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Rapid antiretroviral therapy initiation and its effect on treatment response in MSM in West Africa

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Objective: To assess the time from HIV diagnosis to ART initiation and the effect of rapid ART initiation (i.e. within 7 days of HIV diagnosis) on attrition and virologic and immunologic responses among MSM in Burkina Faso, Côte d'Ivoire, Mali, and Togo.

Design: Prospective cohort study between 2015 and 2019.

Methods: MSM aged 18 years or older newly diagnosed with HIV infection were eligible to participate. ART was proposed to participants upon HIV diagnosis, irrespective of clinical stage and $CD4^+$ cell count, and was initiated as soon as possible, with no specific time frame. Determinants of rapid ART initiation and its effect on treatment outcomes were assessed using multivariate analyses.

Results: Of 350 MSM, 335 (95.7%) initiated ART after a median time of 5 days. Of the latter, 216 (64.5%) had rapid ART initiation. The 335 participants were followed up for a median time of 24.1 months. One hundred and eleven (33.1%) were not retained in care. Rapid ART initiation was less likely in participants with a $CD4^+$ cell count at least 200 cells/μl [adjusted odds ratio (aOR) 0.37, 95% confidence interval (CI) 0.15–0.88]. It improved viral load suppression (aOR 6.96, 95% CI 1.98–24.46) but had no effect on attrition (aOR 0.87, 95% CI 0.57–1.33) or $CD4^+$ cell count increase (adjusted coefficient 28.23, 95% CI −17.00 to 73.45).

Conclusion: These results in MSM in West Africa support the WHO recommendation for rapid ART initiation. Clinics need to develop context-specific strategies for rapid ART initiation and for retaining MSM in HIV care.

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Introduction

Early antiretroviral therapy (ART) initiation reduces HIV-related morbidity and mortality, and contributes to HIV transmission prevention by rapidly suppressing HIV viral load [1–4]. It can also help to control the RNA reservoir when treatment is initiated during the acute HIV infection [5–7]. Since September 2015, the WHO

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has recommended ART for all adults and adolescents living with HIV, irrespective of WHO clinical stage and $CD4^+$ cell count [8]. In July 2017, WHO updated its treatment guidelines by recommending rapid ART initiation – defined as commencing ART within 7 days of HIV diagnosis – for the above groups, including same-day initiation for people ready to start treatment [9,10]. A systematic review of seven randomized controlled trials in adults aged 18 years or older, showed that rapid ART initiation improved ART uptake, viral load suppression and retention in care at 12 months [11–18]. However, the authors concluded that pragmatic research is needed to validate the effects observed in trials when rapid ART initiation is implemented in health systems. In contrast to trials, recent observational studies in Southern Africa found that same-day ART initiation was associated with lower retention in care [19–21].

In West Africa, the HIV epidemic is concentrated in key populations – including MSM – which together with their sexual partners represented 69% of all new HIV infections in 2019 [22]. Unfortunately, access to and retention in HIV prevention and care services for West African MSM are particularly low [23,24], due in part to social and legal barriers (homophobia, stigmatization, discrimination, violence and criminalization of same-sex relationships) [25,26]. Therefore, studies on the effects of care strategies in this population are needed to improve their management by informing policy. In particular, data on rapid ART initiation and its effect on treatment outcomes are lacking.

The CohMSM study was designed to assess the feasibility and benefit of implementing quarterly HIV prevention and care services for MSM in Burkina Faso, Côte d'Ivoire, Mali, and Togo. One of its features was to propose ART initiation to MSM as soon as possible after HIV diagnosis, irrespective of their clinical stage and $CD4^+$ cell count. As the study began in June 2015, rapid ART initiation was not considered, as the latter practice was only recommended by the WHO in 2017. National guidelines in all four study countries adopted the universal treatment strategy in 2018–2019 but rapid ART initiation was included only in Mali's guidelines (the other countries did not specify a specific time for initiation) [27–30]. In the present analysis, we assessed the time from HIV diagnosis to ART initiation and the effect of rapid ART initiation on attrition and virologic and immunologic responses among MSM participating in CohMSM. In addition, we assessed the effect of same-day ART initiation on the same treatment outcomes.

Methods

Study design, setting and participants

A prospective cohort study was performed in HIV-seropositive MSM between June 2015 and December 2019 in Abidjan (Côte d'Ivoire), Bamako (Mali), Lomé (Togo) and Ouagadougou (Burkina Faso). In each country, participants were enrolled and followed up in a community-based clinic already providing MSM-specific prevention, care, and support (*Clinique de Confiance* in Abidjan, *Clinique des Halles* in Bamako, *Centre Lucia* in Lomé and *Centre Oasis* in Ouagadougou). MSM aged 18 years or over and diagnosed HIV-seropositive for the first time either at CohMSM enrolment or during follow-up were eligible to participate.

Study procedures

For those who agreed to take ART, treatment was initiated as soon as possible after HIV diagnosis, irrespective of clinical stage and $CD4^+$ cell count. These participants received treatment recommended in national protocol of each study country, which all follow the WHO guidelines (the preferred first-line ART switched from efavirenz-based to dolutegravir-based regimen in Burkina Faso in March 2019 and in Côte d'Ivoire in June 2019). They attended scheduled study visits with physicians and peer-educators at ART initiation, day 15, months 1 and 3, and every 3 months thereafter. Those who declined to start ART attended scheduled visits every 3 months. All participants could attend the clinics at any time for an unscheduled visit according to their needs. Finally, with their consent, peer-educators could contact the participants by phone if they were 15 days late for their scheduled visits.

At ART initiation and at each scheduled follow-up visit, participants had a clinical examination, were screened and treated for other sexually transmitted infections (STI; using the syndromic approach plus, once a year, serology assays for syphilis), benefited from personalized peer-led counselling (prevention and adherence) and psychosocial support, were provided condoms and lubricants, and – for those on ART – had their prescription refilled. Plasma HIV viral load and $CD4^+$ cell count were measured using quantitative reverse transcriptase PCR (Roche Cobas, limit of quantification 20 copies/ml in Abidjan and Ouagadougou, and Abbott m2000 Real Time, limit of quantification 40 copies/ml in Bamako and Lomé) and flow cytometry (FACSPresto in Abidjan and Bamako, FACSCount in Lomé, and Cyflow counter in Ouagadougou), respectively, at ART initiation and every 6 months thereafter. All services were free of charge. Participants were compensated US$5 for transport costs for each scheduled visit.

Outcomes

First, we measured the proportion of participants who initiated ART following the invitation to do so. Second, we assessed the time from HIV diagnosis to ART initiation in those who agreed to start it. Third, we assessed the effect of rapid ART initiation – using the WHO definition, where initiation occurs within 7 days of HIV diagnosis [10] – on attrition, viral load suppression

and $CD4^+$ cell count increase (main analysis). Finally, we assessed the effect of same-day ART initiation on the same treatment outcomes (secondary analysis). Reasons for attrition included loss to follow-up, deaths and transfers to another healthcare facility (excluding the study sites). Participants were considered lost to follow-up if they did not attend their previous scheduled visit – defined as attending on the scheduled date plus or minus 45 days – prior to the date of study censoring (31 December 2019). Viral load suppression was defined as a plasma RNA level less than 1000 copies/ml. $CD4^+$ cell count increase was calculated as the difference between the $CD4^+$ cell count at ART initiation and at all scheduled 6-monthly visits. Clinical data were recorded in a standardized file by attending physicians. Socio-demographic and behavioural data were collected using a standardized face-to-face questionnaire administered by trained research assistants.

Statistical analysis

First, we calculated follow-up time from the date of HIV diagnosis to the date of last attended visit, death or transfer out. We then calculated the time between HIV diagnosis and ART initiation in participants who agreed to start treatment, and identified factors associated with rapid ART initiation using logistic regressions. Finally, we assessed the associations of rapid ART initiation (or same-day ART initiation) and other potential determinants with attrition, using the Kaplan–Meier method and log-rank test, and then Cox models; viral load suppression, using mixed logistic regressions; $CD4^+$ cell count increase, using mixed linear regressions. All independent variables associated with outcomes, which had a P value less than 0.20 in univariate analyses were included in the complete multivariate model. However, in order to control for any study site-specific confounding effect and/or sampling size-related bias, the city variable was systematically specified in the multivariate models. A manual backward selection based on the maximum likelihood method was used to determine the final multivariate models. We used time-constant and time-varying independent variables. The former included the study city, participant age, educational level, marital status, self-perceived financial situation and history of HIV screening. The latter included self-defined sexual orientation, self-identified gender, sexual attraction (to women, men or both), condomless anal sex during their most recent sexual intercourse, number of times they had anal sex with men in the previous 4 weeks and STI (other than HIV) symptoms. We assigned participants who did not return to the clinic after ART initiation as having had 1 day of follow-up, to ensure they were included in the survival analyses of attrition. All statistical analyses were performed using Stata software (version 15; Stata Corp LP, College Station, Texas, USA). The CohMSM study is registered with ClinicalTrials.gov, number NCT02626286.

Ethical considerations

The study protocol was approved by ethics committees in Burkina Faso, Côte d'Ivoire, Mali, and Togo, and the institutional ethics committee of the French *Institut de Recherche pour le Développement*. All participants provided written informed consent.

Results

Characteristics of participants

Of the 886 MSM in CohMSM, 255 were HIV-seropositive at enrolment (hereafter 'prevalent cases') and 95 seroconverted during follow-up (hereafter 'incident cases'). Of these 350 HIV-infected MSM, 335 (95.7%) initiated ART during the study period. The characteristics of the latter at HIV diagnosis are described in Table 1. Median age was 24 years [interquartile range (IQR) 21.2–27.7). One hundred and sixty-eight (50.4%) self-defined as bisexual, and 139 (41.7%) as homosexual/gay. With regard to sexual behaviours in the previous 4 weeks, 148 (45.7%) reported having had anal sex with men between one and four times, and 121 (37.3%) at least five times. One hundred and seventy-seven (55.5%) reported condomless anal sex during their most recent sexual intercourse. Sixty-four (19.2%) had at least one STI symptom (urethral or anal discharge, penile or anal ulceration, or condyloma), and three (0.9%) had serological evidence of syphilis. All participants were infected with HIV-1, and three of them were co-infected with HIV-2. Two hundred and fifty (74.6%) had already been tested for HIV before diagnosis. Almost all ($n = 320$, 95.8%) were at WHO clinical stage 1. Median $CD4^+$ cell count was 398 cells/μl (IQR 287–529), and median HIV viral load was 4.7 $\log_{10}$ copies/ml (IQR 4.1–5.3). Three hundred and eleven participants (92.8%) received efavirenz-based ART, and 14 (4.2%) dolutegravir-based ART. Median follow-up time for the 335 ART participants was 24.1 months (IQR 12.7–39.6).

Time to antiretroviral therapy initiation

Median time from HIV diagnosis to ART initiation was 5 days (IQR 1–13). Eighty participants (23.9%) initiated ART the same day, 216 (64.5%) within 7 days (i.e. rapid ART initiation), 268 (80%) within 15 days, and 298 (89.0%) within 30 days. Specifically, the proportions of participants initiating ART on the same day and within 7 days were 60.2 and 88.2% in Abidjan, 3.9 and 67% in Bamako, 6 and 41.8% in Lomé, and 22.2 and 51.4% in Ouagadougou, respectively.

In multivariate analysis (Table 2), rapid ART initiation was higher in Abidjan [adjusted odds ratio (aOR) 11.38, 95% confidence interval (CI) 5.08–25.50, $P < 0.001$] and Bamako (aOR 2.97, 95% CI 1.53–5.76, $P = 0.001$) than in Lomé. It was lower in participants who had a $CD4^+$

Table 1. Baseline characteristics of the 335 study's participants who initiated antiretroviral therapy.

	N	*n* (%) or median (IQR)
City	335	
Bamako		103 (30.7%)
Abidjan		93 (27.8%)
Ouagadougou		72 (21.5%)
Lomé		67 (20.0%)
HIV status	335	
Prevalent cases		247 (73.7%)
Incident cases		88 (26.3%)
Age in years	334	24.0 (21.2–27.7)
Educational level	328	
Never attended school/Koranic school		15 (4.6%)
Primary school		49 (14.9%)
Secondary school		151 (46.0%)
University		113 (34.5%)
Marital status	328	
Single/divorced/separated/widowed		266 (81.1%)
Married/free union		62 (18.9%)
Self-perceived financial situation	328	
Comfortable/just making ends meet		152 (46.3%)
Difficult/very difficult		176 (56.7%)
Self-defined sexual orientation	333	
Bisexual		168 (50.4%)
Homosexual/gay		139 (41.7%)
Transsexual/transgender		13 (3.9%)
Heterosexual		7 (2.1%)
Preferred not to answer		6 (1.8%)
Self-identified gender	333	
A man/a boy		150 (45.1%)
Both a man and a woman		126 (37.8%)
Much more a woman		53 (15.9%)
Neither a man nor a woman		4 (1.2%)
Sexual attraction	332	
To men		193 (58.1%)
To men and women		132 (39.8%)
To women		7 (2.1%)
Number of anal sexual intercourses with men[a]	324	
0		55 (17.0%)
1–4		148 (45.7%)
≥ 5		121 (37.3%)
Condomless anal sex during most recent sexual intercourse	319	177 (55.5%)
History of HIV screening	335	250 (74.6%)
STI (other than HIV) symptoms	334	64 (19.2%)
WHO HIV stage	334	
1		320 (95.8%)
2		13 (3.9%)
3		1 (0.3%)
$CD4^+$ cell count (cells/μl)	324	398 (287–529)
HIV viral load (log_{10} copies/ml)	315	4.7 (4.1–5.3)

STI, sexually transmitted infection.
[a]During the previous 4 weeks.

cell count at least 200 cells/μl (aOR 0.37, 95% CI 0.15–0.88, $P = 0.025$).

Attrition

One hundred and eleven participants (33.1%) were not retained in care (i.e. no longer participated in CohMSM), including 104 lost to follow-up, three who died, and four who transferred to another HIV service. All those retained in care were on ART. Overall attrition rate was 17.5 per 100 person-years (95% CI 14.5–21.1). The probability of attrition was 18% (95% CI 14–23) at month 12, 28% (95% CI 23–34) at month 24, and 38% (95% CI 32–44) at month 36. As shown in Fig. 1, rapid ART initiation was not associated with attrition ($P = 0.797$).

Just as in the univariate analysis, rapid ART initiation was not associated with attrition in the multivariate analysis [adjusted hazard ratio (aHR) 0.87, 95% CI 0.57–1.33, $P = 0.525$; Table 2]. Attrition was higher in Ouagadougou (aHR 7.77, 95% CI 3.21–18.78, $P < 0.001$), Abidjan (aHR 5.15, 95% CI 2.11–12.59, $P < 0.001$), and Bamako (aHR 4.36, 95% CI 1.83–10.38, $P = 0.001$) than in Lomé. It was also higher in participants who perceived their financial situation as difficult or very difficult (aHR 1.44, 95% CI 1.28–1.62, $P < 0.001$). Finally, attrition was

Table 2. Factors associated with rapid antiretroviral therapy initiation (logistic regressions) and study attrition after antiretroviral therapy initiation (Cox models).

	Rapid ART initiation						Attrition					
	Univariate analysis			Multivariate analysis			Univariate analysis			Multivariate analysis		
	OR	95% CI	*P*	aOR	95% CI	*P*	HR	95% CI	*P*	aHR	95% CI	*P*
Time to ART initiation ≤7 days							0.95	0.64–1.39	0.798	0.87	0.57–1.33	0.525
City												
Lomé	Ref.			Ref.			Ref.			Ref.		
Abidjan	10.38	4.69–22.99	<0.001	11.38	5.08–25.50	<0.001	4.37	1.82–10.42	0.001	5.15	2.11–12.59	<0.001
Bamako	2.83	1.50–5.34	0.001	2.97	1.53–5.76	0.001	4.12	1.74–9.72	0.001	4.36	1.83–10.38	0.001
Ouagadougou	1.47	0.75–2.88	0.258	1.52	0.77–3.01	0.224	6.18	2.57–14.87	<0.001	7.77	3.21–18.78	<0.001
HIV status												
Prevalent cases	Ref.						Ref.					
Incident cases	0.64	0.39–1.06	0.081				1.01	0.66–1.55	0.947			
Age at least 24 years	1.49	0.95–2.34	0.080				0.61	0.42–0.89	0.010	0.53	0.36–0.78	0.001
Educational level												
Never attended school/koranic school	Ref.						Ref.					
Primary/secondary/university	1.16	0.88–1.54	0.283				0.61	0.30–1.26	0.185			
Marital status												
Single/divorced/separated/ widower	Ref.						Ref.					
Married/free union	1.31	0.95–1.81	0.103				1.04	0.65–1.66	0.871			
Self-perceived financial situation												
Comfortable/just making ends meet	Ref						Ref.			Ref.		
Difficult/very difficult	1.40	0.89–2.20	0.146				1.41	1.24–1.59	<0.001	1.44	1.28–1.62	<0.001
Self-defined sexual orientation												
Heterosexual	Ref.						Ref.					
Homosexual/gay	0.23	0.03–1.98	0.183				0.87	0.27–2.84	0.830			
Transsexual/transgender	0.14	0.01–1.54	0.109				1.32	0.26–6.56	0.735			
Bisexual	0.38	0.04–3.26	0.379				0.86	0.27–2.77	0.802			
Self-identified gender												
A man/a boy	Ref.						Ref.					
Both a man and a woman/much more a woman	1.18	0.75–1.86	0.471				1.22	0.84–1.80	0.298			
Sexual attraction												
To men	Ref.						Ref.					
To men and women	1.36	0.85–2.17	0.195				0.91	0.62–1.38	0.707			
To women	3.81	0.45–32.3	0.220				0.96	0.23–3.94	0.957			
Number of anal sexual intercourses with men[a]												
0	Ref.						Ref.					
1–4	0.95	0.49–1.81	0.867				0.97	0.58–1.62	0.909			
≥ 5	0.89	0.46–1.74	0.735				1.24	0.72–2.13	0.429			
Condomless anal sex during most recent sexual intercourse	1.77	1.11–2.83	0.017				1.40	0.91–2.17	0.128			
History of HIV screening	1.17	0.69–1.96	0.565				1.16	0.75–1.79	0.508			
STI (other than HIV) symptoms	1.07	0.73–1.58	0.724				1.85	1.04–3.27	0.035			
$CD4^+$ cell count at least 200 (cells/μl)	0.49	0.22–1.13	0.096	0.37	0.15–0.88	0.025	0.87	0.34–2.20	0.774			

aHR, adjusted hazard ratio; aOR, adjusted odds ratio; ART, antiretroviral therapy; CI, confidence interval; HR, hazard ratio; OR, odds ratio; Ref, reference; STI, sexually transmitted infection.
[a]During the previous 4 weeks.

lower in participants aged 24 years or over (aHR 0.53, 95% CI 0.36–0.78, $P = 0.001$).

Viral load suppression

Eighty-six percentage of those with rapid ART initiation had a viral load less than 1000 copies/ml versus 76.8% in those who initiated ART later (Fig. 1). Rapid ART initiation was associated with a greater likelihood of viral load suppression in both univariate (OR 5.46, 95% CI 1.88–15.90, $P = 0.002$) and multivariate analyses (aOR 6.96, 95% CI 1.98–24.46, $P = 0.003$; Table 3). In addition, viral load suppression was more likely in participants aged 24 years or over (aOR 28.87, 95% CI 8.21–101.55, $P < 0.001$), in those who had at least been to primary school (aOR 16.01, 95% CI 1.37–187.52, $P = 0.027$), and in those with a $CD4^+$ at least 500 cells/μl (aOR 34.62, 95% CI 4.20–285.10, $P = 0.001$). By contrast, the likelihood of viral load suppression decreased as follow-up time increased (aOR 0.97 per 1 month increase, 95% CI 0.94–1.00, $P = 0.050$).

$CD4^+$ cell count increase

Median $CD4^+$ cell count increase from baseline was 172 cells/μl at month 12, 169 cells/μl at month 24, and 253 cells/μl at month 36, in participants with rapid ART initiation. The respective figures for those who initiated ART later were 152, 171, and 160 cells/μl (Fig. 1).

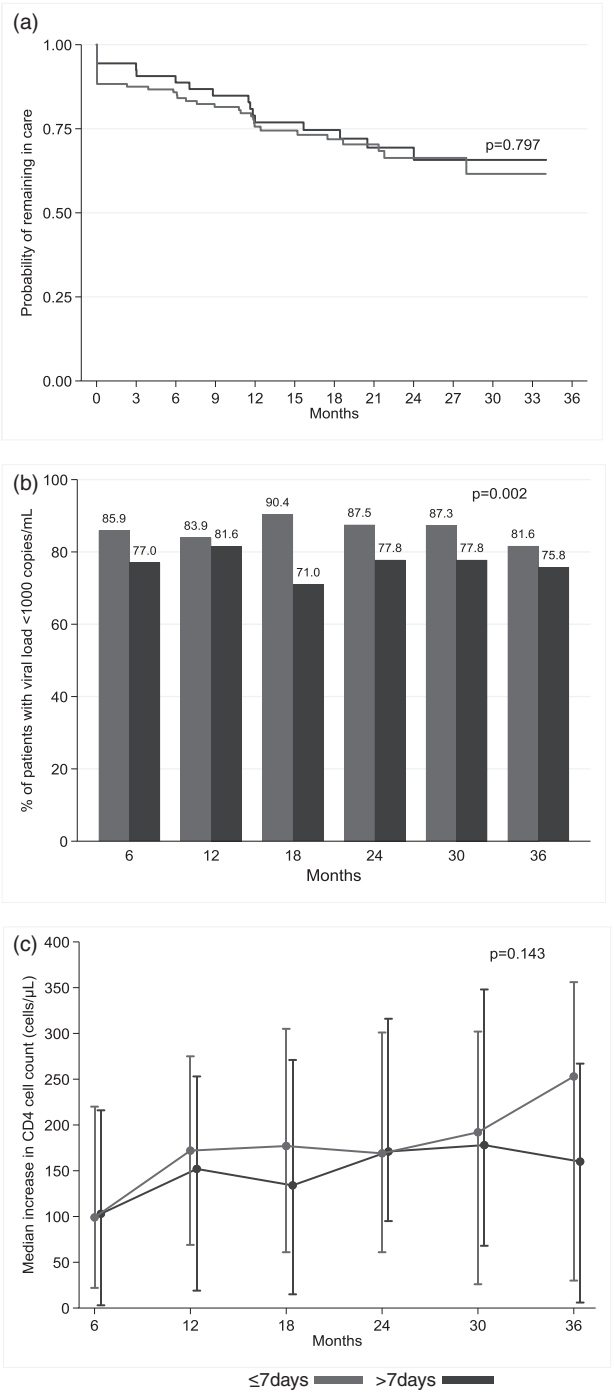

Fig. 1. Outcomes in the study participants according to timing of antiretroviral therapy initiation. (a) Attrition, (b) viral load suppression, (c) $CD4^+$ cell count increase.

Rapid ART initiation was not associated with $CD4^+$ cell count increase in either univariate (coefficient 33.63, 95% CI −11.38 to 78.64, $P=0.143$) or multivariate analyses (adjusted coefficient [aβ] 28.23, 95% CI −17.00 to 73.45, $P=0.221$; Table 3). $CD4^+$ cell count increase was higher in participants who reported condomless anal sex during their most recent sexual intercourse (aβ 46.42, 95% CI 12.21–80.63, $P=0.008$). It also increased with longer follow-up time (aβ 1.38 per 1 month increase, 95% CI 0.50–2.26, $P=0.002$). $CD4^+$ cell count increase was lower in participants followed in Ouagadougou (aβ −83.15, 95% CI −144.28 to −22.03, $P=0.008$) and in those with a higher $CD4^+$ cell count at ART initiation (aβ −0.36 per 1-cell/μl increase, 95% CI −0.46 to −0.26, $P<0.001$).

Same-day antiretroviral therapy initiation

In contrast to rapid ART initiation, same-day initiation was not associated with viral load suppression in either univariate (OR 3.33, 95% CI 0.90–12.31, $P=0.072$) or multivariate analyses (aOR 1.81, 95% CI 0.29–11.08, $P=0.522$). Furthermore, but consistent with rapid ART initiation, same-day initiation was also not associated with attrition (hazard ratio 1.12, 95% CI 0.72–1.75, $P=0.607$ and aHR 1.05, 95% CI 0.59–1.84, $P=0.875$) or $CD4^+$ cell count increase (β 0.55, 95% CI −53.42 to 54.52, $P=0.984$ and aβ −1.91, 95% CI −61.26 to 57.45, $P=0.950$). In the three final multivariate models, the covariates were the same as for the analyses of rapid ART initiation and had comparable results.

Discussion

In this multicountry prospective cohort study in West Africa, approximately two-thirds of MSM newly diagnosed with HIV infection had rapid ART initiation as per WHO recommendations (i.e. initiation within 7 days of HIV diagnosis irrespective of clinical stage and $CD4^+$ cell count), and a quarter started it the same day [8,10]. Moreover, rapid ART initiation was associated with a better virologic response, which is consistent with the above mentioned systematic review of randomized controlled trials [11] as well as with an implementation study in MSM in the Netherlands [16,31]. However, rapid ART initiation had no significant effect on attrition or immunologic response.

Almost all participants (95.7%) initiated ART after a median time of 5 days, which is consistent with recent data reported in Namibia [32]. In addition to the clinical benefits for the patients themselves, this is a very positive result for HIV transmission prevention [4,33,34], given that the participants reported frequent anal sexual intercourse with men, and frequent condomless anal intercourse. Unfortunately, one-third of participants were lost to follow-up. Although it is possible some of them may have received ART elsewhere, it is more likely that many stopped ART. Our data are consistent with others on MSM and general populations in sub-Saharan Africa [24,35,36]. Together, these findings illustrate the difficulty to retain patients in care. Apart from being invited to initiate ART, participants in CohMSM were offered a

Table 3. Factors associated with HIV viral load suppression (i.e. < 1000 copies/ml; mixed logistic regressions) and CD4$^+$ cell count increase (mixed linear regressions) over study period.

	Viral load suppression						CD4$^+$ cell count increase					
	Univariate analysis			Multivariate analysis			Univariate analysis			Multivariate analysis		
	OR	95% CI	*P*	aOR	95% CI	*P*	*β*	95% CI	*P*	aβ	95% CI	*P*
Time to ART initiation 7 days or less	5.46	1.88–15.90	0.002	6.96	1.98–24.46	0.003	33.63	−11.38 to 78.64	0.143	28.23	−17.00 to 73.45	0.221
City												
Lomé	Ref.			Ref.			Ref.			Ref.	.	
Abidjan	0.80	0.18–3.51	0.769	0.30	0.06–1.65	0.168	−49.02	−109.81 to 11.76	0.114	−58.28	−117.79 to 1.23	0.055
Bamako	0.31	0.07–1.30	0.110	0.28	0.06–1.38	0.117	−048.28	−109.05 to 12.49	0.119	−51.90	−108.74 to 4.93	0.073
Ouagadougou	0.71	0.14–3.62	0.679	0.52	0.09–2.98	0.463	−80.56	−147.83 to −13.28	0.019	−83.15	−144.28 to −22.03	0.008
HIV status												
Prevalent cases	Ref.						Ref.					
Incident cases	0.73	0.24–2.26	0.589				12.73	−36.00 to 61.45	0.609			
Follow-up time (per one-month increase)	0.97	0.94–1.00	0.032	0.97	0.94–1.00	0.050	1.36	0.47 to 2.24	0.003	1.38	0.50 to 2.26	0.002
Age ≥24 years	20.42	6.73–61.92	<0.001	28.87	8.21–101.55	<0.001	37.38	−6.73 to 81.50	0.097			
Educational level												
Never attended school/ koranic school	Ref.			Ref.			Ref.					
Primary/secondary/ university	12.50	1.06–147.66	0.045	16.01	1.37–187.52	0.027	75.96	−16.19 to 168.11	0.106			
Marital status												
Single/divorced/ separated/widower	Ref.						Ref.					
Married/free union	0.89	0.41–1.93	0.769				−3.81	−40.79 to 33.17	0.804			
Self-perceived financial situation												
Comfortable/just making ends meet	Ref						Ref.					
Difficult/very difficult	0.78	0.36–1.67	0.525				2.58	−26.35 to 31.51	0.861			
Self-defined sexual orientation												
Heterosexual	Ref.						Ref.					
Homosexual/gay	0.48	0.05–4.34	0.511				35.06	−36.71 to 106.84	0.338			
Transsexual/transgender	2.09	0.03–142.84	0.733				58.56	−60.44 to 177.56	0.335			
Bisexual	0.42	0.05–3.79	0.442				5.06	−65.91 to 76.04	0.889			
Self-identified gender												
A man/a boy	Ref.						Ref.					
Both a man and a woman/ much more a woman	0.82	0.38–1.75	0.613				3.95	−0.85 to 8.76	0.107			
Sexual attraction												
To women	Ref.						Ref.					
To men/to men and women	9.29	0.97–89.2	0.054				78.87	−8.88 to 166.62	0.078			
Number of anal sexual intercourses with men[a]												
0	Ref.						Ref.					
1–4	1.68	0.77–3.65	0.190				−0.42	−28.64 to 27.80	0.977			
≥ 5	1.37	0.53–3.53	0.510				2.29	−31.28 to 35.87	0.894			
Condomless anal sex during most recent sexual intercourse	2.38	0.90–6.27	0.080				49.12	14.26 to 83.98	0.006	46.42	12.21 to 80.63	0.008

Table 3 (*continued*)

	Viral load suppression						$CD4^+$ cell count increase					
	Univariate analysis			Multivariate analysis			Univariate analysis			Multivariate analysis		
	OR	95% CI	*P*	aOR	95% CI	*P*	*β*	95% CI	*P*	aβ	95% CI	*P*
History of HIV screening	0.84	0.25–2.88	0.788				35.96	−16.01 to 87.97	0.175			
STI (other than HIV)	0.41	0.11–1.48	0.173				−26.69	−77.24 to 23.85	0.301			
symptoms												
$CD4^+$ cell count (cells/μl) [b]												
< 200	Ref.			Ref.								
200–350	2.90	0.37–22.45	0.309	2.93	0.36–23.96	0.314						
350–500	5.91	0.77–45.15	0.087	5.91	0.72–48.14	0.097						
≥500	31.63	4.08–245.20	0.001	34.62	4.20–285.10	0.001						
$CD4^+$ cell count at ART initiation (per 1-cell/μl increase)							−0.37	−0.47 to 0.27	<0.001	−0.36	−0.46 to −0.26	<0.001

aHR, adjusted hazard ratio; aOR, adjusted odds ratio; ART, antiretroviral therapy; CI, confidence interval; HR, hazard ratio; OR, odds ratio; Ref, reference; STI, sexually transmitted infection.
[a]During the previous 4 weeks.
[b]Time varying.

combination of prevention and care services in MSM-friendly community-based clinics, including retention strategies, such as peer-led counselling and support, reminder phone calls after missed follow-up visits and compensation for transport costs. The high attrition rate observed and the heterogeneity of attrition between our study countries underscore the need for additional context-specific strategies to retain MSM in care. Unsurprisingly, participants' perception of their financial situation as difficult or very difficult was a risk factor for attrition [37,38], despite all services being free of charge and transport costs being compensated. Finally, our study emphasises the need for special attention for young MSM in terms of HIV care (i.e. for treatment retention and response), as is the case for young HIV-seropositive people in other populations [39–41].

The 64.5% of participants who initiated ART within 7 days is encouraging, especially given that the study did not aim to initiate treatment within a specific time frame. By comparison, in a study offering same-day ART initiation in Botswana, 73.7% of patients (diagnosed HIV-seropositive at study enrolment or known to be HIV-seropositive before enrolment) initiated ART within 7 days [42]. It is important to note that our participants were all newly diagnosed with HIV infection and that rapid ART initiation was, as expected, lower in those with an increased $CD4^+$ cell count. Overall, this finding shows how well community-based clinics in West Africa are able to offer rapid ART initiation. However, differences in the timing of ART initiation were observed between the study clinics and may be related to organizational constraints (e.g. the unavailability of biological tests in clinics) and medical practices (e.g. to prepare patients for ART). Thus, a key element in the faster initiation of ART in Abidjan was the fact that this practice (including same-day initiation) was encouraged in PEPFAR-supported activities. Clinics need to overcome these barriers in order to rapidly initiate ART in all patients.

The main strength of this study is the fact that it was performed in four West African countries, which allowed us to highlight inter-country differences in certain outcomes. Another strength is the relatively long follow-up time. However, our findings should be interpreted taking into account several limitations. First, the study was performed in MSM enrolled and followed up in MSM-friendly community-based clinics. Accordingly, our participants may not be fully representative of the global MSM community in the four study countries. Second, two-thirds of MSM who initiated ART late did so between 8 and 30 days after HIV diagnosis, a relatively small difference in delay compared with rapid ART initiation. This may have limited the estimated effect of rapid ART initiation on treatment response. Similarly, slightly more than half of the MSM who did not initiate ART on the same day did so within the first 7 days. In

addition, our analyses may have lacked statistical power as reflected in the confidence intervals. Third, we did not study mortality because of the relatively small number of patients and instead analysed the increase in $CD4^+$ cell count. However, our study may have also lacked statistical power for this analysis, given that most participants had a relatively high $CD4^+$ cell count at ART initiation and that $CD4^+$ cell count increase was lower in these participants, in accordance with previous studies [43]. Finally, the analyses of virologic and immunologic responses were hampered by the high proportion of participants lost to follow-up and the lack of data on these outcomes afterwards. This limited the assessment of the true effect of rapid ART initiation on treatment response.

In conclusion, the high proportion of participants who agreed to start ART, the short delay between HIV diagnosis and ART initiation, and the positive effect of rapid ART initiation on viral load suppression in MSM newly diagnosed with HIV infection in West Africa, all support the WHO recommendation for rapid ART initiation. Clinics in this region need to set up context-specific strategies to rapidly initiate ART and to retain MSM in care.

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Conflicts of interest

There are no conflicts of interests.

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