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Permalink

https://escholarship.org/uc/item/91b1p022

Journal

Journal of Adolescent Health, 64(2)

ISSN

1054-139X

Authors

Ngeno, Bernadette
Waruru, Anthony
Inwani, Irene
et al.

Publication Date

2019-02-01

DOI

10.1016/j.jadohealth.2018.08.013

Peer reviewed

Disclosure and Clinical Outcomes Among Young Adolescents Living With HIV in Kenya

Bernadette Ngeno, M.D.[a,*], **Anthony Waruru, M.Phil.**[b], **Irene Inwani, M.P.H.**[c], **Lucy Nganga, M.P.H.**[b], **Evelyn Ngugi Wangari, M.P.H.**[b], **Abraham Katana, Ph.D.**[b], **Anthony Gichangi, Ph.D.**[b], **Ann Mwangi, M.P.H.**[d], **Irene Mukui, M.B.Ch.B.**[d], and **George W. Rutherford, M.D.A.M.**[e]

[a.]Division of Global HIV & TB, US Centers for Disease Control and Prevention, Atlanta, Georgia

[b.]Division of Global HIV & TB, US Centers for Disease Control and Prevention, CDC-Kenya, Nairobi, Kenya

[c.]Kenyatta National Hospital, Nairobi, Kenya

[d.]National AIDS and STI Control Programme, Ministry of Health, Annex Kenyatta National Hospital Grounds, Nairobi, Kenya

[e.]Institute for Global Health Sciences, University of California, San Francisco, San Francisco California

Abstract

Purpose: Informing adolescents of their own HIV infection is critical as the number of adolescents living with HIV increases. We assessed the association between HIV disclosure and retention in care and mortality among adolescents aged 10–14 years in Kenya's national program.

Methods: We abstracted routinely collected patient-level data for adolescents enrolled into HIV care in 50 health facilities from November 1, 2004, through March 31, 2010. We defined disclosure as any documentation that the adolescent had been fully or partially made aware of his or her HIV status. We compared weighted proportions for categorical variables using $\chi 2$ and weighted logistic regression to identify predictors of HIV disclosure; we estimated the probability of LTFU using Kaplan–Meier methods and dying using Cox regression-based test for equality of survival curves.

Results: Of the 710 adolescents aged 10–14 years analyzed; 51.3% had severe immunosuppression, 60.3% were in WHO stage 3 or 4, and 36.6% were aware of their HIV status. Adolescents with HIV-infected parents, histories of opportunistic infections (OIs), and enrolled in support groups were more likely to be disclosed to. At 36 months, disclosure was associated with lower mortality [1.5% (95% CI.6%–4.1%) versus 5.4% (95% CI 3.6.6%–8.0%, $p < .001$)] and lower LTFU [6.2% (95% CI 3.0%–12.6%) versus 33.9% (95% CI 27.3%–41.1%) $p < .001$].

Conclusions: Only one third of HIV-infected Kenyan adolescents in treatment programs had been told they were infected, and knowing their HIV status was associated with reduced LTFU and mortality. The disclosure process should be systematically encouraged and organized for HIV-infected adolescents.

In 2015, an estimated 1.8 million adolescents aged 10–19 years old were living with HIV globally, and more than 60% were living in East and Southern Africa [1]. An estimated 250,000 15-to-19-year olds were newly infected with HIV in 2015, of whom 65% were girls [1]. Adolescents and young people represent a rapidly growing subpopulation of people living with HIV worldwide. The expanded access to pediatric antiretroviral therapy (ART) has resulted in increased survival of perinatally infected children and contributed to an increasing population of HIV-infected adolescents [2]. This is in addition to the population of adolescents who were infected with HIV later in life either through sexual or parenteral transmission [3].

Kenya has a generalized HIV epidemic with an adult HIV prevalence of 5.6% and an estimated 1.4 million people living with HIV as of 2012. HIV prevalence was estimated to be.6% among 10–14 year-olds and 1.0% among 15–19-year-olds [4,5]. In 2012, there were roughly 150,000 HIV-infected adolescents aged 10–19 years living with HIV in Kenya [6].

Globally, there is a renewed commitment to the health of adolescents, as adolescence is increasingly being recognized as a unique period requiring age-appropriate quality health care [7,8]. The growing population of HIV-infected adolescents brings new challenges to HIV programs in terms of addressing psychosocial support and sexual and reproductive health (SRH) needs specific to adolescents, adherence to treatment, retention, preventing secondary HIV transmission and promoting overall physical and mental health [9]. As more perinatally infected children reach adolescence and as more adolescents acquire HIV infection, one challenge is determining how and when to inform them of their HIV status. Disclosure of HIV status can have various meanings in the HIV setting including (1) an adolescent's gaining knowledge of his/her HIV status [28], (2) disclosure of caregivers' HIV status to an adolescent [10] or (3) an adolescent's disclosure of his or her own HIV status to others [11]. In this paper, we discuss disclosure in the context of the adolescent gaining knowledge of his/her HIV status.

For adolescents, learning of their HIV diagnosis is an important step towards the long-term disease management necessary for the transition from pediatric care into adolescent and

adult care settings [12]. There are well-documented medical benefits of disclosing HIV status to children and adolescents including enabling them to understand HIV infection and make sense of disease-related experiences [13,14]. Furthermore, disclosure has been associated with better adherence to ART, higher self-esteem, improved participation in healthcare decision-making and higher CD4 counts [9,15,16]. Disclosure is also a key component of HIV prevention and can result in a reduction of high-risk sexual behaviors among adolescents [15]. Despite the known benefits, studies evaluating rates of disclosure in developing countries suggest that many adolescents living with HIV do not know they are infected; disclosure rates vary from 11%–40% depending on the adolescent's age among other factors [16–20]. When, how to disclose positive HIV serostatus to an adolescent is a shared responsibility by parents, medical staff and other caregivers and represents a challenge for all involved [21,22]. Parents and other caregivers require adequate support by healthcare workers to disclose to HIV status. Since disclosure is a complex and critical clinical issue in the care of the HIV-infected adolescent, reasons for nondisclosure for the involved family members, caregivers, and health care workers must be addressed. Some reasons for nondisclosure include fear of discrimination and stigma toward both the adolescent and the family [13,15,23].

The World Health Organization (WHO) strongly encourages disclosing HIV infection status to school-aged children 6 to 12 years old and recommends that younger children be informed incrementally to accommodate their cognitive skills and emotional maturity [24]. Despite the importance of HIV disclosure, there have been few studies addressing adolescent disclosure and its effect on clinical outcomes in developing countries, particularly in sub–Saharan Africa [16]. We sought to determine the prevalence of HIV disclosure and to explore factors associated with disclosure and the association of disclosure with clinical outcomes (death and loss-to-follow-up) in a large cohort of HIV-infected adolescents attending the national pediatric HIV program in Kenya.

Methods

Study setting, design, and population

To assess the national Kenyan pediatric HIV care and treatment program using routinely collected programmatic and clinical indicators, we conducted a retrospective cohort study of children with confirmed HIV infection aged 2 to 14 years old at the time of enrollment into HIV care. Children presenting in the 50 largest HIV pediatric care and treatment facilities in Kenya from November 1, 2004, to March 31, 2010, were included. These enrollment end dates were selected to allow all patients to be in care for a minimum of 12 months before data abstraction. All health facilities offered a standard set of ART services, including HIV testing, pre-ART, and ART care, with counseling and disclosure of HIV (starting from 6 years of age taking into account the child's maturity and the specific clinical and social context) and retention support as per Kenyan national guidelines. In this article, we present a secondary analysis of these data focusing on young adolescents who were between 10 and 14 years of age at the time of enrollment into HIV care.

Site selection and sampling procedures

The site-sampling frame included all the healthcare facilities that reported to National AIDS and Sexually Transmitted Infection (STI) Control Programme (NASCOP), provided ART for at least 40 pediatric patients < 15 years old as of October 31, 2008, and had recorded follow up of the children for 12 months as of March 31, 2008. We selected 50 clinics randomly using probability proportional to size.

Participants' selection

In the selected facilities, the sampling frame included all registered HIV-infected children who were enrolled into HIV care between November 1, 2004, and March 31, 2010, and were 2–14 years of age at enrollment. We randomly selected patients aged 2 years but < 15 years old at enrollment. At each site, we compiled a sequential list of eligible patients from clinic enrollment registers. We used a random number generator to assign each eligible patient a study number, and from this list, we randomly selected 89 patients per clinic. Records from selected patients that could not be retrieved were replaced with the next randomly sampled patient.

Data abstraction and management

For each patient, trained research assistants abstracted clinical follow-up information from the routine care patient charts from the date of enrollment up to the date of the last visit. In addition to patient charts, other data sources including pharmacy and laboratory notes, social worker notes and community health worker log-books were reviewed. Scannable paper-based forms were used for data abstraction. The data collection tools were piloted and revised before the survey to assure that they were appropriate and that all research team members had been given consistent directions. A log for recording the quantity of missing records was kept at each site. At the end of each site visit, research team leads collected all data abstraction forms and sent them to the Kenya Medical Research Institute (KEMRI) for scanning into a database using Tele-form version 9.1 (HP Autonomy, Inc., Sunnyvale, California, USA).

Variables

We defined disclosure as any documentation that the adolescent had been made aware of his or her HIV status since enrollment into HIV care, either fully or partially regardless of whether they were informed by the health care worker or by the caregiver/guardian. We used the Centers for Disease Control and Prevention (CDC) classification for HIV immune status to categorize participants by age, CD4 count and CD4 percentage into three categories: no evidence of immunosuppression, moderate immunosuppression and severe immunosuppression [25]. If both CD4 counts and percentages were available for a participant, we classified him or her according to the CD4 percentage. Predictor variables included demographic, programmatic and clinical characteristics such as age, sex, orphanhood, WHO stage at ART initiation, the degree of immunosuppression at ART initiation, being on ART, history of hospitalization prior to ART initiation and ever having had tuberculosis (TB). For participants who transferred into the sampled clinics while on ART, we used the date of their initial enrollment into care at the current facility as their date

of ART initiation. For these adolescents, their characteristics at enrollment in the study facility were used as the baseline characteristics at ART initiation. We defined retention as being in care at the facility at the time of chart abstraction. We defined being lost to follow up (LTFU) as patients not recorded as dead or transferred out who did not have a recorded clinical visit for more than 90 days from their last clinic appointment [26]. Mortality was all-cause deaths notified from any of the facility records. We calculated the observation time in the facility as the time from enrollment date to the date of chart abstraction, death, and transfer to another clinical center or LTFU.

Statistical analyses

We used descriptive analyses for summarizing characteristics and χ^2 test to compare proportions for categorical variables; we considered a $p < .05$ as statistically significant. We included the factors that were significant in bivariate analyses in a logistic regression model to test for associations of demographic, clinical presentation, and treatment variables to disclosure. All significant factors were included in the logistic regression model. Variables in the final model included sex, WHO stage at enrollment, TB, family enrollment into HIV care, history of opportunistic infection (OI), ever having been hospitalized, and enrollment into a support group. We report unadjusted and adjusted odds ratios (OR) and 95% confidence intervals (CIs). For the analysis of outcomes after enrollment into HIV care, we used Kaplan–Meier estimators to estimate the probability of LTFU and death according to the HIV disclosure status. For analysis purposes, we assumed that any missing data were missing at random and did not impute values. Age was not systematically documented and therefore it was not possible to analyze associations between disclosure and age at HIV infection, disclosure, enrollment on ART, and age at last clinic visit or death.

All sample estimates were weighted to account for sampling design and for clustering by site. We used STATA/MP version 13.1 (STATA Corporation, College Station, Texas, USA) for analyses.

Ethical considerations

The protocol was approved by the University of Nairobi/Kenyatta National Hospital Ethical Review Committee and the U.S. Centers for Disease Control and Prevention Institutional Review Board. No informed consent was required since there was no contact with patients and no patient identifiers were collected.

Results

Between November 2004 and March 2010, 710 HIV-infected adolescents aged 10 to 14 years were enrolled in the national HIV treatment program, 383 (53%) were female, and 420 (60%) and 290 (40%) were 10–11 and 12–14 years old, respectively. The median age at HIV diagnosis was 11 years (interquartile range (IQR) 10–12), and the median age at enrollment into HIV care was 11 years (IQR 10–12). WHO staging was recorded for 395 (56%) adolescents, and of these, 232 (60%) were in WHO stage 3 or 4. Based on the immunological classification, 309 (67%) had advanced or severe HIV disease, 576 (79%) had had at least one OI during follow up, and 94 (13.6%) had ever been hospitalized during

follow up. At any point during care, 217 (32%) had ever been diagnosed with TB. A total of 694 (98%) adolescents were enrolled in school at the time of data abstraction. Overall, 267 (37%) had at least one HIV-infected parent, 364 (51%) were orphaned (one or both parents dead), and 179 (25%) had their mother, father or both parents enrolled in HIV care. Over a median follow-up period of 2 years (IQR 0–4), 587 (82%) were still receiving HIV care in the initial healthcare facilities of enrollment. Overall, 280 adolescents had a documentation on psychosocial support status, but only 133 of these (49.0%) were enrolled in a psychosocial support group. Most of the adolescents, 545 (78%), had been started on ART (Table 1).

Overall, 251 (36.6%) adolescents were aware of their HIV status. In bivariate analyses, disclosure varied by multiple indicators, including but not limited to, parental enrollment in HIV care compared with parents not being enrolled in HIV care or their enrollment status being unknown (51.9% vs. 31.5%, $p = .004$), having had a history of an OI during follow up compared to not having an OI during follow-up (39.7% vs. 24.5%, $p = .026$), being enrolled in a support group versus not being enrolled (79.3 % vs. 37.8%, $p = .001$) and being on ART compared to not being on ART (41.8% vs. 18.1%, $p < .001$) (Table 1). In multivariate analysis, adolescents who had an OIs during follow up (adjusted OR (aOR), 10.6, 95% CI 2.8–40.6) and those who were enrolled in a support group (aOR 6.8, 95% CI 2.5–18.3) had higher adjusted odds of having been informed of their HIV status (Table 2).

One hundred seventy-six (23.7%) adolescents were LTFU. At 36-months of follow-up; 97.3% of those who knew their HIV status were retained in care compared to 74.1% of those did not ($p < .001$) (Figure 1). Twenty-nine (4.0%) had died; the proportion dead was lower (1.5%, 95% CI.6–4.1) among those who had been told their HIV status compared to those to whom HIV status had not been disclosed (5.4%, 95% CI 3.6–8.0, $p < .001$) (Table 3). The cumulative hazard of death was significantly lower among those who knew their HIV status compared to those who did not ($p = .003$, Figure 2).

Discussion

We found that about two-thirds of adolescents living with HIV who were enrolled in HIV care between 10 and 14 years of age and followed up for a median of two years were unaware of their HIV status. These findings are consistent with other studies in low-and middle-income countries where, generally, low rates of disclosure ranging from 14% to 30% have been described [16,22,23,27–29]. This variation in disclosure rates to a large extent depends on the age of the adolescents assessed and the context. One study in Ghana found a higher rate of disclosure (53%) among 13 to 22-year-olds, which is still suboptimal, onsidering that older adolescents and young adults were included [19]. In our study, the finding that only 73.9% of those adolescents in support groups were aware of their HIV status suggests that we may have underestimated disclosure by approximately 25% due to lack of documentation. This is because adolescents would have to be aware of their HIV status to participate in support groups. Moreover, only slightly more than 40% on ART had been told their HIV status; this is of concern because awareness of HIV status is critical in facilitating their understanding of their illness, which in turn promotes their participation in and responsibility for their treatment [30]. Furthermore, adolescents who are aware of their

HIV infection status have better HIV treatment outcomes [31,32]. In the Kenyan, healthcare system where adolescents typically transition from pediatric to adult care starting from 12–15 years, it is crucial that they are aware of their HIV status for this transition to occur smoothly.

We identified some differences between adolescents who were aware of their HIV status compared to those who were not. First, we found an association between HIV disclosure and having suffered an OI. These findings may suggest that being sick may have necessitated the need for HIV disclosure to the adolescent. We also further found an association between disclosure and being enrolled in a peer support group. Even though we could not ascertain the temporal sequence of events, this finding is not surprising because for the adolescents to be enrolled in a support group, they would have to be aware of their HIV status. However, less than a half (49%) of the adolescents were enrolled in a support group despite the known benefits of better outcomes for those in support groups [31].

In this cohort, we observed a lower death rate of 4.1% compared to rates ranging from 4.9%–6.7% among Romanian 5–17 year olds [32], 6.1% among 10–21 year olds in Côte d'Ivoire, Mali and Senegal [16], and 7.8% among 0–15 year olds from nine West African countries [33]. However, we may have underestimated mortality due to possible misclassification of patients who had died as LTFU. In our study, about 28% of adolescents were LTFU, which is higher than the 11.2%–13% among 10–21-year-old adolescents and young adults from Cote d'Ivoire, Mali and Senegal and the 21.2% of LTFU reported in West Africa among children aged 0–15 years old [33]. Because we classified patients as LTFU if there was no record of a clinical visit for more than 90 days from their last clinic appointment [26], we may have overestimated LTFU compared to the studies from West Africa where patients were classified as LTFU if the interval between the last clinic visit registered in the database and the closing date of the database was   6 months [16,33]. Our results suggest the benefit of disclosure on retention in care of younger adolescents as evidenced by lower mortality and lower LTFU among those who were aware of their HIV status. It is likely that adolescents' knowledge of HIV status may facilitate ongoing support from their families and promote their engagement in healthcare. Similar benefits of the disclosure have been described among 5-to-17-year-old Romanian children and adolescents [32]. However, despite these known benefits, the disclosure is generally low. Disclosure of HIV status to adolescents represents a challenge both for the family and for medical staff. Reasons for not disclosing HIV status have included fear of discrimination, stigma, and the perception that the child is not mature enough [13,34,35]. The low disclosure rates among this cohort of young adolescents who are in the health care system suggest that health service-related factors may have contributed to nondisclosure. The majority of studies that have assessed who is best positioned to disclose HIV status to adolescents status favored disclosure by caregivers with support from medical staff [36–39] while only one study found a preference for disclosure by health care staff [40]. Our findings demonstrate the urgent need to explore reasons for nondisclosure from the perspectives of caregivers' and medical staff and to implement locally and culturally sensitive intervention programs to promote disclosure.

Strengths of our study include the larger sample size, which represents the majority of young adolescents receiving HIV care in Kenya's national HIV program followed up over a long duration. The cohort includes patients receiving care throughout Kenya, and thus captures a wide range of differing patient experiences and allows for generalizability. Our study does have limitations. Due to the retrospective design and the use of routinely collected clinical information, some data were missing, which may have led to underreporting of disclosure due to lack of documentation. We also could not assess the timing of events including age at HIV infection, disclosure, and enrollment on ART or the person responsible for disclosing HIV status to the adolescent nor the reasons for nondisclosure. There was also a potential misclassification of deaths as LTFU. To mitigate these, we abstracted data from multiple patient records in the facility including social worker notes, community health care notes, and laboratory and pharmacy records.

This study provides insight into overall disclosure rates and the programmatic outcomes of the young adolescent population in this large public sector ART program in Kenya. The rate of disclosure of young adolescents' HIV status was low in Kenya and likely reflects the lack of clear guidelines on disclosure in the earlier phases of Kenya's public pediatric HIV program when these data were collected. Given that disclosure guidelines now exist, it is likely that more recent data may demonstrate improved disclosure rates due to improved clinical practices. Our findings underscore the need to review the reasons for non-disclosure and to implement locally and culturally sensitive interventions to promote disclosure.

Acknowledgments

Abbreviations:

OI	opportunistic infection
LTFU	loss-to-follow-up
WHO	World Health Organization
ART	antiretroviral therapy
SRH	sexual and reproductive health
NASCOP	National AIDS/STI Control Program
KEMRI	Kenya Medical Research Institute

CDC	Centers for Disease Control and Prevention
ALHIV	adolescents living with HIV
TB	tuberculosis
OR	odds ratios
CI	confidence intervals

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IMPLICATIONS AND CONTRIBUTION

This analysis provides an opportunity to understand the prevalence of HIV disclosure, the factors associated with disclosure and the impact of disclosure on clinical outcomes (death and loss-to-follow-up) in a large cohort of HIV-infected adolescents attending a national pediatric HIV program.
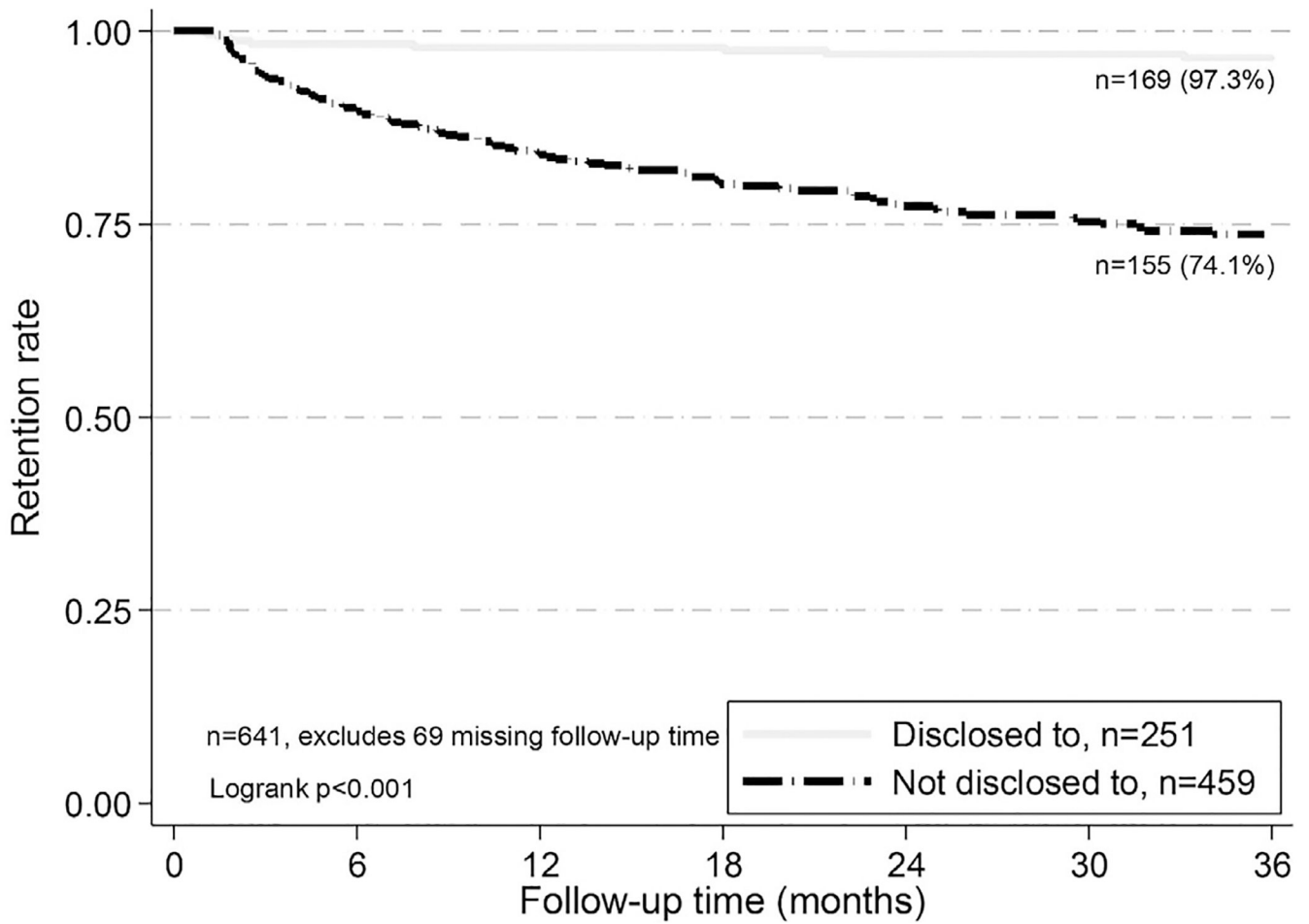
Figure. 1.
Retention rate after 36 months in HIV care by HIV disclosure status, 10-to-14-year-old adolescents, Kenya, 2004–2010 (n = 641).
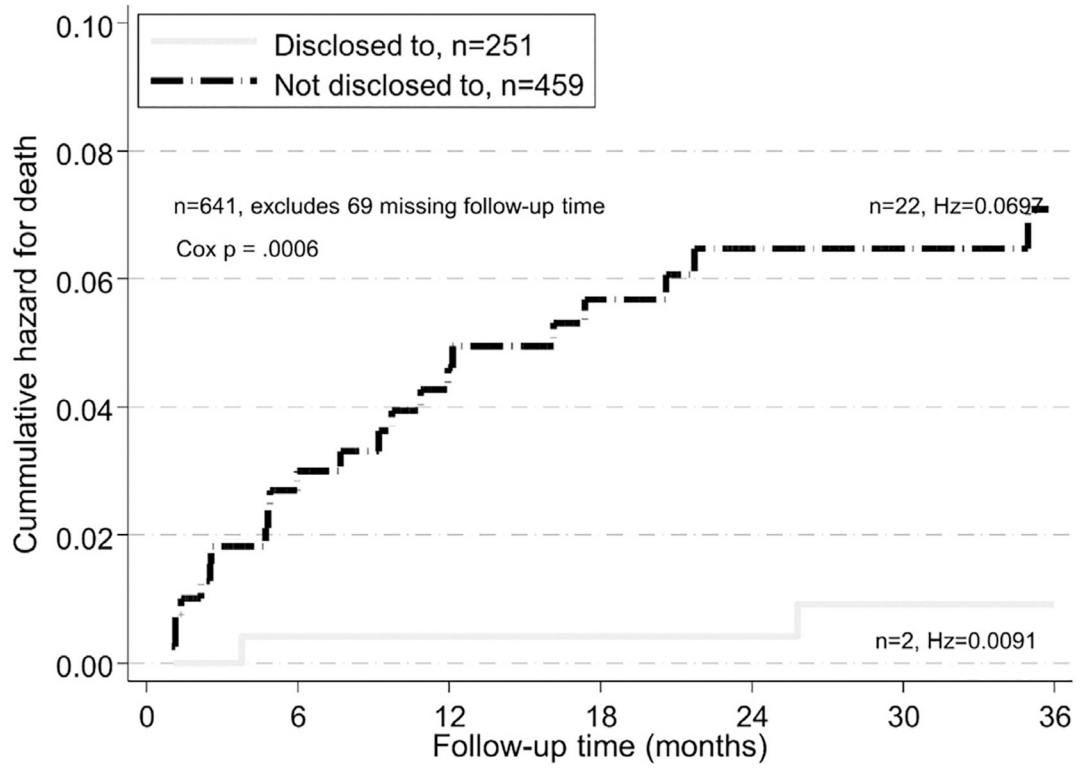
Figure. 2.

Cumulative hazards of death after 36 months in HIV care by HIV disclosure status, 10-to-14-year-old adolescents, Kenya, 2004–2010.

Table 1

Characteristics of HIV-infected adolescents aged 210–14 years in HIV care, Kenya, 2004–2010.

Characteristics	Total		Aware of infection		Unaware of infection		p-value
	N	Percent/IQR[95%CI][a]	n	Percent [95%CI][a]	n	Percent [95%CI][a]	
Total	710	100	251	36.6 [27.9,46.2]	459	63.4 [53.8,72.1]	
Sex							.086
Male	327	46.9 [43.3,50.5]	125	40.3 [29.6,51.9]	202	59.7 [48.1,70.4]	
Female	383	53.1 [49.5,56.7]	126	33.3 [25.3,42.3]	257	66.7 [57.7,74.7]	
Age at diagnosis, years							.385
10–11	420	59.6 [54.9,64.2]	142	35 [25.8,45.4]	278	65 [54.6,74.2]	
12–14	290	40.4 [35.8,45.1]	109	38.9 [28.9,50.0]	181	61.1 [50.0,71.1]	
Median age at HIV diagnosis	589	11 [10–12]	230	11 [10–12]	359	11 [10–12]	
Median age at enrollment into HIV care	710	11 [10–12]	251	11 [10–12]	459	11 [10–12]	
WHO stage							.109
I or II	163	39.7 [33.2,46.6]	69	45.4 [32.0,59.5]	94	54.6 [40.5,68.0]	
III or IV	232	60.3 [53.4,66.8]	80	35.5 [25.2,47.4]	152	64.5 [52.6,74.8]	
TB at enrollment/follow-up							.874
Ever TB	217	31.6 [26.9,36.7]	73	37.1 [26.2,49.6]	144	62.9 [50.4,73.8]	
NoTB	493	68.4 [63.3,73.1]	178	36.3 [27.2,46.4]	315	63.7 [53.6,72.8]	
Orphan status							.661
Both parents alive	164	30.9 [26.5,35.6]	62	40.4 [28.8,53.2]	102	59.6 [46.8,71.2]	
Orphan	364	69.1 [64.4,73.5]	147	42.9 [32.3,54.2]	217	57.1 [45.8,67.7]	
Caregiver							.426
Parents	319	45.3 [39.9,50.9]	124	40.1 [29.1,52.3]	195	59.9 [47.7,70.9]	
Other relatives	294	41.4 [36.6,46.5]	99	34.6 [26.3,44.0]	195	65.4 [56.0,73.7]	
Parents' HIV status at enrollment							.013
Both mother and father HIV-infected	66	9.5 [7.2,12.5]	25	39.1 [25.2,55.0]	41	60.9 [45.0,74.8]	
Only one parent HIV-infected	201	27.7 [23.5,32.4]	88	47.2 [36.0,58.8]	113	52.8 [41.2,64.0]	
Mother's & father's HIV status unknown	443	62.7 [56.9,68.3]	138	31.5 [23.1,41.3]	305	68.5 [58.7,76.9]	
Immune status							.450
No significant immunosuppression	147	33.4 [29.0,38.1]	57	38.8 [28.2,50.5]	90	61.2 [49.5,71.8]	

Characteristics	Total		Aware of infection		Unaware of infection		p-value
	N	Percent/IQR[95%CI][a]	n	Percent [95%CI][a]	n	Percent [95%CI][a]	
Moderate	69	15.0 [10.9,20.3]	30	47.6 [31.2,64.5]	39	52.4 [35.5,68.8]	
Severe	240	51.6 [44.7,58.5]	90	39.7 [30.1,50.2]	150	60.3 [49.8,69.9]	.385
Current schooling status							
In school	694	98.1 [90.8,99.6]	245	36.6 [27.8,46.3]	449	63.4 [53.7,72.2]	
Dropped out	9	1.9 [.4,9.2]	2	21.8 [9.8,41.7]	7	78.2 [58.3,90.2]	.004
Parent(s) enrollment into care							
None/unknown	531	75.1 [69.2,80.3]	186	31.5 [23.2,41.1]	365	68.5 [58.9,76.8]	
Mother/father or both	179	24.9 [19.7,30.8]	82	51.9 [39.3,64.2]	94	48.1 [35.8,60.7]	.026
History of OI[b] at enrolment							
Did not have OIs	134	20.9 [14.8,28.5]	14	10.7 [4.9,21.6]	120	89.3 [78.4,95.1]	
Had OIs	576	79.1 [71.5,85.2]	237	42.7 [33.6,52.4]	339	57.3 [47.6,66.4]	<.001
Ever had an OI[†] during follow-up							
No OIs	137	19.3 [13.3,27.1]	38	24.5 [14.4,38.5]	99	75.5 [61.5,85.6]	
Developed OIs	573	80.7 [72.9,86.7]	213	39.7 [31.1,49.0]	360	60.3 [51.0,68.9]	.494
Ever hospitalized during follow-up							
Hospitalized	94	13.6 [10.5,17.5]	31	34.7 [23.4,48.1]	63	65.3 [51.9,76.6]	
Not hospitalized	561	86.4 [82.5,89.5]	211	38.8 [29.5,49.1]	350	61.2 [50.9,70.5]	.001
Enrolled in support group							
Yes, enrolled	133	49.0 [35.8,62.4]	95	73.9 [61.2,83.6]	38	26.1 [16.4,38.8]	
No, not enrolled	147	51.0 [37.6,64.2]	54	37.8 [27.2,49.6]	93	62.2 [50.4,72.8]	<.001
ART status							
On ART	545	78.0 [72.5,82.6]	221	41.8 [32.0,52.2]	324	58.2 [47.8,68.0]	
Not on ART	165	22.0 [17.4,27.5]	30	18.1 [10.7,29.0]	135	81.9 [71.0,89.3]	<.001
Transferred from another facility							
Not transferred	587	82.3 [77.1,86.4]	201	34.9 [26.5,44.3]	386	65.1 [55.7,73.5]	
Transfer-ins	123	17.7 [13.6,22.9]	50	44.2 [31.6,57.6]	73	5.8 [42.4,68.4]	.097

ART, antiretroviral therapy; CI, confidence interval; IQR, interquartile range; OI, opportunistic infection; TB, tuberculosis

[a] Weighted percentages.

[b] Opportunistic infections.

Table 2

Odds of disclosure of HIV status among 10-t0-14-year-old adolescents enrolled in HIV care, Kenya, 2004–2010.

Characteristics	Total		Disclosed to		Unadjusted OR [95%CI]	Adjusted OR [95%CI]
	N	Percent [95%CI]	N	Percent [95%CI]		
Total	710		251	36.6 [27.9,46.2]		
Sex						
Male	327	46.9 [43.3,50.5]	125	40.3 [29.6,51.9]	ref	
Female	383	53.1 [49.5,56.7]	126	33.3 [25.3,42.3]	1.4[1.0–1.9]	NI
Age at diagnosis						
10–11 years	420	59.6 [54.9,64.2]	142	35.0 [25.8,45.4]	ref	
12–14years	290	40.4 [35.8,45.1]	109	38.9 [28.9,50.0]	1.2 [.8–1.7]	NI
WHO stage						
I or II	163	39.7 [33.2,46.6]	69	45.4 [32.0,59.5]	ref	
III or IV	232	60.3 [53.4,66.8]	80	35.5 [25.2,47.4]	.7 [.4–1.1]	.5 [.2–1.2]
TB at enrollment/follow-up						
Ever TB	217	31.6 [26.9,36.7]	73	37.1 [26.2,49.6]	ref	
No TB	493	68.4 [63.3,73.1]	178	36.3 [27.2,46.4]	1.0 [.6–1.5]	NI
Orphan status						
Both parents alive	164	30.9 [26.5,35.6]	62	40.4 [28.8,53.2]	ref	
Orphan	364	69.1 [64.4,73.5]	147	42.9 [32.3,54.2]	1.1 [.7–1.8]	NI
Caregiver						
Parents	319	52.2 [46.6,57.8]	124	40.1 [29.1,52.3]	1.3 [.8–2.0]	NI
Other relatives	294	47.8 [42.2,53.4]	99	34.6 [26.3,44.0]	ref	
Parents HIV status						
Both known HIV+	66	25.6 [20.5,31.5]	25	39.1 [25.2,55.0]	ref	
One known HIV+	201	74.4 [68.5,79.5]	88	47.2 [36.0,58.8]	1.4 [.8–2.4]	NI
Parent(s) enrollment into care						
None/unknown	531	75.1 [69.2,80.3]	166	31.5 [23.2,41.1]	ref	
Mother/father or both	179	24.9 [19.7,30.8]	85	51.9 [39.3,64.2]	**2.3 [1.5–3.7]**	2.1 [.8–5.5]
History of OI during follow-up						
No OIs	134	19.3 [13.3,27.1]	14	10.7 [4.9,21.6]	Ref	

Characteristics	Total		Disclosed to		Unadjusted OR [95%CI]	Adjusted OR [95%CI]
	N	Percent [95%CI]	N	Percent [95%CI]		
Developed OIs	576	80.7 [72.9,86.7]	237	42.7 [33.6,52.4]	6.3 [2.8–14.1]	10.6 [2.8–40.6]
Ever hospitalized during follow-up						
Yes	94	13.6 [10.5,17.5]	31	34.7 [23.4,48.1]	ref	NI
No	561	86.4 [82.5,89.5]	211	38.8 [29.5,49.1]	1.2 [.7–2.0]	
Enrolled in support group						
Not enrolled	147	51.0 [37.6,64.2]	54	37.8[27.2,49.6]	ref	ref
Yes, enrolled	133	49.0 [35.8,62.4]	96	73.9[61.2,83.6]	4.7 [2.1–10.3]	6.8 [2.5–18.3]
ART status						
On ART	545	78.0 [72.5,82.6]	221	41.8[32.0,52.2]	3.2 [1.7–6.2]	NI
Not on ART	165	22.0 [17.4,27.5]	30	18.1[10.7,29.0]	Ref	

ART, antiretroviral therapy; NI, not included in multivariate model;‡OI, opportunistic infection; OR, odds ratio; TB, tuberculosis

Table 3

Outcomes by disclosure of HIV status among 10-to-14-year-old adolescents enrolled in HIV care, Kenya, 2004–2010.

Outcomes	Aware of infection		Unaware of infection		Total		
	n	Percent [95% CI][a]	n	Percent [95% CI][a]	n	N[b]	Percen t[95% CI][a]
Active	214	86.7 [78.7,92.0]	201	45.3 [37.9,52.9]	415		60.4 [52.5,67.9]
Transferred out	15	5.6 [2.9,10.5]	74	15.5 [12.3,19.3]	89		11.8 [9.3,14.9]
LTFU	18	6.2 [3.0,12.6]	158	33.9 [27.3,41.1]	176		23.7 [17.9,30.8]
Dead *p*<.001	4	1.5 [.6,4.1]	25	5.4 [3.6,8.0]	29		4.0 [2.6,6.0]

CI, confidence interval; LTFU, lost to follow-up

[a]Weighted percentage.

[b]Outcome for one adolescent was unknown.