Published in final edited form as:

J Acquir Immune Defic Syndr. 2015 August 1; 69(4): e135–e141. doi:10.1097/QAI.0000000000000666.

A Time Motion Analysis of HIV Transmission Prevention Counseling and Antiretroviral Adherence Messages in Western Kenya

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Abstract

Background—Shortages of health workers and large number of HIV-infected persons in Africa mean that time to provide antiretroviral therapy (ART) adherence and other messages to patients is limited.

Methods—Using time-motion methodology we documented the intensity and nature of counseling delivered to patients. The study was conducted at a rural and an urban HIV clinic in western Kenya. We recorded all activities of 190 adult patients on ART during their return clinic visits to assess type, frequency, and duration of counseling messages.

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Conflict of Interest: All authors report no conflict of interest.

AUTHORS' CONTRIBUTIONS

Dr. Kurth had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Principal Investigators: Kurth and Siika

Study concept and design: Kurth, Siika, Sidle, Were

Intervention content: Kurth

Acquisition of data: Macharia

Analysis and interpretation of data: Shen, Were, Wools-Kaloustian

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Critical revision of the manuscript for important intellectual content: All authors.

Results—Mean visit length for patients at the rural clinic was 44.5 (SD=27.9) minutes and at urban clinic was 78.2 (SD=42.1) minutes. Median time spent receiving any counseling during a visit was 4.07 minutes (IQR 1.57–7.33) at rural and 3.99 (IQR 2.87–6.25) minutes at urban, representing 11% and 8% of total mean visit time respectively. Median time patients received ART adherence counseling was 1.29 (IQR 0.77–2.83) minutes at rural and 1.76 (IQR 1.23–2.83) minutes at urban ($p=0.001$ for difference). Patients received a median of 0.18 (0–0.72) minutes at rural and 0.28 (IQR 0–0.67) minutes at urban clinic of counseling regarding contraception and pregnancy. Most patients in the study did not receive any counseling regarding alcohol/substance use, emerging risks for ongoing HIV transmission.

Conclusions—Though ART adherence was discussed with most patients, time was limited. Reproductive counseling was provided to only half of patients, and ‘positive prevention’ messaging was minimal. There are strategic opportunities to enhance counseling and information received by clients within HIV programs in resource-limited settings.

Keywords

HIV; time-motion; counseling messages; antiretroviral therapy; sub-Saharan Africa; clinic services

INTRODUCTION

Over seventy percent of the estimated 35 million people living with HIV/AIDS globally reside in sub-Saharan Africa,¹ yet the region contains only three percent of the world’s health care workers. With funding through PEPFAR and other sources, Kenya has gone from essentially treating no patients in need of antiretroviral therapy (ART) in 2003 to an estimated 73 percent coverage by the end of 2012.² Patients receiving care present an opportunity for HIV prevention. Patients who are non-adherent to their antiretroviral regimens are at risk of developing resistant virus, increased viral load, and pose a threat of transmitting resistant virus. If patients are engaged with the health care system, they can be reached for ART adherence counseling, receive secondary HIV prevention messages and information on strategies to support healthy behaviors. However, given the shortage of health care workers in Africa, the necessary scale-up of ART has placed a strain on health care systems.^{3,4} Consequently, the time that health care workers have to provide HIV counseling messages and patient education is limited.

Antiretroviral treatment as a means of preventing new infections has been clearly demonstrated.^{5,6} As such, ‘treatment as prevention’ adds to the armamentarium of interventions to reduce HIV transmission that currently includes risk reduction, barrier methods, pre-exposure prophylaxis, male circumcision, prevention of mother to child transmission of HIV (Option B+)⁷ and post-exposure prophylaxis.^{8–14} Prevention scientists have embraced the need for combination approaches for the mitigation of ongoing HIV transmission with the inclusion of jurisdiction-specific strategies implemented in concert.^{15–18} However, use of strategies such as treatment as prevention and barrier methods require high adherence on an ongoing basis to achieve and maintain effectiveness. Counseling and other psychosocial interventions designed to engender behavioral risk modification and maintenance have been widely studied.^{19–26} However, the uptake and

intensity of these activities within HIV care and treatment programs in sub-Saharan Africa remains uncertain.

In this study, we used time-motion methodology to assess frequency and types of counseling and adherence messages during return clinic visits for adult HIV-positive patients receiving ART. The time-motion methodology is a technique for collecting activity information, where an observer records exact activities and time it takes for tasks to be done by the subject.²⁷ Time-motion methodology is usually regarded as being the most reliable compared to alternative methods such as work sampling and time efficiency questionnaires.²⁸

Our aims were to: (1) identify the types of counseling and ART adherence messages given to patients during these visits; (2) determine the amount of time spent on counseling; (3) identify unmet counseling needs; and (4) determine other times during a routine clinic visit where alternative counseling strategies (that do not depend on a clinician) could be introduced.

METHODS

Study Design

To assess frequency of counseling and adherence messages given to patients during clinic visits, we recorded all activities by patients for the full length of their clinic visits. Recorded activities included the types of counseling – such as ‘positive prevention’ messages supporting safer sexual behaviors – the patient received during the visit and the length of time over which the messages were given. These observations were done using time-motion methodologies that we have previously employed in Kenya²⁹ and Uganda.^{30,31}

Population

For this study we observed adult HIV-positive patients on ART coming for return clinical visits. We excluded patients not on ART, patients who were HIV negative, and patients less than 18 years of age. We followed a convenience sample of 100 established HIV-positive adult patients presenting for routine visits at each of the two study clinics. This number was based on our prior experience conducted for similar time motion studies.³⁰ Patients were contacted by trained research assistants (RAs) as soon as they entered the clinic for the visit. All patients who expressed interest in hearing more about the study received a detailed explanation about the nature of the study. They were made aware that they would be followed and observed by an RA throughout the clinic visit. Only those patients who provided written consent were included in the study. All providers working at the two study clinics were also informed and educated about the nature of the study by the study coordinator. All providers who agreed to be observed provided verbal consent prior to the beginning of the study. Patient data from ten observations were excluded because of incomplete/inadequate collection, resulting in available observations for 190 patients.

Setting

This study was conducted between February 10 and March 16, 2010 at two HIV clinics affiliated with the Academic Model Providing Access to Healthcare (AMPATH) program in western Kenya³². This program provided comprehensive care at the time of the study to more than 85,000 active HIV-positive patients through 35 parent and 26 satellite clinics (Figure 1); the patient census is now 140,000. The two clinics in this study included one urban AMPATH clinic located in Eldoret, Kenya (Module 1 or M1) and a second rural clinic in Burnt Forest, Kenya (BF). The characteristics of these clinics at the end of the study period are outlined in Table 1. Tuberculosis (TB) and HIV services are significantly more integrated at M1 than at BF. At the M1 urban clinic TB medications are prescribed and dispensed in a separate TB clinic whereas in the rural BF setting TB care for the majority of patients is provided within the HIV clinic. M1 also has a reproductive health program that provides some modern birth control methods (pills, Depo-Provera and condoms) and counseling about family planning as well as perinatal visits. Both clinics had access to client support groups though no other specific educational efforts were available or ongoing in waiting rooms at the time of this study. Approximately 90 percent of patient visits at the study clinics are conducted by nurses and clinical officers (equivalent to nurse practitioners or physician assistants) without the presence of a supervising physician. Consulting physicians are available on specified clinic days to address patients with complex clinical problems such as those with severe adverse events, major opportunistic infections or those failing treatment. The consulting physicians are also available by phone as needed.

Data Collection

We programmed a list of patient activities into Personal Digital Assistant (PDA) devices using the HandBase® software (DDH Software, Inc., Wellington, Florida)(See Table 3). These PDAs were used by five trained RAs, also known as observers, to monitor patient activities during the patient's clinic visit. All RAs were trained on how to use the PDAs and software, as well as about study specifics and the content of the pre-established list of activities in the structured menu. All RAs were given consistent definitions for all activities [see Table 3]. In addition, all RAs were trained in human subject protection and study protocol to ensure the privacy of study participants and safety of the data.

When study patients arrived at the clinic for the visit,, the RA opened a HandBase visit record in the PDA. When the subject initiated the first observed activity (such as talking), the observer initiated an observation record in the PDA, which assigned a beginning time to the activity. Once it became clear to the observer what the activity was, he or she recorded the activity by picking it from the pre-established list in a structured menu. When the next activity began, the observer entered a new observation into the PDA, which assigned an ending time to the previous activity and a beginning time to the next activity. "Down time" or inactivity by patient was recorded as "waiting." No conversation was allowed between the person being observed and the RA once the observations were in progress.

The observer recorded all activities until the patient was formally done with the clinic visit (i.e., until the patient left the clinic setting). The RA would contact the first patient who was entering the clinic at the beginning of the RA's shift. Once they were done observing this

patient, they could pick the next patient entering the clinic for the next observation. This continued until the end of the clinic day, at which time the research assistants transferred the data collected in the PDAs to a Microsoft-Access® database (Microsoft Corp, Redmond, WA).

Data Analysis

The unit of analysis for patients was the clinic visit, which was defined as the time from patient's registration to the time he or she checked-out of the clinic. We excluded from the main analysis all wait times before a patient's clinic registration/check-in because there is wide variability in the time at which some patients present before clinics open (there being no strict appointment scheduling system at either site).

In our analyses, we assessed the frequency with which ART adherence and risk behavior questions were asked during visits. We also determined the frequency with which counseling was provided on: alcohol and drug use, contraception/pregnancy, disclosure, and positive prevention messages. The amount of time per visit spent on each of these counseling categories was assessed. Times spent by patients waiting for care also were computed to help determine other possible times during the clinic visits where other forms of counseling that do not depend on a clinical provider could be delivered to patients. Median counseling time was calculated and stratified by content of counseling (adherence, family planning/risk reduction, alcohol and substance abuse, disclosure and other types [positive prevention messages, health promotion plans, unspecified]), and by clinic. Counseling times were compared between clinics using Wilcoxon rank sum tests.

RESULTS

During the study period, a mean of 38 (SD = 18, range 6–71) patients visited BF each clinic day, while 97 (SD 21, range 69–133) visited M1. We made full-visit observations for 96 patients at BF and 94 at M1 for a total of 194 hours of patient observations. The mean visit length for patients at BF was 44.5 (SD=27.9) minutes and at M1 was 78.2 (SD=42.1) minutes.

The median time spent receiving or participating in any counseling during a clinic visit was 4.07 minutes (IQR 1.57–7.33) at BF and 3.99 (IQR 2.87–6.25) minutes at M1, representing 11% and 8% of total mean visit time respectively (Table 2; Figure 2). Median (IQR) of total waiting times at each clinic were 21 (12–39) minutes at BF and 56 (31–77) minutes at M1. This represented 66% and 78% of total visit times respectively at the two sites (Figure 2).

The number of patients who received any counseling during their visit on specific issues related to HIV harm reduction, and/or care and treatment was as follows (Table 2): alcohol and drug use overall n=62 (33%) [(38, 40%) for BF and (24, 26%) for M1]; ART adherence overall n=188 (99%)(95, 99%) for BF and (94,99%) for M1]; contraception/pregnancy overall n=95 (50%) [(39, 41%) for BF and (56, 60%) for M1]; disclosure overall n= 121(64%) [(54, 56%) for BF and (67, 71%) for M1]; and positive prevention messages overall n= 129, (68%) [(48,50%) for BF and (81,86%) for M1]. The median time patients received counseling related to antiretroviral adherence was 1.29 (IQR 0.77–2.83) minutes at

BF and 1.76 (IQR 1.23–2.83) minutes at M1 (Table 2; $p=0.001$ for difference). This content area comprised 25% and 30% of the total mean counseling delivered per visit on average at each site respectively. Patients received a median of 0.18 (0–0.72) minutes at BF and 0.28 (IQR 0–0.67) minutes at M1 of counseling regarding contraception, family planning and pregnancy combined ($p=0.39$ for difference). Staff-delivered positive-prevention messages averaged 17 and 39 seconds at the respective clinics (data not shown). Most ($n=174$, 92%) patients were specifically asked by a provider about their adherence to ART while fewer ($n=57$, 30%) were asked about risky behaviors during their visit.

DISCUSSION

This study documented high rates of ART adherence counseling being delivered within busy HIV care and treatment clinics in a resource-limited setting. Nearly all of the patients observed in this study (99%) were asked about their adherence to ART during the period since their prior clinic visit and were supplied with messaging and support to continue and/or strengthen their medication adherence. Fewer patients received counseling in other content areas relevant to HIV treatment and prevention, including harm reduction behaviors to keep sexual partners healthy and contraception for family planning, despite an integrated approach to reproductive health instituted at one of the clinics studied (M1). Furthermore, only limited counseling was provided with regards to alcohol and drug use within these two settings. This is of concern given the increasing understanding of the hazardous role alcohol use may play in HIV adherence, outcomes and transmission.^{33–35}

Despite the focus of clinicians and health care workers on adherence messaging and counseling in these two clinics, on average less than two minutes were spent with each patient discussing this critical issue. Moreover, on average patients spent approximately 5–6 minutes (8–11%) during their clinic visit involved in counseling discussions with health care professionals, while spending between 30–60 minutes (66%–78%) waiting during their visit. Only very limited counseling on family planning and behavioral harm reduction was observed in this setting.

These findings are consistent with prior time-motion studies conducted in East African HIV care and treatment settings. Were, et al. found that in two Ugandan HIV continuity clinics between 62–66% of patient visit time was spent waiting.³⁰ Some prior studies have found gaps in the quality of HIV-related care within programmatic settings in sub-Saharan Africa, including inadequate focus on reproductive health needs and adherence messaging.^{36–38} However, we believe this is the first study to specifically quantify the magnitude and content of counseling received within ART programs in this setting.

There is limited evidence to inform health care providers and decision makers on the correct “dose” of counseling needed to improve a variety of critical behaviors related to HIV disease progression and transmission including adherence to ART, sexual risk reduction, or family planning strategies. One prior study amongst HIV-infected drug users in an industrialized setting found a 20% increase in ART adherence for every additional hour of counseling received.³⁹ In addition, clinic attendance and the presence of adherence support services within a HIV care and treatment program have been shown to improve clinical

outcomes.^{40,41} While a majority of patients in this study received at least some counseling each visit, it remains uncertain as to whether this was sufficient to affect significant behavior modification or alteration.

Our study suggests that opportunities exist to maximize how HIV-positive patients spend their time during a clinic visit. In particular, there is great opportunity to use this time to engender critical behavior change or maintenance amongst HIV-infected persons. Approaches that could be used include group-based information and counseling sessions, use of expert patients and community health workers to provide counseling during the time patients are waiting. Computer-based or electronic health based delivery mechanisms may be one important methodology in need of further study in this region as it requires fewer additional human resources and offers consistency of messaging. Early studies amongst HIV-infected persons suggest that it may be efficacious; clinic-based computer delivered interventions have been shown to improve adherence among patients with baseline adherence that is less than 95%.^{21,42}

There are several limitations in this study that may have biased our findings or limit their generalizability. First, observing the patients and providers may have changed their behavior (i.e., Hawthorne effect) potentially resulting in an overestimation of the amount and magnitude of counseling received by clients in these clinics. Secondly, there may have been selection bias secondary to the sampling methodology. Third, the observations took place in only two clinics within one care and treatment program (AMPATH). In addition, beyond applying strict exclusion criteria, detailed demographic information was not collected, and these data could potentially have impacted some interpretation of the findings. Finally, this study evaluated the frequency and types of counseling messages delivered to HIV patients, but we did not assess the quality or specifics of the messages delivered.

Through this study, we were able to demonstrate the nature of, and opportunity to improve, counseling messages for HIV-positive patients visiting clinics in resource-limited settings in sub-Saharan Africa. There is substantial room to improve on the type, duration, and quality of counseling messages provided. Innovative approaches using media and technology could help fill the human-capacity gap by offering counseling mechanisms especially during the extended waiting periods in a patient's visit. Notable strengths of this study include the evaluation in two different clinic settings, both urban and rural, as well as attempting to assess not only the quantity of counseling delivered and received in these setting but an understanding of the focus and content areas that were addressed.

CONCLUSION

In these sampled clinics there were relatively high rates, but limited amounts of time, spent by providers on counseling. We identified significant amounts of wait time that could potentially be used for self-administered patient education and counseling. Though adherence was discussed with almost all HIV-positive patients on ARVs during their clinic visit, the time committed to adherence counseling was minimal (small or limited). Positive prevention messaging was not consistently or extensively delivered. Most patients in the study did not receive any counseling regarding alcohol and substance use, an emerging risk

factor in the ongoing transmission of HIV in this setting. There are ample existing opportunities to improve upon and enhance the quantity of the counseling received within HIV care and treatment programs. Greater efficiency and impact in these settings may result in fewer new HIV infections and improved life expectancy and quality for those living with HIV.

Acknowledgments

We thank the following deeply for their contributions and support: our research assistants at Moi University School of Medicine for performing the patient observations.

Source of Funding: The National Institutes of Health (NIH): R01MH085577 (Kurth) provided financial support for this study. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH. The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript.

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Figure 1. USAID-AMPATH clinical sites*

* Study clinics are circled (Burnt Forest, Moi Teaching Hospital Module 1)

Figure 2. Time motion analysis* of patient activity at two HIV care clinics in Kenya

*BF- Burnt Forest (rural) clinic; M1- Eldoret (urban) clinic. Numbers within each bar represent mean number of minutes spent in each activity and as proportion of entire visit within parenthesis.

Clinical evaluation: Includes care and treatment activities such as symptom elicitation, physical examination, phlebotomy/diagnostic testing.

Counseling time: Any activity defined in Table 3

Table 1

Characteristics of HIV clinics in study

Clinic Characteristics	Rural Clinic (BF)	Urban Clinic (M1)
Primary Affiliation(s)	USAID-AMPATH ^a	USAID-AMPATH ^a
Location type	Resource-poor rural setting	Resource-poor urban setting
Adult HIV+ patients in care	2,563	6,750
Adult Patients on ARVs ^b	1024	2,694
Average daily patient census	119 (SD 34, range 71 – 197)	107 (SD 45, range 62 – 172)
Number of full-time physicians ^c	0.01	0.02
Number of full-time COs ^d	4	8
Number of full-time Nurses	3	8

^aUSAID-AMPATH - United States Agency for International Development - Academic Model Providing Access to Healthcare

^bARVs – Antiretroviral HIV medication

^cRepresents full-time equivalent (FTE) effort

^dCO – Clinical Officers (equivalent to nurse practitioners/physician assistants)

Table 2

Median staff counseling time* in minutes, and content, at two HIV clinics in Kenya

Category	BF (N = 96)	Mod 1 (N = 94)	p value
ART adherence	1.29 (0.77–2.55)	1.76 (1.23–2.83)	0.001
Alcohol and drug use	0 (0–1.52)	0 (0–0.12)	0.001
Family planning and behavioral risk reduction	0.18 (0–0.72)	0.28 (0–0.67)	0.39
Disclosure	0.18 (0–1.21)	0.18 (0–0.42)	0.81
Other [†]	0.50 (0.24–1.25)	1.07 (0.42–1.77)	0.004
Total	4.07 (1.57–7.33)	3.99 (2.87–6.25)	0.23

[†]included positive prevention messages, health promotion plans and non-categorized counseling

* Values in parentheses represent IQR for time in minutes

Table 3

Time motion variables* captured at HIV clinic patient visit

Event	Analysis Group
Registration: Getting Registered	Registration
START: PT ENTERING CLINIC	START
Waiting/Walking (to doctor/nurse/pharmacist/peer <u>Doctor/Nurse/Pharmacist/Peer/Other:</u>	Waiting/Walking
Question: ART Adherence	ART Adherence Question
Question: Risky Behavior	Risky Behavior Question
'Abstinence, Be Faithful, Condoms'	Positive Prevention Messages
Alcohol & Drug Use	Alcohol & Drug Use
Alternative/Herbal Meds Use	ART Adherence Message
ART Adherence	ART Adherence Message
Contraception & Pregnancy	Contraception & Pregnancy
Disclosure	Disclosure
Health Promotion Plan	Health Promotion Plan
Referral to Other Counselor	Referral
Risky Behavior & Change	Positive Prevention Messages
Other Counseling	Other Counseling
Patient Other Time with Provider	Patient Other Time with Provider
Patient Personal Time	Patient Personal Time
END: PATIENT DONE WITH CLINIC VISIT	END