



Client and Provider Experiences in Uganda Suggest Demand for and Highlight the Importance of Addressing HIV Stigma and Gender Norms Within Safer Conception Care

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Abstract

Safer conception counseling supports HIV-serodifferent couples to meet reproductive goals while minimizing HIV transmission risk, but has not been integrated into routine HIV care. We piloted a novel safer conception program in an established public-sector HIV clinic in Uganda to inform future implementation. In-depth interviews and counseling observations explored experiences of program clients and healthcare providers to assess program acceptability, appropriateness, and feasibility. Fifteen index clients (8 women, 7 men), 10 pregnancy partners, and 10 providers completed interviews; 15 participants were living with HIV. Ten observations were conducted. We identified four emergent themes: (1) High demand for safer conception services integrated within routine HIV care, (2) Evolving messages of antiretroviral treatment as prevention contribute to confusion about HIV prevention options, (3) Gender and sexual relationship power inequities shape safer conception care, and (4) HIV-related stigma impacts safer conception care uptake. These findings confirm the need for safer conception care and suggest important implementation considerations.

Keywords HIV prevention · Safer conception · Sexual and reproductive health · HIV-serodifferent couples · Uganda

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Introduction

Safer conception counseling is an important component of care for people with HIV (PWH), particularly those in HIV-serodifferent partnerships [1, 2]. Many PWH want to have children and want information on safer conception methods which substantially reduce HIV transmission [3, 4]. In addition to promoting HIV prevention strategies, safer conception programs offer benefits around serostatus disclosure, partner communication, and engagement in HIV care and prevention [5].

Several strategies can reduce HIV transmission for people who choose to conceive when at least one partner is living with HIV [6]. The most effective is ART-mediated viral load suppression for the partner with HIV, which can eliminate sexual transmission [7]. For couples for whom that is not feasible, additional options include condomless sex limited to the woman's peak fertility (timed condomless sex), insemination without intercourse (for couples in which the woman lives with HIV), medical male circumcision, screening and treatment for sexually transmitted infections (STIs),

and pre-exposure prophylaxis (PrEP) for the uninfected partner [6, 8–12]. For couples in which the male partner is living with HIV, semen-processing and assisted reproductive techniques are effective, but availability, accessibility, and acceptability are limited [13–15]. Despite demand for and potential benefits of safer conception programming, it is not yet part of routine HIV care [16–20].

Many health care providers in Uganda embrace the reproductive rights of people with HIV, but lack adequate training and guidelines to provide safer conception care [21–25]. This reveals a gap in the training providers receive about preconception care for HIV-affected couples and results in minimal communication between patients and providers about these topics [26]. In addition, not all healthcare providers support the reproductive rights of HIV-affected people and anticipated healthcare worker stigma towards PWH having children can further exacerbate communication gaps [27–29].

We integrated a pilot safer conception program into an established HIV clinic in rural Uganda, the Healthy Families Clinic, to provide counseling on safer conception methods. Here, we describe results from a qualitative evaluation of patient and provider experiences with the program. The objective was to explore periconception experiences of clients living with HIV and their partners, observe counseling sessions, and better understand provider viewpoints, to assess acceptability, appropriateness, and feasibility of the program. With these data, we can better understand how to meet the safer conception needs of PWH and their partners and inform safer conception counseling implementation within routine HIV care.

Materials and Methods

Study Site

Mbarara Municipality (population 195,000) is located in the Mbarara District of Uganda, 275 km southwest of the capital city, Kampala. The HIV clinic, at the Mbarara Regional Referral Hospital, is a public sector clinic that provides care to PWH with a catchment area spanning southwestern Uganda and parts of northern Rwanda. This clinic initiates ART for approximately 1000 new patients per year.

Healthy Families Clinic

In November 2016, the Healthy Families Clinic began offering safer conception care to adult (≥ 18 years of age) men and women accessing HIV care who expressed personal or partner desire for pregnancy. This program was co-located within the local HIV clinic. In addition, men and women with or without HIV who were not in care

at the clinic access safer conception care at the Healthy Families Clinic. To identify potential clients, nurses working in triage at the HIV clinic added ‘reproductive goals’ into their routine screening questions and referred those who reported pregnancy desire to the Healthy Families Clinic. Our team also developed an informational video about safer conception in the dominant local language, which was broadcast in the clinic waiting area to provide general safer conception information and inform clients of the services available at the Healthy Families Clinic.

The counselling program included three counseling sessions for PWH and/or their pregnancy partners. We utilized culturally appropriate safer conception counseling content based on prior formative work [30, 31] and adapted it to the local context with input from safer conception experts and Ugandan healthcare providers. At the time the program was started, PrEP was available in the Mbarara Regional Hospital HIV Clinic as an early roll-out site for Uganda [32]. In addition to safer conception counselling, we assessed disclosure and pregnancy goals, verified HIV serostatus of all participants, and measured HIV-RNA viral load for PWH. STIs were assessed via syndromic screening. As part of related research, we objectively screened for STIs for a subset of participants and this is described elsewhere [33]. Pregnancy partner participation was encouraged but not required.

In brief, safer conception counselling included information on strategies recommended by international and national guidelines, including: (a) Couples HIV Counseling and Testing (CHCT), (b) initiation of ART and delaying condomless sex until achieving viral load suppression (i.e., treatment as prevention), (c) PrEP for uninfected partners, (d) timing condomless sex to peak fertility, (e) treatment of STIs, (f) sperm washing and in vitro fertilization [1, 34, 35]. To aid in conveying this information, we created a locally designed counseling tool to explain key concepts (Fig. 1). Adapted from an intervention we developed for men with HIV in South Africa, the counselor utilized strategies drawn from cognitive behavioral therapy (CBT), and included a brief motivational exercise, problem-solving, and communication skills training to support clients to meet their reproductive goals while minimizing HIV transmission risks [30]. The sessions were led by one (male) counselor with training as an HIV counselor and midwife and one (female) nurse with training as an HIV clinic nurse.

Study Participants and Recruitment

We conducted individual in-depth interviews with a subset of index Healthy Families Clinic clients, their partners, and providers.

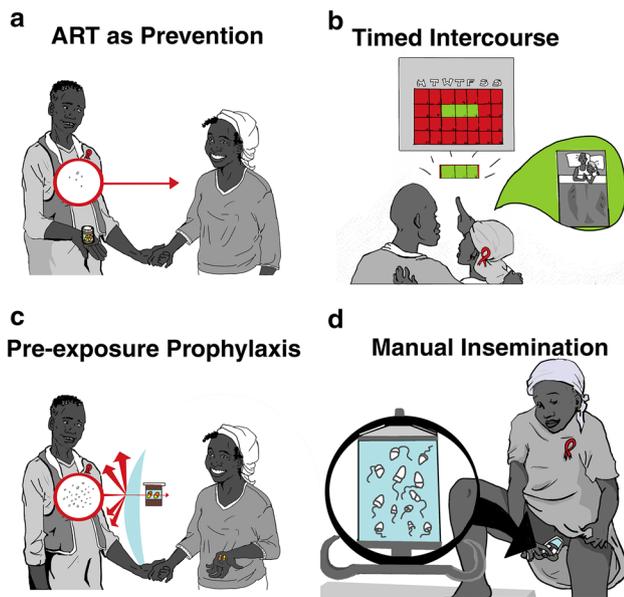


Fig. 1 We developed culturally appropriate messages to illustrate safer conception strategies including **a** Treatment as Prevention, **b** Timing Condomless Sex to Peak Fertility, **c** PrEP, **d** Manual Insemination

Clients

Index clients were defined as the individual within the partnership who first engaged in safer conception care, regardless of their HIV-serostatus. Clients were eligible for the qualitative study after completing at least one counselling session, and if they were able to consent and spoke either English or the local language, Runyankole.

Partners

Partners were eligible to participate if they were partnered with someone who participated in at least one safer conception counselling session, knew the serostatus of their partner, were able to provide consent, and spoke either English or the local language. Potential participants were approached by the research assistant in person or by phone, to assess eligibility and interest in participating. During the informed consent process, we assessed whether the client's desired pregnancy partner was aware of the client's HIV serostatus, and if the client was comfortable providing information to their partner about the study. If so, clients were provided with an information sheet for their partner, informing the partner about the study. A research assistant then followed up with a phone call to the client, to assess partner interest in study participation. If partner interest was confirmed, then the research assistant followed up with the partner, to assess eligibility/interest in study participation, and to conduct the informed consent process.

Providers

Providers were eligible to participate if they were a physician, counselor, nurse, peer educator, or midwife providing HIV or reproductive care at the HIV clinic, or within the obstetrics/gynecology or outpatient departments at the hospital where the program was rolled out. Eligible providers spoke either English or the local language and were able to provide informed consent. Our team was purposeful in recruiting providers from the clinic and hospital settings where they were likely to have had experiences working with HIV-affected clients with reproductive goals.

Data Collection

Demographic information for each index or partner participant was collected from the Healthy Families clinic medical record. We conducted semi-structured, individual, in-depth interviews from April through December 2017. The interview guides were designed to capture periconception experiences in the program, and were developed with input from experts in HIV, reproductive health, and safer conception. The guides were piloted and revised extensively among study staff for clarity and content. Interview guides for index clients and their partners included questions about motivations around safer conception, understanding and use of safer conception methods, impact on HIV-serostatus disclosure and relationship with the partner, potential harms (including unintentional disclosure and interpersonal violence), and overall satisfaction with the program.

Interview guides for providers included questions about the need for safer conception services, the benefits and risks of these interventions related to timed condomless sex, family planning and partner disclosure, the impact of these interventions on patients, and the expansion of this intervention to other health care settings.

All interviews took place in a private location in the clinic, in the preferred language of the participant (English or Runyankole) and lasted approximately one hour. A Ugandan research assistant trained in qualitative research methods and fluent in English and Runyankole conducted the interviews.

Ten field observations were conducted by a research assistant during the safer conception counseling sessions from July through September 2017 in order to provide data about how the program was being implemented and experienced in real-time. To recruit participants for this component of the study, the clinic counselor asked a convenience sample of participants if the RA could be invited to observe the session. If the participants were willing to consider this, the RA was invited to meet the clients and explain the purpose of the field observations. If the clients were willing to have their counseling session observed, SN completed the

informed consent process with the client(s). These studies were observed during regular program visits and included both individuals and couples. The RA did not participate in clinic sessions but took notes about the interactions between the counselor and their clients during the sessions. The sessions were not recorded. Written consent was obtained by all participants prior to the counselling session.

Data Analysis

Interviews were audio-recorded, then translated and transcribed into English by the interviewer. All interview transcripts were reviewed for content, clarity, detail, and grammar. NVivo 10 and 12 (QSR International) were used to facilitate analyses. Transcribed and translated interviews and counseling observations were analyzed using content analysis [36, 37]. Client and partner transcripts were read and discussed by four research team members (CY, RH, MO, LM) to identify major themes and inform development of a coding scheme to categorize the data. The codebook to guide the coding process was completed by two members of the research team (CY and RH). They compared coding for five interviews to ensure coding reliability ($\kappa = 0.85$) [38], then coded the remaining interviews independently. This codebook was also used to analyze counseling observations (EG, LM).

Provider transcripts were read and discussed for emergent themes, and a codebook was created by four team members (EG, MP, MO, LM). The coding was completed by two members of the research team (EG and MP). They compared coding for two interviews to ensure reliability ($\kappa = 0.98$).

After coding all interviews and counseling observations, the research team discussed the emergent periconception themes, informed by the conceptual framework by Crankshaw et al. [39]. Using a thematic analysis approach, data reduction methods were employed to extract the overarching narrative from the most pertinent data [40].

Results

Demographics

Fifteen index clients and 10 pregnancy partners completed interviews (all index clients approached consented to participate, 10 of 15 partners participated). Index clients ($N = 15$) had a median age of 30 years (IQR: 27–38), 8 (53%) were women, and 13 (87%) were living with HIV. All PWH were on ART. Of the PWH, two had recently been diagnosed with HIV and initiated ART, and HIV-RNA had not yet been assessed and 3 were virally suppressed (≤ 550 copies per ml) and had been on ART a

median of 1.9 years (IQR: 0.9–3.8). Fourteen (93%) PWH reported prior disclosure of HIV-serostatus to their partner at enrollment. Pregnancy partners ($N = 10$) had a median age of 32 years (IQR: 27–37), 5 (50%) were women, and 2 (20%) were living with HIV. In 7 of 15 couples (47%), the woman was living with HIV. Thirteen (87%) of relationships were HIV-serodifferent. Nine couples (60%) had been trying to conceive when they started the program and, of those, 4 couples had been trying to conceive for more than 12 months (Table 1).

Ten providers completed interviews (data on screen to enroll ratios are not available). Three doctors, three nurses, two counselors, one peer educator, and one midwife who provided HIV care at the clinic ($N = 6$), obstetrics and gynecology clinics and wards ($N = 1$), outpatient department ($N = 1$), and inpatient medicine wards ($N = 2$) participated. Six were women. Additional provider demographic data were not collected given the small, close-knit community at the health center and potential to compromise the confidential information shared by provider participants.

Ten clinic field observations were completed (all approached consented to participate). Two of the observed sessions were completed with serodifferent couples (including one in which the man was living with HIV and one in which the woman was living with HIV). Five sessions with individual MWH and three sessions with WWH were observed.

Table 1 Baseline characteristics of client study participants

Characteristic	N (%) or Median [IQR]
INDEX (N = 15)	
Age, years	30.2 [27.2–37.8]
Women	8 (53%)
Living with HIV	13 (87%)
Years on ART (N = 10)	2.43 [1.79–4.09]
HIV-RNA < 500 copies (n = 13)	12 (92.3%)
Disclosed to partner (n = 13)	12 (92.3%)
Serodifferent partnership	13 (87%)
Trying to conceive at enrolment	9 (60%)
Trying to conceive ≥ 12 months	4 (27%)
Disclosure at enrolment	14 (93%)
PREGNANCY PARTNER (N = 10)	
Age, years	31.8 [27.2–37.3]
Women	5 (50%)
Living with HIV	2 (20%)
Years on ART (N = 2)	0.53 [0.39–0.67]
HIV-RNA < 500 copies (N = 2)	1 (50%)
Disclosed to partner (N = 2)	2 (100%)

Emergent Themes

We identified four emergent themes from the client and provider interviews and field observations that impact safer conception care, practices, and preferences:

(1) There is high demand for safer conception services integrated within routine HIV care, (2) Evolving messages of treatment as prevention contribute to confusion about HIV prevention options, (3) Gender and sexual relationship power inequities shape safer conception care engagement, and (4) HIV-related stigma impacts safer conception care uptake.

(1) Clients and Providers Describe High Demand for Safer Conception Services Which Align with HIV Care

Clients and providers expressed that the safer conception program met an important need. Most clients did not have prior safer conception knowledge despite a strong desire to have children and valued the education from the counsellor.

I see everything is good. I like the counselling I get from the counsellor. Generally this program cares about our health: they try to help us not to infect our partners with HIV and have a healthy baby.

-Male, Living with HIV, Interview #19 (virally suppressed)

Clients who had struggled to meet reproductive goals also sought care from this program. The client demographic data (Table 1) demonstrate that nine couples (60%) had been trying to conceive when they started the program and, of those, four couples had been trying to conceive for more than 12 months (which is the clinical definition for infertility) [41]. One woman living with HIV who participated in a counseling field observation noted that she and her partner had been trying for a child for 5 years without success (Clinic observation #5).

Participants appreciated the program and the opportunity it provided for them to continue their efforts to conceive in a safe manner.

I liked everything ... they guided me and I got pregnant, so what can I say about the program? So, I like all the aspects. I like the way you talk to people. You talk to people so nicely and so calmly. I did not know one can have sex with an HIV person and he/she does not get sick; that I learnt from the program.

-Female, HIV negative, Interview #4 (partner virally suppressed)

The following quote reflects the perspective of an experienced HIV-counselor on high demand for this program.

It is something very important. I think if you explain it to someone, I don't think there is someone who can refuse it. I think people will embrace it. I know people need the safer conception services because (sero-)discordant couples are increasing these days and yet all these people want children, so they all need to learn more about the safer conception methods

-Male, HIV Counselor, Interview #27

Further, providers described how safer conception counselling restores hope for serodifferent couples to have children.

Before, this kind of relationship [HIV-serodifferent partnership] was either life or death. It was either stay and die for the love of your partner or part for the love of your life, but I think now safer conception gives hope to the discordant families to stay on and to also have children.

-Male, HIV Doctor, Interview #33

Providers spoke of the importance of the program for community messaging around serodifferent partnerships. One provider noted that the church discourages marriage between serodifferent partners, “if this [program] comes up with good results we can ... advise the church that discordant couples can stay together without infecting the negative partner and they can also make a happy family.”

Provider interviews (and participant demographic data, Table 1) highlighted that men were important safer conception program consumers:

I think for him it was like, when he has HIV he will never have children. But when I told him, he was like, “You mean...?”, so he looked interested. I told him that we shall discuss more when he comes back with the wife. Yeah, it looked interesting to him that those who have HIV can also have children.

-Woman, HIV counselor, Interview #26

Providers face many competing demands and described how safer conception is both necessary for and readily incorporated into comprehensive HIV care. This physician discussed how safer conception care, provided by counselors, helped support his role caring for serodifferent couples.

What I like about this program is that most of these couples are in discordant relationships, so the program has helped us so much to rest their expectations that they can also have children and this has helped a lot in the care of HIV patients.

-Male, HIV Doctor, Interview #32

In addition, providers saw safer conception care and family planning as part of a patient-centered continuum of comprehensive sexual and reproductive health care:

Much as we always advocate for means of spacing children, we actually need children [...] If there is an issue of HIV they need to put measures to stop transmission and infecting the other partner from acquiring the HIV and having a safe child...If one needs a child the person can get pregnant and when one does not want a child then they can use family planning so to me I don't find it contradicting.

-Male, HIV Counselor, Interview #27

Providers expressed that the brief video about safer conception care was an important aid to sharing safer conception content with PWH, their partners, and their social networks.

People are taking more interest to listen to this program especially when they are watching the television at the reception. I normally see that they are so attentive watching that television to learn more about safer conception, others may fear to come to us or to go to the counsellor to ask them about the program but when they learn from the television they go and practice and they get what they want. The message is in a language that they can understand so it's good for them.

-Female, Medical Peer Educator, Interview #30

One nurse, Interview #28, noted, “*Even those who do not have safer conception needs have friend[s] who have such needs and they go and tell them about it [the messages in the televised segment.]*”.

(2) Evolving Messaging of Treatment as Prevention can Lead to Confusion Among Clients and Their Partners

Most clients living with HIV were accessing ART and virally suppressed (≤ 550 copies per ml). Counselling emphasized the power of viral load suppression to reduce transmission. However, index and partner participants expressed concerns about ongoing risks of HIV transmission. Several participants noted the importance of adherence to ART medications, but mainly as a way to ensure the health of the partner living with HIV, rather than to prevent HIV transmission. This quote from a man living with HIV expresses his concerns, despite years of being virally suppressed:

I worry about it [transmitting HIV to uninfected partner] a lot when I am sleeping with her without a condom I am always worried of infecting her.

-Male, living with HIV, Interview #13 (virally suppressed, on ART since 2014)

The following quote from an HIV-uninfected man with a partner living with HIV highlights his ongoing fears of acquiring HIV:

It's true, I have a lot of worries. In fact, whenever [I] am going to do tests I am always worried that I have already contracted the HIV virus. I love my wife but at times I ask myself surely why I am with her and yet she is sick. I have checked like 5 times but I am still ok. But I love my wife [and] am ready for anything.

-Male, HIV negative, Interview # 21 (partner virally suppressed)

Providers explained that safer conception education can confuse patients. Messages about the benefits of ART and the meaning of an undetectable viral load can conflict with previous community or healthcare communication patients have received, as described by this provider.

You know communication is something very funny. The way people perceive certain things is always different. Remember there is something they already know which is condom use and now when you tell them not to use condoms it somehow confuses them. You can look into the patient's eyes and know that surely you are confusing them. It happens.

-Male, HIV Doctor, Interview #32

Provider misconceptions, highlighted by this quote from a physician, about treatment as prevention may also contribute to patient doubts about HIV prevention methods.

Of course, it's a contradiction that we find ourselves in. We always emphasize the danger of transmission of HIV and the risks involved... We do not scare them because there are those that fear to have sex with their partners. Well here in Uganda there is no evidence to show that this method of condomless sex during peak fertility days is 100% safe so we tell them, but we are not sure how effective this is because there is no data to prove that.

-Male, HIV Doctor, Interview #33

(3) Gender and Sexual Relationship Power Inequities Inform How Safer Conception Care Should be Delivered

Providers emphasized that safer conception care should be provided to couples rather than individuals to maximize efficacy/reach.

I think coming alone compromises the efficacy of this intervention. When there is no disclosure among the couples and, for example, condom use is suggested as a safer conception method, it will not work. Because the other partner finds it hard to explain to the wife or husband to use a condom, yet they are married. But if they go together, the counsellor will explain to them the reason why they both need to use a condom for some time.

-Male, HIV Counselor, Interview #27

The nurse quoted below further described how women's limited autonomy within their relationships could pose a barrier to the effectiveness of individually-based safer conception care as it might be hard for her to share the messages with her partner.

... when you give a lady messages that are supposed to help both of them, the man will miss out because women fear to tell their husbands some of the things, especially if the messages are related to things like condom use, abstinence, or family planning.

-Female, HIV Nurse, Interview #28

Some women who feared HIV acquisition reported limited ability to make autonomous choices regarding risk reduction. As above, fear of HIV transmission appeared to drive choices, in this woman who used PrEP as part of her safer conception strategy.

I cannot fail to worry, of course. I think about that fact that any time I will get HIV from my partner, but there is nothing I can do about it. I love my husband and I want to give him a child [...] I am worried because I am the one who reminds him to take his medication so I wonder if I get HIV also will I be able to remind him to take his medication and remember to take mine as well? [Tears in her eyes] Otherwise I know that if there is no protection, any time I will catch the virus. He refused to use the condom so my life has always been at a risk.

-Female, HIV negative, Interview #1 (partner virally suppressed)

For the woman quoted below, whose partner was virally suppressed, she selected PrEP despite ongoing concerns about side effects.

Of course, for my husband, he is okay, he has nothing to lose. I am his wife and he had been on medication. Me, I had never taken these drugs [PrEP] before, so for him nothing changed -only that he started having sex without a condom and he is enjoying it. It's me who is suffering with the side effects of the PrEP I get headache and nausea. So it's me who saw new things. I am suffering with the side effects but I have nothing to do since I want a child I will persist and wait.

-Female, HIV negative, Interview #22 (partner virally suppressed)

While couples-based counselling was seen as ideal, some of the participant stories highlighted the challenges of couples-based care. This participant disclosed current intimate partner violence (IPV) during her interview and was referred to local counselling resources.

When my husband comes home drunk he comes fighting and I ask God, 'Why?' I ask God, 'Why [do] I love this man this much that I decided to risk my life and I stay with him despite his status?'. But I wonder why he cannot realise that, and he goes ahead to beat me.'

-Female, HIV negative, Interview #1 (partner virally suppressed)

The participant quoted above had attended safer conception counselling sessions with her partner who was enrolled at the referent HIV Clinic for years. There was no evidence in our data that the safer conception program caused or worsened existing IPV, but these data highlight the challenge of providing safer conception care in settings that do not routinely offer integrated sexual and reproductive healthcare.

During the observed counseling sessions, male-dominant gender roles were observed, highlighting that regardless of which partner is living with HIV, men may have more power within the relationship to enact certain safer conception methods.

He [counselor] went ahead and helped her to calculate her fertile days. He gave her that piece of paper on which he was helping her calculate to use it for reference at home and it's the man who kept it. He [male partner] mentioned that his wife is careless, so he will keep the paper safely, and they both laughed.

-Observation 2 of session with a serodifferent couple in which the female is living with HIV

While the counsellor was gone, the woman put an expression on the face looking very worried and in deep thoughts then the husband would keep telling her that it's okay she should not worry about the PrEP. He kept on encouraging the wife that she will make it and she should not worry about the big tablet after all if she can take food every day to live, then she can also take a tablet per day to have a child. She mentioned that she is going to begin taking PrEP, but she is worried about it and she even wonders if it will work.

-Observation 1 of session with serodifferent couple in which the male is living with HIV

(4) HIV-Related Stigma Impacts Safer Conception Care Uptake

In discussing how the program could be expanded, participants noted their experiences and fear of stigma, both related to HIV diagnosis and being partnered with someone living with HIV.

... in my village when they suspect that you have HIV, they start pointing fingers. So whoever has it has to keep it a secret, otherwise they can harass you and

discriminate you.-Female, Living with HIV, Interview #14 (virally suppressed)

For me, as a person, I feel bad when people get to know that I have an HIV[-positive] man. Some people keep asking me why I am staying with a sick man

-Female, HIV negative, Interview #25 (partner virally suppressed)

While participants reported positive experiences with the program, they had concerns about implementing the Healthy Families program in other clinical settings. These responses seem to reflect both positive interactions with the HIV clinic and staff and a history of negative experiences in other healthcare settings.

I think this program cannot work well in the clinics because they have rumors and yet that is something that is not here in the government hospital. Those people who work in clinics do not keep secrets they may start spreading the rumors about the clients which is bad.

Interviewer: So is there any way how this program can work in the clinic setting?

No. I see the clinic can have a hand in separating people who like each other because of their rumors....

For example a couple may be living in their [HIV-sero]discordant marriage happily but when they do not want other people to know about it and when they know it, they start talking the negative partner out of the marriage.

-Male, HIV negative, Interview #20 (partner virally suppressed)

Participants also noted downsides of engaging in safer conception programming, including PrEP related stigma and side effects.

She has side effects of the medicine [PrEP]. I think most of the effects are psychological because she feels as if it's a burden because she is not HIV-positive but she is taking medication for HIV-positive people.

-Male, living with HIV, Interview #5 (virally suppressed)

Providers discussed how stigma can pose a barrier to those not living with HIV from receiving important information about safer conception care. They explained the importance of distributing these messages within the antenatal care units in addition to HIV clinics.

I think you know most interventions make double impact when you talk to pregnant women so you target where conception is handled. To me I think the most effective place is to put the program at the ANC clinic in the maternal child health building not the [HIV] clinic because HIV negative women fear to be associ-

ated with the [HIV] clinic because they know that is the place for HIV positive people.

-Female, OBGYN Doctor, Interview #34

Discussion

This is the first program, to our knowledge, of safer conception care integrated into HIV care in a public sector, non-research setting in Uganda. Qualitative data collected from a subset of participating clients and providers highlight that demand for comprehensive reproductive health care and the alignment of safer conception care with larger HIV prevention and treatment goals drove client and provider acceptability of safer conception care integration. Key challenges to consider when developing safer conception services include communicating treatment as prevention messages, gender and sexual relationship power inequities, and stigma related to living with or being partnered with someone living with HIV.

Providers appreciated that safer conception care covered topics such as serodifference, disclosure and treatment as prevention, and thus supported their work to meet local and UNAIDS targets [42]. In addition, providers noted that safer conception care is part of a continuum of reproductive health care that works in concert with family planning care. Clients accessing the program noted that local expansion might be challenging due to experiences of provider stigma towards PWH at other sites as well as time constraints. A South African study found that providers support a model where an HIV counselor is the main point of contact for PWH and their partners to discuss preconception options, but all providers should receive further and proper training to reinforce essential information [43, 44]. In a research-based safer conception program in Uganda family planning nurses led the intervention [45]. Our findings support the use of counselors as the main source of safer conception care and the training of providers to reinforce safer conception messaging within comprehensive HIV and reproductive care. Further, automated strategies, such as waiting room educational videos, can support the distribution of novel safer conception messages.

While providers, clients, and partners expressed that safer conception care restores hope for serodifferent couples to have children and many clients appreciated these services, clients expressed ongoing fears around HIV acquisition, despite most participants with HIV receiving ART, having viral load suppression, and participating in education about ART-mediated viral load suppression as part of the safer conception program. Indeed, in this context, providers remained concerned about risk compensation or the lack of evidence that treatment as prevention was an effective HIV prevention tool due to a lack of Uganda-specific data. Global

messaging around ART-mediated viral load suppression has shifted towards the U = U campaign, which more clearly communicates the implications of ART-mediated viral load suppression to PWH and their families [46, 47]. Better communication and understanding of these health implications is an unmet need for most PWH and providers globally. More explicit incorporation of U = U messaging into HIV care as well as safer conception content, and training providers to adopt this messaging within HIV care, may help clients with reproductive goals to simplify approaches and alleviate individual and dyadic concerns [48]. HIV-uninfected partners who are not accessing HIV care may be even less familiar with the benefits of ART. Expanded community messaging might also help distribute these messages while providing an opportunity to mitigate ongoing community-level stigma towards people with HIV and their partners.

Many women reported gender dynamics in their relationships that constrained their risk reduction choices and at times included IPV. We also observed unequal decision making in the couples-based counseling sessions. It is difficult to know whether this program exacerbated existing power imbalances, however, our data did not indicate that it precipitated or worsened violence, which has been a concern for safer conception programs [39]. Addressing harmful gender dynamics requires a multi-faceted approach, and likely includes improved counselling and routine screening and referral for women experiencing violence. An intervention for expectant/current fathers and their partners in Rwanda, has shown promising results with reductions in IPV, physical punishment of children, and increased male engagement in childcare and household tasks [49]. An intervention like this could serve as a template for integration of gender-transformative services into comprehensive integrated HIV and reproductive healthcare. Programs to screen and intervene on IPV have been developed for healthcare settings [50, 51], but implementation within healthcare settings in sub-Saharan Africa has been limited [52]. Addressing these issues is important to reduce the risk of harm and safeguard women's health and rights, and safer conception programs may provide an important opportunity to address these issues and mitigate HIV risk.

Interestingly, men were important consumers in the safer conception pilot program. Men play a significant role in driving the demand for safer conception care and the expansion of these services. Counseling that includes men is optimal to promote uptake of HIV prevention services and care even if they are not able to include their partner. In our prior work with individual men, ethics and scientific reviews have pushed for requiring couple participation [53]. However, in the observed counseling sessions even with couples, the men often drove the conversation and pushed for strategies such as PrEP for women. The idea that requiring couple attendance within counseling

sessions makes for more gender balance in decision-making is naïve, as women were often not able to openly express their questions, wishes or concerns during these conversations [54]. While there is an opportunity to further engage, link and retain men in care, it is critical to consider these gender inequities. Providing both joint- and individual-based sessions for couples may improve communication between partners and allow women and men the opportunity to discuss their individual concerns and screen for IPV in a private setting.

Participants relayed numerous experiences of stigma and discrimination, around HIV status and being in a serodifferent relationship. While participants felt that the program worked well and addressed their needs, there were concerns about expanding to community and other healthcare settings. Providers further emphasized that stigma hinders safer conception uptake. Stigma around HIV status and serodifferent relationships is a well-documented and persistent problem [55, 56]. In Uganda, PWH have specifically noted a lack of communication with their providers about pregnancy desires due to their concerns about provider stigma [28]. Expansion of safer conception services to other settings may be limited by the willingness of community members and providers to engage with the program, and by participant comfort. On the other hand, making safer conception services part of routine HIV care, in the community and healthcare system, may also serve to alleviate some of the stigma around HIV and reproductive health issues. Expanding these services into non-HIV focused areas of healthcare, such as antenatal care, could help reach HIV-negative partners as well as those who are not yet aware of their serostatus and/or accessing HIV care and help normalize reproductive care for serodifferent couples. Careful consideration of local context is warranted, before expanding our approach to other locations.

Our qualitative data have limitations. We recruited participants early in the safer conception counselling program, so we likely recruited a particularly motivated population. In addition, partners living with HIV were already engaged in HIV care and most had already disclosed to their partner. There was low periconception risk of HIV transmission since all infected partners were enrolled in an HIV clinic and on ART and most were virally suppressed. All participants in the safer conception program worked with the same counsellor, so we cannot compare the impact of the counsellor on the results. This study occurred within a small hospital system. Our data collection occurred in 2017 shortly after the launch of U = U campaigning, and thus this knowledge was likely not widely incorporated into the Mbarara Regional Referral Hospital system by the start of this study. Provider participants know our team and the reproductive rights approach of our research program, thus, social desirability bias may have influenced their interviews.

Conclusions/Next Steps

Here we present formative data from a novel safer conception program, implemented into routine HIV care in south-western Uganda. Findings suggest that this program meets some of the characteristics of client-centered medical care, focused on understanding the “unique needs, culture, values, and preferences” of individual patients and includes support of patient self-care and shared decision making and is appreciated and valued by both clients and providers [57, 58]. These data also suggest areas for modification and improvement of the program. More directly addressing fear of HIV transmission by focusing on and clarifying U=U messaging (i.e., there is no risk of sexual HIV transmission when the person living with HIV is on ART and virally undetectable, even during condomless sex) is essential and will assist client decision-making. Clear, unequivocal information about U=U may be particularly important for HIV-uninfected partners, who receive less HIV education than participants who access HIV care. PrEP is an important option for some HIV-uninfected partners, particularly in the context of gender and relationship power inequity. Gender inequity around risk reduction and IPV needs to be addressed more directly, with participant and couples counselling, screening for violence, and a protocol to support and refer participants experiencing IPV. Finally, as we move forward with adapting this program, stigma may be a barrier to implementation and uptake outside the HIV clinic and may require modification of our approach. If the HIV clinic is considered a safer space by participants, a more robust referral system may help us reach more participants and expand coverage. Such improvements, as well as ongoing monitoring and evaluation, will help us reduce HIV transmission and better meet the reproductive desires and needs of PWH and their families. Longitudinal quantitative data on program uptake, safer conception strategy use, partner participation, HIV-seroconversion, and pregnancy events are being analyzed and we anticipate a future publication describing the findings.

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design, data collection, analysis, final approval. AK: data collection tool design, analysis, writing, final approval. LTM: conceptualization, data collection tool design, data collection, analysis, writing, final approval.

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Data availability The informed consent process did not allow for sharing of non-redacted transcripts for client participants. Data access requests for elements of raw data may be sent to the UAB Center for Clinical and Translational Science via CCTS@uab.edu; primary study authors may also be contacted. We would then provide redacted raw data responsive to specific requests. Because the provider interviews were conducted with a small group of providers from a small institution, we do not believe the interviews can be shared without jeopardizing confidentiality.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All participants provided voluntary written informed consent at study enrollment. The Research Ethics Committee of Mbarara University of Science and Technology and the Partners Human Research Committee approved the study. Consistent with national guidelines, we received clearance for conducting our study from the Uganda National Council for Science and Technology and from the Research Secretariat in the Office of the President.

Consent to Participate Through the Mbarara University of Science and Technology Institutional Review Committee informed consent forms were given to all volunteers. The consent form explained the research study and the volunteer role within the study. Different consent forms were created for clients/partners and providers. Categories for consent included: consent to participate in the study interview, consent to participate in the observation of a counselling session (client/partner only), consent to digital audio recording and consent to be contacted for future studies (client/partner only).

References

1. Bekker L-G, Black V, Myer L, Rees H, Cooper D, Mall S, et al. Guideline on safer conception in fertile HIV-infected individuals and couples. *South Afr J HIV Med.* 2011;12(2):14.
2. Mmeje O, Njoroge B, Cohen CR, Temmerman M, Vermund SH, van der Poel S. Achieving pregnancy safely in HIV-affected individuals and couples: an important strategy to eliminate HIV transmission from mother-to-child and between sexual partners. *J Acquir Immune Defic Syndr.* 2015;70(4):e155-9.
3. Schwartz SR, Bassett J, Mutunga L, et al. HIV incidence, pregnancy, and implementation outcomes from the Sakh’umndeni safer conception project in South Africa: a prospective cohort study. *Lancet HIV.* 2019;6(7):e438-46.
4. Heffron R, Ngure K, Velloza J, et al. Implementation of a comprehensive safer conception intervention for HIV-serodiscordant

- couples in Kenya: uptake, use and effectiveness. *J Int AIDS Soc.* 2019;22(4):e25261.
5. Matthews LT, Kiarie JN. Safer conception care to eliminate transmission of HIV. *Lancet HIV.* 2019;6(7):e413-4.
 6. Matthews LT, Smit JA, Cu-Uvin S, Cohan D. Antiretrovirals and safer conception for HIV-serodiscordant couples. *Curr Opin HIV AIDS.* 2012;7(6):569-78.
 7. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med.* 2011;365(6):493-505.
 8. Vernazza PL, Graf I, Sonnenberg-Schwan U, Geit M, Meurer A. Preexposure prophylaxis and timed intercourse for HIV-discordant couples willing to conceive a child. *AIDS.* 2011;25(16):2005-8.
 9. Bailey RC, Moses S, Parker CB, et al. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet.* 2007;369(9562):643-56.
 10. Wawer MJ, Gray RH, Sewankambo NK, et al. A randomized, community trial of intensive sexually transmitted disease control for AIDS prevention, Rakai, Uganda. *AIDS.* 1998;12(10):1211-25.
 11. Baeten JM, Donnell D, Ndase P, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med.* 2012;367(5):399-410.
 12. Matthews LT, Mukherjee JS. Strategies for harm reduction among HIV-affected couples who want to conceive. *AIDS Behav.* 2009;13(Suppl 1):5-11.
 13. Eke AC, Oragwu C. Sperm washing to prevent HIV transmission from HIV-infected men but allowing conception in sero-discordant couples. *Cochrane Database Syst Rev.* 2011. <https://doi.org/10.1002/14651858.CD008498.pub2>
 14. Vitorino RL, Grinsztejn BG, de Andrade CA, et al. Systematic review of the effectiveness and safety of assisted reproduction techniques in couples serodiscordant for human immunodeficiency virus where the man is positive. *Fertil Steril.* 2011;95(5):1684-90.
 15. Taylor TN, Mantell JE, Nywagi N, Cisse N, Cooper D. "He lacks his fatherhood": safer conception technologies and the biological imperative for fatherhood among recently-diagnosed Xhosa-speaking men living with HIV in South Africa. *Cult Health Sex.* 2013;15(9):1101-14.
 16. Matthews LT, Crankshaw T, Giddy J, et al. Reproductive decision-making and periconception practices among HIV-positive men and women attending HIV services in Durban. *South Afr AIDS Behav.* 2013;17(2):461-70.
 17. Kaida A, Kastner J, Ng C, et al. Barriers and promoters to uptake of safer conception strategies among HIV-serodiscordant couples with fertility intention in Mbarara, Uganda. *AIDS Res and Human Retroviruses.* 2014;30(S1):A61-2.
 18. Matthews LT, Crankshaw T, Giddy J, et al. Reproductive counseling by clinic healthcare workers in Durban, South Africa: perspectives from HIV-infected men and women reporting serodiscordant partners. *Infect Dis Obstet Gynecol.* 2012. <https://doi.org/10.1155/2012/146348>.
 19. Schwartz SR, Mehta SH, Taha TE, Rees HV, Venter F, Black V. High pregnancy intentions and missed opportunities for patient-provider communication about fertility in a South African cohort of HIV-positive women on antiretroviral therapy. *AIDS Behav.* 2012;16(1):69-78.
 20. Wagner G, Linnemayr S, Kityo C, Mugenyi P. Factors associated with intention to conceive and its communication to providers among HIV clients in Uganda. *Matern Child Health J.* 2012;16(2):510-8.
 21. Matthews LT, Bajunirwe F, Kastner J, et al. "I Always worry about what might happen ahead": Implementing safer conception services in the current environment of reproductive counseling for HIV-affected men and women in Uganda. *Biomed Res Int.* 2016;2016:4195762.
 22. Gwokyalya V, Beyeza-Kashesya J, Bwanika JB, et al. Knowledge and correlates of use of safer conception methods among HIV-infected women attending HIV care in Uganda. *Reprod Health.* 2019;16(Suppl 1):64.
 23. Hancuch K, Baeten J, Ngure K, et al. Safer conception among HIV-1 serodiscordant couples in East Africa: understanding knowledge, attitudes, and experiences. *AIDS Care.* 2018;30(8):973-81.
 24. Kawale P, Mindry D, Phoya A, Jansen P, Hoffman RM. Provider attitudes about childbearing and knowledge of safer conception at two HIV clinics in Malawi. *Reprod Health.* 2015;12:17.
 25. Ngure K, Kimemia G, Dew K, et al. Delivering safer conception services to HIV serodiscordant couples in Kenya: perspectives from healthcare providers and HIV serodiscordant couples. *J Int AIDS Soc.* 2017;20(Suppl 1):21309.
 26. Saleem HT, Surkan PJ, Kerrigan D, Kennedy CE. HIV care providers' communication with patients about safer conception for people living with HIV in Tanzania. *Int Perspect Sex Reprod Health.* 2016;42(4):179-86.
 27. Mindry D, Wanyenze RK, Beyeza-Kashesya J, et al. safer conception for couples affected by HIV: structural and cultural considerations in the delivery of safer conception care in Uganda. *AIDS Behav.* 2017;21(8):2488-96.
 28. Beyeza-Kashesya J, Wanyenze RK, Goggin K, et al. Stigma gets in my way: Factors affecting client-provider communication regarding childbearing among people living with HIV in Uganda. *PLoS ONE.* 2018;13(2):e0192902.
 29. Joseph Davey D, West S, Umutoni V, Taleghani S, et al. A systematic review of the current status of safer conception strategies for HIV affected heterosexual couples in Sub-Saharan Africa. *AIDS Behav.* 2018;22(9):2916-46.
 30. Khidir H, Psaros C, Greener L, et al. Developing a safer conception intervention for men living with HIV in South Africa. *AIDS Behav.* 2018;22(6):1725-35.
 31. Matthews LT, Burns BF, Bajunirwe F, et al. Beyond HIV-serodiscordance: Partnership communication dynamics that affect engagement in safer conception care. *PLoS ONE.* 2017;12(9):e0183131.
 32. Uganda Aids Commission. The Uganda HIV and AIDS Country Progress Report July 2016-June 2017. 117p. Available from: <https://www.ecoi.net/en/document/1441187.html>
 33. Chitneni P, Bwana MB, Owembabazi M, et al. Sexually transmitted infection prevalence among women at risk for HIV exposure initiating safer conception care in rural. *Southwestern Uganda Sex Transm Dis.* 2020;47(8):e24-8.
 34. Ministry of Health. Consolidated guidelines for prevention and treatment of HIV in Uganda [Internet]. Kampala: MOH; 2016 [cited 2021 Feb 11] 152 p. Available from: <http://library.health.go.ug/publications/hivaids/consolidated-guidelines-prevention-and-treatment-hiv-uganda>
 35. WHO HIV/AIDS Programme. Guidelines on couples HIV testing and counseling including antiretroviral therapy for treatment and prevention in serodiscordant couples: recommendations for a public health approach. WHO; 2012 [cited 2021 Feb 11] 80p. Available from: <https://www.who.int/hiv/pub/guidelines/9789241501972/en/>
 36. Elo S, Kyngas H. The qualitative content analysis process. *J Adv Nurs.* 2008;62(1):107-15.
 37. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15(9):1277-88.
 38. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics.* 1977;33(1):159-74.
 39. Crankshaw TL, Matthews LT, Giddy J, et al. A conceptual framework for understanding HIV risk behavior in the context of supporting fertility goals among HIV-serodiscordant couples. *Reprod Health Matters.* 2012;20(39 Suppl):50-60.

40. Sundler AJ, Lindberg E, Nilsson C, Palmer L. Qualitative thematic analysis based on descriptive phenomenology. *Nurs Open*. 2019;6(3):733–9.
41. Zegers-Hochschild F, Adamson GD, de Mouzon J, et al. International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) revised glossary of ART terminology, 2009. *Fertil Steril*. 2009;92(5):1520–4.
42. UNAIDS [Internet]. 90-90-90: Treatment for All; [updated 2021; cited 2021 Feb 11] Available from: <https://www.unaids.org/en/resources/909090>.
43. Patwa MC, Bassett J, Holmes L, et al. Integrating safer conception services into primary care: providers' perspectives. *BMC Public Health*. 2019;19(1):532.
44. Safer conception services implementation guide and training toolkit [Internet]. Johannesburg, South Africa: Wits RHI; 2018 [cited 2021 Feb 11] Available from: <http://aviwe.wrhi.ac.za/category/clearinghouse/reproductive-health/safer-conception-services-reproductive-health/>
45. Goggin K, Hurley EA, Beyeza-Kashesya J, et al. Study protocol of “Our Choice”: a randomized controlled trial of the integration of safer conception counseling to transform HIV family planning services in Uganda. *Implement Sci*. 2018;13(1):110.
46. The Lancet HIV. U=U taking off in 2017. *Lancet HIV*. 2017;4(11):e475.
47. Prevention Access Campaign [Internet]. Undetectable=Untransmissible [updated 2021 Feb; cited 2021 Feb 11]. Available from: <https://www.preventionaccess.org/undetectable>
48. Woldetsadik MA, Goggin K, Staggs VS, et al. Safer conception methods and counseling: psychometric evaluation of new measures of attitudes and beliefs among HIV clients and providers. *AIDS Behav*. 2016;20(6):1370–81.
49. Doyle K, Levitov RG, Barker G, et al. Gender-transformative Bandebereho couples' intervention to promote male engagement in reproductive and maternal health and violence prevention in Rwanda: Findings from a randomized controlled trial. *PLoS ONE*. 2018;13(4):e0192756.
50. Rivas C, Ramsay J, Sadowski L, et al. Advocacy interventions to reduce or eliminate violence and promote the physical and psychosocial well-being of women who experience intimate partner abuse. *Cochrane Database Syst Rev*. 2015. <https://doi.org/10.1002/14651858.CD005043.pub3>.
51. Moyer VA, Force USPST. Screening for intimate partner violence and abuse of elderly and vulnerable adults: U.S. preventive services task force recommendation statement. *Ann Intern Med*. 2013;158(6):478–86.
52. Young CR, Arnos DM, Matthews LT. A scoping review of interventions to address intimate partner violence in sub-Saharan African healthcare. *Glob Public Health*. 2019;14(9):1335–46.
53. Zaidi H, Mathenjwa M, Mosery N et al. Overcoming ethical challenges to engaging men who have sex with women in HIV research. *AIDS Behav*. 2021. <https://doi.org/10.1007/s10461-021-03185-0>
54. Hampanda KM, Mweemba O, Ahmed Y, et al. Support or control? Qualitative interviews with Zambian women on male partner involvement in HIV care during and after pregnancy. *PLoS ONE*. 2020;15(8):e0238097.
55. Rispel LC, Cloete A, Metcalf CA. “We keep her status to ourselves”: experiences of stigma and discrimination among HIV-discordant couples in South Africa. *Tanzania and Ukraine SAHARA J*. 2015;12:10–7.
56. Bonnington O, Wamoyi J, Ddaaki W, et al. Changing forms of HIV-related stigma along the HIV care and treatment continuum in sub-Saharan Africa: a temporal analysis. *Sex Transm Infect*. 2017;93(Suppl 3):e052975.
57. U.S. Department of Health and Human Services [Internet]. Defining the PCMH [cited 2019 Jan 20]. Available from: <https://pcmh.ahrq.gov/page/defining-pcmh>
58. Peikes D, Genevro J, Scholle SH, Torda P. The Patient-Centered Medical Home: Strategies to Put Patients at the Center of Primary Care. *AHRQ HHS*. 2011;11-0029.

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