

# Barriers to and Facilitators of Adherence to Pediatric Antiretroviral Therapy in a Sub-Saharan Setting: Insights from a Qualitative Study

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## Abstract

Despite the need for HIV-positive children to adhere effectively to antiretroviral treatment (ART), a guiding theory for pediatric ART in resource-limited settings is still missing. Understanding factors that influence pediatric ART adherence is critical to developing adequate strategies. In-depth qualitative interviews were undertaken in Kinshasa, Democratic Republic of the Congo, with 20 sets of HIV disclosed and nondisclosed children along with respective caregivers to better characterize barriers, facilitators, and adherence experiences in children taking ART. Commonly cited barriers included lack of food or nutritional support, lack of assistance or supervision for children, lack of assistance for caregivers, and being unable to remember to take medicines on a consistent basis. Facilitators included having a strong caregiver-child relationship and support system along with strategies for maintaining adherence. Similar themes arose within the child-caregiver sets, but were often characterized differently between the two. Children who were aware of their HIV status displayed fewer instances of frustration and conflict concerning taking medicines and within the child-caregiver relationship. Continued study on pediatric ART adherence should account for differing perspectives of children and caregivers, as well as between status disclosed and nondisclosed children. Areas of future intervention should focus on child-caregiver relationships, disclosure of HIV status, and available nutritional and psychosocial support for children and their caregivers.

## Introduction

**I**N 2008 OVER 2 MILLION CHILDREN worldwide were living with HIV/AIDS, of whom 90% lived in sub-Saharan Africa.<sup>1</sup> Pediatric antiretroviral therapy (ART), including early treatment of HIV-positive infants, has been shown to improve clinical outcomes.<sup>1,2</sup>

Despite improving availability of ART, adherence remains a problem and ART regimens may be complicated for children in resource limited settings. Accurately gauging ART adherence in these children is extremely important because maintaining high rates of adherence is required for successful treatment of HIV. Estimates of 90% adherence or greater are recommended for optimal virologic suppression and to minimize failure rates.<sup>3-6</sup> An exact rate of adherence to pediatric ART regimens necessary to reduce risk of adverse outcomes is

not firmly established as resistance to ART may depend on regimen type and HIV subtype rates. However, poor adherence to ART has been associated with viral resistance, opportunistic infections and ultimately failure of therapy.<sup>3,6-8</sup>

There continues to be a lack of guiding theory in pediatric ART adherence research in resource-limited settings and few reliable predictors of nonadherence have been established.<sup>9-12</sup> There is little consensus on what factors contribute most to pediatric ART adherence in resource limited settings, which may be a more complex issue than with adult counterparts.<sup>12,13</sup> While numerous studies in adults have been undertaken to better understand adherence in these settings, studies in children are still sparse. To date, quantitative studies in children looking at factors predictive of non-adherence vary in both their methods and results. Definitions for what is meant by "adherent," factors measured, and

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analyses vary widely among published studies, making it difficult to compare across studies to draw conclusions.<sup>12</sup> Qualitative research is thus needed in resource limited settings. Qualitative research methods may shed light on factors that influence pediatric adherence and further represent an alternative to evaluate pediatric ART adherence levels. It can be used to inform the development of more valid, culturally appropriate adherence measures and a contextual adherence theory.<sup>11,12</sup>

Program data collected using standard questionnaires at the Kalembe Lembe Pediatric HIV Clinic in Kinshasa, Democratic Republic of the Congo (DRC) revealed that more than 99% of respondents reported perfect adherence to pediatric ART regimens within the preceding 2 days, along with zero days of missed treatment within the last month (F. Behets, unpublished data). This demonstrates the suspected inability to accurately capture adherence rates and experiences using survey methods. These numbers are well above expected adherence rates among children in similar settings where prior reviews have shown average adherence rates ranging from 50% to 80%.<sup>12,14,15</sup>

The objectives of our study were to qualitatively assess barriers and facilitators of ART adherence and the reported effects of child-caregiver relationships, psychosocial support structures, perceptions of living with HIV and of the concept of being "adherent" to medication. We aimed to increase our understanding of how and why the above effect ART adherence and to characterize interaction among complex social dynamics and living situations, overall guiding further development of adherence theory and future studies. As a secondary objective we assessed specific adherence experiences among children and compared adult caregiver with child perceptions of adherence to ART.

## Methods

### Overview

In-depth semistructured interviews were conducted with children 8–17 years old and with their corresponding primary caregivers. The research was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill in the United States and the Kinshasa School of Public Health Ethics Review Committee in the DRC. Informed consent, parental consent, and informed assent were obtained as appropriate.

### Setting and recruitment

All children were recruited at the HIV clinic of the Kalembe Lembe Public Pediatric Hospital (KLL) in Kinshasa, DRC. Nine hundred fifteen HIV-positive children had been enrolled at this clinic as of September 1, 2010. A total of 20 sets of children and their respective primary caregivers were purposively recruited from the clinic cohort for this study by KLL HIV clinic staff if they were between 8 and 17 years of age, HIV seropositive, on ART for at least 6 months, and had a history of perceived poor adherence noted in their medical record or if their health care provider suspected poor adherence. In addition, we recruited one child who had perceived good adherence along with her caregiver, to explore information about factors that facilitated adherence. The primary caregiver, defined as the adult who primarily serves to assist

the child with taking ART, was recruited along with each child. This relationship was assessed by study recruiters during initial recruitment scripts. If this was not the person who accompanied the child to the clinic, an attempt was made to contact and arrange follow-up with this person. Subjects were excluded if the child or caregiver was unwilling or unable to be interviewed alone or if the participants were personally known to an interviewer.

We recruited children who were both aware and unaware of their HIV infection, the status of which is routinely noted in their medical chart. Therefore "HIV/AIDS" or "ART" was not mentioned during initial recruitment. All caregiver interviews preceded child interviews and it was at that time the child's disclosure status was confirmed. Children who were aware of their status were fully informed of the study objectives regarding HIV/AIDS and ART, whereas those who were unaware were informed that this was a general study regarding medication adherence.

Each participant was compensated with an equivalent of \$5 USD for their time (\$10 for caregiver/child sets) and was provided with snack and drink during their interview session.

### Study design and data collection

A total of 40 interviews were conducted exploring the experiences of the study participants in dealing with ART regimens. We selected this number because previous studies on ART adherence had reached a saturation of themes interviewing from 20 to 50 participants and our taking into account budget and time constraints.<sup>14,16–18</sup>

Three separate interview scripts, consisting of 14 to 22 questions, were developed and administered to adults, children aware of their HIV infection, and children uninformed of their HIV infection. Scripts for disclosed and nondisclosed children were similar with several questions relating specifically to HIV being omitted from the nondisclosed status script. The interviews began with structured questions that asked about individual demographics and the relationship between child and caregiver. We then used open-ended questions with a list of probes to explore general themes with adult caregivers about overall attitudes toward ART regimens, perceived benefits or liabilities of ART, health beliefs on ART and on HIV, what "good adherence" meant to them, perceived barriers in carrying out regimens as prescribed, and facilitators which aid ART adherence. Throughout the interviews the child-caregiver relationship was characterized in greater detail. These questions were followed by an assessment of the child's specific adherence experiences. For instance, caregivers were asked, "What types of things make taking medicine more difficult for your child?", and then followed with more closed-ended probes related to how taste, difficult schedule, stigma, or going to school or work can affect adherence. We used the same kinds of open ended questions with probes to explore similar themes and the child-caregiver relationship with the child participants. These included beliefs regarding ART and HIV (for disclosed children) and perceived barriers and facilitators to good adherence of their medicine. Throughout the process, we explored specific instances of missed doses that arose.

Question sets were developed to meet study objectives regarding adherence through a mix of deductive question development, prior literature searches exploring themes

regarding ART adherence, and through meetings with the KLL HIV clinic physicians and support staff.<sup>11,12,14,19</sup> The semistructured nature of the interviews and multiple question probes allowed interviewers to explore topics in detail which were relevant to each participant, yet allowed for additional exploration and clarification of new and emerging issues pertinent to ART adherence.

For the assessment of adherence, both caregivers and children were asked a series of time intervals in which they had missed their last dose. For instance, we asked "Have you missed a dose in the last day, 2 days, 3 days, week, month?" Since the primary objective did not include assessing whether the participants were adherent or not, there was no definition as such. Responses of the children and caregivers were compared to assess for likeness between them.

Trained Congolese qualitative interviewers, fluent in Lingala, conducted interviews in private rooms. Several rehearsal interviews were performed with the clinic staff to familiarize the interviewers with the questions and to deal with delicate issues surrounding HIV disclosure. Further, questions were screened for poor wording or lack of clarity that might have occurred in translation from English to Lingala and adjusted accordingly.

Interviews lasted 45–90 min for children and 60–120 min for adult caregivers. All interviews were digitally recorded, with participants' consent, and directly translated into English during transcription. Each interview was proofread for translation errors by a study coordinator fluent in both English and Lingala.

### Analysis

Data were analyzed using qualitative content analysis to identify themes and patterns as related to research questions.<sup>20</sup> The translated interview scripts were entered into Atlas.Ti v. 6.1 (Atlas.Ti Scientific Software Development, Berlin, Germany) and line-by-line coding of each transcribed page was undertaken. A mixture of deductive and inductive codes were progressively developed, reviewed by other team members, and applied to the transcripts. Codes were applied to the transcripts in multiple iterations in order to produce a consistent and reliable coding framework.

Deductive codes included issues with the medication regimen, side effects, or medicine characteristics, issues relating to money, issues relating to home or school life, or issues related to stigma or the community. In addition to these themes, a number of other factors emerged during the analysis that were captured. All codes were specifically defined and applied to excerpts that met that definition.

The coding framework was reviewed and combined into broader categories for a more concise presentation of results. Ultimately each code was interpreted based on the general accord among responses. Specific pattern comparisons in coding were made between adults and children and between the HIV status disclosed children and the nondisclosed children.

## Results

### Study participants

A total of 40 interviews were completed, 20 with children and 20 with their corresponding caregivers. One adult and

one child interview were cut-short and unable to be completed due to scheduling conflicts of the participants, yielding 18 complete sets. The characteristics of the cohort are provided in Table 1. The ages of the children ranged from 9 to 17 years and from 25 to 63 years among adult caregivers. Most children were primarily cared for by a family member other than the biological parents ( $n=17$ ). Nine children were listed as having both parents deceased. The nonrelative caregivers included persons working in an orphanage ( $n=2$ ) and a family friend ( $n=1$ ).

All children had been actively receiving care and treatment at KLL for 1–5 years and had at least one follow-up visit in the 6 months prior to their participation in this study. The majority of ART regimens consisted of standard first line pediatric treatment zidovudine or stavudine plus lamivudine plus nevirapine or efavirenz. Seven of the children were on alternate or second-line pediatric regimens as outlined by the World Health Organization ART Guidelines.<sup>3</sup> Documented instances of perceived poor adherence had been noted by clinic staff for 19 of the children, while 1 child was noted to have perceived good adherence. Reasons for perceived poor adherence noted from the child's medical chart included lack of assistance in the home, instances of child refusing to take medications, repeated missing of clinic appointments, stated mistrust in the medications, and a high level of curiosity regarding the reason for medications. Four of the children were living with other HIV-positive members in their household, either their caregiver or another child. All but one caregiver described their child's health as excellent or quite good, the exception noting their child's health as poor.

TABLE 1. DEMOGRAPHICS

Children	(n=20)	%	Adults	(n=20)	%
Gender	12	60.0%	Gender	13	65.0%
Female			Female		
Age	14	(years)	Age	43	
(Median)			(Median)		(years)
8 to 11	5	25.0%	Completed education		
12 to 15	11	55.0%	Primary school	2	10.0%
16 to 18	4	20.0%	Secondary school	6	30.0%
HIV status disclosed			Undergraduate degree	6	30.0%
Yes	4	20.0%	State diploma	4	20.0%
No	13	65.0%	Nursing degree	1	5.0%
Caregiver Unsure	3	15.0%	Unknown	1	5.0%
			Caregiver Type		
			Mother	3	15.0%
			Father	2	10.0%
			Sister	1	5.0%
			Aunt	6	30.0%
			Uncle	2	10.0%
			Grandmother	2	10.0%
			Nonrelative	3	15.0%
			Brother-in-law	1	5.0%

TABLE 2. SELECTED QUOTATIONS

Children	Caregivers
<p><i>Barriers</i>  <i>Frustration/fed-up</i>                      "Sometimes when I am fed up I will go 2 or 3 days without taking them [medicine], and after that I take again. And if people keep talking to me [about medicine], it makes me feel angry and I don't want to take them again."—11-year-old male                      "I can be annoyed some days. I even come here and ask them to stop giving me medicines because I am worn out. I do tell them I am frustrated"—14-year-old female  <i>Lack of food/hunger</i>                      "This makes me feel dizzy [taking medicine without food], I feel as if I want to vomit... To take it [medicine] without eating? It becomes a serious problem."—15-year-old Male</p>	<p><i>Barriers</i>  <i>Frustration/fed-up</i>                      "Apart from the problem of food, it is just the fact that he is taking the ARV everyday, whereas other children in the house are not taking the medicines like him."—Aunt, caregiver of an 11-year-old male                      "They [medicines] frustrate her because it is three years since we entered the project... I feel unhappy when I look at her, being a very young girl taking very big tablets everyday. This fact hurts us much."—Aunt, caregiver of a 13-year-old female  <i>Lack of food/hunger</i>                      "I can say, maybe if there is nothing to eat and he must take his dose, at that time he shows a little weakness. He may refuse to take. That is why I am struggling so that he could always have something to eat. I would like also to raise a very important point, these medicines administered to them brings appetite. It should be noted that he eats too much, more; he is still demanding, he even gets what we have left."—Uncle, caregiver of a 16-year-old male                      "If she doesn't have anything to eat, I personally don't want to give her medicines until we get food. There are times I was not giving her medicines if we didn't have food and she spent the night without taking medicines."—Sister, caregiver of an 11-year-old Female  <i>Lack of assistance</i>                      "At a previous time his elder brother was seriously sick and hospitalized here at KLL; much attention was given to his elder and we were neglecting the young. In so doing he was 10 years old and the person with whom we left them didn't pay much attention to the medicines. He started falling sick from time to time and we wanted to know the reason he falls sick while taking his medicines... then we got informed that he was skipping his dosages."—Aunt, caregiver of a 15-year-old male                      "Our [the parents] absence can disturb her getting medicines, our presence can encourage her but others may or not care, even she can willingly avoid taking medicines with others."—Family friend, caregiver of a 14-year-old female</p>
<p><i>Forgetting</i>                      "I need to be reminded. Most of the time, I forget to take them and my aunt has to remind me to take the medicines. It is often my aunt who does it. Most of the time, if she is not there, myself I forget to take and I will not take my medicine that day."—11-year-old male                      "If someone is thinking a lot or busy he can forget to take medicines just because of that. Or, if you have a problem, this also may affect your way of taking medicines."—15-year-old male                      "During vacation, we often go out for a walk or have a new schedule. If it turns 7:00 PM while I am there, I forget to take medicines. I simply forget about it."—16-year-old male  <i>Facilitators</i>  <i>Assistance</i>                      "If it happens that I forget taking my medicines, I will remember that I didn't take them. Mind that my mother is a nurse she will awake me saying that you didn't take your medicines as you are taking them at eight p.m. tomorrow morning you must take your dosage at 8:00 AM then I respect her instructions."—13-year-old female</p>	<p><i>Forgetting</i>                      "Sometimes I ask him what is wrong, why do your forget. He says 'I just forget from time to time.' I also realized that when he plays a lot, he often forgets. When he plays, he even forgets to take his cup of tea. He can even forget to eat. He can easily be a child and just forget. That is the reason why I don't want him to play too much."—Brother-in-law, caregiver of a 14-year-old male                      "What is true is as a human being, it may happen that I forget to give him medicines; I will remember but may be it will be too late. He easily forgets also. They will take only his second dose."—Children's center caregiver of a 16-year-old male  <i>Facilitators</i>  <i>Assistance</i>                      "The answer to that question is already given [regarding adherence facilitators]. It is just the problem of assistance. Show the child that you love him as he is, prove him that you want him to be fine. Just take care of him and advise him every day about what is important. If I do that, I know my child cannot refuse to take medicines. He will take without problem"—Aunt, caregiver of a 15-year-old male</p>

(continued)



TABLE 2. (CONTINUED)

Children	Caregivers
<p>"They [caregivers] say "Go to take your medicines. Don't you know that medicine is all your life? If you refuse to take, it is your problem. You are alive because of medicines."—14-year-old female</p> <p><i>Belief medicine is helping</i></p> <p>"I have noticed a big change [Since starting ART]. I say this because, in the past I used to fall ill all the time, but not now...now I become very strong, I am not falling ill every time."—14-year-old female</p> <p><i>Routine/strategy</i></p> <p>"I put the alarm in my telephone to remind me. I put it at 7:00 in the morning and also at 19:00 in the afternoon. Sometimes if I did not hear it, someone can remind me that I have to take my medicine it is time to take them."—13-year-old female</p> <p>"I was told that if I neglected my medicines I will die. I am afraid of that. I am sure to take them every day."—16-year-old male</p>	<p>"Whenever we're together at home, I never cease to provide such advice that you should always respect the time indicated for the taking of medication. We manage this situation in this way and we have no problems."—Uncle, caregiver of a 16-year-old male</p> <p><i>Belief medicine is helping</i></p> <p>"As I mentioned early, he was in bad health status before he started taking medicines. Now he is strong. That is what encourages me to monitor him closely."—Uncle, caregiver of a 16-year-old male</p> <p><i>Routine/strategy</i></p> <p>"We have a habit of praying at 6:00 AM everyday. When we end with the prayer she also takes her medicines at that time. That way it is not easy to forget."—Mother of a 13-year-old female</p> <p>"There is a cupboard in my bedroom where her medicines are locked up. No other children have access to that cupboard except her. Then there is a can of water at a corner of my bedroom. This allows her to take her medicines even if it is dark—there is no power."—Father of a 14-year-old female</p>
<p><i>Shame/stigma</i></p> <p>"Taking medicines is not the issue per se. It is the shame that goes with it."—16-year-old male</p>	<p><i>Shame/stigma</i></p> <p>"Others discourage her by saying, "This is enough. You are taking medicines everyday, can't you stop? When are you going to stop taking medicines?" It aggravates her, to see that they say that she takes medicines without end. This makes it very difficult for her."—Grandmother, caregiver of a 14-year-old female</p> <p>"And some times when they [the child's friends] are joking, they provoke him about the fact that he is taking medicines every day. I know one they one of the boys told him 'Why you are taking medicines everyday may be you are suffering from AIDS?' He was very angry. His attitude changed about his medicine at that time."—Children's center caregiver of a 16-year-old male</p>
<p>"Others are astonished to see that I am still taking medicines until today... That is the reason why some time even if it is time to take my medicines, as we are sitting with other people, and we are talking outside, I will not take."—14-year-old female</p> <p><i>Disclosure related</i></p> <p>"I can say this: As far as I am concerned, I want to know this medicine is for which kind of illness? I say this, because a normal human being can not take medicines just for pleasure. He or she musts know the reason why he or she takes medicines. That is why I want to know, these medicines are for which kind of illness? Otherwise I must refuse."—15-year-old male (nondisclosed)</p> <p>"Having heard explanations made it easy for me to take medicines. I was told what medicines do in my body. That is why I take them. I have the willingness and the need for taking them with no problem."—16-year-old male (disclosed)</p> <p>"Now, I trust those medicines simply because I am fine. Before I was not convinced to take and to respect my medicines, but now I have changed. Now as I know everything about those medicines and what they are for, I am convinced that they help me to be fine."—14-year-old female (disclosed)</p> <p>"A person who knows that he is suffering from a bad illness like HIV can not forget to take the medicines." 11-year-old male (disclosed)</p>	<p><i>Disclosure related</i></p> <p>"He [the child] really wonders why he has to take medicines everyday. He sort of revolts and asks the reason for being burdened with medicines...he finds no importance as he feels healthy. It becomes difficult to motivate him."—Uncle, caregiver of a 16-year-old male (nondisclosed)</p> <p>"As I told you that taking for a long time as she doesn't know her status, she is annoyed taking medicines everyday, she feels as if she is forced to do so."—Family friend, caregiver of a 15-year-old female (nondisclosed)</p> <p>"Some times he is taking [ART] but other times he can refuse even if I insist. So as they are children they don't have maturity to know that medicines is for his own sake, I can understand because he is not disclosed. He does not know why he is taking medicines."—Children's center caregiver of a 16-year-old male (nondisclosed)</p> <p>"It is her own will to take her medicine [now that the child is disclosed]. I asked her if she will keep taking medicines and she told that she will because she is aware of her health situation, she not neglect taking medicines."—Father of a 14-year-old female (disclosed)</p>

ARV, antiretroviral; ART, antiretroviral therapy.

Thirteen children had not been informed of their HIV infection. This reflects practices commonly observed at the KLL Clinic and elsewhere in sub-Saharan Africa.<sup>14,21</sup> In three instances the caregiver was unsure if the child was informed or not, but either suspected that the child knew or that the child was highly suspicious without having been officially informed. The route of HIV acquisition was unknown in most children, however it is presumed to be perinatal in most instances.

A number of themes emerged from a majority of study participants relating to adherence. Selected quotes, felt to be an adequate representation of responses, regarding these themes are given in Table 2.

#### *Barriers associated with adherence*

Most prominent among barriers to adherence was the idea of being frustrated or “fed up” with the medication regimen. Often the children compared themselves to peers and they noted the fact that other children are not constrained by such medicine regimens. This theme arose much more frequently in the 16 children who were unaware of their HIV infection and their respective caregivers with 36 instances compared with only 3 instances among the 4 disclosed children. Frustration occurred regardless of age but was more frequently cited in older adolescents.

Lack of food in the home was another significant and commonly cited barrier by the children ( $n = 11$ ; 55%). Many children described discomfort, often a ‘burning’ sensation or feeling “dizzy, lightheaded,” after taking ART. These sensations were described as being alleviated through consumption of food with taking medicine. However, there was not always food available when ART doses were scheduled. 25% ( $n = 5$ ) of children stated they would flatly refuse to take their medicine if no food was available.

Lack of assistance also played a major role in poor adherence. It was apparent that some form of adult supervision, even with the adolescents, was necessary for optimal levels of adherence. Given how frustrated many of these children became regarding their regimens, without strong psychosocial support or reminders of the continued importance of medication from caregivers, children would often admit to skipping doses when they could get away with it. Caregivers acknowledged that when they were not around, their child was more likely to miss a dose. A complicating factor in this scenario was that most caregivers had no other adults to assist them with administering medicine for their child. Often due to issues with stigma, caregivers were fearful of disclosing the child’s HIV status to other family members or friends and were unwilling or unable to recruit others for additional assistance.

The act of forgetting was also mentioned by both children and adult caregivers and tied heavily into lack of adult assistance. It was described as “easy” or “common” to forget taking medications by the children. Children were often preoccupied with their social lives and recreational activities. Though taking medication was, on their own admission, a priority for most children, unless the adult was vigilant or strategies for remembering were in place, forgetting doses appeared to occur on a frequent and haphazard basis.

A number of other adherence barriers were cited multiple times by both children and caregivers within this study,

though were only mentioned in one or two sets while the above mentioned barriers were more pervasive throughout the interviews. Adherence barriers that were mentioned repeatedly by a few sets included difficulties with taking medicine in secret, belief they are healthy and not understanding the rationale for continued medication use, and simply lack of motivation and not understanding the purpose of medicines in the nondisclosed group.

Many children described issues with the characteristics of the medicine itself (bad taste, large quantity, and dosing frequency) as well as side effects, such as irritated or upset stomach and fatigue, as things they disliked about the medicine. However these did not seem to play roles as major deterrents to ART adherence. Typically the children accepted these factors and addressed them through taking the medicine with food or sweets. Money for transport or food was twice cited as a barrier from a number of caregivers. Issues related specifically to school or home life did not appear to play major roles either, as the children could schedule doses for before or after school, and developed strategies for taking medicines in private while at home.

Adult caregivers and children were overall in agreement regarding barriers to ART adherence as the themes coded in adult interviews frequently mirrored what arose during their child’s interview. For instance, if we saw one caregiver remarking how his or her child refused taking ART due to lack of food, typically we heard the child remarking about this same issue from their perspective.

#### *Facilitators associated with adherence*

Adult caregivers and children were asked how their medication regimens could be easier to adhere to or, when specific barriers arose during the interview sessions, we prompted them for potential solutions to these issues.

Having assistance or increased psychosocial support was one of the most commonly cited reasons for good adherence, a theme which arose in 26 children ( $n = 15$ ) and caregiver interviews ( $n = 11$ ). This mirrors the frequency with which lack of assistance was cited as a barrier to adherence. Support or assistance was described in many forms. Often it was cited by the child as coming from the caregiver themselves. Having a vigilant caregiver was helpful in reducing instances of forgetting and overcome issues with frustration. Assistance from the HIV clinic was also noted as significant in terms of the free provision of medications and the psychosocial support offered to children and caregivers.

Assistance also came in the form of other family members. When there were two or more caregivers who assisted the child in taking medications, there were less conflict or child-caregiver relationship issues coded. Assistance was not cited as coming from the community or from those outside the family, other than the KLL clinic staff. In 8 caregiver interviews and 6 child interviews, participants cited religion or faith as helping to provide motivation toward keeping the child or themselves respectively adherent to medications. Another 15 caregivers and children directly cited the quality of medical care, counseling from clinic, and the availability of support groups at the clinic as helping to remain motivated in taking medications.

The belief itself that the medication was helping also served as a strong facilitator to adherence. Often caregivers and

children would cite instances of impressively improved health since beginning ART, even nondisclosed children. Some caregivers expressed a high degree of understanding about the importance of maintaining good adherence to ART and consequences of poor adherence. This level of understanding served to increase vigilance toward adherence.

In all 18 complete interview sets, having a routine or strategy were noted to be important in maintaining good adherence. Both adults and children found it helpful to set specific times of day as medication times, for instance at 08:00 and 20:00 hours. Though they were not always able to take doses right on the mark, after a while these times of day became associated with taking medications and provided an internal cue to do so. Keeping medicines consistently within the same spot was also helpful, as passing this spot also could cue a reminder toward taking medication. For instance, this could be in a special place in the cupboard, a small box on the child's nightstand, or any place frequently encountered at these times of day. However, it was important for this to be placed where other family members or friends would not disturb or discover the medications.

Several specific strategies were mentioned during the interviews and came in two forms. One involved strategies for being reminded to take medications. To remind themselves to take medicines, caregivers would set phone or clock alarms at appropriate times. Keeping logs as a record of completed doses was also mentioned. These logs could be kept by the bedside of the caregiver and checked every night.

Other strategies related to ways in which caregivers would motivate or convince the children to remain vigilant toward taking their medication. In motivating children to take their doses, several strategies were used by caregivers. Inducement was not uncommon for good adherence, including small amounts of money or gifts from the caregivers. Fear was also commonly used with nondisclosed children. This often involved some form of deception or exaggeration of the effects of missed doses. Some caregivers felt that since they could not reveal the true purpose of the child's medication, scaring them into continuing to take their medications was the only effective method available.

#### *Shame and stigma as related to adherence and disclosure*

The shame of having to take daily medications on a regular basis and how HIV is stigmatized in the community played a role in maintaining good adherence. The theme of shame or stigma most commonly arose along with cited barriers to adherence. The children, even the younger ones, realized that taking these medicines made them different from others and created opportunity for stigmatization or ridicule.

Numerous instances were cited in which the children had been teased or were repeatedly asked questions from peers or other community members regarding their medicines. Typically these were negative experiences and often made the children uncomfortable to recollect. Therefore, the children were either taught by their caregiver or had taught themselves to always take their medication in private. However, this practice became a problem if the children were not in their routine schedule (i.e., during travel, when relatives or friends visited the home, or when special events and festivals took place) and was the cause of several described instances of

missed doses. In addition, if children missed their morning dose or did not have food at that time, they would skip the dose rather than taking medication to school and risk being "discovered."

This was in part related to why caregivers felt it was necessary to delay disclosure to their child—to protect them from the effects that stigma to their disease carries. Also, caregivers felt their child could not be trusted with information related to the true nature of their condition and if they knew the truth it may be inadvertently revealed to their friends, their friends' parents, the community, and so forth. This was a great fear expressed by some caregivers. Therefore, the common sentiment was that it would be better if as few individuals knew the child's HIV status as possible, which often included the child.

#### *HIV disclosure status of the child and adherence*

Although only 4 of the 20 children knew they had HIV, it was evident that these children had a different perspective regarding their medication regimens. Overall the informed children reported fewer barriers to adherence when compared with the uninformed children.

Nondisclosure of HIV status itself served as a barrier to adherence while disclosure frequently served as a motivating factor. As mentioned earlier, misunderstanding the rationale behind the medicines often served to frustrate the children and many of them could not understand why they would continue to take medicine if they felt healthy.

Deception and conflict were two themes that emerged during the analysis as related to disclosure status. These appeared more frequently, per interview, in the non-disclosed group. Deception was noted in instances where there was deception by the child about taking his or her medicine or deception by the caregiver toward the child regarding the medicine. Conflict was cited in instances of conflict between the child and caregiver.

Three of the four caregivers of disclosed children directly cited their child's knowledge and understanding of HIV as a motivating factor for adherence. Many unresolvable issues nondisclosed children faced, such as rationale behind medication regimens, length of treatment, and importance of strict adherence were no longer poignant issues. These caregivers believed their children's adherence directly improved postdisclosure. Furthermore, one caregiver used improved adherence as their rationale for moving toward disclosure.

Of the informed children, sentiments were similar to their caregivers regarding disclosure. When directly asked, none regretted knowing their status. They often reported that their knowledge gave them "strength" in adherence to medications. Understanding how and why the medications made them healthy was an overall strong motivator to remain adherent.

#### *Adherence experiences*

Adherence was assessed at the end of each interview session after rapport was developed between the interviewer and interviewee and a brief script to destigmatize missed doses was read to the participant. Responses are presented in Table 3. Adult caregivers and children frequently mirrored one another when speaking on barriers and facilitators to adherence; however, this was not the case when reporting a



TABLE 3. REPORTED ADHERENCE EXPERIENCES

Children	#	%	Caregivers	#	%
Most recent missed dose			Most recent missed dose		
Yesterday	8	40.0%	Yesterday	1	5.0%
2 days ago	1	5.0%	2 days ago	1	5.0%
3 days ago	1	5.0%	3 days ago	1	5.0%
Any in last week	3	15.0%	Any in last week	2	10.0%
Any in last month	1	5.0%	Any in last month	4	20.0%
None missed	5	25.0%	None missed	9	45.0%
Don't know	0	0.0%	Don't know	1	5.0%
Not asked	1	5.0%	Not asked	1	5.0%

direct measurement of adherence. Discrepancies were found between the child and caregiver's responses in most interview sets. Only 6 caregiver-child (33%) sets were in agreement with one another regarding the question of most recently missed ART dose. In the 12 remaining completed interview sets the child and caregiver responses differed. In these instances the child typically reported a more recent missed dose compared with the adult caregiver ( $n = 11$ ). In 9 of the interview sets, the adult reported no instances of missed doses in the prior month however only 4 of those children agreed.

Seven participant sets reported a specific time of day as being harder than another in adherence to medication (morning versus evening dose). Of these, 6 stated that the morning was more difficult due to waking up late and missing the regular time, rushing to school or work, or lack of food early in the morning. The one set who reported that evenings were more difficult cited lack of assistance and forgetting during this time of the day.

## Discussion

Our study conducted at a public HIV clinic in Kinshasa, DRC suggests the complex nature of pediatric ART adherence in a resource limited setting and its connection to psychosocial, structural, and environmental variables. Most prominent in relation to ART adherence were the dynamics of the child-caregiver relationship, the importance of a supportive structure for both the child and caregiver, and HIV disclosure status of the child. Our results add to the knowledge generated by other qualitative studies assessing pediatric adherence in resource limited settings in that psychosocial support structures and the HIV disclosure status of the child play a prominent role with regards to ART adherence.<sup>12,14,15,22</sup> Our study is unique in that we evaluated adherence-related perceptions and experiences among both children and their respective caregivers. We found there was considerable synchrony in the responses of each child-caregiver set regarding their experiences with adherence, although they may recall these experiences differently or interpret barriers and facilitators to adherence in different ways. Furthermore, the child-caregiver relationship and nutritional support were both well-characterized and prominent themes that emerged as important factors affecting ART adherence.

The child-caregiver relationship is an important feature related to adherence and is characterized in this study by the

reported relation of caregiver assistance, or lack thereof, to adherence. In addition, the child-caregiver relationship and its relation to adherence is illustrated by the emergent themes of deception and conflict between the child and caregiver. Our findings underscore the need to support the caregiver and their child to work together to form a strong relationship to promote adherence through trust and understanding.

The children and caregivers in this study expressed a considerable degree of frustration in dealing with HIV/AIDS and with long-term medication. Only 25% of caregivers were biological parents. In sub-Saharan Africa alone, over 14 million children are estimated to have lost one or both parents to HIV/AIDS.<sup>23</sup> Orphaned children may have more strained relationships with nonparental caregivers with whom they have had less time to form relationships with. The ability to cope well with HIV may be a strong correlate to adherence, which underscores the importance of psychosocial well-being and support structures in place for children with HIV.<sup>17,22,24</sup>

A paucity of food in the home or lack of resources to procure food has been cited as a potential barrier to adherence in other qualitative studies, though it has not been well characterized.<sup>14,25</sup> In this study, the role of food and nutritional support was very prominent, arising in more than half of all interviews. Lack of nutritional support was cited by both children and caregivers in a number of explored instances of missed doses. Poor ART adherence combined with inadequate nutritional support may have a synergistically negative effect on outcomes of children with HIV and may be further explored. HIV care and treatment programs need adequate resources to provide nutritional support for their patients. In a country where undernutrition is rampant funding agencies should not forget nutritional support for people on ART, especially children.<sup>25</sup>

Having routine practices or specific strategies in facilitating adherence was important. A number of suggestions appeared in other studies, including the use of timers, alarms, or cell phones.<sup>3,25</sup> Our study suggests that strategies as simple as placing medications in a prominent place, associating medication taking with specific times of the day, specific activities, or environmental cues may be extremely useful. In resource limited settings where use of alarms, cell phones, or other electronics may be uncommon or unavailable, culturally and financially appropriate strategies should be used. A robust child-caregiver relationship, including caregiver assistance and minimizing conflict, may be necessary to develop teamwork needed for such strategies.

Participants perceived that a great deal of stigma was associated with HIV/AIDS and with the taking of medications in their communities. When looking at the overall spectrum of interviews, it was clear that the secretive nature that surrounded taking medications often led to missed doses in the setting of unavailable privacy. The need to maintain privacy from other family members and from the community at large with taking medications was expressed to be a salient issue that pervaded daily life for these families. The lack of a private place to store medicines as well as reliable private place to take medications was a common practical factor associated with missed doses. Stigma also related to the lack of HIV status disclosure, which also appeared related to barriers of adherence. This was cited by



adults to justify withholding knowledge of HIV status to the children, who felt by withholding this information they would protect the child and reduce the risk that children themselves may unwittingly disclose their status to other family or community members.

Children being uninformed of their HIV infection was a prominent aspect related to adherence in this study. Our research results show that disclosed and non-disclosed children viewed taking their medicine differently, as supported elsewhere.<sup>21</sup> Overall, status disclosed children and their caregivers expressed less frustration because knowledge of HIV status was a motivational factor aiding adherence. Increased understanding of the purpose of medications led to a greater willingness to increase efforts to maintain adherence on the part of the child.

In this study, frustration was a more prominent theme with children unaware of their HIV status. There were also more instances of deception and conflict arising with these caregivers. Deception and conflict may breed mistrust and could be a marker for poor child-caregiver relationships. Given that a strong relationship and caregiver assistance were cited in helping to maintain good adherence in this study, poorer child-caregiver relationships with non-disclosed children may help guide our understanding of why disclosure status has been associated with poor adherence in previous studies.<sup>14,21</sup>

We found that the caregivers and children brought up many of the same issues, however characterized them differently. For instance, as noted above, lack of food was prominently featured as a potential barrier to adherence. While children focused on the burning sensation they experienced when taking ART on an empty stomach, adults centered on the difficulty of providing increased quantities of food. Furthermore, both expressed strong frustration with the lack of assistance to cope with the illness and medications. It was apparent that children needed more tangible assistance when they talked about how they missed their doses. However, children often characterized this as a lack of assistance coming directly from the primary caregiver rather than from a group of caregivers. Adults on the other hand expressed disappointment or frustration that no other adults or community members were available to help them and to share the responsibility of caring for the child and their illness.

The differences in perception of adherence experiences between children and adults may be important for future studies and interventions to take into account, as survey data or quantitative methodology may oversimplify an issue, such as a lack of food, or fail to recognize that there may be varying perspectives relating to a particular issue. In addition, it may be easy to identify barriers or facilitators, but understanding how children and caregivers perceive and experience these barriers differently will be important for targeted interventions. Children and their caregivers may each require uniquely directed strategies for improved adherence.<sup>3</sup>

Despite children and caregivers characterizing some themes differently, our findings reveal devoted caregivers are very much in tune with the needs of their respective children and ways to optimize child behavior given that similar themes arose among the child-caregiver sets. This suggests they play an equally important role as children when studying adherence to pediatric regimens.

We made an attempt to characterize actual adherence experiences among our study participants by directly asking about their most recent missed dose, prefaced by a short script to destigmatize missing doses. Unlike in our routine care assessments, children and their caregivers acknowledged missing doses, demonstrating the advantage of qualitative research. Child and caregiver responses differed regarding timing of the last missed dose. Caregivers overall estimated lower occurrences of missed doses than their child counterparts. This may have been due to several reasons. For instance, children may deceive their caregivers about taking their medication. Despite our attempt to destigmatize non-adherence before asking directly about adherence experiences, social desirability bias may have been more prominent among adults resulting in more favorable adherence reporting. Other studies have suggested that assessment of adherence by directly asking subjects yields variable results and call for more objective measures such as pill counts or electronic monitoring.<sup>12,27-29</sup>

Our study has limitations. First, we interviewed mostly children who had a suspected history of poor adherence. This was helpful in understanding barriers to adherence, but we might have missed children who could provide further information regarding facilitators or strategies toward improving adherence. Although we attempted to characterize the child's relationship to the caregiver and interview the person who played the most significant role in assisting with ART, it was clear that each relationship varied and the length of some relationships with nonparental caregivers was unknown. Qualitative studies typically include a small number of participants and findings are not meant to be generalizable. They can, as shown here, provide valuable insights into the issues and context and identify areas for continued quantitative study and/or intervention.

It is clear pediatric adherence to ART in resource limited settings is a complex process and HIV-positive children and their caregivers face many challenges. Full understanding of this issue goes beyond the child-caregiver dynamic. Intertwined with adherence are relationships with the rest of the family group, the community, and with the health care structure and support systems in place.<sup>15</sup> Despite this, improving and sustaining pediatric ART adherence will rely heavily on a robust child-caregiver relationship and marks a highly feasible area for intervention and continued study.

Our study results further underscore the need for increased facilitation of HIV status disclosure to children in a supportive environment and comprehensive care programs which focus on improving support for both the child and caregiver. Psychosocial support structures for children and caregivers should be in place at facilities treating children with HIV and providing ART. This should include counseling and educational services, as well as support from the health care system in terms of nutritional support, devices that may assist with adherence, such as a cell phone or alarm clock, or other material goods. Reliable adherence measures are needed that can be easily implemented to monitor and intervene on suboptimal adherence. Continued in-depth qualitative analysis will be helpful in determining future quantitative studies and determining how to structure targeted interventions toward improving adherence.<sup>12</sup> With continued scale-up of ART to children in sub-Saharan Africa and other resource limited

settings, understanding and optimizing adherence must remain a high priority.

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