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Linkage to HIV care before and after the introduction of provider-initiated testing and counselling in six Rwandan health facilities

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ABSTRACT

HIV testing and counselling forms the gateway to the HIV care and treatment continuum. Therefore, the World Health Organization recommends provider-initiated testing and counselling (PITC) in countries with a generalized HIV epidemic. Few studies have investigated linkage-to-HIV-care among out-patients after PITC. Our objective was to study timely linkage-to-HIV-care in six Rwandan health facilities (HFs) before and after the introduction of PITC in the out-patient departments (OPDs). Information from patients diagnosed with HIV was abstracted from voluntary counselling and testing, OPD and laboratory registers of six Rwandan HFs during three-month periods before (March–May 2009) and after (December 2009–February 2010) the introduction of PITC in the OPDs of these facilities. Information on patients' subsequent linkage-to-pre-antiretroviral therapy (ART) care and ART was abstracted from ART clinic registers of each HF. To triangulate the findings from HF routine, a survey was held among patients to assess reasons for non-enrolment. Of 635 patients with an HIV diagnosis, 232 (36.5%) enrolled at the ART clinic within 90 days of diagnosis. Enrolment among out-patients decreased after the introduction of PITC (adjusted odds ratio, 2.0; 95% confidence interval, 1.0–4.2; $p = .051$). Survey findings showed that retesting for HIV among patients already diagnosed and enrolled into care was not uncommon. Patients reported non-acceptance of disease status, stigma and problems with healthcare services as main barriers for enrolment. Timely linkage-to-HIV-care was suboptimal in this Rwandan study before and after the introduction of PITC; the introduction of PITC in the OPD may have had a negative impact on linkage-to-HIV-care. Healthier patients tested through PITC might be less ready to engage in HIV care. Fear of HIV stigma and mistrust of test results appear to be at the root of these problems.

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Introduction

The increase in access to antiretroviral therapy (ART) in Sub-Saharan Africa (SSA) is a success story in the history of the HIV epidemic (World Health Organization [WHO], 2013). ART has proven effective in reducing mortality rates among people infected with HIV (Palella et al., 1998), as well as reducing vertical (De Cock et al., 2000; Siegfried, van der Merwe, Brocklehurst, & Sint, 2011) and horizontal transmission rates (Cohen et al., 2011). Therefore, the WHO recommends provider-initiated testing and counselling (PITC) in countries with an HIV prevalence of 3.0% or higher (WHO, 2007). HIV testing and counselling forms the gateway to the care and treatment continuum (McNairy & El Sadr, 2012). However, only one-third to two-thirds of patients with a new HIV diagnosis are tested for CD4 or return for results within three months of the HIV test in SSA (Kranzer, Govindasamy, Ford, Johnston, & Lawn, 2012; Rosen & Fox, 2011). Transport costs and distance to clinic, as well as stigma and fear of disclosure are common barriers towards linkage-to-HIV-care (Govindasamy, Ford, & Kranzer, 2012; Lankowski, Siedner, Bangsberg, & Tsai, 2014).

Rwanda is a densely populated country, with an adult HIV seroprevalence rate of 3.0% (National Institute of Statistics of Rwanda [NISR], 2012). The prevalence is higher in urban (7.1%) than rural areas (2.3%) (NISR, 2012). ART is available in 93% of hospitals and 29% of health centres (HCs) (NISR, 2008). In 2005, the Demographic and Health survey of Rwanda reported that around 80% of adults had not been tested for HIV (NISR, 2006). The Ministry of Health therefore

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recommended introducing PITC in all its health facilities (HFs) in 2008. At the start of the study, PITC was already running with high uptake rates among antenatal women and tuberculosis (TB) patients. PITC was not practised in out-patient departments (OPDs); HIV testing was only performed when out-patients presented with symptoms of HIV infection.

PITC has increased ART uptake in antenatal care clinics in SSA (Hensen et al., 2012). Fewer studies have investigated linkage-to-HIV-care among out-patients after PITC (Kennedy et al., 2013; Roura, Watson-Jones, Kahawita, Ferguson, & Ross, 2013). In this study, a PITC intervention was introduced in OPDs of six Rwandan HFs. The objective of this study was to examine linkage-to-HIV-care (pre-ART, eligibility for ART and start of ART) before and after the introduction of a PITC intervention in the OPD. As patients who attend the OPD for a purpose other than getting an HIV test might be less motivated to seek HIV care than patients specifically coming for HIV testing, we hypothesized that linkage-to-HIV-care at the OPD would be lower after the introduction of PITC.

Methods

Setting

The current study was part of a cluster non-randomized controlled trial that investigated the HIV testing uptake and acceptability of introducing a PITC intervention in OPDs of Rwandan HFs (Kayigamba et al., 2012, 2014). Eight Rwandan HFs were purposefully selected for this trial, ensuring inclusion of urban and rural HFs and sufficient numbers of attendees. All these HFs had a complete range of HIV testing, care, and treatment activities in place. All HFs had an OPD, where routine PITC was not yet practised at the start of the study. HFs were located in the Musanze district in the north-west of Rwanda (Ruhengeri hospital, Muhoza HC, Rwaza HC, and control site Gasiza HC) and in the Gasabo district surrounding the capital Kigali (Kibagabaga hospital, Kimironko HC, Kinyinya HC, and control site Kabuye HC).

This study investigated linkage-to-HIV-care before and after the introduction of a PITC intervention. The following stages were investigated: (1) linkage-to-pre-ART-care (we studied how many patients registered at the HFs ART clinic within 90 days of HIV diagnosis); (2) eligibility for ART (at the time of the study, HIV-infected patients were eligible for ART when CD4 count was <350 cells/mm^3 or they were in WHO clinical stage 4; TB was classified as WHO stage 3 (Trac-plus, 2009)); and (3) start of ART (we studied how many eligible patients started ART within 90 days of HIV diagnosis). This study is a sub-analysis of data from the OPDs and voluntary counselling and testing (VCT) departments of the six HFs that implemented the intervention. Data from VCT departments were included in order to examine whether linkage-to-HIV-care among out-patients differed from VCT patients and to detect seasonal effects. Due to low numbers of HIV cases in the two control HFs, these could not serve as control sites for the purpose of the current study and were therefore excluded (Kayigamba et al., 2012). Characteristics of the HFs included in this study are described in Table S1.

The intervention

The intervention consisted of three phases: in phase 1 (March–May 2009) PITC was not operational in OPDs. In phase 2 (June–November 2009) healthcare workers (HCWs) were trained to offer PITC and provided materials, administer HIV testing, and use registers adapted for the study to record details of testing. In phase 3 (December 2009–February 2010) PITC was fully operational in the OPDs. Patients in OPDs were systematically offered an HIV test on an opt-out basis. We anticipated that this new intervention would increase workload and responsibility for HCW; accordingly we provided salary top-ups to department heads and stipends to HCW.

Data collection

At each HF, patients who were diagnosed with HIV were referred to the ART clinic of that HF, with the exception of one clinic (Muhoza), from where patients were referred to the neighbouring Ruhengeri hospital. At the ART clinic each patient was examined by a physician, the WHO stage was established, and a blood sample was taken to measure the CD4 count. Information on patients' subsequent linkage-to-pre-ART care and ART was abstracted from ART clinic registers of each HF. Information from patients diagnosed with HIV was abstracted from VCT, OPD, and laboratory registers of six Rwandan HFs during three-month periods before (March–May 2009) and after (December 2009–February 2010) the introduction of PITC in the OPDs of these HFs. Data collection and hospital routine have been described in detail before (Kayigamba et al., 2012).

Survey

We conducted a survey in order to identify patient-reported barriers towards linkage-to-HIV-care. We interviewed a convenience sample of patients from each HF aged 18 years or above who were diagnosed

with HIV in phase 3 and did not enrol within 90 days. The survey was done in August 2010 at patients' homes. For this survey, a questionnaire was developed that included closed questions on demographic characteristics of the patient, whether the patient enrolled into care at the time of the survey and, if so, into which HF, and a final open-ended question about his/her reason(s) for not enrolling into HIV care. The questions were read to patients in Kinyarwanda by trained interviewers. Answers were written down on the questionnaire form and later translated into English by a trained translator.

Data analysis

We used STATA software release 11 (StataCorp, College Station, TX, USA) for all quantitative analyses. Associations between four explanatory variables (department by phase, site, sex, and age) and five outcomes (enrolment into pre-ART care; advanced WHO stage; CD4 count; ART eligibility; and start of ART) were assessed using the chi-squared test, Fisher's exact test or Kruskal–Wallis test, as appropriate. Multivariable logistic regression analyses were done to identify factors associated with non-enrolment into pre-ART care, advanced clinical disease stage (WHO stage 3 or 4), ART eligibility, and not starting ART. All explanatory variables were included in multivariable models a priori. p Values of <.05 were considered statistically significant. Time from HIV diagnosis to enrolment into pre-ART care and to start of ART, and time from CD4 count to start of ART were examined with Kaplan–Meier graphs.

Answers to the open-ended survey question regarding reasons for non-enrolment in pre-ART care were read multiple times and coded by a researcher (CF) using principles of thematic analysis (Boyatzis, 1998). When concepts or statements were unclear, the meaning of words in Kinyarwanda was discussed with the translator. Codes were categorized into overarching themes by discussing the findings among the authors (CF, KM, MB, and FK) and reviewing the existing literature on commonly reported barriers towards linkage-to-HIV-care.

Ethics

Ethical approval was provided by the Rwandan National Ethics Committee and the research ethics committee of the Academic Medical Center, Amsterdam. Permission for home visits and written informed consent was obtained from all patients.

Results

Patients diagnosed with HIV

In phases 1 and 3 of the study, 722 patients were diagnosed with HIV; children below 15 years ($n = 23$) were excluded, as were 64 patients due to missing names or codes (Figure 1), leaving 635 patients in the analysis.

Most patients were female (61.7%) and the median age was 30 years (interquartile range (IQR) 24–38). In phase 1, 73 patients (23.5%) were diagnosed at the OPD. In phase 3, the number and the relative share of patients diagnosed at the OPD increased (125; 38.5%). Between 13 and 255 persons were diagnosed at each individual site.

Linkage-to-pre-ART-care

Among the 635 patients, 232 (36.5%) enrolled into pre-ART care during phases 1 and 3 combined (Figure 1). There was no significant difference in enrolment by sex or age (Table 1), but enrolment varied strongly by study site: Muhoza had the lowest enrolment (23.5%), and Rwaza the highest (55.6%; $p < .001$). Among VCT patients, enrolment remained relatively constant during phases 1 and 3 (38.3% and 35.5%, respectively). Enrolment among out-patients was slightly higher than among VCT patients during phase 1 (43.8%), but enrolment among out-patients was lower during phase 3 (29.6%). The difference between enrolment among out-patients in phases 1 and 3 was significant in univariable, but not in multivariable analysis (adjusted odds ratio (aOR), 2.0; 95% confidence interval (CI), 1.0–4.2; $p = .051$, Table 2).

Of the 232 patients enrolled into pre-ART care, 169 (74.6%) had done so 14 days after HIV diagnosis, and 205 (88.4%) after 30 days (Figure 2(a)). Among those who enrolled, the median time to enrolment was 6 days (IQR 2–15). Median time to enrolment in phase 1 was 3.5 days (IQR 1–13.5) among VCT patients, and 9 days (IQR 4.5–20.5) among out-patients. This was similar in phase 3 (4 days (IQR 2–10) and 9 days (IQR 4–19), respectively).

Art eligibility

Of the 232 patients enrolled in pre-ART care, WHO staging was available for 217 (93.5%) patients. Of these, 19.8% were in WHO stage 3 and none were in stage 4 (Table 1). This was similar for men and women (20.9% and 19.1%, respectively). Only study site was significantly associated with high WHO stage in univariable and multivariable analysis (Table S2).

CD4 count was available for 218 patients (94.0%). Median CD4 count was 384 cells/mm^3 (IQR, 214–539; Table 1). CD4 counts were significantly lower among

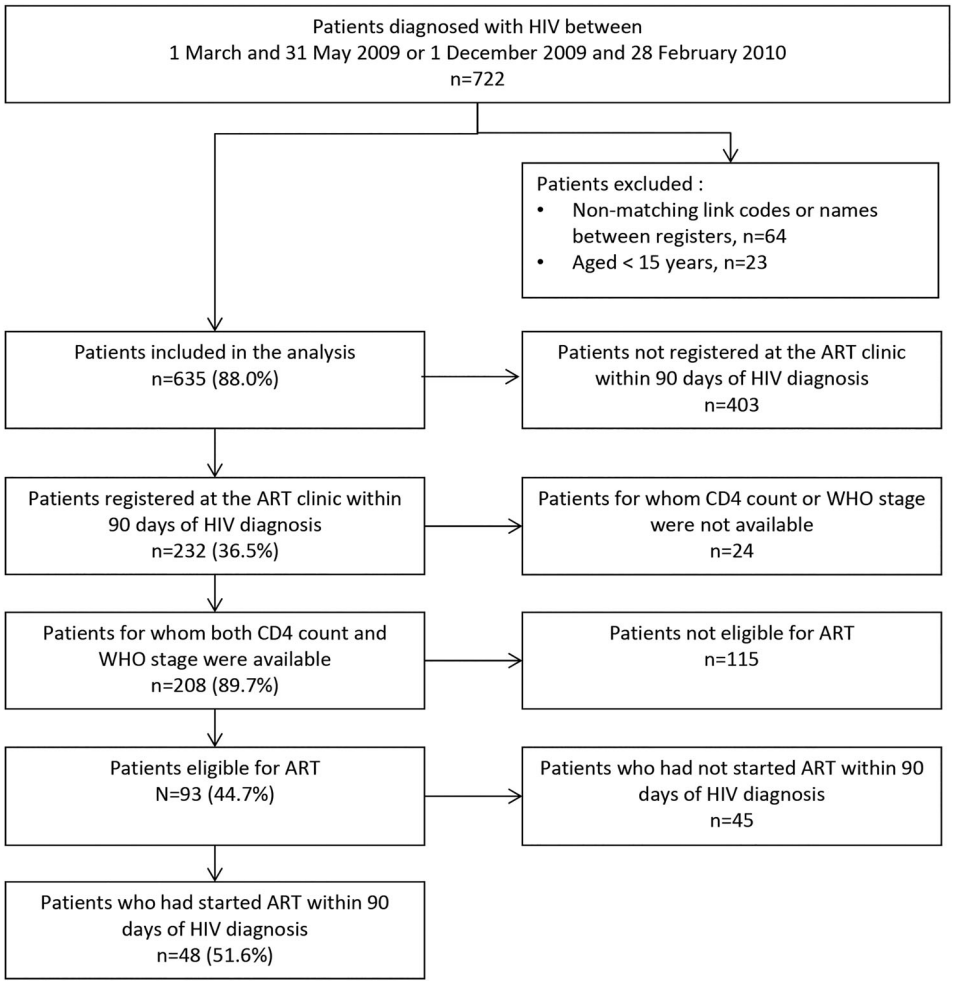

Figure 1. Flow of linkage-to-pre-ART-care and start of ART among HIV-infected patients, Rwanda, March–May 2009 (phase 1) and December 2009–February 2010 (phase 3). ART = antiretroviral therapy and WHO = World Health Organization.

men and older patients ($p = .003$ and $p = .011$, respectively). Among out-patients, the median CD4 count was 287 cells/mm^3 in phase 1 and 312 cells/mm^3 in phase 3 and among VCT patients, the median CD4 count was 398 cells/mm^3 in phase 1 and 431 cells/mm^3 in phase 3 ($p = .008$). CD4 counts did not differ significantly between sites (Table 1).

Both CD4 count and WHO staging were available for 89.7% (208/232) of patients. Of these, 93 (44.7%) were eligible for ART (Table 1). ART eligibility was fully dependent on a low CD4 count (<350 cells/mm^3) as none of the patients were classified in WHO stage 4. Only sex was significantly associated with ART eligibility ($p = .017$), with men being more often eligible for ART than women (aOR 1.9; 95% CI 1.0–3.5; Table S3).

Start of ART

Of the 93 patients eligible for ART, 48 (51.6%) started ART within 90 days of HIV diagnosis (Figure 1). Among the 48 patients who started ART the median time between HIV diagnosis and start of ART was 35.5 days (IQR 17–60), and between CD4 count and start of ART 27 days (IQR 12.5–50) (Figure 2(b and c)). The proportions of patients starting ART varied significantly by study site (Tables 1 and S4). Due to small numbers, we did not perform multivariable analysis.

Survey results

In total, 60 patients (34 VCT patients and 26 out-patients) – who had not been enrolled into pre-ART care in phase 3 of the study – were interviewed for the survey (76% of the approached patients). The main reason for non-interview was that the patient had moved or could not be found at the provided address at the time of interview.

The majority of patients 57% (34/60) were still not enrolled into pre-ART care (Table 3). Of the patients who did enrol, most (10/60, 17%) enrolled at a different

Table 1. Linkage to pre-ART care, WHO stage, CD4 count, ART eligibility, and start of ART, by department of test, study phase, study site, sex, and age; Rwanda, March–May 2009 (phase 1) and December 2009–February 2010 (phase 3).

	Total	Number (%) of patients enrolled into pre-ART care ≤90 days	Number (%) of patients in WHO stage 3/4[a]	Median CD4 count in cells/mm^3 (IQR)[b]	Number (%) of ART-eligible patients[c]	Number (%) of eligible patients who started ART ≤90 days
Total	635	232/635 (36.5)	43/217 (19.8)	384 (214–539)	93/208 (44.7)	48/93 (51.6)
Department, by phase						
OPD phase 1	73	32/73 (43.8)	7/28 (25.0)	287 (112–387)	16/27 (59.3)	11/16 (68.8)
OPD phase 3	125	37/125 (29.6)	7/37 (18.9)	312 (134–563)	19/35 (54.3)	10/19 (52.6)
VCT phase 1	237	92/237 (38.3)	12/85 (14.1)	398 (288–533)	30/81 (37.0)	16/30 (53.3)
VCT phase 3	200	71/200 (35.5)	17/67 (25.4)	431 (245–655)	28/65 (43.1)	11/28 (39.3)
p Value[d]		.180	.317	**.008**	.132	.304
Study site						
Muhoza	255	60/255 (23.5)	17/60 (28.3)	391 (260–560)	28/60 (46.7)	22/28 (78.6)
Ruhengeri	13	6/13 (46.2)	3/6 (50.0)	177 (97–440)	4/6 (66.7)	3/4 (75.0)
Kibagabaga	90	35/90 (38.9)	1/27 (3.7)	444 (262–568)	8/27 (29.6)	8/8 (100.0)
Kinyinya	92	38/92 (41.3)	9/37 (24.3)	367 (276–702)	15/31 (48.4)	5/15 (33.3)
Kimironko	158	78/158 (49.4)	10/72 (13.9)	358 (154–533)	32/69 (46.4)	5/32 (15.6)
Rwaza	27	15/27 (55.6)	3/15 (20.0)	369 (215–408)	6/15 (40.0)	5/6 (83.3)
p Value[d]		**<.001**	**.017**	.306	.537	**<.001**
Sex						
Male	243	92/243 (37.9)	18/86 (20.9)	311 (154–484)	45/82 (54.9)	27/46 (58.7)
Female	392	140/392 (35.7)	25/131 (19.1)	422 (269–605)	48/126 (38.1)	21/47 (44.7)
p Value[d]		.585	.739	**.003**	**.017**	.176
Age group						
15–24 years	160	58/160 (36.3)	9/55 (16.4)	487 (288–660)	18/53 (34.0)	7/18 (38.9)
25–34 years	254	92/254 (36.2)	14/84 (16.7)	385 (222–582)	36/81 (44.4)	18/36 (50.0)
35–44 years	122	44/122 (36.1)	10/42 (23.8)	317 (109–435)	22/39 (56.4)	10/22 (45.5)
≥45 years	90	38/90 (42.2)	10/36 (27.8)	360 (215–453)	17/35 (48.6)	13/17 (76.5)
p Value[d]		.753	.415	**.011**	.183	.125

Notes: Those aged <15 were excluded from the analyses. Significant *p* values have presented in bold. ART, antiretroviral therapy; HIV, human immunodeficiency virus; IQR, interquartile range; OPD, out-patient department; VCT, voluntary counselling and testing; WHO, World Health Organization.
[a]WHO stage was available for 217/232.
[b]CD4 count results were available for 218/232.
[c]ART eligibility was based on CD4 count (CD4 < 350 cells/mm^3) and WHO stage (stage 4) which were available for 208/232 patients.
[d]The *p* values are based on Chi-squared test, Fisher's exact test, or Kruskal–Wallis test, as appropriate.

HF then the one they were tested at, and only 2/60 (3%) enrolled at the same HF. A large proportion of patients (14/60, 23%) were already enrolled into pre-ART care before they took an HIV test (a retest) in phase 3. Among VCT patients, 29% (10/34) had retested for HIV and among out-patients 15% (4/26) had retested for HIV (Table 3). VCT patients had retested for HIV on their own initiative. Some patients who were already taking ART mentioned taking a retest to assess whether they had been cured by prayers. Out-patients had been retested on request by the HCW at the OPD.

A reason for not enrolling into HIV care that was often reported was not accepting or mistrusting one's positive HIV status (7/34, 21%). Some patients mentioned taking up to three or four tests at different facilities to confirm the results. Patients often reported that they did not want to return to the same clinic after an HIV diagnosis, because of fear of being seen and stigmatized by people they knew (8/34, 24%). Some of the patients who reported this reason had enrolled at a different HF. Many patients (8/34, 24%) reported that they did not enrol into HIV care because they encountered problems at the HF (Table 3). Specific reasons given were: long waiting times, not being told, or not realizing, that they had to return for a follow-up, or failing to find the HCW at the given follow-up appointment. Some patients (5/34, 15%) mentioned that after an initial positive result they were tested at a different HF and had a negative HIV outcome there.

Discussion

In this study in six Rwandan HFs, timely linkage-to-pre-ART-care and ART was suboptimal before and after the introduction of PITC. We found that enrolment among out-patients was lower after the implementation of PITC, although this finding was not significant in multivariable analysis.

It is possible that under PITC, healthier out-patients enrolled less often. As hypothesized, when coming to the OPD for a different reason than to be tested for HIV, some patients might be less ready to enrol into HIV care; this may be especially the case for patients without clear symptoms of HIV. Low perceived susceptibility to HIV has been linked to treatment avoidance (Nakigozi et al., 2013; Varni, Miller, McCuin, & Solomon, 2012). This hypothesis is supported by the finding that out-patients in this study who enrolled into pre-ART care had lower absolute CD4 counts than VCT patients both before and after the introduction of

Table 2. Factors associated with non-enrolment among adult HIV patients diagnosed in VCT or OPD department of six Rwanda HFs, March–May 2009 (phase 1) and December 2009–February 2010 (phase 3); univariable and multivariable logistic regression.

	n/N (%)	OR (95% CI)	*p* Value	aOR (95% CI)	*p* Value
Total	403/635 (63.5)				
Department, by phase			.177		.061
OPD phase 1	41/73 (56.2)	1		1	
OPD phase 3	88/125 (70.4)	**1.9 (1.0–3.4)**		2.0 (1.0–4.2)	
VCT phase 1	145/237 (61.2)	1.2 (0.7–2.1)		1.1 (0.6–2.1)	
VCT phase 3	129/200 (64.5)	1.4 (0.8–2.4)		1.3 (0.6–2.5)	
Study site			**<.001**		**<.001**
Muhoza	195/255 (76.5)	1		1	
Ruhengeri	7/13 (53.9)	0.4 (0.1–1.1)		**0.3 (0.1–0.9)**	
Kibagabaga	55/90 (61.1)	**0.5 (0.3–0.8)**		**0.5 (0.3–0.8)**	
Kinyinya	54/92 (58.7)	**0.4 (0.3–0.7)**		**0.4 (0.2–0.7)**	
Kimironko	80/158 (50.6)	**0.3 (0.2–0.5)**		**0.3 (0.2–0.4)**	
Rwaza	12/27 (44.4)	**0.2 (0.1–0.6)**		**0.3 (0.1–0.7)**	
Sex			.586		.813
Female	252/392 (64.3)	1		1	
Male	151/243 (62.1)	0.9 (0.7–1.3)		1.0 (0.7–1.5)	
Age			.756		.678
15–24 years	102/160 (63.8)	1.3 (0.7–2.3)		1.3 (0.7–2.3)	
25–34 years	162/254 (63.8)	1.3 (0.8–2.1)		1.3 (0.8–2.2)	
35–44 years	78/122 (63.9)	1.3 (0.7–2.3)		1.4 (0.8–2.6)	
≥45 years	52/90 (57.8)	1		1	

Notes: Those aged <15 years were excluded from the analyses. aOR, adjusted odds ratio; HIV, human immunodeficiency virus; OPD, out-patient department; VCT, voluntary counselling and testing; OR, odds ratio; 95% CI, 95% confidence interval.

PITC. Several studies report that operational problems such as increased waiting times are common under PITC (Evans & Ndirangu, 2009; Roura et al., 2013; Topp et al., 2010). This could also have led to lower linkage-to-pre-ART-care after PITC in this study. Problems with health services were one of the main barriers towards linkage-to-care reported by patients in this study. Higher workload and longer consultation time under PITC were reported by heath staff, as previously discussed (Kayigamba et al., 2014).

However, our findings should be interpreted with caution. The proportion of patients enrolling into pre-ART care in this study, both at the VCT and OPD departments before as well as after the introduction of PITC, was among the lowest reported in SSA (Kranzer et al., 2012; Mutimura et al., 2014; Rosen & Fox, 2011). Our survey among patients who were not registered at the ART clinic demonstrated that this proportion was an underestimate of patients actually linked to pre-ART care. This survey showed that over one-third of these non-registered patients had in fact enrolled at a different HF or, perhaps surprisingly, had already enrolled in HIV care prior to their diagnosis in this study. It is likely that these factors may have also led to underestimates of patients linking to pre-ART care in other studies from SSA, as in many places no tracking system is operational to track patients after an HIV diagnosis (Bassett et al., 2010; Rosen & Fox, 2011).

Retesting for HIV appears to happen frequently, among non-enrolled patients and patients already enrolled into HIV care. Under PITC a previous HIV diagnosis and enrolment in care might not be communicated to the HCW. Different research by our group (Kayigamba et al., 2012, 2014) found that before the introduction of PITC the most common reason for testing was the desire to know one's HIV status, while afterwards this was because one was offered a test. Some patients reported an HIV-negative test after their initial positive test when they were tested at a different facility. False positive rapid-test results have been reported in the literature (Anzala et al., 2008; Gray et al., 2007; Kagulire et al., 2011; Klarkowski et al., 2009), but operational issues, such as non-observance of standard operating procedures and lack of quality control, might also play a role (Shanks, Klarkowski, & O'Brien, 2013).

Our findings should be viewed in the wider context of a strong present HIV/AIDS stigma. Difficulty in accepting their test result and fear of being seen at the HF were main barriers towards enrolment in pre-ART care mentioned by patients in this study and also resulted in them repeating HIV testing. Other studies have reported that denial of HIV status and fear of HIV stigma can result in non-engagement in care and decreased quality of life (Beer, Fagan, Valverde, & Bertolli, 2009; Kamen et al., 2012; Nakigozi et al., 2013; Weaver et al., 2004).

This study was subject to certain limitations. Missing or non-matching data between HF registers (names, age, sex, initial department of consultation) resulted in the exclusion of 9% of patients. The survey was held among a relatively small sample of patients from phase 3. We were

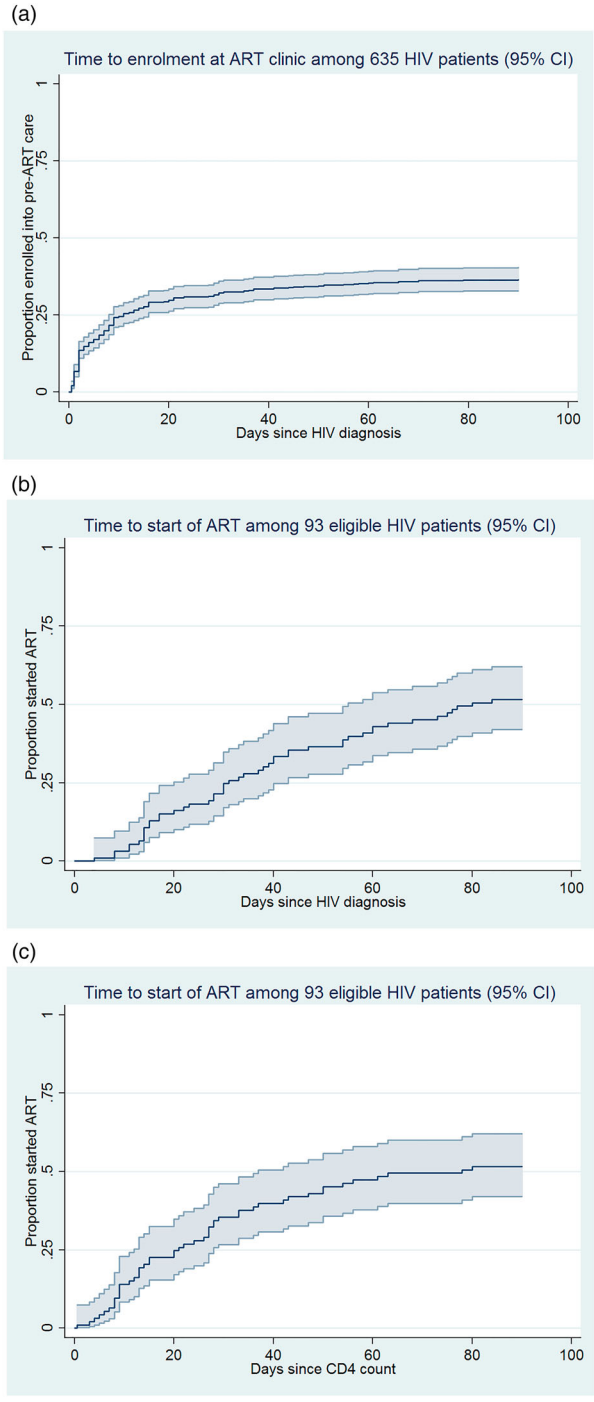

Figure 2. (a) Time to enrolment at ART clinic among 635 HIV patients from the date of HIV diagnosis. (b) Time to start ART among 93 eligible HIV patients, from the date of HIV diagnosis. (c) Time to start ART among 93 eligible HIV patients, from the date of CD4 count. Rwanda, March–May 2009 (phase 1) and December 2009–February 2010 (phase 3). ART = antiretroviral therapy; HIV = human immunodeficiency virus; 95% CI = 95% confidence interval.

Table 3. Characteristics of 60 survey respondents who were not enrolled into pre-ART care in phase 3 of the study, their enrolment status at the time of the survey, and reason(s) for non-enrolment, Rwanda, August 2010.

	All patients *N* = 60	VCT patients *N* = 34	Out-patients *N* = 26	*P* Value[a]
Median age (IQR)	32 (25–40)	30 (25–40)	37 (25–45)	.379
Sex	*N* (%)	*N* (%)	*N* (%)	.362
Male	26 (43)	13 (38)	13 (50)	
Female	34 (57)	21 (62)	13 (50)	
Education				.609
None	10 (17)	5 (15)	5 (19)	
Primary	39 (65)	24 (71)	15 (58)	
Secondary	10 (17)	5 (15)	5 (19)	
Vocational training	1 (2)	0 (0)	1 (4)	
Site				**<.001**
Muhoza	27 (45)	20 (59)	7 (27)	
Ruhengeri	5 (8)	0 (0)	5 (19)	
Kibagabaga	5 (8)	0 (0)	5 (19)	
Kinyinya	10 (17)	8 (24)	2 (8)	
Kimironko	9 (15)	4 (12)	5 (19)	
Rwaza	4 (7)	2 (6)	2 (8)	
Enrolled into pre-ART care at the time of survey				.644
Yes, before they took the HIV (re)test in phase 3	14 (23)	10 (29)	4 (15)	
Yes, at a different HF	10 (17)	5 (15)	5 (19)	
Yes, at the same HF	2 (3)	1 (3)	1 (4)	
No	34 (57)	18 (53)	16 (62)	
Reason(s) for not enrolling into pre-ART care[b]	*N* = 34	*N* = 18	*N* = 16	.485
Due to problems with the service at the HF	8 (24)	6 (33)	2 (13)	
Fear of the consequences of disclosing HIV status	8 (24)	2 (11)	6 (38)	
Difficulties accepting or mistrusting the test result	7 (21)	4 (22)	3 (19)	
Negative HIV test at different HF	5 (15)	4 (22)	1 (6)	
No time to come back to the clinic	4 (12)	1 (6)	3 (19)	
Feeling healthy, do not see the need	4 (12)	2 (11)	2 (13)	
Believe that prayers can cure HIV	3 (9)	2 (11)	1 (6)	
Not seeing the benefit of taking ART	3 (9)	2 (11)	1 (6)	
Other[c]	4 (12)	3 (17)	1 (6)	

Notes: ART, antiretroviral therapy; HIV, human immunodeficiency virus; IQR, interquartile range; VCT, voluntary counselling and testing.
[a]The *p* values are based on Chi-squared test, Fisher's exact test, or Kruskal–Wallis test, as appropriate.
[b]More reasons per person could be given.
[c]The other four reasons given were: due to a misunderstanding with the husband; lacking the willingness; lost health insurance card; and too old to act upon the problem.

unable to explore differences in reported barriers before and after the introduction of PITC and the power to find significant differences between VCT and OPD departments was limited. A key strength of our study is that we used routine data from primary care clinics and hospitals, reflecting routine healthcare practice. Another strength is that we triangulated our findings from the hospital registers with data from a survey among non-enrolled patients, through which we were able to explore patient-reported barriers towards linkage-to-HIV-care.

In conclusion, the introduction of PITC in the OPD may have had a negative impact on linkage-to-HIV-care in Rwandan HFs. Healthier patients tested through PITC might be less ready to engage in HIV care. Fear of HIV stigma and mistrust of test results appear to be at the root of these problems.

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References

Anzala, O., Sanders, E. J., Kamali, A., Katende, M., Mutua, G. N., Ruzagira, E. … , Price, M. (2008). Sensitivity and specificity of HIV rapid tests used for research and voluntary counselling and testing. *The East African Medical Journal*, *85*, 500–504.

Bassett, I. V., Regan, S., Chetty, S., Giddy, J., Uhler, L. M., Holst, H. … Losina, E. (2010). Who starts antiretroviral therapy in Durban, South Africa? … not everyone who should. *AIDS*, *24*(Suppl. 1), S37–S44.

Beer, L., Fagan, J. L., Valverde, E., & Bertolli, J. (2009). Health-related beliefs and decisions about accessing HIV medical care among HIV-infected persons who are not receiving care. *AIDS Patient Care and STDs*, *23*, 785–792.

Boyatzis, R. (1998). *Transforming qualitative information: Thematic analysis and code development*. Thousand Oaks, CA: Sage.

Cohen, M. S., Chen, Y. Q., McCauley, M., Gamble, T., Hosseinipour, M. C., Kumarasamy, N., … Fleming, T. R. (2011). Prevention of HIV-1 infection with early antiretroviral therapy. *New England Journal of Medicine*, *365*, 493–505.

De Cock, K. M., Fowler, M. G., Mercier, E., de Vincenzi, I., Saba, J., Hoff, E., … Shaffer, N. (2000). Prevention of mother-to-child HIV transmission in resource-poor countries: Translating research into policy and practice. *JAMA*, *283*, 1175–1182.

Evans, C., & Ndirangu, E. (2009). The nursing implications of routine provider-initiated HIV testing and counselling in sub-Saharan Africa: A critical review of new policy guidance from WHO/UNAIDS. *International Journal of Nursing Studies*, *46*, 723–731.

Govindasamy, D., Ford, N., & Kranzer, K. (2012). Risk factors, barriers and facilitators for linkage to antiretroviral therapy care: A systematic review. *AIDS*, *26*, 2059–2067.

Gray, R. H., Makumbi, F., Serwadda, D., Lutalo, T., Nalugoda, F., Opendi, P., … Wawer, M. J. (2007). Limitations of rapid HIV-1 tests during screening for trials in Uganda: Diagnostic test accuracy study. *BMJ*, *335*, 188.

Hensen, B., Baggaley, R., Wong, V. J., Grabbe, K. L., Shaffer, N., Lo, Y. R. J., & Hargreaves, J. (2012). Universal voluntary HIV testing in antenatal care settings: A review of the contribution of provider-initiated testing & counselling. *Tropical Medicine & International Health*, *17*, 59–70.

Kagulire, S. C., Opendi, P., Stamper, P. D., Nakavuma, J. L., Mills, L. A., Makumbi, F., … Reynolds, S. J. (2011). Field evaluation of five rapid diagnostic tests for screening of HIV-1 infections in rural Rakai, Uganda. *International Journal of STD & AIDS*, *22*, 308–309.

Kamen, C., Taniguchi, S., Student, A., Kienitz, E., Giles, K., Khan, C., … Koopman, C. (2012). The impact of denial on health-related quality of life in patients with HIV. *Quality of Life Research*, *21*, 1327–1336.

Kayigamba, F. R., Bakker, M. I., Fikse, H., Mugisha, V., Asiimwe, A., & Schim van der Loeff, M. (2012). Patient enrolment into HIV care and treatment within 90 days of HIV diagnosis in eight Rwandan health facilities: A review of facility-based registers. *PLoS One*, *7*, e36792.

Kayigamba, F. R., Bakker, M. I., Lammers, J., Mugisha, V., Bagiruwigize, E., Asiimwe, A., & van der Loeff, M. F. S. (2014). Provider-initiated HIV testing and counselling in Rwanda: Acceptability among clinic attendees and workers, reasons for testing and predictors of testing. *PLoS One*, *9*, e95459.

Kennedy, C. E., Fonner, V. A., Sweat, M. D., Okero, F. A., Baggaley, R., & O'Reilly, K. R. (2013). Provider-initiated HIV testing and counseling in low- and middle-income countries: A systematic review. *AIDS and Behavior*, *17*, 1571–1590.

Klarkowski, D. B., Wazome, J. M., Lokuge, K. M., Shanks, L., Mills, C. F., & O'Brien, D. P. (2009). The evaluation of a rapid in situ HIV confirmation test in a programme with a high failure rate of the WHO HIV two-test diagnostic algorithm. *PLoS One*, *4*, e4351.

Kranzer, K., Govindasamy, D., Ford, N., Johnston, V., & Lawn, S. D. (2012). Quantifying and addressing losses along the continuum of care for people living with HIV infection in sub-Saharan Africa: A systematic review. *Journal of the International AIDS Society*, *15*, 17383.

Lankowski, A. J., Siedner, M. J., Bangsberg, D. R., & Tsai, A. C. (2014). Impact of geographic and transportation-related barriers on HIV outcomes in sub-Saharan Africa: A systematic review. *AIDS and Behavior*, *18*, 1199–1223.

McNairy, M. L., & El Sadr, W. M. (2012). The HIV care continuum: No partial credit given. *AIDS*, *26*, 1735–1738.

Mutimura, E., Addison, D., Anastos, K., Hoover, D., Dusingize, J., Karenzi, B., … Nash, D. (2014). Trends in and determinants of CD4+ cell count at antiretroviral

therapy initiation after changes in national ART guidelines in Rwanda. *AIDS*, 29(1), 67–76.

Nakigozi, G., Atuyambe, L., Kamya, M., Makumbi, F. E., Chang, L. W., Nakyanjo, N., … Gray, R. (2013). A qualitative study of barriers to enrollment into free HIV care: Perspectives of never-in-care HIV-positive patients and providers in Rakai, Uganda. *BioMed Research International*, *2013*, ID 470245.

National Institute of Statistics of Rwanda. (2006). *Rwanda demographic and health survey* 2005. Calverton, MD: INSR and ORC Macro.

National Institute of Statistics of Rwanda. (2008). *Rwanda service provision assessment survey* 2007. Calverton, MD: NIS, MOH, and Macro International.

National Institute of Statistics of Rwanda. (2012). *Rwanda demographic and health survey* 2010. Calverton, MD: NISR, MOH, and ICF International.

Palella, F. J. J., Delaney, K. M., Moorman, A. C., Loveless, M. O., Fuhrer, J., Satten, G. A., … Holmberg, S. D. (1998). Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV outpatient study investigators. *New England Journal of Medicine*, *338*, 853–860.

Rosen, S., & Fox, M. P. (2011). Retention in HIV care between testing and treatment in sub-Saharan Africa: A systematic review. *PLoS Medicine*, *8*, e1001056.

Roura, M., Watson-Jones, D., Kahawita, T. M., Ferguson, L., & Ross, D. A. (2013). Provider-initiated testing and counselling programmes in sub-Saharan Africa: A systematic review of their operational implementation. *AIDS*, *27*, 617–626.

Shanks, L., Klarkowski, D., & O'Brien, D. P. (2013). False positive HIV diagnoses in resource limited settings: Operational lessons learned for HIV programmes. *PLoS One*, *8*, e59906.

Siegfried, N., van der Merwe, L., Brocklehurst, P., & Sint, T. T. (2011). Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection. *Cochrane Database of Systematic Reviews*, *2011*(1), CD003510.

Topp, S. M., Chipukuma, J. M., Giganti, M., Mwango, L. K., Chiko, L. M., Tambatamba-Chapula, B., … Reid, S. (2010). Strengthening health systems at facility-level: Feasibility of integrating antiretroviral therapy into primary health care services in Lusaka, Zambia. *PLoS One*, *5*, e11522.

Trac-plus (2009). *Guidelines for the provision of comprehensive care to persons infected by HIV in Rwanda*. Kigali: Ministry of Health.

Varni, S., Miller, C., McCuin, T., & Solomon, S. (2012). Disengagement and engagement coping with HIV/AIDS stigma and psychological well-being of people with HIV/AIDS. *Journal of Social and Clinical Psychology*, *31*, 123–150.

Weaver, K. E., Antoni, M. H., Lechner, S. C., Duran, R. E. F., Penedo, F., Fernandez, M. I., … Schneiderman, N. (2004). Perceived stress mediates the effects of coping on the quality of life of HIV-positive women on highly active antiretroviral therapy. *AIDS and Behavior*, *8*, 175–183.

World Health Organization. (2007). *Guidance on provider-initiated HIV testing and counselling in health facilities. Strengthening health services to fight HIV/AIDS*. Geneva: Author.

World Health Organization. (2013). *Global report on HIV treatment 2013: Results, impact and opportunities*. Geneva: Author.