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ORIGINAL PAPER

# Pediatric HIV Pre-test Informational Video is Associated with Higher Knowledge Scores Compared to Counselor-Delivered Information

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## Abstract

Video-based pre-test information is used in high resource settings to increase HIV testing coverage but remains untested in resource-limited settings. We conducted formative and evaluative focus group discussions with healthcare workers (HCWs) and caregivers of children in Kenya to develop and refine a pediatric HIV pre-test informational video. We then assessed HIV knowledge among caregivers sequentially enrolled in one of three pre-test information groups: (1) individual HCW-led (N = 50), (2) individual video-based (N = 50), and (3) group video-based (N = 50) sessions. A brief video incorporating information on national pediatric testing, modes of HIV transmission, and dramatized testimonials of caregivers who tested children was produced in three languages. Compared to individual HCW-led sessions (mean: 7.2/9; standard deviation [SD]: 1.3), both the group video-based (mean: 7.7; SD: 0.9) and individual video-based (mean: 7.6; SD: 0.9) sessions had higher mean knowledge scores. Video-based pre-test information could enhance existing pediatric HIV testing services.

**Keywords** Video counseling · Pre-test counseling · HIV · Children · Pediatric HIV testing

## Introduction

Early diagnosis of HIV and initiation of antiretroviral therapy (ART) dramatically reduces morbidity and mortality and improves growth and neurodevelopment for children living with HIV [1–3]. However, globally, only 53% of children living with HIV ages 0–14 years are on treatment, with gaps in HIV testing being a major contributor [4]. In Kenya, HIV prevalence was 4.9% and 79% of children ages 0–14 years had a known HIV status in 2018 [5]. To reach the UNAIDS 95-95-95 targets for testing in children (95% of children living with HIV are tested), efforts to expand HIV testing are urgently needed.

Facility-based HIV testing services (HTS) is a low-cost approach to identify children with HIV and is recommended by the World Health Organization [6]. However, uptake remains sub-optimal in resource-limited settings [7, 8], particularly in outpatient departments [9]. High volumes of children, limited numbers of healthcare workers (HCWs), shortages of appropriate HIV testing space, and low confidence among HCWs to conduct pediatric-specific HIV counseling and testing are all barriers to universal HTS in outpatient clinics [7]. The COVID-19 pandemic social

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distancing guidelines have likely exacerbated already existing challenges in pediatric HIV testing by limiting caregiver care seeking behavior [10].

Video-based pre-test information may overcome some operational challenges in outpatient settings. Video-based pre-test information is acceptable and effective in improving HIV knowledge and increasing demand and coverage for HIV testing in high resource settings [11–14]. It saves counselors time, allows counselors to focus their limited time on individually tailored post-test counseling, allows for information provision in multiple languages, and ensures consistency and accuracy in what information is shared [11–14]. Additionally, videos may alleviate caregiver fears of discussing sensitive topics. However, it is not known whether video-based pre-test information could increase HIV testing in pediatric populations in resource-limited, high HIV prevalence countries with high patient volumes. It is also unclear whether benefits are maintained when the video is delivered in a group rather than individual setting.

This study utilized caregiver (parents and guardians to children) and HCW perspectives in a high HIV prevalence setting to develop and refine an HIV pre-test informational video, then compared knowledge scores among caregivers who received the video pre-test information, administered either individually or in a group, versus HCW-led pre-test information (standard of care).

## Methods

### Ethics Statement

The study was approved by the Institutional Review Board (IRB) at the University of Washington and the Kenyatta National Hospital/University of Nairobi (KNH/UON) Ethics and Research Committee (ERC). All study participants provided written informed consent.

### Setting

Formative and evaluative focus group discussions (FGDs) were conducted in outpatient departments at a rural sub-county hospital in Kisumu County, Kenya in 2018. The video was then tested at a different rural hospital in the same county in 2019. Adult HIV prevalence in Kisumu was 16.3% in 2019 [15].

### Study Design

This cross-sectional, mixed-methods study employed FGDs to develop and refine a video-based pre-test information intervention and then compared knowledge scores among caregivers who watched the video to those who received standard in-person, HCW-led pre-test counseling.

### Video Formative Development and Evaluative Refinement

Video development included formative FGDs to determine the optimal format and content of the video and evaluative FGDs to improve the video. In formative FGDs, HCWs and caregivers reviewed existing multimedia materials—such as pamphlets, books, videos—to determine the most acceptable format for visual, non-HCW-led HIV pre-test counseling and identified the most important information to include based on current recommendations on pre-test counseling from Kenyan national guidelines. Following formative work, a draft video was created by a Kenyan videography company. Subsequently, evaluative FGDs were conducted with caregivers and HCWs to improve the content and format of the video (Video file in English available as Digital Online Appendix 1).

#### Recruitment and Enrollment

Overall, there were six formative and nine evaluative FGDs of 7–11 individuals each. There were two formative and three evaluative FGDs from each of the following strata: (1) HCWs with experience testing children for HIV, (2) caregivers who had tested their children for HIV (regardless of child HIV status), and (3) caregivers in a general pediatric outpatient clinic (regardless of caregiver or child HIV testing history). Adults attending clinic were invited to participate in a FGD on a separate day; they were invited sequentially until the intended sample size was achieved for each group. Socio-demographic data were collected during evaluative FGDs but not formative.

#### Qualitative Data Collection

A trained Kenyan facilitator conducted the FGDs following a semi-structured guide. The formative FGD guide included questions on visual format (picture book, animated video, or live action video), characters and narrator (caregiver, HCW, or child), tone, informational content, and how the video should be presented, including viewing in a group versus viewing alone, and viewing in a public or private space. The video script was developed based on the results from the formative FGDs. During the evaluative FGDs, participants reviewed the draft videos in three languages: English, Kiswahili, and Dholuo; the evaluative FGD guide asked about the format, narration, length, and content of the video. The video was then refined and finalized using feedback from the evaluative FGDs. FGDs were

audio-recorded, transcribed and translated, as necessary. Debrief memos were written by the facilitator following each FGD.

#### Qualitative Data Analysis

We utilized the framework method to guide our coding and thematic analysis approach [16]. The framework method is a directed content analysis approach that uses deductive coding based on a pre-developed framework or conceptual model. It utilizes a matrix format to organize and synthesize content into summarized themes. The pre-developed coding categories in the formative phase of this analysis were: visual format, characters and narrator, tone, informational content, and video presentation. The coding categories in the evaluative phase were: format, narration, length, and content. A primary and secondary analyst pulled excerpts from transcripts and debrief reports and categorized responses into positive and negative features of the coding categories. The broader study team reviewed the matrices and used a consensus approach to decide on the video format and content.

### Video Testing

Caregivers with children aged 18 months to 12 years seeking general pediatric health services were recruited from the waiting room of an outpatient department of a hospital in Kisumu, Kenya. Interested and eligible participants were consecutively assigned to one of three pre-test information formats depending on the week they presented—week 1: standard individual HCW-led information sessions, week 2: individual video-based information sessions, or week 3: group video-based information sessions with three to five caregivers per group. HCWs performing standard HCW-led information sessions were not provided additional training as part of the study. Caregivers and their children were not tested for HIV as part of this study.

After the pre-test information sessions, each caregiver answered nine true/false HIV-related knowledge questions. Questions were based on content covered in standard pediatric HIV counseling sessions, along with common misperceptions (Table 2). Mean knowledge scores were compared between the three groups using t-tests, comparing those who received individual or group video-based counseling to those who received standard individual HCW-led information sessions as the reference group. The t-value or the ratio of the difference between the mean of the groups and the difference within the groups was reported for each comparison. Analyses were conducted in Stata 14.0 (College Station, Texas).

## Results

### Formative FGDs

Both HCWs and caregivers preferred a video over picture book format and live actors over animation. HCWs and caregivers preferred to see HCW, caregiver, and child characters. HCWs and caregivers wanted a variety of informational messages, including the definition of HIV, benefits and importance of HIV testing for children, HIV testing procedures, the possible outcomes of the test and how to cope with a positive diagnosis, modes of HIV prevention and transmission for children, eligibility for testing, guidelines about testing all children, and confidentiality of HIV testing services.

Participants found all proposed formats for watching the video to be acceptable, but with different cost, privacy, and coverage benefits. Participants felt that viewing the video alone in a private setting allowed rewinding or restarting the video, taking as much time as is needed, making decisions independently, and feeling comfortable in their own space. Meanwhile, others were concerned that independent viewing in a private location would have high costs and resource constraints, worried that participants might feel anxious viewing the video alone, and concerned about making others wait until it was their turn to watch the video, thereby wasting others' time. In contrast, watching in public settings in a group was felt to save time for HCWs, capture most caregivers, provide patients with the opportunity to obtain more knowledge by asking questions and sharing opinions in the group, and empower patients since everyone would watch together. Drawbacks of watching in a group included the potential influence of other participants in the group to pressure an individual to accept testing and the fact that some participants might start viewing the video after it had already begun.

### Evaluative FGDs

A total of 23 HCWs and 40 caregivers participated in evaluative FGDs. About half (48%) of HCWs were female, most HCWs (83%) had a college education, and there was a diversity of cadres represented (Table 1a). Most caregivers were female (86%) and had a secondary school education or lower (60%). Caregivers had a median of two children and less than half (42%) were employed (Table 1b).

HCWs and caregivers felt that dubbing the video in local languages, including Kiswahili and Dholuo, would increase understanding compared to using subtitles. While HCWs and caregivers generally felt that the HCW in the video appeared welcoming and trustworthy, they wanted to

**Table 1** Sociodemographic characteristics of participants

| | N | N or median | % or IQR |
|---|---|---|---|
| **(a) HCW characteristics** | | | |
| Female | 23 | 11 | 48% |
| Age | 23 | 32 | 27, 38 |
| Education (years) | 23 | 16 | 15, 17 |
| College | | 19 | 83% |
| University | | 4 | 17% |
| Location of work | 23 | | |
| Outpatient | | 10 | 43% |
| Inpatient | | 2 | 9% |
| HIV care clinic | | 2 | 9% |
| Maternal and child health clinic | | 6 | 26% |
| Other* | | 3 | 13% |
| Cadre | 23 | | |
| HIV testing services counselor | | 6 | 26% |
| Lab/pharmacy technologist | | 6 | 26% |
| Nurse | | 7 | 30% |
| Clinical officer | | 1 | 4% |
| Counselor or social worker | | 2 | 9% |
| Voluntary medical male circumcision worker | | 1 | 4% |
| Years at current clinic | 23 | 3 | 2, 4 |
| Years in HIV counseling | 22 | 4 | 2, 8 |
| **(b) Caregiver characteristics** | | | |
| Female | 37 | 32 | 86% |
| Age (years) | 40 | 29 | 24, 38 |
| Number of children | 38 | 2 | 1, 3 |
| Age of youngest child in years | 38 | 4 | 2.5, 6 |
| Education (years) | 36** | 8 | 8, 13.5 |
| Primary | | 16 | 42% |
| Secondary | | 7 | 18% |
| College | | 11 | 29% |
| University | | 4 | 11% |
| Employed | 38 | 16 | 42% |
| Marital status | 40 | | |
| Single (never married) | | 8 | 20% |
| Divorced/separated | | 2 | 5% |
| Widowed | | 4 | 10% |
| Married (monogamous) | | 20 | 50% |
| Married (polygamous) | | 4 | 10% |
| Steady boyfriend/girlfriend | | 2 | 5% |

*Laboratory (N = 2) and voluntary medical male circumcision clinic (N = 1)

**2/38 missing number of years of education but provided a response for education category

see HCWs wearing their white coats (a symbol of having an official role as a HCW). Also, HCWs and caregivers felt that the video should avoid using clinical acronyms to ensure the audience's understanding.

HCWs and caregivers generally found the content acceptable, but felt that clearer wording should be used regarding the HIV test for children under 18 months (i.e., "PCR test" instead of "special test") and modes of HIV transmission (i.e., "sharp objects including needles" instead of "sharp needles"). Information clarifying that HCWs at the facility can help caregivers determine when and how the HIV result will be disclosed to the child was also added to ensure caregiver comfort with the HIV testing process. While the initial script stated that HIV testing was free, HCWs recommended reemphasizing that "free HIV testing is available at this clinic/facility" at the end of the video. When asked about where the video should be presented, HCWs and caregivers responded that the video could be shown in waiting areas within the hospital and in the wards. HCWs and caregivers felt that it would be important to speak to a HCW after the video to allow caregivers to ask questions.

## Video Evaluation

Caregivers enrolled had children ages 18 months to 12 years. Preferred language was Swahili (59%), Luo (21%), and English (19%), which did not differ by group. HIV knowledge scores across the three groups were high (mean: 7.5/9; standard deviation [SD]: 1.1]). Compared to individual HCW-led sessions (mean: 7.2; SD: 1.3), both the group video-based (mean: 7.7; SD: 0.9) and individual video-based (mean: 7.6; SD: 0.9) sessions had higher mean scores ($t = -2.6$, $p = 0.01$ and $t = -2.1$, $p = 0.04$, respectively; Fig. 1), and there was no difference between individual and group video-based counseling sessions ($t = -0.6$, $p = 0.58$).

The most common logistical challenge in using the group video was identifying individuals with the same language preference.

Overall, 25 (17%) caregivers answered all questions correct—6 (12%) in the standard individual HCW-led sessions, 9 (18%) in the individual video sessions, and 10 (20%) in the group video sessions (Table 2). The questions most commonly answered correctly across all groups included that a baby could get HIV from their mother during pregnancy, delivery, and breastfeeding (99% correct), that HIV is the virus that causes AIDS (98% correct), and that it is possible to do a test and find out results of a child's HIV status today for children more than 18 months of age (98% correct). The questions most commonly answered incorrectly across all three groups were related to interpreting the first HIV test result (47% incorrect), whether a child who looks healthy can have HIV (29% incorrect), and that babies and children will likely die from HIV even if they are taking medication (27% incorrect) (Table 2).

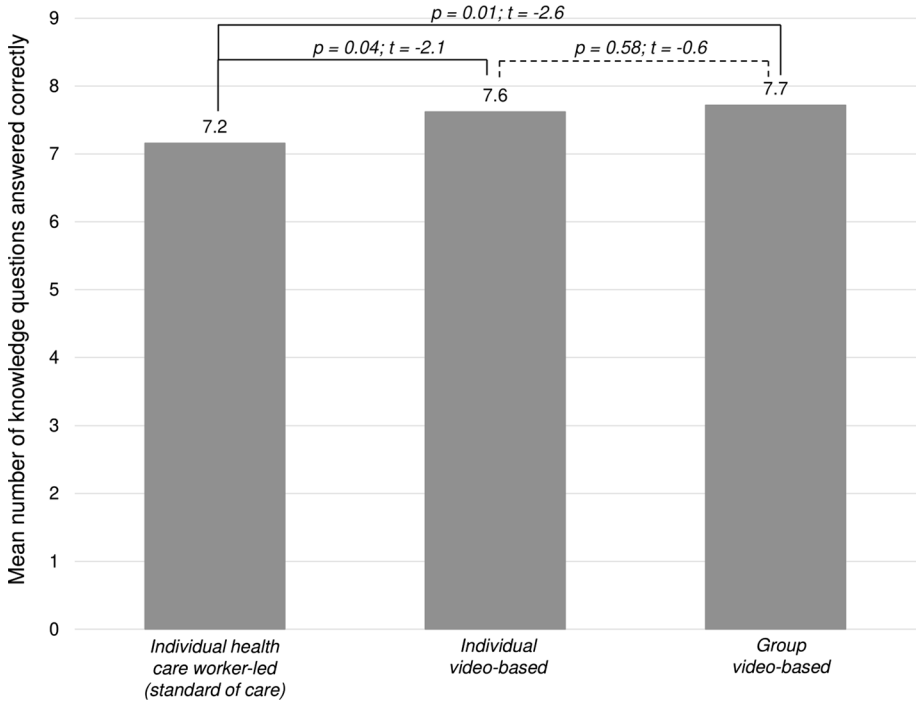


**Fig. 1** Number of accurate answers to HIV knowledge question by modality of pre-test information provision

**Table 2** HIV knowledge questions and answers by caregivers in each group

| | | Answered correctly n (%) | | | |
|---|---|---|---|---|---|
| | | Standard individual counselor-led N = 50 | Individual video N = 50 | Group video N = 50 | Overall N = 150 |
| 1 | HIV is the virus that causes AIDS. (True) | 48 (96%) | 49 (98%) | 50 (100%) | 147 (98%) |
| 2 | A baby can get HIV from their mother during pregnancy, delivery, and breastfeeding. (True) | 48 (96%) | 50 (100%) | 50 (100%) | 148 (99%) |
| 3 | Babies and children who have HIV will likely die, even if they are taking their HIV medicines. (False) | 36 (72%) | 34 (68%) | 40 (80%) | 110 (73%) |
| 4 | It is possible to tell whether a child has HIV just by looking at them; a child who looks healthy cannot have HIV. (False) | 35 (70%) | 32 (64%) | 40 (80%) | 107 (71%) |
| 5 | Children of any age can have HIV, even older children who have never been sick. (True) | 36 (72%) | 43 (86%) | 46 (92%) | 125 (83%) |
| 6 | For children who are more than 18 months of age, it is possible to do a test and find out the child's HIV status today. (True) | 48 (96%) | 50 (100%) | 49 (98%) | 147 (98%) |
| 7 | If the first test is negative, the child is negative. (True) | 23 (46%) | 32 (64%) | 25 (50%) | 80 (53%) |
| 8 | If the first test is positive, another test is done to confirm the HIV status. (True) | 46 (92%) | 47 (94%) | 49 (98%) | 142 (95%) |
| 9 | For children who are less than 18 months of age it is possible to get take a test and find out the child's HIV status today. (False) | 38 (76%) | 44 (88%) | 37 (74%) | 119 (79%) |
| | Answered all questions correct | 6 (12%) | 9 (18%) | 10 (20%) | 25 (17%) |

## Discussion

In this study of HCWs and caregivers in Kenya, a pre-test video developed from formative FGDs and refined through evaluative FGDs resulted in higher HIV testing knowledge scores compared to standard HCW-led HIV pre-test counseling among caregivers attending a rural outpatient hospital. Video preferences from formative FGDs included real, live action HCWs delivering information ranging from the importance of testing to guidance on how to cope with a positive test.

This study is the first to evaluate the effectiveness of video-based pre-test information for pediatric HIV testing. A randomized trial in the US among adults in emergency settings found that those receiving video-based pre-test information sessions had significantly higher HIV knowledge scores compared to those in the HCW-led counseling arm [12]. Similarly, adolescents receiving video-based pre-test information sessions in emergency departments in the US had higher knowledge scores and HIV test uptake than adolescents who received standard HCW-led counseling [11]. Consistent with findings from US-based studies among adults and adolescents [11, 12], pediatric HIV knowledge scores were higher among Kenyan caregivers in outpatient settings who watched the pre-test video compared to those who received standard HCW-led counseling. Video-based pre-test information has also been shown to yield higher knowledge scores and uptake of HIV testing compared to pictorial brochures [17]. Several studies have demonstrated either superior or equivalent HIV testing uptake among adults with video- versus standard information sessions [11, 18, 19] and that video-based platforms are acceptable [11, 19, 20]. Evidence that found video-based pre-test information sessions acceptable, feasible, and likely effective in increasing uptake of testing for adults has resulted in inclusion of video-based pre-test information sessions into WHO guidelines for adult HIV testing [21]. Video-based pre-test information sessions could be an effective and acceptable substitute for standard HCW-led delivery of information for caregivers of children receiving care in outpatient departments in Kenya.

While video-based pre-test information sessions require high initial costs for video development, expanding the video to new clinics can be implemented with little cost and ongoing operational costs are low relative to HCW time, which is a major driver of high pediatric HIV testing costs. Videos could be displayed on televisions in waiting rooms or on individual tablets and translated into local languages. Key barriers to testing children cited by HCWs include the high volume of patients and lack of specific training on pediatric HIV pre-test counseling [7]. Video-based pre-test information sessions can be a time-saving strategy that could facilitate pediatric HIV testing in outpatient settings and allow HCWs to focus on individually tailored post-test counseling.

Video-based pre-test information sessions could complement other innovative task shifting strategies to increase or maintain coverage of pediatric HIV testing in inpatient and outpatient settings during the COVID-19 pandemic and beyond. Oral mucosal transudate (OMT) testing has recently been validated in children 18 months and older [22], has been endorsed by the WHO for HCWs to test children, and has been further endorsed by the President's Emergency Plan for AIDS Relief (PEPFAR) for caregivers to test their own children, particularly during the COVID-19 pandemic [23]. Using video-based pre-test information sessions together with caregiver-administered OMT testing could reduce the burden on HCWs to achieve high coverage of pediatric HIV testing in outpatient and inpatient settings. In qualitative studies assessing the acceptability and feasibility of caregiver-administered OMT testing, potential benefits identified by HCWs and caregivers included ease of sample collection, privacy [24, 25], reduced provider workload, and increased child testing (*Neary in preparation*) [26]. Countries like Kenya with a high number of untested children also have high mobile phone penetration, which could be used for delivery of individual video-based pre-test information sessions outside of facility settings. Our study provides evidence supporting feasible, acceptable alternatives to in-person, counselor-delivered, HIV pre-test counseling in a pandemic period. Video-based pretest counseling may also be warranted for other information-dense counseling sessions including—pre-exposure prophylaxis (PrEP), family planning, and partner testing.

There are several limitations to this study. This study was only conducted in one region in Kenya and may not be generalizable; however, the video script was generated using country-wide guidelines about pre-test counseling. We did not assess uptake of HIV testing following the different informational formats. Most caregivers were female, further data on video-based pre-test counselling among male caregivers is warranted. The questions assessing HIV knowledge were not a standard, validated instrument; however, existing, validated knowledge questionnaires were available only for adults and HIV prevention, and the pediatric knowledge questionnaire for this study was developed by pediatric HIV experts. For four of the nine items assessing HIV knowledge, > 90% of participants scored correctly, which may indicate that the knowledge questionnaire could be susceptible to the ceiling effect, making it more difficult to compare groups. There was, however, variability in the proportion of correct responses to the remaining five items of the nine-item scale, allowing for comparison between groups.

## Conclusions

Video-based pre-test information sessions were acceptable to caregivers and HCWs and resulted in higher mean pediatric HIV knowledge scores among caregivers than standard of care counselor-delivered pre-test information. Further studies to determine optimal implementation of video pre-test counseling are warranted.

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**Author Contributions** YW, JN, INN, and ADW developed the first draft of the manuscript; YW, XZ, JN conducted the data analysis with mentorship from GO, ADW, INN, JN, GCJ-S, JAS, GO and DW developed the protocol. ADW and INN obtained grant funding. AO, HM, CK, and VO collected study data. ADW, INN, ERB, XZ, YW and JN developed study material and supervised data collection. All co-authors revised and approved the final draft of this manuscript.

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## Declarations

**Conflict of interest** Authors have no conflict of interest to disclose.

**Ethical Approval** The study was approved by the Institutional Review Board (IRB) at the University of Washington and the Kenyatta National Hospital/University of Nairobi (KNH/UON) Ethics and Research Committee (ERC).

**Informed Consent** All study participants provided written informed consent.

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