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Abstract

The Sustainable East Africa Research in Community Health (SEARCH), a universal test and treat (UTT) trial, implemented 'Streamlined Care'—a multicomponent strategy including rapid linkage to care and antiretroviral therapy (ART) start, 3-monthly refills, viral load counseling, and accessible, patient-centered care provision. To understand patient and provider experiences of Streamlined Care to inform future care innovations, we conducted in-depth interviews with patients ($n = 18$) and providers ($n = 28$) at baseline (2014) and follow-up (2015) ($n = 17$ patients; $n = 21$ providers). Audio recordings were transcribed, translated, and deductively and inductively coded. Streamlined Care helped to decongest clinic spaces and de-stigmatize human immunodeficiency virus (HIV) care. Patients credited the individualized counselling, provider-assisted HIV status disclosure, and providers' knowledge of patient's drug schedules, availability, and phone call reminders for their care engagement. However, for some, denial (repeated testing to disprove HIV+ results), feeling healthy, limited understanding of the benefits of early ART, and anticipated side-effects, and mistrust of researchers hindered rapid ART initiation. Patients' short and long-term mobility proved challenging for both patients and providers. Providers viewed viral load counselling as a powerful tool to convince otherwise healthy and high-CD4 patients to initiate ART. Patient-centered HIV care models should build on the successes of Streamlined Care, while addressing persistent barriers.

#NCT01864683—<https://clinicaltrials.gov/ct2/show/NCT01864603>

Keywords

HIV care, differentiated service delivery, viral suppression, viral load counseling, rapid ART, care linkage, patient-centered care

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Introduction

Universal human immunodeficiency virus (HIV) testing and treatment (UTT) strategies demonstrate that early and expanded testing, combined with early antiretroviral therapy (ART) initiation, can increase testing, linkage to care, and viral suppression, leading to improved health and reduced mortality among people living with HIV (PLHIV).¹⁻⁵ The success of UTT, now recommended in the World Health Organization (WHO) guidelines,⁶ hinges on the effectiveness of not only the 'test' aspect of the strategy, but also the 'treat.' Retention of PLHIV in HIV care is critical for ensuring adherence to ART and viral suppression. Ineffective care engagement can undermine the effectiveness of UTT strategies, limiting their full potential for maintaining health and reducing new HIV infections.⁷⁻⁹ New models of care delivery, referred to as Differentiated Service Delivery (DSD) or Differentiated Care Models (DCM), aim to provide tailored care provision to address persistent social and structural barriers to HIV care engagement.¹⁰⁻¹⁸ As millions in sub-Saharan Africa (SSA) are expected to take up HIV care in response to new universal guidelines for ART initiation, health systems will need to optimize UTT and DSD models to manage the increased volume of patients.¹⁹ Optimizing the potential of these approaches to eradicate HIV and improve the health of persons living with HIV (PLHIV) requires a nuanced understanding of barriers and facilitators to care engagement^{20,21} as well as an understanding of patients' and providers' experiences with and views of these novel models of care delivery.

The Sustainable East Africa Research in Community Health (SEARCH) study, a community-cluster randomized UTT trial (NCT01864603) in 32 communities across three regions of Kenya and Uganda, developed, implemented, and evaluated a multidisease, patient-centered strategy termed Streamlined Care.²²⁻²⁴ Streamlined Care was a multifaceted intervention spanning the HIV care continuum, anchored in three core principles: reducing structural barriers to care, improving relationships between patients and the clinic, and enhancing patient and clinician knowledge of HIV. Sustainable East Africa Research in Community Health (SEARCH) demonstrated the efficacy of this model of care in rural East African communities:^{2,22,24} at 48 weeks, the study retained 92% of adults and 89% of children,²⁵ and exceeded the United Nations Programme on HIV and AIDS (UNAIDS) population-level viral suppression target within 2 years after program implementation.² In these communities at baseline, population-level viral suppression was 42% among 15 399 HIV-infected persons; at three years, the prevalence of viral suppression was 15% higher in the intervention than in the control group (79% vs 68%; relative prevalence, 1.15; 95% confidence interval [CI], 1.11 to 1.20).¹ Further, SEARCH demonstrated reductions in time spent at the health facility and away from home and work, improved socioeconomic outcomes, similar or lower cost as compared to the standard of care, and reductions in overall mortality in a randomized comparison of communities among persons eligible for ART who did or did not receive streamlined care.^{1,25-30}

The components of Streamlined Care include rapid linkage and ART initiation; nurse-driven triage and routine care with referral to clinician for difficult cases; routine visits focused on symptoms and side-effect management; multi-disease care (including diabetes, hypertension, and other conditions); tiered tracking with phone appointment reminders and physical tracking after missed visits; 24-h phone access to a clinician; providers trained to emphasize friendly and supportive interactions with patients, with flexible working hours; and structured counseling on viral load (VL) results at 6 months and annually thereafter.^{23,24}

This qualitative study sought to explore patient and provider perspectives on and experiences with Streamlined Care in the context of a test-and-treat study in Kenya and Uganda, with community-wide HIV testing followed by rapid linkage to care and ART initiation. We explored provider and patient perspectives about this care model, identifying factors that have facilitated their successes, while highlighting areas for improvement, to inform both policy and HIV care implementation during massive scale-up of ART in low-resource settings.

Methods

Research Team

A gender-balanced team of six qualitative researchers from Kenya and Uganda were involved in data collection and analyses, with the oversight of a US-based research coordinator and lead investigator.

Study Design and Sites

Data were gathered from communities participating in SEARCH (NCT #01864603), a community-level cluster randomized controlled trial in rural Kenya and Uganda, which tested whether universal HIV testing and ART with a multidisease, patient-centered strategy could reduce new HIV infections and improve community health. The study conducted hybrid multi-disease screening and HIV testing at community health campaigns (CHCs), followed by home-based testing (HBT) for CHC-non attendees.^{3,24} In 16 SEARCH intervention communities, HIV-positive patients identified during the CHCs or HBT were referred to study clinics for rapid ART initiation, on the same day or within a week, and provided transport vouchers. HIV care was delivered utilizing a streamlined and patient-centered model.²² A longitudinal qualitative study was conducted within eight communities participating in the trial collected data to characterize diverse social and cultural contexts for the intervention. The communities were selected to include two matched intervention and control communities in each of the two SEARCH regions in Uganda (southwest/Mbarara, and eastern/Mbale), two Kenyan Lake Victoria island communities, and two inland communities in southern Nyanza, Kenya. For purposes of this manuscript, data analyses have been limited to only the four intervention communities, where Streamlined Care was being implemented.

Table 1. Cohort and Data Sources by Year of Data Collection.

Cohort	Baseline (Feb 2014-Dec 2014)	Follow-up (Jan 2015-Dec 2015)	Total IDIs
IDIs with HIV-positive patients	18	17 ^a	35
IDIs with health care providers	28	21 ^b	49

Abbreviations: IDI, In-depth interview; HIV, human immunodeficiency virus.

^a*n* = 1 participant death.

^bAttrition due to change in staffing or out-migration.

Participants and Sampling

The study used systematic and purposive sampling techniques to establish two cohorts for the analyses: community members and HIV care providers. Both were recruited at baseline between February and December 2014, and interviewed again a year later from January 2015 to December 2015 (see Table 1). The community cohort was composed by systematically selecting participants to compose balanced groupings by gender and baseline HIV status from a population-based sample of SEARCH participants (aged 15 years and older) in each community selected to participate in a household socioeconomic survey.³ We further selected the HIV-positive members of the cohort to compose a balanced grouping by treatment status at baseline, to ensure inclusion of those with CD4 count above 500 cells/ μ L, those on ART, and those eligible for ART but not yet linked to care at the time of sampling. We purposively selected providers working at intervention facilities delivering Streamlined Care to each of the four intervention communities, to compose a cohort inclusive of all cadre of professionals and paraprofessionals involved in the provision of Streamlined Care, including clinical officers, counselors, nurses, trackers, and peer educators.

Data Collection

Eighteen (*n* = 18) HIV-positive patients (60% female), confirmed to be in care at facilities with Streamlined Care, were interviewed during the first year; 17 (*n* = 17) patients participated in the second year of interviews; one cohort member had died. A systematically sampled cohort of 28 (*n* = 28) providers delivering Streamlined Care were interviewed in the first year, and 21 (*n* = 21) in the second year, with attrition due to reassignment of staff and out-migration. Data were collected through semi-structured interviews in the local languages (Ateso, Dholuo, Lusoga, Lugwere, and Runyankole), and lasted 1 to 2 h. Patient interviews explored experiences with HIV testing, care, and treatment, while provider interviews explored individual-, community-, and health systems-level challenges to providing ART initiation and HIV care. In addition, interviews included discussion of other topics potentially influential of successful care engagement and care delivery, including perceptions of individual and community attitudes toward human

immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), and perceptions and experiences related to stigma and HIV status disclosure.

Data Analysis

The lead investigator for the qualitative study trained a team of local researchers in qualitative data collection, coding, and analysis. Audio recordings of interviews were transcribed and translated into English; transcripts were deductively and inductively coded in a process informed by constructivist grounded theoretical approaches.³¹ A coding framework was initially developed with conceptual categories defined *a priori* on the basis of theory-informed interview guides. At defined stages during the data collection and analysis process, the coding framework was iteratively refined by the full study team (with codes added, re-organized, and expanded) through review of transcripts and team discussions of conceptual categories emergent in the empirical data. Difficult to code segments and contradictions in coding approaches were discussed to achieve and consensus and strengthen intercoder reliability. This coding framework was iteratively applied to the transcripts using *Atlas.ti* 7.0. Coded excerpts were then queried and reviewed to develop analytical memos describing dominant emergent themes as well as negative/deviant cases and contradictions in the findings. Here, we use selected participant quotes to highlight key aspects of the experiences of Streamlined Care among PLHIV and their care providers.

Ethical Approval

The study received ethical approvals from the University of California San Francisco Committee on Human Research, the Ethical Review Committee of the Kenya Medical Research Institute, School of Medicine Research and Ethics Committee (SOMREC), and the Uganda National Council for Science and Technology. All participants gave written consent in their preferred language to participate.

Results

First, we present providers' perspectives about the perceived impact of Streamlined Care. We then present the principal themes emergent in data collected from both patients and providers, organized by their salience to stages in the HIV care cascade: immediate linkage to care and accelerated ART initiation, and targeted adherence support and care retention, including structured VL counseling. We present facilitators and barriers to progress as perceived and experienced among recipients and providers of Streamlined Care.

Providers' Perspectives About the Impact of Streamlined Care

Providers viewed Streamlined Care as a critical tool to reduce clinic wait times, decongest clinic spaces, improve patient-

centered care, and improve care retention. A research assistant discussed the observed wait times at facilities implementing Streamlined Care, as compared to other non-SEARCH facilities:

Nowadays [patients] don't wait for too long and especially the HIV positive clients [...] I have gone to facilities where [Streamlined Care] is not implemented and the waiting time is normally longer. (Female provider, Kenya)

Providers viewed the 3-month refills as a key tool for managing patient flow and decongesting clinic spaces, while addressing patient-level barriers such as lack of transport.

Transportation was a big problem to many patients and has been addressed by the long refills. Patients are now happy that they don't have to frequent the hospital many times. (Female provider, Kenya)

But now we have introduced a gap of three months before their next visit, we have been able to spread out their visits, so like this week we had only about six people. The visits are spread out; there are fewer people. (Male provider, Uganda)

Other providers discussed increased patient satisfaction in response to the reduced wait times, accomplished through a multidisease and one-stop streamlined service.

[Streamlined Care patients] are offered all the services at the clinician's bench before they leave for home. (Male provider, Kenya)

There is no limited time for the client [services available all day] and the peer educator and research assistant can retrieve patient files anytime- the clients are really impressed. (Female provider, Kenya)

Providers credited the multi-disease model and patient-centered approach for continued care engagement. The provision of multidisease services was perceived to destigmatize clinic spaces:

About our waiting area, there are no longer concerns [...] There are very many illnesses that we treat, we have NCD [non-communicable disease] patients, and there are ART patients as well. They sit there and say 'uh, I do not mind because the Reverend was here yesterday with his wife and they had come to test for hypertension, so no one will say that I am here for the same reason that the people in the tent are here for.' So, we have worked out that system [...] Stigma as regards to the setup of the health center is now minimal. (Male provider, Uganda)

Providers also credited the patient-centered and friendly approach:

The interaction is very ok, if you are keen on how we interact with them, it will be hard for you to differentiate between a provider and a patient. The society is equally friendly because of how we interact at the facility level. (Female provider, Kenya)

Even if one misses the appointments, we don't quarrel with them but we try to dig deep into the reason as to why they missed. When they open up to tell you why they missed, they become easier to help. There is no deliberate failure to honor appointments and there must be a cause as to why the client missed [his/her appointment]. (Female provider, Kenya)

Immediate Linkage to Care and Rapid ART Initiation

Continued Health and Benefit of Early ART-Supported Rapid Initiation. A desire to live a long and healthy life motivated rapid ART start, especially for high CD4 patients. A patient explains his rationale for accepting to start ART early:

By the time they get these drugs [ART] [...] they are worse off. That's why you see when someone is badly off, and they give them ART but in three months they may die. But they told me that if I start these ARTs when am still strong, I live longer. (Male patient, Uganda)

Others were motivated to maintain their health for the sake of their families and/or children:

I look at my status and my age, then I say... I must push on to at least see my children grow to be old people. (Male patient, Kenya)

Couples and Individuals with Anticipated Stigma Delayed Starting ART Because They Feared Disclosure; Provider-Assisted Disclosure was Helpful for Many. While both men and women reported delaying care due to stigma and nondisclosure, provider-assisted disclosure was particularly important for women who anticipated violence and dissolution of marriages. Women, exclusively, reported needing to ask their male partners for permission, when considering ART initiation. Provider-assisted disclosure was therefore key in facilitating rapid-ART start.

They (women) say 'I don't know how I will tell my husband... let me come with him is when I can start that.' (Female provider, Kenya)

A provider discusses how he assisted in a disclosure, including a home-visit, to support ART initiation:

A pregnant mother tested positive and when advised to start ART, she refused saying that she was far from the husband and cannot start care without the knowledge of the husband. We even conducted several home visits to talk to her further. She finally agreed and started using the drugs. (Male provider, Kenya)

Men, on the other hand, did not report needing permission to test, but reported hiding their HIV-test results and fear of being blamed for the infection or abandonment. A man explains why he delayed treatment for several months:

This is the fear I have up to now, how to disclose to her that I am HIV-positive. [...] I sometimes joke with questions such as, 'mother

of my children, if in case I am found HIV-positive will you run and leave me, or you will stay?' (Male patient, Kenya)

A man feared his wife becoming angry and refusing to support him and their home:

I wanted to first take her for testing and tell her that I am also positive if I found that she was also positive. When she tested, she found that she was HIV-negative. She was young, we did not have any children yet and when you tell a young woman that you have HIV, she may get very angry and even stop doing all that she has been working on. (Male patient, Uganda)

Desire to Retest for HIV-Delayed ART Initiation. Despite the provision of transport vouchers and same-day referral to clinic, some newly diagnosed patients delayed care due to a desire to retest for HIV, before fully accepting their diagnosis. A man shared his experience of repeated HIV tests as shown below:

I tested HIV-positive though I did not expect the positive result. I did not enroll immediately but went through several tests which all gave the same result. (Male patient, Kenya)

For some, this desire to retest was more complex. The provider below discusses how a patient reported repeat HIV-testing, in hopes that his prayers had changed the outcome to a more favorable result (ie to HIV-negative).

This [patient] went to [an HIV clinic] and posed as a new tester; he was tested and was still positive, when he was being probed to open a file[...].he told the provider that he just wanted to confirm his status because he had gone for prayers and wanted to know whether he had turned negative. (Male provider, Kenya)

Even patients who initiated ART immediately following HIV testing during the health campaigns discussed a history of repeat HIV tests in the past, underscoring the lengthy and complex path toward HIV-positive status acceptance and ART start for some patients.

I told myself that I would take my drugs if the third test came out positive. When I was 7 months pregnant, I had a miscarriage and about the same time your organization (SEARCH) came here testing; I went for testing and I started the drugs. (Female patient, Uganda)

Feeling Healthy, not Understanding the Benefits of Early ART, and Anticipating ART side Effects Discouraged Rapid ART Initiation.

Narratives revealed that, in some instances, patients were slow to accept new universal ART guidelines. Providers shared that some patients thought that rapid ART initiation conflicted with the standard national ART guidelines of prophylactic antibiotics to prevent opportunistic infections before eligibility for ART. Similarly, these new guidelines were in conflict with their knowledge of ART initiation following a drop in CD4 cell count. A provider discussed patients who thought they needed cotrimoxazole (prophylactic antibiotics)

prior to ART start, and how rapid ART often conflicted with what they were witnessing among their peers:

Patients will say, 'I know a friend of mine, who has been on cotrimoxazole for about ten years, why should I be the one to start the ART?' (Male provider, Uganda)

Another provider discusses how a patient who had agreed to initiate ART and was later found to be taking cotrimoxazole:

When you initiate [ARTs], then you do a home visit somebody tells you that 'I have not been using ARVs.' You then tell her to bring all the drugs... you realize she is using cotrimoxazole ... ARVs aside. (Male provider, Kenya)

Similarly, community discussions about the side effects of ART, along with accounts of HIV-positive individuals' experiences of negative side effects, discouraged rapid ART start. A provider discusses a patient's worry about ART side effects and its impact on his livelihood:

They say "I am a person who carries heavy things like matooke (local bananas) every day, if you tell me that this medication is going to make me dizzy, how will I work when I am dizzy, I need to work and provide for my family. (Male provider, Uganda)

A patient discussed the anticipated side effects of ART, including those she perceived would lead to others knowing her status and ART use:

"When you take the drugs [ARTs], they have an effect on your body eg they can darken your skin or make you fat, and people easily get to know that you are taking the drugs." (Female patient, Uganda)

Misconceptions and Rumors About ART, and Mistrust of Medical Authorities Delayed ART Start.

Patients expressed concern about the intentions of researchers, including the provision of free ART. Patients shared concerns about western conspiracies to control their reproduction, reflecting mistrust of medical authorities, and complex histories of western researchers in these communities:

Some [patients] say that ARVs are meant for family planning and that ARV is a money-making initiative by the whites since they get nothing in return. Some also say that ARVs is meant to reduce Africans because the whites do not take ARVs (laughter). (Female provider, Kenya)

Targeted Adherence Efforts and Retention in Care

Supportive and Friendly Provider Counseling-Supported Care Engagement. Patients reported satisfaction with the individualized support they received, including providers' knowledge of their drug schedule, their availability during off-hours, and

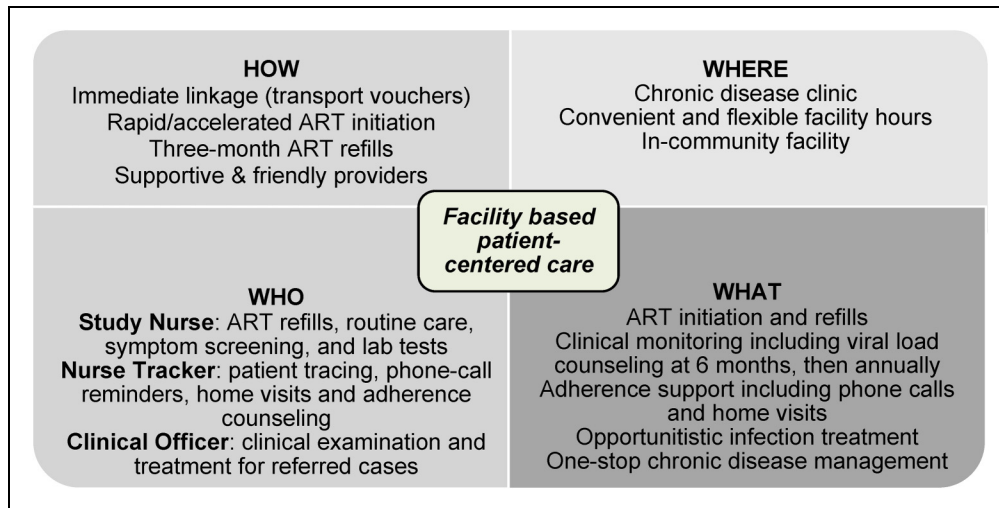


Figure 1. Building blocks: SEARCH streamlined care model. Visually adapted content.^{20,23.}

phone call appointment reminders, all components of the Streamlined Care model (Figure 1).

They expressed appreciation for the attitudes of their providers and the quality of the services provided:

Our health workers are very good; they serve us with happiness and in time [...] I gained a lot of confidence when I visited the health center, the health personnel counseled me a lot about what people said. (Female patient, Uganda)

Others were happy with the reduced amount of time spent in clinic:

They [providers] are not rude to us. We even spend a short time at the health facility. We spend about 30 min, yet the other people who receive HIV services with the other organization spend the whole day at the health facility. (Male patient, Uganda)

A patient below shares provider support through phone call reminders for appointments:

The SEARCH providers always make it a point to call us two days before our appointment days. So, whenever I go there, I tell them 'May God bless you.' But even when they do not call me, I know that I am supposed to go there on such and such a day. (Female patient, Uganda)

Drug Stock Outs Presented Challenges for Longer Refills. Drug stock outs were cited by both patients and providers as interfering with 3-month refills and spaced clinic visits.

One of the components of Streamlined Care is spaced out appointment dates, but you realize that by the time we are running out of the drugs, we have to give short TCAs [lit. 'to come again', a return appointment date] so that they come back when the drugs are available. (Male provider, Kenya)

Indeed, when patients shared challenges with transport to clinic, they referenced the short period between appointments

for drug refills. A patient discusses challenges related to the frequency of her appointments and drug availability.

They do not have the drugs; they give us drugs for one month and in one month they are finished and you have to go back. Yet you do not have the money. You see in the village, if you do not have a business to run, then you have problems. (Female patient, Uganda)

Patients' Mobility and Out-Migration Undermined Targeted Adherence Efforts. Patients and providers indicated that mobility (short-term localized movements to and from the community) and out-migration (permanent changes in residence to another community) presented challenges to ART adherence.

A patient cited the frequent mobility of her polygamous partner as a cause for his poor adherence.

He can forget to carry his drugs from the widow's home (second wife) yet he can spend over five days at his home without drugs. He doesn't usually finish his drugs from the container and he makes sure that before I go and pick for him his drugs (as I pick mine too) he pours away all the pill balances. (Female patient, Uganda)

Another patient discussed how she misses taking her drugs when her travel is unexpectedly extended:

Supposing I miss to take my drugs for two days, what should I do? You may find that I set for a two days journey and pack drugs that can last me that long, then it happens that the journey extends—what should I do after that? (Female patient, Kenya)

Providers also expressed challenges with tracking patients who are mobile or migrate outside of the clinic communities:

The most demotivating aspect of this job is the movement of the clients who are not natives of the island. Following them up is not easy, hence client retention becomes a challenge. (Male provider, Kenya)

Some of these people try to move, look for money, so they are ever on the move. So an appointment reaches when this person is not in the area, because he has gone to look for money for survival. (Female provider, Uganda)

Structured viral load Education and Counseling

Providers Viewed VL Education as a Tool to Increase Care Engagement. VL monitoring and counseling was reported to increase the VL knowledge of both patients and providers. Providers cited it as a powerful tool to convince otherwise healthy and high CD4 count patients to initiate and adhere to ART.

When am initiating [patients on ARVs], I talk about the viral load because the patient needs to know what he is taking in his body so that he starts the journey of ART. So, when I tell them all about how viral load works, they know what they will achieve at the end of the day. (Female provider, Uganda)

Providers preferred VL results for patient education and viewed positive results as a validation of their efforts.

When we disclose to the clients about their viral load results and it turns out to be suppressed, they feel very happy about it and as a provider I feel happier too because after all that is the aim as a provider. When a client feels good because of what I do, I feel happy too. (Female provider, Kenya)

Other providers viewed it as a tool for strengthening patient-provider relationships, and fostering trust.

When we use the viral loads counseling, it is very practical that the patients see us as very knowledgeable people. They feel like the health workers know what they are doing in order to help them. (Male provider, Uganda)

For patients who reported understanding the concept of VL, it was a valuable tool in remaining conversant about their care and tracking their progress.

It is good to know [your VL]. Whether it is reducing or increasing so that when you are taking drugs you may say 'so the load of this virus is reducing' hence you will be encouraged to continue adhering to drugs. (Female patient, Kenya)

Of late I was told it [VL] is down and that it was good that way, so I felt happy at the good news. I feel very happy when it is very low. My mathematics is that I add more years when it is low. (Male patient, Kenya)

However, other narratives reveal a varied and incomplete understanding of viral load. Some patients could not understand the purpose of VL measurements, and often confused it with CD4 tests:

[Interviewer]: when the providers draw blood from you, what do they tell you they are going to test? **[Patient]:** They tell me that they are taking the blood to [another lab]. I think they take

it to test for CD4. As for viral load, I have not done that test. However, the last time I was at the clinic, the providers took my blood, I guess that is what they were going to test, and I have not got the results yet. (Female patient, Uganda)

Discussion

The SEARCH Streamlined Care model enabled the provision of patient-centered care that facilitated rapid ART initiation and supported retention in care, leading to the study's success in exceeding the UNAIDS 90-90-90 goals after 3 years and reducing mortality.^{2,21} Both providers and patients felt that provider-assisted disclosure of HIV-positive status, individualized counseling and care, and understanding the utility of the VL test were elements of the Streamlined Care model that enabled patients' progress across the ART treatment cascade. For some, our findings suggest that repeat HIV testing, stigma, nondisclosure of HIV status, ART misconceptions, and population mobility presented challenges. Overall, despite some challenges with drug stock outs, Streamlined Care was reported to reduce patient load, decongest clinic spaces, and reduce long-wait times.

The SEARCH Streamlined Care model is thus informative for the development of DSD models, including individual, group, facility or community-based service delivery, which aim to provide tailored care to populations of interest and can address persistent social and structural barriers to HIV care engagement.^{10-17,32} As millions join HIV care systems for ART, health systems need to optimize DSD models to manage the increased volume of patients.¹⁹ The findings presented here suggest that key elements of the SEARCH approach should be considered for the development and implementation of DSD models. The first key element, reducing structural barriers to care, is a common focus of DSD models, which often include community-wide HIV testing, rapid ART initiation, mobile phone support, as well as VL-informed care.^{33,34} These findings emphasize the importance of retaining other elements of the Streamlined Care, including training to improve relationships between patients and the clinicians, multidisease care, and enhanced patient and clinician knowledge of HIV.

Despite the successes of this model, findings underscore that at the time of this study, not all newly diagnosed patients were ready to initiate ART on the same day they are diagnosed or soon thereafter. In our study, some delayed ART initiation as they slowly came to terms with their diagnosis, testing repeatedly in a bid to disprove results. Patients discussed undergoing additional HIV testing by visiting other providers, in instances where they doubted the validity of SEARCH-conducted HIV tests, or repeated testing at the study health campaign over the course of several days. In addition, patients reported repeat HIV testing as they hoped for a cure as a result of their faith and prayers. Repeated HIV testing may reflect a general mistrust of HIV test results, as has been documented in other settings; in a study in Eswatini, newly diagnosed patients sought repeat tests if they did not consider themselves at risk for HIV infection or if they had a different result previously, testing several times, and at times, over a period of years.³⁵ Our results and those of other researchers suggest that this phenomenon

may be part of the patient's journey to acceptance of a new HIV diagnosis, underscoring the tension between rapid ART initiation and HIV-positive status acceptance.³⁶ HIV-care models, in an effort to be more patient-centered and facilitative, need to offer rapid ART initiation, in a way that conveys the importance of early ART and treatment as prevention, while also respecting patients' decision-making process regarding when to start ART. Indeed, other studies support the imperative to strategize ART initiation, especially among healthy HIV patients, which is of particular importance in the context of increased ART rollout.^{36,37}

Our findings also suggest that stigma, nondisclosure, ART misconceptions, and mobility also were reported to delay ART initiation. Moreover, stigma and non-disclosure were highly gendered, underscoring the individual, interpersonal, and health systems challenges women must overcome to initiate ART. As we previously observed in this population, men had more agency than did women to seek care and make treatment decisions autonomously.^{25,36,38} Men also reported fewer negative consequences compared to women, in response to an HIV-positive status disclosure, did not need permission to seek care or start ART, and were generally well-supported, as we observed previously.³⁹ However, even in the context of highly gendered experiences of stigma and disclosure, patient narratives reveal the critical role of the assisted disclosure offered in the Streamlined Care model in supporting both men and women's care engagement. For men, disclosure support was helpful when fearing negative reactions such as accusations of infidelity, blame, and marital dissolution. For women, couples' disclosure was especially helpful when fearing violent reactions and physical abuse, in addition to accusations and blame from their male partners, consistent with our previous findings.^{38,39}

Provider support, education, and assisted disclosure were a critical element of Streamlined Care that facilitated care retention along the care cascade, especially immediately after HIV testing. Further, data were collected prior to the 2015 WHO guideline for treatment-for-all, and in a setting where nonintervention communities were providing care according to government guidelines. This served as a barrier towards rapid ART initiation as patients struggled to reconcile previous and more familiar regimens involving only cotrimoxazole (prophylactic antibiotics) prior to CD4-decline prompting ART initiation. Additionally, due to knowledge of past ART regimens that were associated with many pills and serious side effects, many healthy individuals discussed having to weigh the benefit of early ART and anticipated side effects. The fear of side effects may also have been fueled by more detailed language in the study consent form as compared to routine HIV care. Among high CD4 patients, physical well-being, determined as having no outward signs of HIV, along with anticipated negative side effects of ARTs, led to delays in starting treatment for some patients. This confluence of the feeling of being well, fear of negative side-effects, and confusion about treatment guidelines was at times a challenge for rapid ART initiation. Previous studies support these findings as barriers toward ART initiation.^{20,21,34-36} For example, in a study among female sex workers who delayed treatment in Uganda,

participants felt it was an achievement to not need to start ART and to stay on cotrimoxazole.⁴⁰ Patients also shared many misconceptions about the intended use of ART, discussing conspiracies around the control of African women's fertility. Although not widespread, such misconceptions may stem from historical experiences of injustice and exploitation within the community and SSA in general. While in SEARCH, community sensitization helped overcome some of these misconceptions, the persistence of these rumors and misconceptions underscores the importance of addressing the community mistrust of researchers, stemming from the colonial legacies of research within communities, for any large-scale prevention and treatment efforts to be successful.⁴¹

While immediate linkage and rapid ART start had the potential to overcome barriers between HIV-testing and linkage, patients' geographic mobility proved to be a major limitation to facilitating their care retention, concurrent with previous findings.^{20,39} The Streamlined Care model helped patients overcome barriers to care engagement stemming from work-related mobility, by reducing wait times, providing flexibility in scheduling appointments, and permitting flexibility prescription refills; however, the mobility of some patients—particularly if unplanned, or if an out-migration to a distant community—proved untenable for sustained engagement in care in the study facilities. This suggests that care models must employ new elements to address the needs of mobile populations. Finally, VL counseling and education, a critical component of Streamlined Care, was reported to be an effective tool in the monitoring of HIV treatment success, as shown previously.^{6,7,42} For patients who understood the purpose and results of VL tests, it served as a concrete measure of adherence success, and a motivator toward achieving their health goals. Viral suppression was reported to be associated with feelings of pride, accomplishment, and success by both clinicians and patients. However, some patients reported a limited understanding of VL tests, especially in the baseline year of the study. Despite this, some patients were able to articulate the importance of VL and could explain what the results meant to them personally. These findings underscore the importance of VL counseling, and of VL results for individualized patient education.⁴³

Specifically, our study suggests the continuation and reiteration of viral load education and counseling, even among patients achieving viral suppression. Among providers, VL education was important in two ways: first, as a tool to convey the need for ART initiation among otherwise healthy and high CD4 individuals, and second, to foster trust and strengthen provider-patient relationships. For high CD4 patients, VL results helped communicate the benefits of a suppressed VL in maintaining a healthy immune system, and protecting HIV-negative partners, or unborn babies, even in the absence of immunological or physical signs of HIV infection.

We note the limitations of this model of care with respect to key populations including highly mobile individuals. However, our findings and those of others also suggest that while community-based models may reduce some aspects of cost and barriers related to care seeking in facilities, some patients

will still prefer to access care within facilities due to persistent fear of stigma and discrimination.⁴² It is critical for care systems to do a comprehensive assessment of their patient populations to determine patients suitable for alternative ARV delivery models;¹⁹ data on care models, such as the one provided in this study, can help care systems make informed decisions about which models of care to present to their communities.

Limitations

Data were gathered using semistructured guides that explored experiences of care and although we learned a great deal about aspects of the streamlined care model that may have influenced outcomes for patients, the inquiry was not designed to systematically explore each individual aspect of the Streamlined Care model, ie, the data from patients directly speaking to phone call reminders, longer refill dates, and other specific elements was limited. Moreover, patients may have lacked perspectives on alternative or standard models of care with which to compare their experiences, and interviews did not specifically pursue this line of inquiry. Nevertheless, the data is cross-regional from high and low HIV prevalence settings, varied mobility patterns, and population density settings across four communities in two countries; it draws on both provider and patient perspectives. Analysis and interpretation involved the full study team including those who collected the data, strengthening the rigor of the study and validity of data interpretation.

Conclusion

Our findings explored patient and provider experiences with Streamlined Care, a patient-centered, multiple disease model of HIV-care provision that led to successful attainment of the UNAIDS 90-90-90 goals in communities within the first 2 years of a UTT trial. Overall, the model was helpful in reducing wait times, decongesting clinic spaces, and improving care retention among stable populations. Although repeat HIV testing, ART misconceptions, stigma, nondisclosure, and mobility were barriers to the implementation of this model, VL education, assisted disclosure, and individualized counseling helped facilitate success. As HIV care delivery is scaled up in rural settings across sub-Saharan Africa, Streamlined Care is one approach that could be adapted and implemented in other settings. Innovative service delivery models will be key to engaging and retaining patients in care and ultimately achieving the UNAIDS 95-95-95 targets.

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