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Peri-transition outcomes of Southeast Asian adolescents and young adults with HIV transferring from pediatric to adult care

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Abstract

Purpose—To study clinical and social outcomes of healthcare transition among Asian adolescents and youth with HIV (AYHIV).

Methods—AYHIV who transferred from a pediatric to an adult clinic within the past year across five sites in Malaysia, Thailand, and Vietnam had clinical and laboratory evaluations, and

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completed questionnaires about their health, socio-economic factors, and transition experiences. Multiple logistic regression was used to assess associations with HIV viremia.

Results—Of 93 AYHIV enrolled between June 2016 to April 2017, 56% were female, 87% acquired HIV through perinatal exposure, median age was 20 (interquartile range [IQR] 18.5, 21) years. Two-thirds were in a formal education program, 43% were employed, 43% of females and 35% of males were sexually active. Median lifetime ART duration was 6.2 (IQR 3.3, 10.7) years; 45% had received second-line therapy. Median CD4 was 601 (IQR 477, 800) cells/mm³; 82% had HIV-RNA <40 copies/mL. Being in a relationship, a shorter post-transition duration, self-reported adherence of 95%, and higher CD4 were inversely associated with HIV viremia. Half felt very prepared for the transfer to adult care, and 20% frequently and 43% sometimes still met with pediatric providers. Two-thirds reported needing to keep their HIV a secret, and 23–38% reported never or rarely having someone to discuss problems with.

Conclusions—Asian AYHIV in our cohort were concerned about the negative social impact of having and disclosing HIV, and one-third lacked people they could trust with their personal problems, which could have negative implications for their ability to navigate adult life.

Keywords

HIV; perinatal; adolescent; young adult; healthcare transition; Asia; Thailand; Malaysia; Vietnam

Global survival among children with perinatally acquired HIV infection has greatly improved with the scale-up of antiretroviral therapy (ART).(1, 2) As they age into adolescence, they shift from dependence on their caregivers to being responsible for managing their own infection as a chronic disease. This will eventually include needing to transition from pediatric-focused care to adult HIV care, and may involve a physical transfer to another provider or clinic, or other changes in care management if within an all-ages clinic. When adolescent transition is unsuccessful, serious medical problems can arise, including poor ART adherence leading to increased HIV viral load and declines in immune function, resulting in treatment failure, potential emergence of drug resistance, and death, as well as onward transmission to partners.(3–5)

Adolescents and young adults with HIV (AYHIV) are at high risk for poor medication adherence due to factors such as not appreciating the need to take medications when one feels well, inconsistent daily routines, depression, substance abuse, and fear of disclosure. (6–8) While pediatric HIV providers are more likely to have adolescent-focused support systems to address poor medication adherence, adult providers may be better equipped to provide AYHIV with comprehensive care that extends to sexual, reproductive, and mental health.(9)

Experiences in some Western countries have raised concerns about the ability of healthcare systems to adequately support transitioning youth, which are compounded by issues of poverty and limited public health infrastructure in low- and middle-income settings.(10, 11) Within Asia, while some adolescents are referred out to adult clinics at the age of 15 years, others may remain in pediatric clinics into their early 20s. A study in Thailand showed that treatment and retention outcomes can be good when intensive support and counseling are

provided through a formal transition planning process that involved adult HIV clinicians and nursing staff.(12) However, post-transition data on Asian youth who are transferred from pediatrician-staffed clinics into adult HIV care remain limited.(13, 14) We conducted a study to gather evidence on post-transition clinical outcomes and social aspects of transition among Asian AYHIV who had completed a transfer from pediatric to adult HIV care in order to guide future interventions to promote post-transition adherence and retention in care.

Methods

We implemented a prospective observational cohort study among AYHIV who have already transitioned to adult-based HIV care involving a physical transfer from a pediatric to an adult clinic within participating sites in the TREAT Asia network of IeDEA Asia-Pacific (International epidemiology Databases to Evaluate AIDS).(15) The baseline peri-transition data at study enrollment are presented in this analysis.

Study sites and participants

Study participants were recruited and enrolled at five participating sites in Malaysia (Sungai Buloh Hospital, Selangor), Thailand (Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok; Faculty of Medicine Srinagarind Hospital, Khon Kaen University, Khon Kaen; Chiangrai Prachanukroh Regional Hospital, Chiang Rai), and Vietnam (National Hospital of Pediatrics, Hanoi). The four study sites besides Sungai Buloh Hospital in Malaysia were pediatric specialty clinics within larger healthcare facilities that referred out to adult receiving clinics. The three Thai and one Vietnamese pediatric sites had local and national transition preparation protocols in place to facilitate preparation of adolescents and caregivers for transfer to adult HIV care that included active communication with the receiving adult HIV clinic. Besides the Malaysia site, adult HIV receiving clinics were not included in the study. HIV treatment for children, adolescents, and adults was and remains freely provided in these countries.

Female and male AYHIV aged 16–24 years were eligible to participate if they had confirmed HIV infection, were able to provide assent or consent, were aware of their HIV infection status, and had transitioned from a participating pediatric clinical care site to an adult HIV clinic within one year prior to enrolment. Eligibility was initially determined by clinic staff at the participating sites who approached potential study participants. Interested AYHIV were referred to designated on-site study staff who conducted study enrollment procedures.

Ethics review

Institutional review board approval was obtained at the participating sites and the coordinating center (TREAT Asia/amfAR, Bangkok, Thailand). Participants provided informed consent if they were legally old enough to consent independently to participate in all study procedures. Otherwise, parent or legal guardian consent was obtained (i.e., Vietnam) with formal participant assent if required by local IRBs (i.e., Malaysia, Thailand). During the enrollment period, the age of consent to participate in research was 18 years in

all three countries. Upon reaching age 18, participants were formally consented as individuals. Consent and assent processes were conducted in a private area to ensure confidentiality and in local languages (e.g., Malay, Thai, Vietnamese).

Study procedures

Study procedures took place at their “sending” pediatric clinic (Thailand and Vietnam) or their “receiving” adult clinic (Malaysia). At enrollment, participants had 1) clinical assessments (including demographic data, ART histories), 2) laboratory evaluations (e.g., HIV-related tests, metabolic profiles), and 3) completed questionnaires about their health and medical history, self-reported ART adherence(16), socio-economic factors (e.g., education, employment, income), behavioral risks (e.g., sex, substance use), and transition experiences. Data were collected using standardized clinical research forms and online self-questionnaires. Social impact questions were selected from the Strategies to Optimize Antiretroviral Therapy Services for Maternal & Child Health (MCH-ART) study’s Social Impact Scale,(17) and social relationship and problem-solving questions were from the NIH Toolbox Emotion Battery, 2012 (Emotional Support Short/Fixed Form Age 18+ and the Self-Efficacy Computer Adaptive Tests Form Age 18+).(18)

Data management and analysis

The study sample size was based on a convenience sample of AYHIV who had transitioned to adult HIV care at participating sites within one year prior to enrolment, estimated to be between 80–100 participants overall. Sites were limited to up to 25 enrollments each. Study data were entered by site study staff into paper-based research forms and by individual participants through an online portal. Data were submitted to a centralized data management center for processing. Data cleaning and analyses were then conducted with Stata version 15 (Statacorp, College Station, TX, USA). Survey data and medical history-related variables were examined using descriptive statistics. The primary objective of this analysis was to describe peri-transition, health-related outcomes of AYHIV. Multiple logistic regression was used to assess associations between demographic, socio-economic, behavioral and clinical factors and failure to maintain viral suppression. Linearity of continuous covariates against the logit function was assessed, and in the case of non-linearity the covariate was modelled as quartiles. Adjacent categories were collapsed together if the odds ratio (OR) and size of the confidence intervals were similar. Covariates with $p < 0.1$ in univariate models were adjusted for in multivariate models.

Results

A total of 93 AYHIV were enrolled between June 2016 to April 2017, 56% were female and 81% were Thai, with 87% acquiring HIV through perinatal exposure (Table 1). The median age at enrollment was 20 (interquartile range [IQR] 18.5, 21) years. This varied by country: Thailand, $n=75$ (25 at each site), median 20 (19–22) years; Vietnam, $n=10$, median 17.5 (17–18) years; Malaysia, $n=8$, median 17 (17–17.5) years. Median time since transition was 3.4 (IQR 2.5, 8.8) months from the last pediatric clinic visit for 28% of the cohort and 4.7 (IQR 1.8, 8.8) months from the first adult HIV clinic visit for 72% the remainder of the cohort; neither variable was available for all participants. Two-thirds were currently in a

formal education or training program, of which 48% were in college or university. At the same time, 43% were employed, with 45% of these in full-time jobs; 40% reported having a monthly income. Half (54%) were currently single and 40% reported having sex in the past. Of 24 (43%) sexually active females, 20 (83%) reported female-male relationships and 4 (17%) female-female relationships. Of the 13 (35%) sexually active males, 10 (77%) reported male-female relationships and 4 (31%) male-male relationships.

Almost all (99%) were currently on ART, for a median duration of 6.2 (IQR 3.3, 10.7) years, 45% having been on second-line therapy, in 93% of cases due to treatment failure on first-line regimens (Table 2). Of the 19% who missed at least one ART dose in the previous three months, the median missed doses were 3 (IQR 2, 4). Overall median CD4 count was 601 (IQR 477, 800) cells/mm³, and 82% had HIV-RNA at <40 copies/mL. Of those with detectable virus, the median log HIV-RNA was 3.69 (IQR 3.54, 4.41). The median fasting cholesterol was 169 (IQR 152, 196) mg/dL. In a multivariate model, being in a relationship, shorter duration from transition, self-reported adherence of ≥95%, and higher CD4 counts were inversely associated with detectable viral load (Table 3).

With regards to transition experiences, 90% recalled having preparatory discussions about clinic transfer and the transition process, at a median age of 19 (IQR 18, 20) years (Supplemental Table 1). Their first medical visit in their adult HIV clinic was at a median age of 20 (IQR 18, 21) years. Of the 45 (48%) who felt very prepared for the transfer to adult HIV care, 20 (44%) reported that moving to the adult HIV clinic was a very easy process, 6 (13%) that it was not easy and not difficult, and 1 (2.2%) that it was difficult. Overall, of the 3 (3.2%) youth who reported that moving to adult HIV care was difficult, one each said they felt very prepared, somewhat prepared, and not prepared for the transition.

While 41% overall felt very comfortable receiving care at the adult clinic, 20% frequently and 43% sometimes still met with pediatric care providers at their clinic (not for HIV care). In general, 47% reported their health was “very good,” and 18% that it was “excellent,” with 6% reported “fair” or “poor” health. Half (51%) knew their most recent CD4 count, and 39% answered that it was >350 cells/mm³. Of the 63% who knew their HIV-RNA level, 56% answered it was “very good” (very low or suppressed) and 7% reported that it was “not good” (not low but not high) or “bad” (high). While 41% reported that taking their daily ART was “very easy” and 31% that it was “easy,” 22% reported it was “not easy, not difficult,” and 6% that it was “difficult” or “very difficult.” The most commonly reported methods to remind them to take their ART (not mutually exclusive) was an alarm on a mobile phone (55%), an alarm on a wrist watch or clock (45%), or having someone to remind them directly (23%).

Their responses on the social impact questions showed that while the majority disagreed that their HIV status impacted routine social interactions and relationships, 67% felt they needed to keep their HIV status a secret (Figure 1). With regards to the social relationships questions around whether they had people they could talk with about their problems, daily challenges, and feelings, 23–38% reported never or rarely having anyone in their lives they could turn to, and 35–42% reported usually or always having this type of support (Figure 2). With regards to their own problem-solving abilities (Supplemental Figure 1), 15–30%

reported never or rarely being able to manage difficult problems and find solutions to accomplish their goals, 34–48% reported they felt they could do this sometimes, and 22–44% that they usually or were always able to overcome these challenges.

Discussion

Across geographic and cultural settings, life-long HIV is associated with complex social, economic, mental, and developmental consequences for those who have perinatally acquired infection. These challenges become increasingly apparent during adolescence and continue into young adult life. The study represents the first regional effort to characterize the immediate peritransition period in AYHIV in Southeast Asia. In this cohort with primarily perinatally acquired HIV, all were transferred from specialist pediatric to adult care at a median age of 20 years, and half reported feeling well-prepared for the change. Overall health within six months of transition was good, with a median CD4 count of 601 cells/mm³, and 82% having HIV viral suppression. This is higher than the 73% viral suppression we have reported prior to transfer to adult HIV care in our routine cohort data, which includes a mix of targeted and standard interval viral load testing.(19) This compares to only half or less of AYHIV with undetectable HIV-RNA entering adult HIV care in some US and UK cohorts, and may be related to the differing social and demographic factors associated with pediatric and maternal HIV infection in these contexts or our convenience sampling methods.(10, 20–22)

Stable immune status by CD4 count, self-reported good adherence around the time of transfer, and a shorter time from transition were associated with undetectable HIV-RNA. With the majority having a regular ongoing connection to their pediatric providers, longer follow-up would be needed to study the resilience of AYHIV to successfully remain in adult care and on treatment as they perceive needing less support from their pediatric HIV clinics.

More than half still visited their “former” pediatric clinics and met with their “old” providers. From discussions with the study teams, this was for reasons other than routine HIV medical care, and included the youth asking help with emotional support or advice around family and personal relationships. For those who require a physical transfer from specialist pediatric to adult HIV care, the transition may involve losing key health support systems, leading to increased vulnerability and risk of treatment failure and death.(4, 23–25) Because of the often close relationships that AYHIV establish with their pediatric providers, transfers in care can be emotionally difficult and associated with a deep sense of personal loss.(8, 24, 26) AYHIV and their pediatric providers may be concerned about discrimination from new adult providers or other patients in the adult healthcare system associated with HIV-related stigma, or worry about the potential loss of confidentiality.(27–29) Such concerns can delay the transition process.

Two-thirds of our cohort reported needing to avoid disclosure of their HIV status, which may have been a factor in the lack of people in their lives they felt they could rely on for advice and encouragement. They would consequently have a greater need to maintain the contacts they had, such as their pediatric providers, who knew about their family and personal histories of living with HIV. Notably, in addition to being retained in HIV care and

on treatment, most of the youth in our cohort were in active formal education or training programs and about half were employed, reflecting a high level of structure in their lives. However, other studies have raised the concern that this type of general social engagement through education and work may be insufficient to build the types of relationships needed to sustain AYHIV through adult life, particularly in the absence of disclosure of their HIV status to family and friends and while living with the fear of stigma.(4, 23, 24)

In Southeast Asia, although HIV treatment and care are often freely provided through government- and external donor-funded programs to both children and adults, HIV awareness is less integrated into everyday life than in high-prevalence settings, and stigma is often associated with the key affected populations at greatest risk of incident infection (e.g., males who have sex with males, sex workers, people who use drugs, transgender individuals).(1, 29) This places an added burden on AYHIV to either educate their peers or hide their status, (30, 31) with the majority of our cohort choosing the latter. Fear of discrimination is especially high around disclosing to employers. Our study sites have reported that some multinational companies in the region can obtain HIV testing information through employment or health insurance-related medical testing, which discourages individuals from seeking formal employment situations.

Because of ART scale-up in the mid-2000s, there are growing populations of older youth with perinatally acquired HIV in the region - many who will need to be transferred to adult care. In Thailand and Malaysia, they are more often transferred as young adults than older adolescents, while the Vietnamese healthcare system requires transfer between 16 to 18 years of age.(12) Despite differences in how transition is practiced, regional providers share a common priority to expand youth-specific HIV care interventions around adherence and retention.(14) As more AYHIV reach transition ages, the need for health systems-level coordination of the adult care transfer process will increase. This may require joint training for pediatric and adult providers to consider how to optimize both the process of “letting go” of adolescents with perinatally acquired HIV as well as how to receive them in a way that engenders trust.

Our results are limited by the scope of our sample, which reflects a cohort that largely transitioned at older ages and successfully engaged in adult HIV care, with high rates of viral suppression and advanced educational attainment. As a result, our results may not be generalizable to settings where transfers occur at younger ages or AYHIV remain in the same clinics in a family-centered care model. The cohort also was predominantly Thai, although almost most eligible youth at the Malaysian site (8 of 9) and the Vietnamese site (10 of 15) were enrolled. Those in Thailand and Vietnam completed study procedures at their pediatric (“sending”) clinic, and their responses to the participants surveys (especially with regards to social impact, problem-solving, and risk behaviors) may have been different if they had been obtained at their adult clinics, as was done in Malaysia. Moreover, the preparation for transition that each individual patient received would have varied, as study sites offered differing combinations of standardized counseling, patient navigation support, adult HIV clinic engagement, and transitional adolescent clinics. While this was a peri-transition cohort, the high levels of ongoing contact reported with their former pediatric clinics implies that some youth had not completely moved on to rely on their adult HIV

providers for their health and support needs. We also did not enroll control patients, which prevented us from evaluating socio-demographic factors or social relationships in comparison to HIV-uninfected peers.(32, 33)

Conclusions

In this Southeast Asian cohort of AYHIV who were transferred from pediatric to adult HIV care, most reported feeling prepared for the shift in care, found the transfer process smooth, and were comfortable at their adult HIV clinic. However, during this early post-transition period, the majority were having ongoing contact with their “sending” pediatric clinics and providers. Many were concerned about the negative social impact of having HIV, and most felt they needed to keep their HIV status an ongoing secret. One-third did not have people in their lives they could trust with their personal problems, which could have negative implications for their ability to navigate adult life. Post-transition data over more extended periods of time can help guide future interventions to ensure successful transfers and promote ongoing retention in adult-based HIV care of this vulnerable population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Conflicts of interest

AHS reports grants and travel funding to her institution from ViiV Healthcare. JA has received honoraria for participating in advisory meetings for ViiV Healthcare, Gilead, Merck, Roche and AbbVie. PR reports independent scientific grant support outside the submitted work from Gilead Sciences, Janssen Pharmaceuticals Inc, Merck & Co, and ViiV Healthcare (through his institution); he has served on scientific advisory board for Gilead Sciences, ViiV Healthcare, Merck & Co and Teva Pharmaceutical Industries and on a Data Safety Monitoring Committee for Janssen Pharmaceuticals Inc (all honoraria paid to institution).

Abbreviations

ART antiretroviral therapy

AYHIV	adolescents and youth living with HIV
IQR	interquartile range

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Implications and Contribution

As global survival rates for children with perinatally acquired HIV improve, these young people are increasingly responsible for their own care as they transition to adult care. Asian youth in this study report concern about the negative social impact of having HIV and isolation due to their status.

Figure 1.
Social impact questionnaire responses at enrollment (N=93)

Figure 2.
Social relationships questionnaire responses at enrollment (N=93)

Table 1.

Cohort characteristics of patients at enrollment (N=93)

Characteristic	Value
Female, N (%)	56 (60)
Ethnicity, N (%)	
Thai	75 (81)
Vietnamese	10 (11)
Malay	6 (6.5)
Chinese	2 (2.2)
HIV exposure category, N (%)	
Perinatal	87 (94)
Unknown	6 (6.5)
Age, median (IQR) years	
Female	20 (18.5, 21)
Male	20 (18, 21)
Overall	20 (18, 21)
Time since transition, median (IQR) months	
If transition from first adult HIV clinic visit (N=67)	4.7 (1, 8.8)
If transition from last pediatric HIV clinic visit (N=26)	3.4 (2.5, 8.8)
Living situation, N (%) [*]	
Relatives	40 (43)
Biological parents	36 (39)
Partner or friend	16 (17)
Orphanage/care home/shelter	12 (13)
Alone	5 (5.4)
No answer	1 (1.1)
Housing situation	
House	63 (68)
Orphanage/care home/shelter	10 (11)
Dormitory	7 (7.5)
Rented/temporary room	6 (6.5)
Apartment/condominium	2 (2.2)
No answer	5 (5.4)
Currently in school or training program, N (%)	60 (65)
Type of school or training program	
- Grade 4–6	2 (2.2)
- Grade 7–9	6 (6.5)
- Grade 10–12	15 (16)
- Vocational	5 (5.4)

Characteristic	Value
- College/university	29 (31)
- Other	2 (2.2)
- No answer	1 (1.1)
<hr/>	
If not in school or training, highest level of education, N (%)	33 (35)
- Grade 1–3	3 (3.2)
- Grade 4–6	2 (2.2)
- Grade 7–9	4 (4.3)
- Grade 10–12	11 (12)
- Vocational	3 (3.2)
- College/university	10 (11)
<hr/>	
Currently employed, N (%)	40 (43)
Type of employment	
- Full-time	18 (19)
- Part-time	12 (13)
- Temporary	6 (6.5)
- No answer	4 (4.3)
<hr/>	
Monthly income, N (%) **	
<5,000 Baht (<161 USD)	14 (15)
5,001–10,000 Baht (161–323 USD)	17 (18)
10,001–15,000 Baht (323–484 USD)	2 (2.2)
15,001–20,000 Baht (484–645 USD)	1 (1.1)
20,001–25,000 Baht (645–806 USD)	2 (2.2)
>25,000 Baht (>806 USD)	1 (1.1)
Not working or no answer	56 (60)
<hr/>	
Relationship status, N (%)	
Single	50 (54)
1 partner, not married	31 (33)
Married	6 (6.5)
No answer	6 (6.5)
<hr/>	
Previous sexual intercourse, overall, N (%)	37 (40)
- Female (among all females, N=56)	24 (43)
- Male (among all males, N=37)	13 (35)
Age at first intercourse, overall, median (IQR) years (N=26 responding)	16 (16, 18)
<hr/>	
Alcohol use in the past 3 months, N (%)	27 (29)
<hr/>	
Cigarette smoking in the past 3 months, N (%)	9 (9.7)

* Answer options are not mutually exclusive.

** US Dollar (USD) equivalent calculated at 31 Thai Baht to 1 USD; 3 participants with no answer. Monthly minimum wage ranges based on 2017 ASEAN data: Malaysia 233.83 to 254.16 USD, Thailand 285.39 to 294.90 USD, Vietnam 114.29 to 166.13 USD (source: <https://www.vietnam-briefing.com/news/vietnam-minimum-wages-on-the-rise-in-2018.html/>)

IQR-interquartile range

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Table 2.

Cohort HIV and treatment characteristics at enrollment (N=93)

Characteristic	Value
BMI, all, median (IQR) kg	19.3 (18.0, 21.8)
- Female (N=56)	19.4 (17.9, 21.8)
- Male (N=37)	19.0 (18.0, 21.6)
ART history *	
- Prior or current first-line regimen	89 (96)
- Prior or current second-line regimen	42 (45)
- Prior or current holding regimen **	3 (3.2)
Duration on ART, median (IQR) years	6.2 (3.3–10.7)
Reasons for second-line switch, N (%) (N=42)	
- Treatment failure	39 (93)
- Toxicity	2 (2.2)
- Patient preference	1 (1.1)
Current ART regimen	
- PI-based	39 (42)
- NVP-based	23 (25)
- EFV-based	24 (26)
- Others	5 (5)
- Missing	2 (2)
Daily ART pill burden, median (IQR)	3 (2, 5)
Median (IQR) VAS, %	97 (90,100)
Missed 1 ART dose in the past 3 months, N (%) ***	18 (19)
- Median (IQR) doses missed	3 (2, 4)
Primary financial responsibility for ART	
- National health insurance	32 (34)
- Private, employer or other health insurance	14 (15)
- Social security	13 (14)
- Self-pay	9 (10)
- Do not remember or no answer	25 (27)
Hepatitis B virus vaccine (known), N (%)	84 (90)
Hepatitis B surface antigen	
- Negative	87 (94)
- Positive	5 (5.4)
- Not done	1 (1.1)

Characteristic	Value
Hepatitis C virus antibody, N (%)	
- Negative	45 (48)
- Not tested, unknown	48 (52)
CD4, median (IQR) cells/mm ³	601 (477, 800)
HIV-RNA < 40 copies/mL, N (%)	76 (82)
- Log HIV-RNA in those with >40 copies/mL (N=17), median (IQR)	3.69 (3.54, 4.41)
ALT, median (IQR) U/L	17 (13, 26)
Creatinine, median (IQR) mg/dL	0.75 (0.60, 0.86)
Fasting cholesterol, median (IQR) mg/dL	169 (152, 196)
Fasting high-density lipoprotein, median (IQR) mg/dL	51 (39, 64)
Fasting low-density lipoprotein, median (IQR) mg/dL	98 (80, 117)
Fasting triglycerides, median (IQR) mg/dL	104 (79, 140)

* Responses are not mutually exclusive

** This represents treatment with a non-suppressive regimen during a period of poor adherence (e.g., lamivudine monotherapy)

*** Adherence by self-report

BMI-body mass index; ART-antiretroviral therapy; IQR-interquartile range; PI-protease inhibitor; NVP-nevirapine; EFV-efavirenz; VAS-visual analogue scale. The visual analogue scale is a tool to collect self-reported adherence information on a 0–100 scale (see reference 16, Finitis DJ, et al, 2016).

Table 3.

Factors associated with HIV-RNA >40 copies/mL (N=93)

	Univariate	p value	Multivariate	p value
	OR (95%CI)		aOR (95%CI)	
Female	1.26 (0.42–3.77)	0.67		
Ethnicity		0.89		
Thai	0.92 (0.18–4.8)			
Vietnamese	0.57 (0.04–7.74)			
Malay or Chinese	ref			
Age, years		0.50		
<17	ref			
17–21	0.52 (0.04–6.25)			
21	0.29 (0.02–3.92)			
Time since transition, months		0.08		0.02
<8 months	0.38 (0.13–1.11)		0.098 (0.011–0.849)	
8 months	ref		ref	
Living situation		0.30		
Relatives	ref			
Biological parents	3.18 (0.86–11.83)			
Partner or friend	4.38 (0.78–24.66)			
Orphanage/care home/shelter	0.97 (0.10–9.80)			
Alone	2.19 (0.19–24.68)			
Monthly income		0.43		
<5,000 Thai Baht (<161 US Dollars)	1.44 (0.31–6.62)			
>5,000 Thai Baht (>161 US Dollars)	ref			
Not working or no answer	0.60 (0.17–2.08)			
Relationship status		0.09		0.01
Single	ref		ref	
1 partner or married	0.28 (0.07–1.08)		0.037 (0.003–0.543)	
No answer	1.58 (0.26–9.75)		0.263 (0.011–6.455)	

	Univariate	p value	Multivariate	p value
Alcohol use, yes	2.05 (0.66–6.38)	0.20		
Cigarette smoking, yes	1.04 (0.26–4.14)	0.96		
VAS		0.01		0.049
<95%	ref		ref	
95%	0.24 (0.08–0.76)		0.147 (0.018–1.174)	
CD4 cell count/mm ³		0.002		<0.001
<600	ref		ref	
600	0.16 (0.04–0.59)		0.02 (0.001–0.296)	
I have someone I trust to talk with about my problems [*]		0.01		0.29
Never (n=11)	ref		ref	
Rarely/sometimes (n=42)	0.17 (0.04–0.70)		0.95 (0.07–12.35)	
Usually/always (n=39)	0.10 (0.02–0.46)		0.26 (0.01–5.82)	
I can handle whatever comes my way [*]		0.09		0.81
Never (n=3)	ref		Ref	
Rarely/sometimes (n=52)	0.20 (0.03–1.15)		0.17 (0.01–5.61)	
Usually/always (n=35)	0.11 (0.01–0.79)		0.06 (0.001–3.87)	
I can solve most problems if I try hard enough [*]		0.06		0.11
Never (n=4)	ref		Ref	
Rarely/sometimes (n=48)	0.30 (0.04–2.36)		0.46 (0.003–64.88)	
Usually/always (n=39)	0.08 (0.01–0.82)		0.12 (0.001–19.54)	

VAS-visual analogue scale

* Responses included in the analysis excluded the remainder of the individuals who chose “rather not answer.”