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Knowledge, attitudes, and practices regarding antiretroviral management, reproductive health, sexually transmitted infections, and sexual risk behavior among perinatally HIV-infected youth in Thailand

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Abstract

More than 30% of perinatally HIV-infected children in Thailand are 12 years and older. As these youth become sexually active, there is a risk that they will transmit HIV to their partners. Data on the knowledge, attitudes, and practices (KAP) of HIV-infected youth in Thailand are limited. Therefore, we assessed the KAP of perinatally HIV-infected youth and youth reporting sexual risk behaviors receiving care at two tertiary care hospitals in Bangkok, Thailand and living in an orphanage in Lopburi, Thailand. From October 2010 to July 2011, 197 HIV-infected youth completed an audio computer-assisted self-interview to assess their KAP regarding antiretroviral (ARV) management, reproductive health, sexual risk behaviors, and sexually transmitted infections (STIs). A majority of youth in this study correctly answered questions about HIV transmission and prevention and the importance of taking ARVs regularly. More than half of the youth in this study demonstrated a lack of family planning, reproductive health, and STI knowledge. Girls had more appropriate attitudes toward safe sex and risk behaviors than boys. Although only 5% of the youth reported that they had engaged in sexual intercourse, about a third reported sexual risk behaviors (e.g., having or kissing boy/girlfriend or consuming an alcoholic beverage). We found low condom use and other family planning practices, increasing the risk of HIV and/or STI transmission to sexual partners. Additional resources are needed to improve reproductive health knowledge and reduce risk behavior among HIV-infected youth in Thailand.

Keywords

HIV-infected youth; knowledge; attitudes; sexual risk behavior; ARV management; Thailand

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Introduction

The expansion of access to antiretroviral (ARV) therapy has transformed HIV into a manageable chronic disease in Thailand. As a result, while the number of children annually infected with HIV declined over the past decade, an estimated 11,000 children were living with HIV in Thailand in 2011. Approximately 6500 of these children were on ARV therapy (Thailand AIDS Response Progress Report, 2012 (Reporting period: 2010–2011)) and more than 30% of these children were 12 years of age. Perinatally HIV-infected youth face many challenges, including mental health and behavioral difficulties (Koenig, Nesheim, & Abramowitz, 2011). Many of them take ARV medicines for much of their lives and suffer from ARV side effects, poor drug adherence, ARV drug resistance, or low self-esteem due to the perceived stigma of HIV infection or being orphaned. Furthermore, as they become sexually active they risk transmitting HIV to their partners.

A behavioral sentinel surveillance survey among youth in Thailand in 2011 revealed that a significant portion of growing-up youth were sexually active (4% of students in high school grade eight and 50% of students in vocational school reported having had sexual intercourse) and had low HIV knowledge (Bureau of Epidemiology, 2011). The average age of these youth at first sex was 15 years and less than 55% used a condom during their first experience. Consistent condom use was low, particularly with steady partners (<45%; Bureau of Epidemiology, 2011). A cohort study of primarily sexually HIV-infected youth receiving care at a tertiary care hospital in Bangkok found that one-third were <95% adherent to ARV treatment and only 60% used a condom consistently. Forty-seven percent of sexually active youth in that cohort reported sex with an HIV-seronegative partner or partner of unknown HIV status in the previous 30 days, and one-third reported unprotected intercourse with that partner (Rongkavilit et al., 2007).

There is limited data on the knowledge, attitudes, and practices (KAP) of perinatally HIV-infected youth in Thailand, making it challenging to design appropriate interventions for them. Therefore, we assessed the KAP of youth receiving HIV care at two tertiary care hospitals in Bangkok, Thailand and living in an orphanage in Lopburi, Thailand regarding ARV management, reproductive health, sexually transmitted infections (STIs), and sexual risk behavior, as well as factors associated with low knowledge scores, low attitude scores, and sexual risk behaviors.

Methods

From October 2010 to July 2011, we invited youth receiving care at the two study hospitals or living in the study orphanage to participate in the survey. All perinatally HIV-infected youth 12 years and youth reporting sexual risk behaviors were invited to participate. All study participants were aware of their HIV status (Boon-Yasidhi et al., 2012).

The two study hospitals – Queen Sirikit National Institute of Child Health (QSNICH) and Siriraj Hospital – are large urban hospitals. In contrast, the Dhamaraksa orphanage is in a rural area of Lopburi province. HIV-positive youth living at the orphanage receive HIV treatment at a local community hospital.

Study sites were selected so as to capture a range of HIV-infected youth conditions and experiences. The KAP of youth receiving care at the tertiary care hospitals were intended to represent those of youth living in a home setting, while the KAP of children at the Dhamaraksa orphanage were intended to reflect those of youth cared for by foster guardians. Informed consent was obtained from caretakers or a foster guardian at the orphanage and informed assent was obtained from youth during routine clinical visits.

Participating youth were instructed in how to use an audio computer-assisted self-interview (ACASI) by study staff. ACASI is a method of collecting data that includes a recorded voice within a computer-assisted self-interview. This method allows respondents to privately answer sensitive questions via a computer and has been shown to be effective in collecting sensitive data such as information about sexual behavior (Dolezal et al., 2012). The approach was also chosen so as to reduce data entry errors and facilitate data collection from youth regardless of their ability to read.

In addition to capturing basic demographic information about respondents, the ACASI asked participants about their knowledge and attitudes toward reproductive health, HIV prevention and transmission, STIs, ARV management, self-care, and risk behaviors. Survey questions collected information about participant sexual, self-care, and ARV management practices. The correct answers to attitude statements in this survey were determined by a study advisory working group. Participants were allowed to skip questions that they did not wish to answer. If participants were unclear about the meaning of any questions, they were able to ask study staff for clarification. The ACASI questions appear in Tables 2–4.

Prior to the study, the ACASI questionnaire was pilot tested among 10 perinatally HIV-infected youth at QSNICH and Siriraj Hospital to validate that the questions captured the desired information and were understood by youth. Changes to the questionnaire were made based on pilot test results and a study advisory working group's opinions.

Data from ACASI was exported into a Microsoft Access database for analysis. Information about participant ARV therapy, adherence to therapy, Tanner staging, and CD4 and viral load (VL) test results (for the prior six months) was gathered from patient medical records and included in the database to enable additional analysis.

Data analysis

Data was analyzed using STATA 11.0 (StataCorp., College Station, TX, USA). Characteristics of survey participants were presented as proportions (percentages).

Each participant's knowledge score represented the number of questions that the youth answered correctly (range 0–18). Responses to attitude statements 1–15 were scored using a 4-point Likert scale, ranging from a score of 1 (“strongly disagree”) to a score of 4 (“strongly agree”). Attitudes with negative statements were reversed (i.e., “strongly agree” became a score of 1). Each participant's attitude score was the sum of their scores from the 15 attitude statements (range points 15–60). Median percentages of knowledge and attitude scores were calculated. Knowledge and attitudes scores lower than median score were defined as low scores.

Factors associated with low knowledge and low attitude scores were analyzed using bivariate and multivariate logistic regression to estimate odds ratios (OR) with 95% confidence intervals (CI). We conducted logistic regression using a generalized estimating equations estimation (GEE) instead of the normal logistic regression model for factors associated with having sexual risk behaviors in order to account for correlation within site (intra-class correlation) and to produce robust standard errors. Fisher's exact test was used to test the association when more than 20% of the expected frequencies in a two-by-two table were less than five. Variables in bivariate analysis with a *P*-value <0.1 were included in a multivariate model.

Human subjects' protections

Human subject research ethics approval for the study was obtained from QSNICH, Siriraj Hospital, the Thailand Ministry of Public Health and the U.S. Centers for Disease Control and Prevention (U.S. CDC).

Results

From October 2010 to July 2011, 220 youth were invited to participate in the survey. Of these, 197 (90%) youth completed the questionnaire and 23 youth or their caretakers declined to participate. The main reason for declining to participate was that youth or their caretakers were not available.

Participant characteristics appear in Table 1. Median age of participants was 14 years (range 11–18) and 111 (56%) were female. Participants were aware of their HIV status for a median of three years. All youth were receiving ARV treatment and 142 (72%) had HIV RNA <40 copies/ml. Median CD4 count was 625 cells/mm³.

Among participants receiving care at the tertiary care hospitals, less than half lived with their parents. Although the demographic characteristics of females compared with males among those participants were not statistically different, females were more likely to have attended an HIV education class compared with males. There were no statistical differences in demographic characteristics or participation in an HIV education class between youth receiving care at the tertiary care hospitals and with youth living in the orphanage (*P* = 0.15; data not shown).

Knowledge about ARV management, HIV, reproductive health, and STI

Overall, youth answered a median of eight (44%; range 0–16, IQR 5–10) knowledge questions correctly (Table 2). Less than 50% of respondents correctly answered questions related to pregnancy prevention methods, signs and symptoms of STIs, HIV and STI transmission, monitoring HIV viral resistance, and ARV management after immune recovery. Girls were significantly more likely than boys to correctly answer questions related to menstruation, oral contraceptive pills, and viral resistance.

In multivariate analysis, knowledge scores less than the median were associated with age <15 years (aOR 2.6, 95% CI 1.3–5.7), living at the orphanage (aOR 10.6, 95% CI 1.8–61.7), and attitude scores less than the median (aOR 3.0, 95% CI 1.5–5.9; Table 5).

Attitudes toward appropriate behaviors in self-care, ARV management, and sexual behaviors

Responses to attitude and skills questions appear in Table 3. Overall, the median score was 41 (IQR 36–46). About half of the youth thought that people who have HIV should not have sex. Forty percent of youth thought that an HIV-infected person should not marry an HIV-negative person. Girls were more likely than boys to report attitudes toward safe sex and safe behavior (Table 3).

Most youth (>90%) reported that it was easy to take ARVs on schedule and to talk with doctors and caretakers about their health. About two-thirds said it was easy to talk with doctors and caretakers about sex and felt it was easy to talk with their boyfriend/girlfriend about pre-marital abstinence. Almost two-thirds of youth said it was easy to say no to their friends or boyfriend/girlfriend if they were asked to use methamphetamine or other drugs or to have sex.

Attitude scores less than the median were associated with being male (aOR 2.2, 95% CI 1.2–4.2), Tanner stage <II (aOR 2.1, 95% CI 1.01–4.3), and an overall knowledge score <50% (aOR 2.5, 95% CI 1.3–4.6; Table 5).

Practice in self-care, ARV management, and risk behaviors

Most (>90%) youth participating in the survey played sports and exercised (Table 4). Less than 10% remembered their latest CD4 and VL test results and 16% missed taking at least one dose of their ARVs during the previous week. Youth reported that the most common methods used to remind themselves to take their ARVs were watching a clock (73%), asking a caregiver to remind them (42%), and setting a clock alarm (40%). For questions related to health and sex, youth were most likely to ask their caregivers or parents, doctors, or nurses. Almost one-fifth of youth reported that they had stayed out all night without permission from their parents or guardians at least one time.

Two percent of youth reported using illicit drugs, 13% reported smoking cigarettes, and 29% had drunk an alcoholic beverage. A higher proportion of boys (21%) reported having smoked cigarettes than girls (7%; $P = 0.01$).

Of 197 youth participating in the survey, 58 (29%) had a boyfriend/girlfriend. Of these, 23 (40%) had hugged or kissed their boyfriend/girlfriend; 21 (11%) reported their boyfriend/girlfriend had touched, kissed, or tried to have sex with them against their will; and 7 (12%) had disclosed their HIV status to their boyfriend/girlfriend.

Ten (5%) youth reported that they had had sexual intercourse. The median age when having first sex was 15 years old and four (40%) of those reporting sexual intercourse had had sex with more than one partner. Of the 10 youth who had had sexual intercourse, 5 (50%) used condoms during last sex; 2 (20%) had disclosed their HIV status to their boy/girlfriends; 2 (20%) had been pregnant or gotten someone pregnant; and 3 (30%) had had STI symptoms. Only six (60%) used contraception at last sex, including condoms (30%), birth control pills (10%), withdrawal (10%), and post-coital pill (10%).

The three most common sources of sex education among youth were school/teachers (54%), health-care providers (52%), and caretakers (50%). In addition to caregivers and health-care providers, 21% of youth had had their HIV status disclosed to relatives and 9% of youth disclosed their status to friends.

In multivariate analysis, having sexual risk behaviors was less likely among youth aged <15 years old (aOR 0.6, 95% CI 0.4–0.8) and youth who completed primary school or lower (aOR 0.6, 95% CI 0.4–0.9; Table 5).

Discussion

More than half of the HIV-infected youth in this study demonstrated a lack of reproductive health, family planning, and STI knowledge. Girls had more appropriate attitudes toward safe sex and risk behaviors than boys. Although only 5% of the youth had engaged in sexual intercourse, about a third reported sexual risk behaviors (e.g., having or kissing boy/girlfriend or consuming an alcoholic beverage). We found low condom use and other family planning practices, increasing the risk of HIV and/or STI transmission to sexual partners.

The overall low knowledge scores by respondents may reflect a gap in education for HIV-infected youth in Thailand. Although Thailand's national HIV treatment and care guidelines recommend basic sex education for HIV-infected youth aged 9–12 years and advanced sex education and life skills training for youth aged 12–14 years (Phanuphak et al., 2010), access to structured systematic youth interventions, tools, and materials is limited. Most education for HIV-infected youth focuses on ARV treatment, adherence, and side effects, opportunistic infections and HIV transmission and disclosure. Before 2012, few tools were available for educating HIV-infected youth in Thailand about STI, family planning, and reproductive health.

Youth receiving care at the two tertiary care hospitals had significantly higher knowledge scores than youth living in the orphanage and receiving HIV treatment at a local community hospital. This may be because the two tertiary care hospitals provide intensive HIV education classes for HIV-infected youth. The local community hospital does not routinely provide HIV education classes and interventions for HIV-infected youth (Lolekha et al., 2010; Sungkanuparp et al., 2007). In addition, youth receiving care at the tertiary care hospitals live in an urban environment with parents or relatives and may therefore have greater exposure to educational media than youth living in the rural orphanage, who are raised in a communal environment with one guardian responsible for multiple children.

The finding that more than a third of respondents found it difficult to refuse offers of illicit drugs or sexual advances highlights the need for life skills training for HIV-infected youth. The ability to successfully resist peer pressure is associated with high self-esteem, high self-efficacy, and low stress (DiIorio et al., 2002; Zimmerman, Sprecher, Langer, & Holloway, 1995). Educational interventions for HIV-infected youth should therefore also include activities that assess and promote self-esteem and self-efficacy.

Less than 10% of youth in this study were able to remember their CD4 count and VL level, highlighting the need for health-care providers to better prepare HIV-infected youth for the

transition to adult HIV services. Although health education for HIV-infected children in Thailand emphasizes and promotes ARV adherence, some youth in this study reported missing doses of ARV during the previous week and had VL results higher than 40 copies/mL. This finding implies that current adherence promotion interventions may not be sufficient for HIV-infected youth. Studies among HIV-infected youth have shown that using personalized, interactive, daily SMS reminders (Dowshen, Kuhns, Johnson, Holoyda, & Garofalo, 2012) had positive effects on improving ARV adherence. Such approaches should be considered when planning interventions to improve ARV adherence among HIV-infected youth in Thailand.

Some youth were sexually active and engaged in high-risk sexual behavior. The rate of sexual intercourse among respondents (5%) was consistent with rates previously reported in Thailand (4%) (Lee & Oberdorfer, 2009), but lower than rates reported by the US-based Pediatric HIV/AIDS Cohort Study (28%; Tassiopoulos et al., 2012). That study also reported that ARV non-adherence was associated with sexual initiation during follow-up, which we did not find.

Youth <15 years and youth who completed primary school or lower reported less sexual risk behavior than older youth. This may be due to sexual activity increasing with age. Youth who had poor attitude scores toward appropriate sexual behaviors were significantly more likely to have low knowledge scores, be male, and be <15 years. Educational interventions and life skills training should therefore start before HIV-infected children are 15 years and target young males. Given this sexual risk behavior, it is also important to ensure that sexually active youth have access to contraception and condoms.

Two trials in the USA reported that motivational interviewing (MI), a counseling technique, can help HIV-infected youth reduce sexual risk behavior (Mbuagbaw, Ye, & Thabane, 2012). More data is needed to determine whether this technique would be appropriate to incorporate into educational programs and life skills training for HIV-infected youth in Thailand (Rongkavilit et al., 2010, 2012).

The study had at least three limitations. First, data were limited to perinatally HIV-infected youth from two tertiary care hospitals in Bangkok and one orphanage in a more rural area. Because the number of HIV-infected youth at these sites was estimated to be <10% of HIV-infected youth in Thailand, the results may not be generalizable to other HIV-infected youth and health-care settings in the country. Second, because youth were allowed to skip questions, they may not have reported risk behaviors, resulting in an underestimate of risk. Third, the study's advisory working group in Thailand determined the correct answers to attitude statements in this survey. The definition of a correct answer may vary in other cultures and country contexts.

In conclusion, more than half of youth in this study lacked proper reproductive health and STI knowledge. Although only 5% of youth reported that they had engaged in sexual intercourse, 40% of youth that had a boyfriend or girlfriend reported pre-sexual activities. Interventions to reduce the risk behaviors and improve the life skills, reproductive health knowledge, and STI knowledge of perinatally HIV-infected youth are needed.

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References

- Boon-Yasidhi V, Chokephaibulkit K, McConnell MS, Vanprapar N, Leowsrisook P, Prasitsurbsai W, Chotpitayasunond T. Development of a diagnosis disclosure model for perinatally HIV-infected children in Thailand. *AIDS Care*. 2012; 25:756–762.10.1080/09540121.2012.749331 [PubMed: 23252607]
- Bureau of Epidemiology, Thailand Ministry of Public Health. Report of behavioral surveillance among grade 11, grade 8 and vocational students in Thailand 2011. 2011. in Thai
- DiIorio C, Resnicow K, Thomas S, Wang DT, Dudley WN, Van Marter DF, Lipana J. Keepin' it R.E.A.L.!: Program description and results of baseline assessment. *Health Education Behavior*. 2002; 29(1):104–123. [PubMed: 11822548]
- Dolezal C, Marhefka SL, Santamaria EK, Leu CS, Brackis-Cott E, Mellins CA. A comparison of audio computer-assisted self-interviews to face-to-face interviews of sexual behavior among perinatally HIV-exposed youth. *Archives Sexual Behavior*. 2012; 41:401–410.10.1007/s10508-011-9769-6
- Dowshen N, Kuhns LM, Johnson A, Holyda BJ, Garofalo R. Improving adherence to antiretroviral therapy for youth living with HIV/AIDS: A pilot study using personalized, interactive, daily text message reminders. *Journal of Medical Internet Research*. 2012; 14(2):e51.10.2196/jmir.2015 [PubMed: 22481246]
- Koenig LJ, Nesheim S, Abramowitz S. Adolescents with perinatally acquired HIV: Emerging behavioral and health needs for long-term survivors. *Current Opinion in Obstetrics Gynecology*. 2011; 23:321–327.10.1097/GCO.0b013e32834a581b [PubMed: 21836510]
- Lee B, Oberdorfer P. Risk-taking behaviors among vertically HIV-infected adolescents in northern Thailand. *Journal of the International Association of Physicians AIDS Care (Chic)*. 2009; 8:221–228.10.1177/1545109709341082
- Lolekha R, Chunwimaleung S, Hansudewechakul R, Leawsrisook P, Prasitsuebsai W, Srisamang P, McConnell MS. Pediatric HIVQUAL-T: Measuring and improving the quality of pediatric HIV care in Thailand, 2005–2007. *Joint Commission Journal on Quality and Patient Safety*. 2010; 36:541–551. [PubMed: 21222356]
- Mbuagbaw L, Ye C, Thabane L. Motivational interviewing for improving outcomes in youth living with HIV. *The Cochrane Database of Systematic Reviews*. 2012; 9:CD009748.10.1002/14651858.CD009748.pub2 [PubMed: 22972147]
- Phanuphak, P.; Leechawengwong, M.; Siraprasiri, T.; Juntratit, W.; Techasathit, W.; Teeraratkul, A.; Chasombat, S. National guidelines on HIV/AIDS diagnosis and treatment: Thailand 2010. 1. Bangkok: The agricultural co-operative federation of Thailand; 2010.
- Rongkavilit C, Naar-King S, Chuenyam T, Wang B, Wright K, Phanuphak P. Health risk behaviors among HIV-infected youth in Bangkok, Thailand. *Journal of Adolescent Health*. 2007; 40:358, e351–e358.10.1016/j.jadohealth.2006.11.004 [PubMed: 17367731]
- Rongkavilit C, Naar-King S, Kaljee LM, Panthong A, Koken JA, Bunupuradah T, Parsons JT. Applying the information-motivation-behavioral skills model in medication adherence among Thai youth living with HIV: A qualitative study. *AIDS Patient Care STDS*. 2010; 24:787–794.10.1089/apc.2010.0069 [PubMed: 21091238]
- Rongkavilit C, Naar-King S, Koken JA, Bunupuradah T, Chen X, Saengcharnchai P, Parsons JT. A feasibility study of motivational interviewing for health risk behaviors among Thai youth living

with HIV. *Journal of the Association of Nurses in AIDS Care*. 2012; 25(1):92–97.10.1016/j.jana.2012.02.008 [PubMed: 22683198]

Sungkanuparp, S.; Chokeyhaibulkit, K.; Anekthananondh, T.; Hirunsutthikul, N.; Samkoset, L.; Jirawatanapaisal, T. Thailand national antiretroviral treatment guideline 2006/2007. Bangkok: The Agricultural Co-operative Federation of Thailand; 2007.

Tassiopoulos K, Moscicki AB, Mellins C, Kacanek D, Malee K, Allison S, Seage GR III. Sexual risk behavior among youth with perinatal HIV infection in the United States: Predictors and implications for intervention development. *Clinical Infectious Disease*. 2012; 56:283–290.10.1093/cid/cis816

Thailand AIDS Response Progress Report 2012 (Reporting period: 2010–2011).

Zimmerman RS, Sprecher S, Langer LM, Holloway CD. Adolescents' perceived ability to say "no" to unwanted sex. *Journal of Adolescent Research*. 1995; 10:383–399.10.1177/0743554895103005 [PubMed: 12290754]

Table 1

Characteristics of perinatally HIV-infected youth attending two tertiary care hospitals in Bangkok and an orphanage in Lopburi province, Thailand, 2010–2011.

Characteristics	Total (N = 197)	Boys (N = 86)	Girls (N = 111)	P-value
	Number (%)	Number (%)	Number (%)	
Age, years (range)	14 (11–18)	15 (12–18)	14 (11–18)	0.47
Health settings				
• Siriraj Hospital (home setting)	81 (41)	40 (47)	41 (37)	0.11
• QSNICH (home setting)	83 (42)	29 (34)	54 (49)	
• Dhamaraksa orphanage	33 (17)	17 (20)	16 (14)	
Education				
• Grade 6	51 (35)	20 (23)	31 (28)	0.46
• >Grade 6	146 (65)	66 (77)	80 (72)	
Live with				
• Parents	90 (46)	42 (49)	48 (43)	0.43
• Blood relatives	58 (29)	20 (23)	38 (34)	
• Others	49 (25)	24 (28)	25 (23)	
Primary caretaker				
• Parents	88 (45)	39 (45)	49 (44)	0.87
• Blood relatives	66 (33)	26 (30)	40 (36)	
• Others	43 (22)	21 (25)	22 (20)	
Time since aware of HIV status				
• 1 year	52 (26)	17 (20)	35 (32)	0.18
• >1 years	126 (64)	60 (70)	66 (59)	
• Unknown/missing	19 (10)	9 (10)	10 (9)	
Tanner stage				
• II	60 (30)	29 (34)	31 (28)	0.27
• >II	133 (68)	54 (63)	79 (71)	
• Unknown	4 (2)	3 (3)	1 (1)	
Receiving antiretroviral treatment				
• NNRTI-based HAART	86 (44)	39 (45)	47 (42)	0.76
• PI-based HAART	97 (49)	40 (47)	57 (51)	
• Others/unknown	14 (7)	7 (8)	7 (6)	
Recent CD4 count (median, range, cells/mm ³)	625 (1–1920)	644 (1–1920)	660 (7–1795)	0.77
Recent VL (median, range, copies/mL)	<40 (<40–1,275,029)	<40 (<40–766,554)	<40 (<40–1,275,029)	0.98
Ever attended HIV education class in hospitals	129 (65)	44 (51)	85 (77)	<0.01

Table 2

Knowledge scores of perinatally HIV-infected youth attending two tertiary care centers in Bangkok and an orphanage in Lopburi province, Thailand, 2010–2011.

Knowledge Indicate whether you think the following statements are true or false.	Correct answers	Answered correctly, n (%)			P-value
		Total (N = 196)	Boys (N = 86)	Girls (N = 110)	
<i>Reproductive health</i>					
1. If a girl menstruates, it means she can become pregnant if she has sex	TRUE	120 (61)	40 (47)	80 (73)	<0.001
2. If a boy has a “wet dream,” it means he is able to get someone pregnant	TRUE	95 (48)	44 (51)	51 (46)	.51
3. Withdrawal before ejaculation is an effective way to prevent pregnancy	FALSE	15 (8)	9 (10)	6 (5)	.19
4. There is a pill that you can take after sex to prevent pregnancy	TRUE	87 (44)	36 (42)	51 (46)	.53
5. Washing the vagina immediately after having sex can prevent pregnancy	FALSE	28 (14)	11 (13)	17 (15)	.60
6. Jumping up and down many times after having sex can prevent pregnancy	FALSE	37 (19)	16 (19)	21 (19)	.93
7. There are pills that a girl can take every day to prevent pregnancy	TRUE	91 (46)	31 (36)	60 (55)	.01
<i>HIV transmission and prevention</i>					
8. There are ways for HIV-infected people to have sex without transmitting HIV to their sexual partner	TRUE	123 (63)	49 (57)	74 (67)	.14
9. Wearing a condom every time you have sex can prevent HIV transmission	TRUE	141 (72)	67 (78)	74 (67)	.10
10. Using a condom is a good way to prevent HIV and STI transmission during sex	TRUE	145 (74)	68 (79)	77 (70)	.15
<i>HIV and STI knowledge</i>					
11. If you already have HIV, you cannot get HIV again and you cannot get other STIs	FALSE	58 (30)	21 (24)	37 (34)	.16
12. People with an STI may feel pain when they urinate	TRUE	38 (19)	16 (19)	22 (20)	.81
13. An STI may create pus or abnormal discharge from the penis or vagina	TRUE	59 (30)	31 (36)	28 (25)	.11
<i>ARV management and self-care</i>					
14. Viral resistance means that ARVs are less effective at stopping HIV from replicating	TRUE	116 (59)	40 (47)	76 (69)	<0.01
15. You should have a test for viral resistance every time you come to see the doctor	FALSE	10 (5)	5 (6)	5 (5)	.69
16. It is important to regularly have your blood tested to measure your CD4 count and to monitor your health	TRUE	154 (79)	64 (74)	90 (82)	.21
17. You can stop taking ARVs when you have CD4 count of more than 500 cells/mm ³	FALSE	65 (33)	33 (38)	32 (29)	.17
18. If you do not take your ARV medications every day, nothing will happen to your health right now but you may have health problems later	TRUE	134 (68)	54 (63)	80 (73)	.14

Table 3

Attitudes and skills in self-care, ARV management, and risk behaviors of perinatally HIV-infected youth attending two tertiary care centers in Bangkok and an orphanage in Lopburi province, Thailand, 2010–2011.

Attitudes	Correct answers*	Answered correctly, N (%)			P-value
		Total (N = 196)	Boys (N = 86)	Girls (N = 110)	
1. Staying out all night without permission from your parent or guardian is wrong	Agree	141 (72)	60 (70)	81 (74)	.55
2. Frequently watching porn clips, porn VCDs, porn films, or visiting porn websites is OK for teens to do	Disagree	132 (67)	50 (58)	82 (75)	.01
3. It is okay to hug or kiss a boyfriend/girlfriend as long as you do not have sex	Disagree	96 (49)	34 (40)	62 (56)	.02
4. It is okay for teens to have sex with their boyfriend or girlfriend	Disagree	123 (63)	47 (55)	76 (69)	.04
5. When a teen's boyfriend/girlfriend wants to have sex, teens should do it to please them (even if teens do not want to)	Disagree	157 (80)	56 (65)	101 (92)	<0.001
6. It is not necessary to always use a condom with a boyfriend/girlfriend	Disagree	161 (82)	63 (73)	98 (89)	<0.01
7. It is easy for you to get birth control pills if you need them	Agree	73 (37)	30 (35)	43 (39)	.55
8. It is easy for you to get condoms if you need them	Agree	119 (61)	48 (56)	71 (65)	.21
9. Teens should not have sex	Agree	130 (66)	51 (59)	79 (72)	.07
10. HIV-infected people can marry to an HIV negative person	Agree	116 (59)	55 (64)	61 (55)	.23
11. People who have HIV should not have sex	Disagree	86 (44)	43 (50)	43 (39)	.13
12. It is not necessary to tell sex partners that you have HIV	Disagree	101 (52)	42 (49)	59 (54)	.51
13. If a teen has sex without using a condom, the teen might get an STI	Agree	144 (73)	58 (67)	86 (78)	.09
14. Teens should not play games (on the computer or, internet) more than two hours/day	Agree	130 (66)	52 (60)	68 (62)	.85
15. Going out with someone you meet from chatting on the internet is risky	Agree	140 (71)	56 (65)	84 (76)	.08
Self-care		Easy to do the following (N%)			
	Total (N = 195)	Boys (N = 85)	Girls (N = 110)	P-value	
16. Always take your ARVs on time	174 (89)	74 (87)	100 (91)	.39	
17. Talk with your doctors or providers about your health	169 (87)	72 (85)	97 (88)	.48	
18. Talk with your doctors or providers about sex	115 (59)	38 (45)	77 (70)	<0.01	
19. Talk with your caretakers about your health	163 (84)	65 (76)	98 (89)	.02	
20. Talk with your caretakers about sex	118 (61)	46 (54)	72 (65)	.11	
21. Talk with your boyfriend/girlfriend about waiting until marriage before having sex	108 (55)	46 (54)	62 (56)	.75	
Life skills		Easy to say no (%)			
	Total (N = 195)	Boys (N = 85)	Girls (N = 110)	P-value	

Attitudes	Answered correctly, N (%)			P-value
	Correct answers*	Total (N = 196)	Girls (N = 110)	
22. Your friend wants you to go out at night (to a discotheque, pub, karaoke bar, etc.) but you do not want to go	106 (54)	41 (48)	65 (59)	.13
23. Your friend offers you a cigarette or an alcoholic beverage and you do not want it	115 (59)	47 (55)	68 (62)	.36
24. Your friend offers you some (amphetamine or some other drugs and you do not want it	114 (58)	45 (53)	69 (63)	.17
25. Someone you like a lot wants to have sex with you and you do not want it	95 (49)	36 (42)	59 (54)	.12
26. Both you and your boyfriend/girlfriend want to have sex	103 (53)	39 (46)	64 (75)	.09

* The correct answers to attitude statements in this survey were determined by a study advisory working group in Thailand.

Table 4

Personal practices in self-care, ARV management, and risk behaviors of perinatally HIV-infected youth attending two tertiary care centers in Bangkok and an orphanage in Lopburi province, Thailand, 2010–2011.

Characteristics	Total (N = 197) Number answered (%)
<i>Self-care and ARV management</i>	
Play sports and exercise regularly	
• Yes, regularly	60 (30)
• Yes, sometimes	127 (64)
• No	9 (5)
Know your last CD4 test result	
• Yes, remember CD4 number	12 (6)
• Yes, but cannot remember number	119 (61)
• No/unknown	65 (33)
Know your latest viral load test result	
• Yes, remember VL number	11 (6)
• Yes, but cannot remember number	108 (55)
• No/unknown	77 (36)
Ever missed taking your ARVs during the past week	32 (16)
Methods to remind for taking ARV medication	
• Watch the clock	144 (73)
• Set an alarm clock/watch	79 (40)
• Reminded by TV or radio program	18 (9)
• Reminded by caregiver	83 (42)
• No system, I take it when I remember/missing	3 (2)
Whenever I have a question about health, I generally ask? (can select >1 answer)	
• My friends	32 (16)
• My caregivers or parents	150 (76)
• My close relatives	41 (21)
• My doctor	80 (41)
• A nurse or counselor in the clinic	48 (24)
• Search the Internet or read from pamphlets, books	15 (8)
• No one/no answer	7 (4)
Whenever I have a question about reproductive health or sex, I generally ask? (can select >1 answer)	
• My friends	35 (18)
• My caregivers or parents	113 (57)
• My close relatives	35 (18)
• My doctor	70 (36)
• A nurse or counselor in the clinic	42 (21)
• Search the Internet or read from pamphlets, books	20 (10)
• No one/no answer	24 (12)
Ever stayed out all night without permission from guardians	35 (18)
<i>Alcohol, nicotine, and illicit drug use</i>	

Characteristics	Total (N = 197) Number answered (%)
Ever had an alcoholic beverage	58 (29)
Ever smoked cigarettes	26 (13)
Ever used any addictive substances e.g., smoking marijuana, taking methamphetamine, glue sniffing, solvent sniffing	3 (2)
<i>Sex behaviors</i>	
Currently have a boyfriend /girlfriend	58 (29)
• Ever hugged or kissed your boyfriend/girlfriend	23 (40)
• Ever touched, kissed or tried to have sex with you against your will	21 (11)
Ever had sexual intercourse	10
• Median age when having first sex (yr, range)	15 (12–17)
• No. of people ever had sex with	
○ 1 person	6
○ >1 person	4
• Condom last sex	5 (50)
• Prevent pregnancy last sex by	
○ Birth control pills	1 (10)
○ Condoms	3 (30)
○ Withdrawal	1 (10)
○ Post-coital pill	1 (10)
○ Some other method/missing	4 (40)
• Ever pregnant or gotten someone pregnant	2 (20)
• Ever had STI symptoms	3 (30)
HIV disclosure to others (can select >1 answer)	
• No/no answer	140 (71)
• Relatives	41 (21)
• Friends	17 (9)
• Boyfriend/girlfriend	7 (4)
Sources of sex education information (can select >1 answer)	
• Caretaker	99 (50)
• School/teacher	106 (54)
• Friends/neighbors	40 (20)
• Media	72 (37)
• Websites	48 (24)
• Doctor/provider/counselor	103 (52)
• Never got/others	10 (5)

Table 5

Factors associated with low knowledge score, poor attitude score, and sexual risk behavior.

Factors	No. (%)	Knowledge score less than the median*		Attitude score less than the median**		Sexual risk behavior***	
		OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Age							
<15 years	102 (51.8)	2.9 (1.5–5.4) ^{†††}	2.6 (1.3–5.7) ^{††}	1.2 (0.7–2.2)		0.4 (0.3–0.5) ^{†††}	0.6 (0.4–0.8) ^{††}
15 years	95 (48.2)	1	1	1		1	1
Sex							
Male	86 (43.7)	1.2 (0.7–2.2)		2.4 (1.3–4.5) ^{††}	2.2 (1.2–4.2) [†]	1.0 (0.8–1.3)	
Female	111 (56.3)	1		1	1	1	
Education							
Primary	51 (25.9)	2.5 (1.2–5.3) ^{††}	1.2 (0.5–2.8)	1.7 (0.8–3.3)		0.4 (0.3–0.6) ^{†††}	0.6 (0.4–0.9) ^{††}
>Primary	146 (74.1)	1	1	1		1	1
Facility							
Orphanage	33 (16.8)	7.4 (2.4–26.5) ^{†††}	10.6 (1.8–61.7) ^{††}	1.0 (0.4–2.5)		0.7 (0.3–1.7)	–
QSNICH	83 (42.1)	1.5 (0.8–2.9)	1.6 (0.8–3.2)	0.9 (0.5–1.8)		0.4 (0.2–0.8) [†]	–
Siriraj	81 (41.1)	1	1	1		1	–
Primary caretakers							
Blood relative	66 (33.5)	0.9 (0.5–1.9)	0.8 (0.4–1.6)	1.5 (0.8–3.0)		1.0 (0.8–1.4)	
Others	43 (21.8)	2.6 (1.1–6.1) [†]	0.6 (0.1–2.9)	1.1 (0.5–2.4)		1.3 (0.7–2.6)	
Parents	88 (44.7)	1	1	1		1	
Time since aware of HIV status							
1 year	52 (29.2)	1.8 (0.9–3.6)		1.3 (0.6–2.6)		0.7 (0.5–1.1)	
>1 year	126 (70.8)	1		1		1	
Tanner stage							
II	60 (31.1)	2.0 (1.03–4.0) [†]	0.9 (0.4–1.9)	2.5 (1.3–4.9) ^{††}	2.1 (1.01–4.3) [†]	0.5 (0.2–1.0) [±]	0.9 (0.5–1.7)
>II	133 (68.9)	1	1	1	1	1	1
Viral load							
<50 copies/mL	142 (72.4)	0.7 (0.4–1.5)		1.0 (0.5–2.1)		1.1 (0.6–2.1)	
50 copies/mL	54 (27.6)	1		1		1	

Factors	No. (%)	Knowledge score less than the median*		Attitude score less than the median**		Sexual risk behavior***	
		OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Everattended HIV education class inhospitals							
Yes	129 (65.5)	0.8 (0.4–1.6)		0.6 (0.3–1.1)±	0.7 (0.4–1.4)	1.1 (0.8–1.7)	
No	68 (34.5)	1		1	1	1	
Ever attended kid's camp							
Yes	15 (7.6)	1.3 (0.4–4.6)		2.8 (0.8–10.9)		1.2 (0.2–7.3)	
No	182 (92.4)	1		1		1	
Low attitudes score							
< median	86 (43.6)	2.6 (1.4–4.9)††	3.0 (1.5–5.9)††	–	–	0.7 (0.4–1.1)±	0.8 (0.5–1.1)
median	111 (56.4)	1	1	–	–	1	1
Knowledge score							
< median	107 (54.3)	–	–	2.6 (1.4–4.9)††	2.5 (1.3–4.6)††	0.4 (0.2–1.04)±	0.6 (0.2–1.4)
median	90 (45.7)	–	–	1	1	1	1

* Knowledge score less than the median (Knowledge score: median 8, range 0–16, IQR = 5–10).

** Attitude score less than the median (Attitude score: median 41, range 0–56, IQR = 36–46).

*** Sexual risk behavior defined as having boyfriend/girlfriend, kissing, engaging in sexual intercourse.

††† $P < 0.001$;

†† $P < 0.01$;

† $P < 0.05$;

± $P < 0.1$.