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Viral load suppression and retention in care among children and adolescents receiving multi-month anti-retroviral therapy refills: a program data review in Uganda

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Abstract

Background In July 2022, Uganda's Ministry of Health extended the 2021 WHO guidelines that recommended 3–6 monthly dispensing of antiretroviral therapy (ART) to include all children and adolescents living with HIV (CALHIV). Treatment outcomes following this recommendation have not yet been documented. We compared viral load (VL) suppression and retention in HIV care rates among CALHIV receiving 1, 2–5, and > =6 monthly ART dispensation in Uganda.

Methods A cross-sectional study of electronic medical records in 118 health facilities was conducted. Data for CALHIV 10–19 years captured at their most recent five clinic visits as of 15th May 2023 were analysed. Most recent two VL < 1000 copies/ml were used as measures for VL suppression and sustained VL suppression. A client was considered retained in care if they visited the clinic within 28 days from their expected return visit date. We used margins plots and a modified poisson model adjusting for facility level clustering to assess VL suppression and retention across multi-month ART categories.

Results A total of 2864 CALHIV, 1609 (56.2%) being females and with a median age of 12 years (inter quartile range, iqr = 7) were included. Overall suppression and retention rates were 80.4% (2133/2654) and 87.8% (2514/2864) respectively. A significant number had been dispensed ART for ≥ 2 months (50%, 2–5 months and 43.5%, ≥ 6 months). Probability of having a suppressed VL was higher among CALHIV that had received ≥ 6 months and 2–5 months of ART compared to those of 1 month i.e., 83% vs 79% vs 41% respectively. Probability of being retained in care didn't differ across multi-month ART categories. CALHIV who received ART for 2–5 months and ≥ 6 months compared to 1 month were more likely to have a suppressed VL; (adj.PR = 1.98; 95%CI:1.41, 2.80) and (adj.PR = 2.21; 95% CI:1.59, 3.05) respectively. CALHIV with a Tuberculosis diagnosis history were less likely to have a suppressed VL (adj.PR = 0.73; 95%CI:0.65,0.81), however this was not statistically significantly different between multi-month categories.

Conclusion CALHIV receiving multi-month ART including 6 months dispensation had better VL suppression rates. Retention rates however didn't differ by multi-month dispensing categories as observed among adults in the interval

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trial. We recommend multi-month ART dispensation including more than 6 months among CALHIV irrespective of their age, clinical stage, and history of prior co-morbidities.

Keywords HIV, Multi-month, Children, Adolescents, Viral suppression and retention

Background

Over the last two decades, the number of people living with HIV (PLHIV) accessing anti-retroviral therapy (ART) globally has exponentially increased from less than 3 million in 2003 [1] to 29.8 million in 2022 [2]. This trajectory has been associated with reduced AIDS related mortality as well as improved quality of life among PLHIV [3, 4]. Similar trends have been observed among children and adolescents especially in high HIV burden sub–Saharan Africa [5, 6]. Most recently the need to offer more than just ART and beyond viral load suppression is growing among recipients and providers of HIV care to also include health related quality of life (HRQoL) [7, 8], and patient-centered care [9, 10]. Patient centered care (PCC) is defined as "providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions" [11].

Children and adolescents [12] living with HIV (CALHIV) face unique challenges hindering them to achieve their treatment targets [13]. Globally adolescents have been shown to have poor viral load (VL) suppression and retention in HIV care rates compared to the adult population [14–16] and consequently children living with HIV and born to such adolescent mothers have the same fate. The need for better therapeutic options, systems in place to promote ART adherence and retention in HIV care for adolescents as well as offering a child centered approach in HIV programming have been underscored [17, 18]. It is not uncommon therefore to recommend needs-tailored HIV services for children and adolescents to mitigate such challenges. According to the 2020 framework [19] guiding country programs to improve service delivery for infants, children and adolescents, decentralised care and differentiated service delivery (DSD) HIV approaches are some of the recommended strategies to improve continuity in care.

Facility level multi-month dispensing (MMD) of ART is one of the strategies that has been shown to meet the needs to clients [20] as a way to offering patient centred care; reducing the burden for frequent clinic travels, long waiting times and high costs of travel among others. Published literature on treatment outcomes following multi-month ART dispensation already exist among the adult population [20–22], but scarce among CALHIV. The few published studies among children or/and adolescents focused on trends in scale-up of MMD [23] and impact of covid-19 on MMD [24] but didn't access for VL suppression and retention in care as part of their outcomes. One study however in Tanzania has shown that adolescents on 3 and 6 months ART were more likely to be virally suppressed [25]. Gray literature through the World Health Organisation [26] have now recommended ART MMD for children and adolescents including up to/or more than 6 months. Despite this however, treatment outcomes including viral load suppression have not been documented. Our study therefore set out to assess VL suppression and retention in care rates comparing children and adolescents who received 1, 2–5 and ≥ 6 + months of ART dispensation in eastern Uganda.

Methods

Study design, setting and population

This was a cross sectional analytic study design among CALHIV receiving care in facilities within districts of eastern Uganda. Data from electronic medical records (EMR) in 118 health facility HIV clinics supported by Baylor College of Medicine Children's Foundation Uganda under the USAID Local Partner Health Services project (eastern Uganda) were abstracted. The region has 158 HIV care and treatment Centres all of which have functional EMR systems where clients' data routinely captured in files is updated. Both clients' files and computers with EMR databases are kept at their corresponding health facilities.

Based on quarterly project reports the selected facilities contributed 86% of the regional number of active clients in care by January-March 2023 quarter. Of the 118 health facilities, five (5) were general hospitals, sixteen (16) were health centre IV and ninety five (95) were health centre III. In Uganda, a decentralized health care system is used to deliver health services and it is categorised in seven tiers, including national referral hospitals, regional referral hospitals, district hospitals, health center IV, health center III, health center II and community health workers (CHWs), locally referred to as the Village Health teams. The region has one regional referral hospital (RRH) with but was not included in this analysis because of ethical approval processes. All RRH in Uganda were transitioned from regional to one centralised implementing partner as of 2021.

Clients included in this evaluation were managed as per Uganda's HIV care and treatment guidelines [27]. The

job aid to these guidelines (page 212) attached as appendix I recommend multi-month prescriptions to all clients on less intensive (community-based) approaches like Community Drug Distribution Points (CDDPs). It further guides (page 209) that unsuppressed clients can now also receive care from community based approaches. Clients irrespective of their VL level could receive 1–6 months of ART depending of the clinician's assessment. All sites included in this study provide similar HIV care services including among others; HIV counselling and testing, tuberculosis screening and testing, baseline CD4 count and viral load testing, as well as multi-month ART dispensing. The region started multi-month ART dispensation for CALHIV in July 2022.

Sampling, inclusion, and exclusion criteria

We purposively sampled health facilities with majority (3156/3459, 91%) of CALHIV within the supported project facilities in the region. Data for CALHIV 0–19 years in facility EMRs captured at their most recent five clinic visits as of 14th June 2023 was used for analysis. Only CALHIV who had been on ART for at least 6 months were included in this analysis.

Data collection procedures

Data was downloaded from the ministry of health EMR system as Microsoft spreadsheets guided by the following variables: socio-demographic characteristics, HIV diagnosis and treatment, viral load tests, ART regimen, adherence rates, TB status and last clinic encounter dates among others. Data quality checks were conducted, and missing data were cross-referenced from ART and viral load registers and ART dispensing logs and cleaned accordingly. Data were cleaned in Microsoft spreadsheets and exported to Stata statistical software version 18.0 for analysis.

Variables measurements

The main outcomes of interest were viral load suppression and retention in care. VL suppression was defined as most recent VL < 1000 copies/ml based on the 2018 guidelines in Uganda [28] while sustained VL suppression was measured as two consistent VL < 1000 copies/ml on the most recent viral load values. Retention was defined as keeping appointment within 28 days from the scheduled appointment date, factoring in the number of days medication prescribed to the client. Retention for charts with only one encounter visit date were evaluated based on the final date of data abstraction (14th June 2023) i.e., those who had not appeared despite being scheduled were considered as lost to follow-up from the clinic. Clients who were transferred out of the clinics were assessed based on their most recent clinic encounter. We categorized multi-month as follows; those who consistently received 1 month prescription only for all five clinic visits (1 month), those who had received at least one ≥ 6-month prescription in the five clinic visits (≥ 6 months) and the rest were within the 2–5 months prescription category. This categorization was used to reflect what happens in real clinical practice. Independent variables used in the multivariate model included socio-demographic characteristics (age, sex), clinical characteristics including ART regimen, duration in ART, and TB status. Data about TB diagnosis within 2022 and 2023 calendar years were considered during abstraction.

Statistical analysis

Descriptive statistics and margins plots were used to compare VL suppression and retention rates by multi-month ART dispensation. Determinants for viral load suppression were analysed using a modified Poison regression model with log-link and Poisson-family via a generalized linear model, adjusting for clustering at facility level. We report our findings in line with the recommended Strengthening of Observational Studies in Epidemiology (STROBE) statement guidelines.

Results

Participants individual characteristics and MMD

Table 1 shows characteristics of participants included in this study. Majority of participants were older adolescents, 10–19 years (65.9%), females (56.2) from either health centre IIIs or IVs. Over eighty two percent (82.2%) had been on HIV treatment for two years or more, with majority being on dolutegravir (DTG) based regimen. Most were with WHO clinical stage I (90.3%), and with no history of having been diagnosed with TB (98.6%). Table 2 shows frequency distributions of MMD by participants individual and clinical characteristics. Overall, there were statistically significant differences in proportions across MMD categories. CALHIV receiving more or equal to 6 months of ART were majorly from health centre III level (50%, $p = 0.001$). CALHIV receiving 2 or more months of ART drugs were majorly older adolescents 10–19 years of age (62.5%, 2–5 months, 71.6%, ≥ 6 months and 54.5%, 1 month, $p = 0.001$).

VL suppression, sustained VL suppression and retention by participant characteristics

Table 3 illustrates frequency distributions of VL suppression, sustained VL suppression, and retention in care by participants characteristics. There were statistically significant differences in both VL suppression and sustained VL suppression rates across MMD categories, history of TB diagnosis and facility level. Compared to younger adolescents, older adolescents

Table 1 Characteristics of study participants

Characteristics		n (%)
Overall		***n*** **= 2,864**
Health facility level	Hospital	484 (16.9)
	HCIV	986 (34.4)
	HCIII	1,394 (48.7)
Sex	Male	1,255 (43.8)
	Female	1,609 (56.2)
Age group[α]	0—9y	976 (34.1)
	10—19y	1,888 (65.9)
Duration on ART*	6—12 m	221 (7.7)
	13—24 m	288 (10.1)
	≥ 24 m	2,355 (82.2)
ART regimen	DTG based regimen	2,826 (98.7)
	Other regimens	38 (1.3)
WHO clinical stage	Stage I	2,585 (90.3)
	Stage II	102 (3.6)
	Stage III	24 (0.8)
	Missing	152 (5.3)
Transfer-outs	Yes	70 (2.4)
	No	2,794 (97.6)
History of TB diagnosis	Yes	40 (1.4)
	No	2,824 (98.6)

*Duration of ART in months, α - age reported in years, *HC* Health Centre, *ART* Anti-retroviral therapy, *TB* Tuberculosis, *DTG* Dolutegravir, Age group (0-9y) – Children, (10-19y) – Adolescents

10–19 years of age had significantly higher proportions of VL suppression; (68.3% vs. 31.7%, $p=0.02$), however this was not observed with sustained VL suppression (69.9% vs. 30.1%, $p=0.05$). Statistically significant differences in proportions of VL suppression and sustained VL suppression were observed across MMD categories; VL suppression (1 month: 3.0% vs. 2–5 months: 51.2% vs. ≥ 6 months: 45.8%, $p=0.001$), sustained VL suppression (1 month: 2.0% vs. 2–5 months: 51.8% vs. ≥ 6 months: 46.2%, $p=0.001$). Comparatively, there were significantly lower proportions of VL suppression among clients who had a TB diagnosis history. This however did not differ among those who received 1 month versus those who received ≥ 2 months of ART. Results in Table 3 also show that VL suppression and sustained VL suppression did not differ significantly by sex i.e., $p=0.927$ and $p=0.813$ respectively. Retention in HIV care on the other hand did not differ significantly by individual characteristics including MMD of ART. Results in Fig. 1 underscore results in Table 3, highlighting that the probability of VL suppression across MMD categories differed significantly while retention in care did not. The predicted probability of VL suppression among CALHIV that received ≥ 6 months was approximately 83% compared to 79% and 41% for those that received 2–5 months and 1 month of ART respectively. Retention rates across MMD categories ranged from 86 to 87%.

Predictors of VL suppression

Results in Table 4 show both crude and adjusted prevalence ratio estimates from the multivariate regression model that assessed the predictors for VL suppression. Overall, MMD, history of TB diagnosis and duration on ART were statistically significantly different. Compared to CALHIV that received 1 month of ART, those that received 2–5 months and ≥ 6 months were statistically significantly associated with VL suppression; (adj. PR = 1.98; 95%CI:1.41, 2.80) and (adj.PR = 2.21; 95% CI:1.59, 3.05) respectively. Those with a history of a TB diagnosis were less likely to have a suppressed VL; (adj. PR = 0.73; 95%CI:0.65, 0.81), however this didn't differ significantly among those who had TB and received 1 month versus those who received ≥ 2 months of ART. Duration on ART was statistically significantly associated with VL suppression with those who had spent 12 months or more on ART being less likely to have a suppressed VL. This probability however was marginally small i.e., 7% (adj.PR = 0.93, 95%CI:0.65, 0.81) for those 2–5 months and 4% (adj.PR = 0.96, 95%CI:0.94, 0.98) for those more than 24 months. Sex, age, health facility level, ART regimen, and WHO clinical stage were not statistically significantly different.

Discussion

Our study highlights that viral load suppression as well as sustained viral load suppression were better among CALHIV that received two or more months of ART compared to those receiving 1 month of ART. Significantly higher probability of being virally suppressed for those that received 2–5 months and ≥ 6 months of ART (adj.PR = 1.98; 95%CI:1.41, 2.80) and (adj.PR = 2.21; 95% CI:1.59, 3.05) respectively. Retention in care rates did not differ significantly by months of ART dispensed. These results indicate that clients given multi-months of ART drugs including beyond 6 months can still achieve and maintain suppressed VL rates as compared to those receiving monthly prescriptions. They also show that even with multi-month ART prescriptions, CALHIV can keep their scheduled clinic appointments.

Overall VL suppression and retention rates in this study were below the global targets of 95% however these results were not surprising given that this age group has been documented elsewhere to be challenged even beyond the HIV treatment itself i.e., socially, emotionally, and physically [29]. CALHIV receiving multi-month ART showing good viral load suppression rates compared

Table 2 Multi-month ART dispensation by individual characteristics

Variable	ART dispensation			
	≤ 1 month, n (%)	2–5 months, n (%)	> = 6 months, n (%)	*p*-value
Health facility level				**0.001**
Hospital	30 (16.0)	210 (14.7)	244 (19.6)	
HC IV	49 (26.2)	559 (39.0)	378 (30.4)	
HC III	108 (57.8)	663 (46.3)	623 (50.0)	
Sex				**0.028**
Male	78 (41.7)	663 (46.3)	514 (41.3)	
Female	109 (58.3)	769 (53.7)	731 (58.7)	
Age group (years)				**0.001**
0—9y	85 (45.5)	537 (37.5)	354 (28.4)	
10—19y	102 (54.5)	895 (62.5)	891 (71.6)	
WHO clinical stage				**0.001**
Stage1	150 (90.9)	1277 (93.0)	1158 (98.6)	
Stage2	10 (6.1)	83 (6.0)	10 (0.9)	
Stage3	5 (3.0)	13 (1.0)	6 (0.5)	
Duration on ART[a]				**0.001**
6—12 m	31 (16.6)	62 (4.4)	128 (10.3)	
13—24 m	22 (11.8)	138 (9.6)	128 (10.3)	
> 24 m	134 (71.6)	1,232 (86.0)	989 (79.4)	
ART regimen				**0.001**
DTG-based regimen	179 (95.7)	1410 (98.5)	1237 (99.4)	
Other regimens	8 (4.3)	22 (1.5)	8 (0.6)	

[a] Duration in months, *HC* Health Centre, *ART* Anti-retroviral therapy

Table 3 Viral load suppression and retention by individual characteristics

Variable	Viral load[a], *N* = 2,654			Sustained viral load[b], *N* = 2,372			Retention in HIV care, *N* = 2,864		
	< 1,000 cp/ml *n* = 2,133	> = 1,000 cp/ml *n* = 521	χ2	Yes *n* = 1625	No *n* = 747	χ2	Retained *n* = 2514	Not retained *n* = 350	χ2
Health facility level			**0.032**			**0.003**			0.599
Hospital	369 (17.3)	91 (17.5)		296 (18.2)	129 (17.3)		431 (17.1)	53 (15.1)	
HC IV	771 (36.2)	158 (30.3)		616 (37.9)	236 (31.6)		866 (34.5)	120 (34.3)	
HC III	993 (46.5)	272 (52.2)		713 (43.9)	382 (51.1)		1,217 (48.4)	177 (50.6)	
Age group			**0.020**			0.052			0.158
0 – 9y	676 (31.7)	193 (37.0)		490 (30.1)	255 (34.1)		845 (33.6)	131 (37.4)	
10 – 19y	1,457 (68.3)	328 (63.0)		1,135 (69.9)	492 (65.9)		1,669 (66.4)	219 (62.6)	
Sex			0.927			0.813			0.098
Male	941 (44.1)	231 (44.3)		729 (44.9)	339 (45.4)		1,116 (44.4)	139 (39.7)	
Female	1,192 (55.9)	290 (55.7)		896 (55.1)	408 (54.6)		1,398 (55.6)	211 (60.3)	
ART dispensed			**0.001**			**0.001**			0.434
1 month	66 (3.0)	95 (18.2)		33 (2.0)	105 (14.0)		164 (6.5)	23 (6.6)	
2—5 months	1,091 (51.2)	293 (56.3)		842 (51.8)	418 (56.0)		1,268 (50.5)	164 (46.8)	
> = 6 months	976 (45.8)	133 (25.5)		750 (46.2)	224 (30.0)		1,082 (43.0)	163 (46.6)	
History of TB[c]			**0.001**			**0.001**			0.589
Yes	16 (0.8)	15 (2.9)		9 (0.6)	18 (2.4)		34 (1.4)	6 (1.7)	
No	2,117 (99.2)	506 (97.1)		1,616 (99.5)	729 (97.6)		2,480 (98.6)	344 (98.3)	

[a] Based on most recent viral load value. [b]based on most recent two viral load values. [c]cases had missing VL values, *HC* Health Centre, *ART* Anti-retroviral therapy, *TB* Tuberculosis, *cp/ml* copies per millilitre of blood

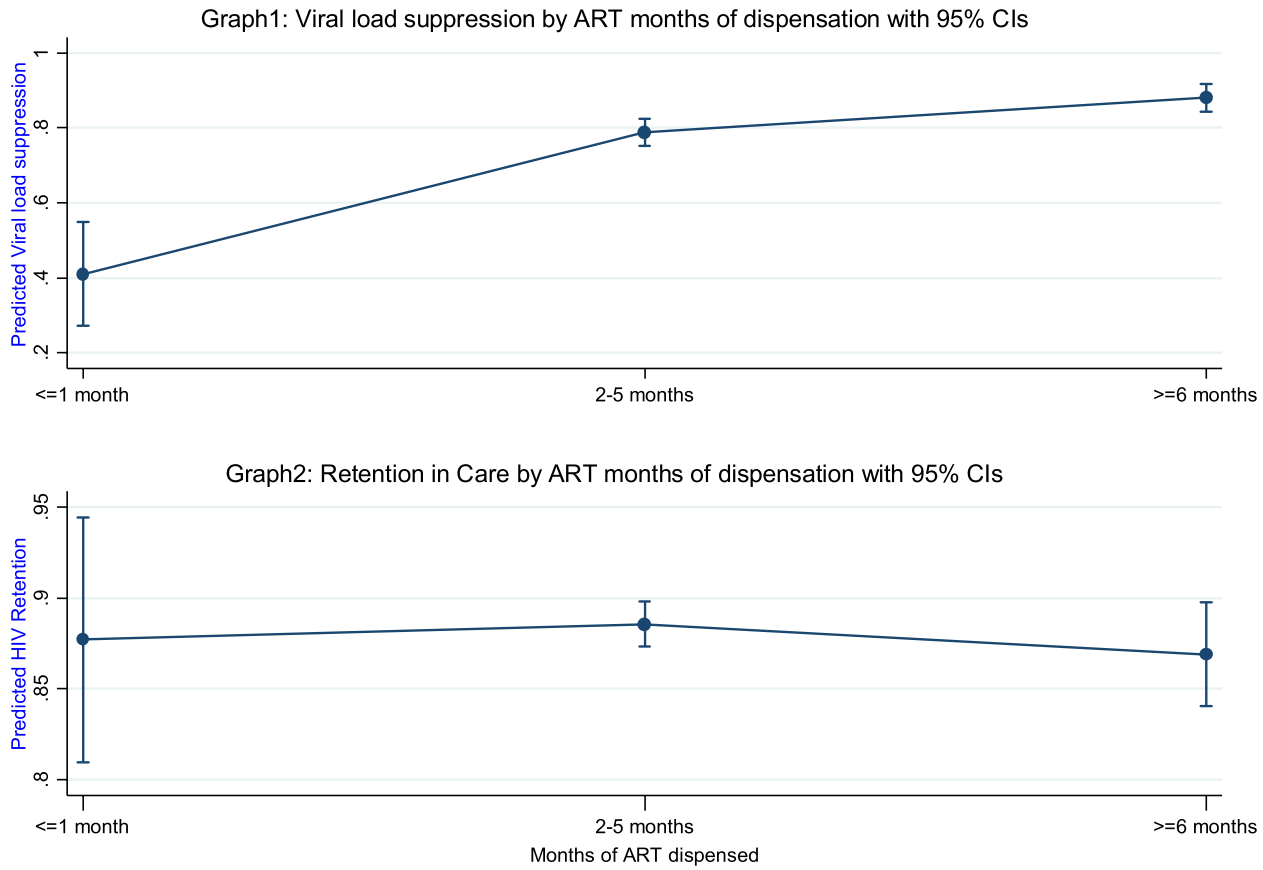

Fig.1 Margin plots of Viral load suppression and retention in care by multi-month ART dispensation

Table 4 Crude and adjusted prevalence ratios associated with VL suppression among children and adolescents in Uganda

Variable		VL suppression, [*n* = 2,133]	Unadj.PR	95% CI	adj.PR	95% CI	*p*-value
Sex	Female	1,192 (55.9)	1.0 (ref)				
	Male	941 (44.1)	0.99	0.94—1.05	1.00	0.95—1.06	0.916
Age group	0—9y	676 (31.7)	**1.0 (ref)**				
	10—19y	1,457 (68.3)	1.05	0.98—1.12	1.01	0.94—1.10	0.713
Months of ART dispensed	1 month	66 (3.0)	**1.0 (ref)**				
	2—5 months	1,091 (51.2)	1.92	1.31—2.82	1.98	1.41—2.80	**0.001**
	> = 6 months	976 (45.8)	2.15	1.48—3.11	2.21	1.59—3.05	**0.001**
History of TB	No	2,117 (99.2)	**1.0 (ref)**				
	Yes	16 (0.8)	0.64	0.53—0.78	0.73	0.65—0.81	**0.001**
Duration on ART	6—12 m	85 (4.0)	**1.0 (ref)**				
	13—24 m	192 (9.0)	0.95	0.88—1.03	0.93	0.88—0.99	**0.031**
	> 24 m	1,856 (87.0)	0.99	0.94—1.03	0.96	0.94—0.98	**0.001**
ART regimen	Other regimens	19 (0.9)	**1.0 (ref)**				
	DTG-based regimen	2,114 (99.1)	1.53	0.74—3.16	1.49	0.81—2.74	0.199
WHO clinical stage	Stage1	1,952 (95.9)	**1.0 (ref)**				
	Stage2	71 (3.5)	0.93	0.82—1.05	1.01	0.91—1.11	0.848
	Stage3	12 (0.6)	0.73	0.42—1.28	0.91	0.46—1.80	0.777

ART Anti-retroviral therapy, *TB* Tuberculosis, *VL* Viral load, *Unadj.PR* Unadjusted Prevalence Ratio, *adj.PR* adjusted prevalence ratio, *DTG* Dolutegravir

those on 1 month provides new evidence that multi-month dispensation of ART is feasible and could be improved even further in this vulnerable age group. Our results are similar to what has been documented in Tanzania among adolescents [25]. Because majority of the study participants had been on ART for 2 or more years, there is a likelihood that a large proportion of CALHIV had stabilised on ART and as such had higher chances of being virally suppressed compared to those just starting ART. Having said this however, given that a person's viral load on average drops to undetectable viral load within 6 months or less while adhering to ART, we would also expect a significant number in this study to have suppressed in the early stages after starting ART.

Comparably, CALHIV on multi-month ART significantly had higher rates of sustained viral load suppression compared to those on 1 month as illustrated in Table 3. This finding underscores that notion that if well counselled and provided with adequate information on ART adherence, CALHIV can continue to adhere to their medication. Multi-variate results in Table 4 on the other hand showed that CALHIV who had been on ART for longer than 2 years were less likely to be virally suppressed. This result provides additional insights on long term viral load suppression among this age group i.e., even with good sustained viral load suppression rates, there could be some level of medication fatigue in some CALHIV receiving multi-month ART dispensation. ART fatigue among adolescents and adult population has well been documented before [30] and as such health care providers ought to rethink of long-term strategies to address this challenge if we are to achieve and sustain viral load suppression at or above the 95% global target.

Additionally, because viral load suppression overall in this age group has been documented to be poor compared to the general population [26], this should not hinder MMD scale-up in this age group. Having said this the probability of being suppressed was approx. 90% (≥6 months) and approx. 79% (2–5 months). Caution therefore needs to be taken by health care providers in this cohort to identify barriers for viral load suppression at individual, family, and health facility level to improve the probability of being virally suppressed.

Our study in Table 3 shows a significantly higher proportion of older CALHIV aged 10–19 years compared to the younger counterparts to have virally suppressed but this was not the same observation when it came to sustained viral load suppression (Table 3) as well as predicting suppression rates (Table 4). These results were surprising given that younger children (0–9 years) are oftentimes under the full care of their guardians, and we would expect a higher proportion virally suppressed. Despite this however, the final model results in Table 4 did not seem to show statistically significant differences in viral load suppression by age group. Our results are in agreement with other studies published elsewhere [31] where age is not a significant factor in viral load suppression. Despite these results showing not significant differences by age group, it is important to highlight that person-centred care in HIV also requires age specific interventions that are targeted to improve viral loas suppression.

Retention in HIV care overall in our study didn't come out significantly different across sex, age group, multi-month ART dispensing as well as health facility level. From Fig. 1, retention rates ranged between 86 and 88% across multi-month ART dispensing which was not statistically significantly different. This is another cornerstone finding from our study revealing that even within this vulnerable group, multi-month prescription will not jeopardize retention rates as has been documented in the adult population [20, 32]. We didn't find contrasting results showing that retention rates were worse among cohorts on multi-month compared to 1 month ART dispensation. Because adolescents are at increased risk of lost to follow-up from HIV care [33], and the fact that the probability of retention in our study was below the 95% targeted mark is an indication that more attention is needed to mitigate lost to follow-up. Identifying apriori CALHIV at higher risk of lost to follow-up and minimising multi-month ART dispensation in such individuals is thus recommended.

Individual with history of a TB diagnosis were less likely to be virally suppressed while duration on ART, ART regimen, current WHO clinical stage was not significantly associated with vial load suppression. Despite this however, there was not statistically significant differences among TB clients by multi-month ART dispensation. HIV associated co-morbidities including TB have been linked to poor overall HIV treatment outcomes [34] which is the same finding in our study, however, getting multi-month ART drugs does not increase or reduce your probability of being virally suppressed.

Conclusion

CALHIV receiving multi-month ART including 6 months dispensation had better VL suppression rates. Retention rates however didn't differ by multi-month dispensing categories as observed in the Interval trial that focused on adults 18 years and older. We recommend multi-month ART dispensation including more than 6 months among CALHIV irrespective of their age, clinical stage, and history of prior co-morbidities. We recommend further research around facilitators and barriers to VL suppression and retention in care for CALHIV on multi-month ART regimens. We also recommend

repeating this study with finer age groups i.e. young adolescents (0–9 years), 10–14 years and older adolescents (15–19 years).

Study limitations

Our study had some limitations; first majority of CALHIV that received 2–5 month (52.3%) and ≥6 months (42%) of ARV dispensing had been on ART for more than 24 months and consequently better HIV treatment literacy and adherence. We however minimised this limitation by including relatively comparable CALHIV i.e. only those who had been on ART for a minimum of 6 months. Evidence elsewhere [35] proved that clients take 1–6 months to achieve undetectable viral load after starting ART and as such, even those within the one-month category could have had higher proportions of virally suppressed CALHIV. Secondly, our results and conclusions might not align well with other researchers who used "receiving a MMD of ART on the most recent visit" as the definition of MMD based on the WHO guidance. WHO's MMD definition based on the most recent clinic visit might miss out clients who could have received MMD on previous visits other than the most recent one. As such under or overestimating VL suppression rates among MMD cohorts. We however believe that our findings will be a benchmark to rethink about the definition of MMD for ART and incorporate in aspects of consistence and not focus on the last clinic visit alone. Thirdly some 210 (7%) CALHIV had missing viral load values, however we believe the results are still generalisable.

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Anti-retroviral therapy
CALHIV	Children and Adolescents living with HIV
DTG	Dolutegravir
DSD	Differentiated Service Delivery
EMR	Electronic Medical Records
HC	Health Centre
HIV	Human immunodeficiency virus
LTFU	Lost to follow-up
MoH	Ministry of Health
MMD	Multi-Month Dispensing
PLHIV	People Living with HIV
TB	Tuberculosis
VL	Viral load

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12887-024-05295-9.

Supplementary Material 1.

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Authors' contributions

Conceptualization: BA, RNS, Data curation: BA, Methodology and Formal analysis: RNS, Project administration: WA, AM, DJB, AKM, DK, Writing original draft: RNS, Review & editing: BA, RNS, WA, PN, AM, DJB, AKM, PJE, DK. Both BA and RNS contributed equally to this manuscript. All Authors read and approved the manuscript. The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of either the USAD or PEPFAR.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from Makerere University School of Medicine Research Ethics Committee (reference number, 2009–090) and the Uganda National Council for Science and Technology (UNCST), reference number (HS 649), under the Outcomes protocol before data collection. Consent for study participants was not required in this study since this was based on routinely captured secondary anonymised data and of minimal risk. We conducted this study under the UNCST guidelines of 2014 [36], Sect. 5.5 that provides for a waiver of informed consent if the research project carries no more than minimal risk.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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