance impact counselling

Given that HIV-negative clients attempting to conceive in the context of an HIV serodiscordant relationship are at risk of HIV infection, we explored the counselling messages HCPs would relate to clients regarding conception. eThekwini HCPs who were familiar with serodiscordance among their clients worried that barriers to disclosure among couples in a serodiscordant relationship would soon lead to the infection of the negative partner:

And she would have sex with him, know that she is HIV-positive, and without telling her partner, you see that? [...] And a person ends up infecting the man because the woman did not tell him that she is HIV-positive because they think if she tells him, he will dump her, and maybe she is counting on him because she is not working, only the man works (SA05, 44 years old, female, counsellor, eThekwini).

The risk of partners infecting one another and becoming seroconcordant in the context of conception attempts was also a concern expressed by HCPs from Mbarara:

That one obviously they are expecting a virus. [...] So they are like if we want to conceive, that means the partner will be HIV positive. Like that (UG03, 28 years old, female, nurse, Mbarara).

HCPs at both sites who articulated understandings of serodiscordance tended to provide more useful periconception counselling:

If the PCR is negative I don't think there is a risk there, they can have a healthy child [...] I'll ask him to wait or I will take the blood for, for this thing for PCR to exclude the HIV from the one who is negative [...] after the PCR [...] they can have the baby provided [...] the man is negative and the woman is positive and there is [low] viral load and CD4 it's okay (SA03, 54 years old, female, professional nurse, eThekwini).

[W]e always advise them to have unprotected sex within the expected time of fertility, then [...] after the woman is pregnant maybe [she] is the one negative,

they start using their condom as usual (UG04, 30 years old, female, professional nurse, Mbarara).

[W]e first of all have the positive person taking his or her ARVs well, the other is actually the person who is negative, getting what we call PrEP, you take ARVs, even when you [...] are going to have sex [...]. You take ARVs before and after the sexual encounter, or you could even use the post exposure the one they call PEP. So you, you have the sex and then take the ARVs for a month afterwards. Those are the methods which have been very effective in helping discordant couples stay discordant (UG08, 37 years old, female medical officer, Mbarara).

In contrast, HCPs who articulated a misunderstanding of serodiscordance did not know how to reduce periconception HIV transmission risk:

[S]ay a female is negative and a male is positive, I'll say you can't, there is no way that [...] we can prevent transmission now that you want the child.... Then I would say you can't, don't. Don't have unprotected sex. I will tell the client that you will definitely be HIV positive. Because I will say to you stop using condoms because you want to have a child. Then you will stop using condoms and what would happen at the end? You will get HIV (SA06, 36 years old, female, doctor, eThekweni).

If you are prepared to risk [to have sex with an infected partner in order to get pregnant], then there is nothing we can do (SA04, 42 years old, female, professional nurse, eThekweni).

Participant: *Most of couple counselling for discordant couples, most of the times what we talk of is use of a condom. That's what we normally talk of.*

Interviewer: *Ok use of a condom.... What, if anything [...] can an HIV-positive individual who has an HIV negative partner do to reduce the risk of transmission to that negative partner and to the baby, if they want to have children?*

Participant: *Ah to the baby, they still use the other option B+, but to the mother, that one I don't know. Because there are two things, you either become also positive, or you remain negative (UG05, 28 years old, female, professional nurse, Mbarara).*

Discussion

The ability to provide effective and relevant counselling to HIV serodiscordant couples is vital for prevention efforts (Spino, Clark, & Stash, 2010; WHO, 2012a). Our data suggest that when HCPs are unclear about the epidemiology of or mechanisms for HIV serodiscordance, messages provided to clients are affected. HCPs who displayed an understanding of HIV serodiscordance tended to articulate the most useful advice for individuals or couples attempting to conceive safely, whereas HCPs who did not have such an understanding were unable to describe strategies to reduce periconception HIV transmission risk. HCPs act as gatekeepers — not only do their technical skills and knowledge affect the services they provide, but their opinions, attitudes and advice influence how they counsel

clients, which in turn has an impact on client behaviour (Orlando, Weber, Martinez, Cohan, & Seidman, 2017; Shelton, 2001; West et al., 2016).

Many HCPs in eThekweni did not understand or were unfamiliar with the occurrence of HIV serodiscordance among their clients or assumed those who were serodiscordant would inevitably become concordant positive. Assumptions of seroconcordance are cause for concern, as this precludes efforts on the part of the HCP to offer the counselling necessary to reduce transmission risk between couples. Indeed, in prior research with clients accessing care at these clinics, we reported misperceptions of serodiscordance, which are similar to the ideas expressed by HCPs reported here and which appeared to lead to riskier sex behaviour (Matthews et al., 2012).

Differences in the perceptions of HIV serodiscordance may reflect the nature of the HIV epidemic at each site. HIV prevalence for eThekweni, KwaZulu-Natal, is estimated at 15% versus 8% in Mbarara (across all ages), while HIV prevalence among those of reproductive age (15–49 years old) in KwaZulu-Natal is estimated at 28% (Shisana et al., 2014). The generalised nature of the HIV epidemic in KwaZulu-Natal, South Africa, may have an impact on HCP assumptions of HIV infection among client partners with an unknown infection status (Jain et al., 2014). In a previous analysis of these data in South Africa we observed that when probing periconception risks, eThekweni HCPs rarely assess sexual transmission risk, focusing instead on perinatal transmission of HIV (Matthews et al., 2015). In addition, the culture of clinics in this area is such that couples rarely attend clinic together and provision of couples-based counselling and testing is not routine (Kilembe et al., 2015; Matthews, Moore, et al., 2014). Conversely, in Uganda couples HIV counselling and testing (CHCT) has been a priority for government HIV prevention plans and was predicted to be around 34% of those clients presenting for these services in 2013 (Nannozi, Wobudeya, Matsiko, & Gahagan, 2017).

Assumptions of HIV seroconcordant status of couples, disbelief of the possibility of HIV-uninfected partners, and a lack of ongoing support for clients in serodiscordant relationships may impede the adoption and maintenance of HIV-prevention behaviour by serodiscordant couples (Matovu, 2010). Positive prevention efforts which prioritise risk-reduction activities among HIV-infected individuals in a serodiscordant relationship, while also improving quality of life for men and women living with HIV, are a critical intervention strategy, which cannot be realised if HIV serodiscordancy among clients is not acknowledged by HCPs (Bunnell, Mermin, & De Cock, 2006; Sikkema et al., 2010). In support of this, a study conducted in eThekweni district, South Africa, showed that a couples-based HIV counselling and testing intervention improved clients' knowledge of HIV serodiscordance, and mechanisms of transmission and prevention (Kilembe et al., 2015). Such interventions, coupled with improved public messaging regarding HIV serodiscordance may dispel misconceptions regarding HIV serodiscordance, modes of transmission and steps for prevention among healthcare clients in a serodiscordant relationship.

Limitations

These data were collected in 2012 and 2013. Since then the HIV prevention and treatment landscape has changed. However, there have been no programmes to support providers to understand HIV serodiscordance in either setting, to the best of our knowledge, so this problem likely remains. As the major themes of analysis were emergent in eThekweni, and *a priori* in Mbarara, results are not meant to be directly comparable between the two sites. However, the study results provide insight into how serodiscordance is understood in healthcare provision in both contexts and how providers might be supported to provide helpful counselling to men and women living with HIV and their partners. This will be particularly important in settings where HIV serodiscordant couples are a key population for PrEP use, such as Uganda (Uganda Ministry of Health, 2016).

Conclusion and recommendations

Both countries identify serodiscordant couples as a priority population in their national HIV prevention plans (SANAC, 2017; Uganda Ministry of Health, 2016) and guidelines for safer conception for people living with HIV have been released in South Africa (Bekker et al., 2011). However, couples-oriented HIV counselling and testing programmes have not been implemented on a large scale in sub-Saharan Africa (Desgrées-du-Loû & Orne-Gliemann, 2008). Studies in both Uganda and South Africa have shown difficulties (such as low partner attendance at clinics, fear of marital consequences due to HIV status disclosure) when attempting to conduct CHCT (Harries et al., 2007; Matovu et al., 2013). Additionally, HCPs require ongoing training and support on serodiscordance and its prevalence among their client population to implement risk reduction programming for serodiscordant couples (e.g. CHCT, PrEP, TasP and safer conception programmes) (Crankshaw, Mindry, Munthree, Letsoalo, & Maharaj, 2014; Mmeje et al., 2016; Ngure et al., 2017). Public messaging in each country must also incorporate information regarding HIV serodiscordant relationships, including disclosure, knowledge of each partners' status (to protect the negative partner) and should dissuade HIV fatalism and assumptions of eventual seroconcordance.

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