ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ANTIRETROVIRAL TREATMENT ADHERENCE AND ITS CORRELATES AMONG PEOPLE LIVING WITH HIV/AIDS ON HIGHLY ACTIVE ANTIRETROVIRAL THERAPY IN ADDIS ABABA, ETHIOPIA

BY

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DEDICATION

I would like to dedicate this work to my lovely mother W/r Mulumebet Alemu Chekol, who has been the very source of inspiration through all my life.

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ADHERENCE - the extent to which a client’s behavior coincides with the prescribed health care regimen as agreed upon through a shared decision making process between the client and the health care provider. It is perceived as a patient agreeing to make behavior changes that improved his / her health.

ARV-Antiretroviral drugs used for the treatment of HIV infection.

ART- Anti retroviral Therapy

ART-Units-A unit in hospitals responsible for counseling, investigating, and treating HIV infected persons with antiretroviral drugs.

AIDS-Acquired immunodeficiency syndrome

Combination Therapy-Treatment of HIV infected people with three or more antiretroviral drugs

HIV- Human Immune deficiency virus

HAART-It is a combination therapy, known as highly active antiretroviral therapy.

MEMS-Medication Event Monitoring System-it is a pill bottle cap containing a microchip that records each instance of bottle opening.

MOH- Ministry of Health

PLWHIV- People living with HIV infection

PLWHA-People living with HIV and manifestations of AIDS

PMTCT- Prevention of Mother to Child Transmission

UNAIDS- Joint United Nations Program on HIV/AIDS

VCT- Voluntary Counseling and Testing

Abstract

Background: The introduction of HAART has transformed HIV infection into a chronic manageable disease. The key to this success is the ability and willingness of HIV-positive individuals to adhere to HAART regimens. But at present little is known about the patient's experience and adherence when taking such complex regimens.

Objective: To assess the degree of adherence with antiretroviral therapy, identify which factors influence it, and describe the everyday experience of PLWHA on ARV therapy.

Design and setting: We used a combination of methodologies, including questionnaires, interviews and medical record review with patients in selected hospitals.

Patients and methods: For in-depth interviews, we purposively sampled 10 PLWHA. After screening for HIV- dementia each participated in an audio taped interview with the investigator. In the cross - sectional survey, consecutive HIV-infected patients at three ART centers in Addis Ababa were invited. Data on drug adherence were collected using patient self-report and depression was measured using Beck's depression inventory (BDI). Clinical data were recorded by asking the patient and reviewing their chart. Knowledge about ART was assessed by questions presented in "Yes" or "No" format.

Results: A total of 431 HIV infected patients responded to the survey questionnaire. 81.2% of patients were adherent by self report in the week before the assessment.

The major reasons reported for non-adherence were, being too busy with other things or simply forgot (33.9%) and being away from home (27.5%). Correlates of adherence in the multivariate analysis controlling for sociodemographic differences were: having regular follow-up, not being depressed, having no side effects, fitting a regimen to the daily routine, being satisfied with the relationship with health care providers, and the perception that doctors were capable and had access to assistance and reliable pharmacy.

Conclusions: The self-reported adherence rate in our study was higher than that seen in developed countries. Programs and clinical efforts to improve medication taking in the study setups should strive to: provide regular follow up for patients, manage depression with a multidisciplinary approach, increase patients' awareness of the side effects of ARVs and possible remedies, integrate medications better into patients' daily routines, improve patients' confidence, trust and satisfaction with their caregivers, eliminate problems of access, and alleviate the impact of cost.

Introduction

At present many researchers have proven that the introduction of HAART has transformed HIV infection into a chronic manageable disease, bringing a major impact to the quality of life and the prospects for extended survival in PLWHA, many of whom have been able to go back to work and lead a full social life.

Numerous reports have documented that the key to the success of the new HAART is the ability and willingness of HIV-positive individuals to adhere to complex ARV regimens, and at least 95% adherence is required for ARV regimens to be fully effective and to avoid the emergence of resistant strains of the virus (3, 7).

Attaining this high level of adherence is a serious concern today in the world.

Because of this, provision of antiretroviral to the poor and marginalized segment of the population was the most controversial and feared act due to the number of impacts it could pose to the individual as well as to the whole of society. It was also universally recognized that access to effective HIV/AIDS treatment and care till recently was highly inequitable (1, 3). In response to these, the World Health Organization (WHO) has set a target to have 3 million people on anti-retroviral therapy (ART) by the year 2005 (4).

As in many other resource poor countries, HIV- infected people in Ethiopia have not yet fully benefited from the use of ART. However, since the beginning of 2002, ART is more openly discussed in the public media, coinciding with the publication of the ART policy in Ethiopia (5) and due to the efforts made by multilateral donors and non-governmental organizations (NGO) to provide ART in limited settings (e.g. for pregnant women)(6).

At present, though there is no organized ART delivery system, there are many hospitals in Addis Ababa and main cities in most regions that provide ART service for patients who can afford to pay for the drugs. Also in a few selected hospitals projects provide ART for pregnant women.

The experiences in implementing these projects identified the following major problems in adherence to treatment: insufficient training of staff, poor infrastructure, long waiting time, lack of trust, stigma, poor supply system, poor motivation of staff, cultural beliefs, pill burden, poor patient information and knowledge, the use of traditional medicine and poverty.

Adherence in general is a complex behavior, which is influenced by several determinants belonging to the domains: the patient, the treatment, the disease state, the physician and patient-physician relationship and the health care system (3). And the studies so far yielded discordant results, making it difficult to achieve consensus on modifiable correlates and predictors on which intervention strategies should be designed.

Because of these researches on correlates of adherence recommends employing comprehensive and individualized cognitive, behavioral, and effective strategies and continuous monitoring adherence with a variety of assessment methods (7, 8).

Currently the initial optimism regarding the efficacy of HARRT has also dissipated in the face of the onerous challenges of maintaining the nearly perfect and probably indefinite adherence to precise dosing schedules and exacting dietary adjustments that successful therapy requires. There is also a fear that sub optimal adherence, allowing ongoing viral replication, facilitates the emergence of HIV-1 variants resistant to the drugs being used.

The emergence of drug resistance will also reduce considerably the treatment options for the individual patient, since drug cross-resistance exists to a large extent among antiretroviral agents within a therapeutic class (3, 9).

In addition to the individual patient health impact, non-adherence has also implication for broader public health. Non-adherence to HIV treatments may increase the risk of HIV transmission as non-adherent patients have higher concentrations of HIV RNA in their semen or cervical secretion, furthermore non-adherence accelerates the development of drug resistance strains of HIV, and persons with resistant virus can spread resistance among those whom they infect(3,9,10)

So in light of this, in this study, we are interested in the adherence of PLWHA to ARV, the correlates of adherence, and the benefit as well as impact of the ARV drugs so far in our country to PLWHA from their own perspectives.

It is also our expectation that the findings generated from this study will contribute to knowledge and understanding of non-adherence to ARVs and be useful in developing interventions that will be undertaken to address ARV adherence. The data collected also could be used by organizations involved in this area to deal with the problems associated with non-adherence.

LITERATURE RELATED TO THE STUDY

From the literature, non-adherence for ARV users ranges from 10% - 92% with an average of 50%. In people with HIV infections and prescribed a combination of ARVs treatment adherence levels of > 95% are required to maintain virologic suppression. However, actual adherence rates are often far lower; most studies show that 40% to 60% of patients are < 90% adherent. Adherence also tends to decrease over time and in a number of studies patients offer a range of reasons for non-adherence (8).

Contrary to previous assumptions that in African settings and other lower socioeconomic areas non-adherence will be high and pose a threat to HAART success to the rest of the world, recent data from these settings have suggested patients are able to achieve excellent rates of adherence with access to routine medical care, subsidized ARV therapy, and free laboratory monitoring (11, 46, 47).

Although to my review there are few studies in Africa and almost none in Ethiopia, many studies in other parts of the world has investigated the barriers to optimal HAART adherence and the reasons for non-adherence are multifaceted in nature.

A few factors were found to be consistently associated with poor adherence to HAART, including patient-reported symptoms, stressful life events, lack of social or family support, complexity of the regimen and self-efficacy for medication taking (3, 7, and 8).

Findings suggest an association between stressful life events and non-adherence (12, 13) people with HIV may experience high levels of stress, which leads to non-adherence and additional stress. The majority of the studies investigating the relationship between adherence and family or social support found that lack of support was an important risk factor for non-adherence (13, 14, 15, 16, 17, 20, and 22).

It has been postulated that the complexity of the treatment regimen may have a negative impact on adherence; evidence from two studies (15, 21) suggests that considering the combination of number of daily doses together with instructions about food or correct timing, less complex regimens were associated with significantly improved adherence.

Patients' confidence about their ability to take antiretroviral drugs (12, 13, 16, and 18) and incorporate the treatment regimen into their daily routine (13) was associated with better adherence. These studies suggest the importance of tailoring the regimen to the patient's needs and life style.

Among factors inconsistently associated with HAART adherence studies show conflicting results in their findings on the association of adherence with age, race and ethnicity. Nearly all of the studies showing an association between adherence and age suggest better adherence with increasing age (14, 17, 22, 28, 35, 36).

The inconsistent association of race and ethnicity with HAART adherence may reflect the diversity of customs, health beliefs and attitudes towards treatment across different studies (15, 16, 18, 20, 21, 22, 24, 25, 27, 36).

Findings have also been inconsistent in defining the relationship of lower income (15, 18, 22, 24, and 25) and unstable housing (22, 26, and 28) to adherence.

Active use of injection drugs or alcohol has been associated with decreased adherence in several studies (12,14,17,21,28,36), while other studies have not confirmed this association (12,18,16,23,25,27,35,36).

Depression has been strongly related to non-adherence to HAART in some (21, 22, 25) but not all studies.

Findings have diverged in studies investigating adherence and health related quality of life (13, 15, 20, 22, 23, 36), underling the need for further study.

Regarding virologic and immunologic factors, some studies have documented better adherence in persons with higher CD4+T lymphocyte counts (14, 27).

There are no conclusive results regarding the importance of dosing frequency (15, 25, 26, 37, and 38) and the risk related with non-adherence. More study is also needed on the impact of patients knowledge about the current HAART regimen and patients' belief in the benefits associated with the treatment (15, 22, 25, 27, 35, and 40).

Although data are limited, good patient– provider relationships and patient satisfaction with health care staff have shown a positive correlation with adherence in some studies (14, 19, 21, 23, 24, and 26).

Some of the studies have not also shown a link between adherence behavior and treatment related factors including being naïve to antiretroviral treatment (17,22,23) length of time on treatment (14,16,17,25,36), number of prescribed drugs (16,18,27,36), type of antiretroviral agent (17,13,22,23) and number of daily pills (12,14,15).

In the reviewed articles the different studies conducted in different settings (13,18,35,38), have revealed also the most common reasons patients reported for skipping HAART medications included complexity of medication regimens (7%-52% of participants), difficulty of integrating treatment schedules into their daily activities (36%-57%), fear of side effects (13%-42%), worries about HIV disclosure (14%-33%), and forgetfulness in taking medication (30%-66%). Notably in a telephone survey (38), the perceptions of prescribing physician about reasons for patients' non adherence diverged from those of the patients themselves. Physicians indicated clinical barriers such as number of daily doses and number of pills per dose.

In contrast, patients stressed that the primary reason was difficulty of integrating treatment into their daily routine due to dietary instructions and complexity of the regimen. Patients and physicians agreed on the importance of side effects as a key reason for non-adherence.

Even though all the investigators tried their best all their papers and others not included here are found to have several limitations. And these several limitations of the existing body of research make it difficult to reach a synthesis of findings relating various factors to adherence to HAART. These include the measurement of adherence, the assessment of correlates and predicators of adherence, the study population and the study design.

Regarding the measurement of adherence, the questions are: how, what, and when to measure? There is no gold standard for adherence assessment, and different assessment methods have been used across the studies. Studies comparing MEMS, pill count, and self-report have found wide variations in adherence rates (29, 30). It has been suggested that adherence may be underestimated by MEMS and overestimated by patient self-report and pill count (30). Among studies using the same type of adherence measurement, there is discordance in what specific measure is used. In the case of patient-reported information, no standardized set of questions has been established and validated in the different languages, the time frame investigated varies (e.g. past 3 days, past 4 days, past week), and the administration procedure ranges from anonymous questionnaire to interviews. Non-adherence is defined in different ways by using various cutoff points for percentage of doses taken to categorize patients or by creating summary indexes based on multiple questions (17,25,28) or multiple measures (14,22,37,38).

Adherence is a dynamic process, and patient behavior can change over time (30, 33, 34) Because of this, when to measure adherence is still an open question. Patterns of longitudinal adherence behavior have yet to be studied.

The second category of limitation concerns the assessment of correlates and predictors of HAART adherence, for research purposes. Different instrument have been used to investigate depressive symptoms, quality of life, social support, self-efficacy, and beliefs about treatment. Moreover, checklists for assessing barriers to adherence have not been standardized across different studies.

Characteristics of the study population represent the third limitation of HAART adherence studies. Sample sizes are small in many studies, making it more difficult to identify important predictors. Generalizability of results is also uncertain as participants often represent convenience samples of patients in care, participating in cohort studies (31, 34, 35), or receiving monetary incentives (29).

Study design presents a final limitation. The absence of a control group in most studies raises the possibility of bias by indication, such as that of prescribing more complex regimens to patients with better adherence.

Finally, since the complexity and burden of planning for and implementing the self administration of medication challenges individuals and increases the person's risk for non adherence, in order to assist PLWHA to adjust to their prescribed regimen resent studies suggests, information specific to integrating HAART into daily life is needed, to counsel and advise the patients to manage their daily regimen. There is also a need to understand the difficulties of living with this regimen in order to enable them to adapt their lifestyle and to promote adherence to combination ARV therapy (8, 34, 48, and 49).

OBJECTIVES OF THE STUDY

The main objective of this study was to determine the current adherence rate and its correlates among Ethiopian patients living with HIV/AIDS on combination antiretroviral therapy and to assess quality of life from the perspectives of the patients on the regimen.

Specific objectives were to:

1-Determine the current ART adherence rate among PLWHA.

2-Identify the correlates of ARV adherence.

3-Describe the observed side effects of the ARVs currently used.

4- Describe the every day experience of PLWHA on combination ARV therapy

5-Assess the association between adherence and quality of life from the perspective of the patients on the regimen.

METHODOLOGY

STUDY DESIGN

The study consisted of a combination of methods. Both qualitative and quantitative methods were employed in the data collection. The two approaches were arranged to complement each other and the preliminary qualitative study in particular to explore issues related to adherence, which will help in finalizing the development of an appropriate questionnaire for the quantitative cross-sectional survey.

STUDY AREA AND SETTING

The study was conducted at antiretroviral therapy units in Addis Ababa, particularly the ART Unit in Tikur Anbessa, Zewditu and St. Paul's hospitals from December 10/2004 to January 10/2005.

St. Paul's hospital is a general specialized hospital under the Federal Ministry of Health. There were some 256 Patients on follow-up in the hospital's ART unit. During the study time the female physician responsible for the unit for a long time was handing over the unit to the newly assigned male physician. The ART-unit is known as ‘‘Room No 32” by all the staff and clients visiting the hospital. It was at the end of the corridor where offices for the different departments out patient services were located.

Zewditu Hospital is under Addis Ababa Regional Health Bureau, known to serve most of the patients on ART follow up. Two female physicians and three Nurses were permanently assigned in the unit. The unit was located in two isolated buildings in the hospital compound with its own separate card room.

Tikur Anbessa Hospital is a teaching hospital under the Ministry of Education. The ART unit is the first room in the corridor of the out patient service of internal medicine department. In front of the unit there is a space for reception and waiting for all visitors of the hospital.

One male physician was assigned to the unit, in addition to his assignment in the radiotherapy unit on permanent base. The schedule for ART service was mostly between 11AM to 2PM, in his lunch time. The two Nurses in the VCT unit assist him with patient cards and registration.

SOURCE POPULATION

The source populations constituted all PLWHA on combination ARV therapy, and were on follow up in Addis Ababa hospitals ART-Units.

STUDY POPULATION AND SUBJECTS

People living with HIV/ AIDS (PLWHA) who were on combination ARV treatment and on follow up in the selected three hospitals.

The inclusion criteria used to select the sample participants were:

Those aged at least 18 years, who gave informed consent, were not in a moribund state, and were free of neurocognitive impairments.

SAMPLE SIZE AND SAMPLING

For the in-depth interview the selection of the participants who fulfill the inclusion criteria was based on purposive sampling to reflect the diverse sociodemographic characteristics of the population of PLWHA and receiving combination ARV treatment (age, sex, education status, ethnicity, income and work situation.)

Based on the above concept we sampled 10 adult PLWHA who were prescribed combination therapy and were on follow up.

These individuals were from the above hospitals, a minimum of three from each hospital, this was not fixed at the beginning, but what we did was analyze interview of the patient on the previous day, and continue till we felt some redundancy in the information generated.

To determine the sample size for the cross-sectional survey it was assumed that the precision to an acceptable approximation of the population was taken to be 95% (CI of 95%), taking a difference of no more than 5% from the actual figures in the source population. Since our current adherence rate or proportions of any related concepts to adherence was not known, a rate of 50% was preferred to obtain the largest possible sample size using the single population formulae. To compute for non-response, 10% of the required was added, and then the total sample size became 422.

The sample size was calculated using the following formulae;

$$N= \frac{Z\,(\alpha/2)^2\,P\,(1-P)}{D^2}$$

N = sample size

Z (α/2) = 1.96, which is the upper percentile of the standard normal distribution.

P= Adherence rate among PLWHA on HAART, which is assumed to be 50%

D= difference from the actual figures of source population, which is taken to be 5%

This gives N=384

At last 10% of this added for non-response, and we got 384 + 38 =422

Data Collection

The qualitative method used was a semi-structured in-depth interview and the quantitative method a cross sectional survey supplemented with patient medical record review to extract and counter check the clinical data reports of the participants.

For the in-depth interview PLWHA who met the inclusion criteria were invited to participate. Following informed consent, all were screened by the investigator for neurocognitive impairment using the four tests (i.e. five minute recall of four items, anti-saccadic eye movement, timed written alphabet, and cube copy time) of HIV Dementia scale (HDS) (41) **Annex II**.

The purpose of this screening was to ensure that participants would be able to understand the interview questions and offer a coherent response.

Following this, each individual participated in a 25-35 minute audiotape interview with the investigator in an isolated office in the above hospitals.

Based on the review of adherence and combination therapy literature we developed a semi structured interview guide. It provided direction for interview questions, as well as permitting some flexibility based on participant response.

Instructions and questions included were:

From whom /where did you hear /obtain the information about ARV?, How long after diagnosis did you decide to start ARV? What were the factors which influenced your decision making? , Who pays for the drugs? , Describe the impact of the cost to you /your family; Describe your understanding of your treatment plan, Describe your daily routine when taking combination ARV , Have you experienced any problems –like side-effects, access, cost, interaction with other medications, dosing schedules--?, Whom do you consult in case of treatment problems?, Do you have access any time you want advice /support for your problems? , How do you describe your relationship with health care providers?, How convenient is the treatment unit location /services for you?, Has taking combination ARV treatment changed the quality of your life; if so, in what ways?

For the cross-sectional survey consecutive HIV infected patient followed in an HIV ART unit at the three participating hospitals from January 10, 2005, for the subsequent three weeks were invited and asked whether they agreed to participate in the questionnaire based interview.

Patients were recruited by their caregivers at the ART unit in question and were asked to contact the study nurse in her office. The interview and survey were both confidential and anonymous; the study nurses also explained and reassured the participant that anything said would be for research purposes only.

The questionnaire was developed by the investigator using items available from WHO standard assessment questionnaires, the locally validated Beck's depression inventory and the results we found from the qualitative in-depth interview.

The questionnaire included: questions on sociodemography, psychological health, illness and treatment knowledge, relation with health care professionals and opinion of the health delivery system.

The questionnaire was piloted on 20 individuals and modified accordingly to develop the definitive questionnaire. Later all the interview questionnaires were filled in private by the trained study nurse in each hospital.

Depression was measured using the locally validated version of Beck's depression inventory (BDI), which has been successfully used to assess the depression level in HIV infected patients in previous study. Although three categories are classically distinguished in the depression scale: slight (10 -15 points), moderate (16-23) and Severe (24-62), a cut-off of 14 was used in our study to distinguish between depressed and non -depressed individuals (10).

Clinical data, CD4 lymphocytes count, adverse reactions to ARV and the duration of antiretroviral therapy were recorded by asking the patient and confirming this information with that recorded in their clinical chart.

Knowledge about ART was assessed by questions presented in ˝Yes˝ or ˝No˝ format, which is borrowed from the format used in the study by Ambay Degefu and his colleagues at Ethio-Netherlands AIDS research project (39). Three concepts related to ART knowledge were assessed. Benefit of ART, i.e., what the treatment can and cannot do plus its side-effects (covered by 5 questions), who is eligible to take ART based on international criteria to initiate ART (covered by 2 questions) and adherence to ART. i.e. necessity of strict adherence (covered by 3 questions), knowledge was considered "good" when all statements related to a concept were answered correctly.

Data on drug adherence was collected using patient self report sequentially about the number of doses skipped on the previous day, the past three days and the past seven days to minimize the recall bias for the 7 days adherence assessment.

Data analysis

The interview was transcribed verbatim. Each interview transcript was examined line by line using different colored highlighters by hand. Later data were reviewed and combined into broader concepts. The concepts were refined into major themes.

Results of the interviews were used for three main purposes: to make adaptations to the survey questionnaire, clarify and complement results of the questionnaire, and address our last two specific objectives.

Survey data were entered and analyzed using SPSS version 11 and Epi-Info version 6 statistical packages. The primary outcome variable was adherence with therapy. This was defined as patient self report of whether any antiretroviral medication had been skipped the previous day, the previous three days and the previous seven days. For the comparison assessment we used the adherence in the previous seven days.

Self reported adherence to all antiretroviral agents was summarized as the ratio of the average daily number of antiretroviral medications adhered to correctly according to the standard instructions over the total number of antiretroviral medication prescribed. The results were then expressed as a percentage, and patients aggregated into two group consisting of those adherent (took > 95% antiretroviral correctly) and non adherent (took <95% antiretroviral correctly).

The analysis consisted of basic summaries of patient characteristics, univariate binary logistic analysis of the relation between dose skipping and various factors, and multivariate logistic regression analysis to adjust values of the dependent variable for the influence of the likely confounding explanatory variables (covariates).

The magnitude of the association between the different variables in relation to the adherence to treatment was measured through Odds ratios (OR) and their 95% confidence interval (CI).

Comparisons for which P-values were below 0.05 were considered statistically significant.

ETHICAL CONSIDERATIONS

The study was approved by the AAU, Medical Faculty review board, and permission to conduct the study in the selected hospitals ART unit was obtained from the medical director's office in each hospital through the support letter sent to them by DCH, AAU.

Since young persons over the age of 18 years are considered capable of deciding for themselves whether to participate in research or giving valid consent, we have restricted our invitation by the inclusion criteria, though we did not encounter anyone below 18 during the study period.

Each study participant when invited by their treating doctor was adequately informed about the purpose, methods, anticipated benefits of the study.

The study nurse also informed participants that participation is entirely voluntary, they have the right to refuse or withdraw, and their treatment will not be influenced whether they take part or not. They were explained and reassured that anything said would be for research purposes only and no one even their treating doctor will have access to their response.

During the pretest, since we noticed that giving their signature on the consent form made participants suspicious and scared. And the investigator, the supervisors, and the study nurses are professionals under oath and they have been giving different health services for such group of patients, I felt for the benefit of the study as well as for the convenience of the participants informed verbal consent will suffice, and all gave informed verbal consent.

The findings of this study are also going to be disseminated through presentation, publication, and distribution to relevant bodies.

RESULTS

Findings of In-depth interview

The purpose of this preliminary qualitative study was to describe the everyday experience of PLWHA on combination ARV therapy, explore the concepts around treatment adherence, and examine the association between combination treatment adherence and quality of life from the patient's perspective.

All the respondents provided informed verbal consent, were above 18 years of age, diagnosed with HIV, free of neurocognitive impairment as indicated by their scores of above 10 on the four tests of the HDS, and prescribed combination ARV therapy. Of the participants, all were working actively, educational status ranging from Grade 6 Elementary School to a Professor. The participant's characteristics are displayed in Table 1.

Table1. Sociodemographic Characteristics of the Respondents

Respondent	Age	Sex	Education	Marital status	Religion	Ethnicity	Income ETB*	Work Situation
R_1	40	M	12+2	Single	Orthodox	Oromo	1000	Working
R_2	40	F	12	Married	Muslim	Harare	Unknown	Working
R_3	36	F	12	Widow	Protestant	Amhara	120	Working
R_4	47	M	10	Married	Protestant	Oromo	500	Working
R_5	36	F	12+2	Married	Muslim	Amhara	300	Working
R_6	37	M	8	Married	Orthodox.	Oromo	750	Working
R_7	28	M	6	Married	Orthodox.	Oromo	Unknown	Working
R_8	35	F	12	Married	Orthodox.	Tigre	Unknown	Working
R_9	48	M	PhD	Married	Orthodox.	Amhara	2600+	Working
R_{10}	42	M	12	Single	Orthodox.	Amhara	956	working

*ETB-Ethiopian Birr → 1USD=8.6 Birr

The major themes identified were: Decision making, Barriers and Problems, ART Knowledge, ART and Daily routine, Support and access, and Quality of life.

The whole interview has given us a lot of insight in assessing the concepts around adherence and in the development of a standard questionnaire for the survey. In particular, the first five and the last themes enabled us to address the purpose of describing the patient experience while living with HAART and the benefits of the ARV drugs on the patient quality of life from their own perspectives respectively.

Decision Making

The source of information about ARV drugs for most of the participants i.e. 8 out of 10 was from health care professionals, they were informed either when discharged from hospitals or after having repeated visits for chronic or recurrent illnesses like TB.

One Female participant said, “I was a TB patient, had TB four times, after I was tested for HIV and counseled the health care professionals inform me there are ARV drugs to prolong my life”

Only two participants mentioned other sources, a male respondent member of “Tesfa Goh” (Organization founded by PLWHA) stated their organization as his source and the other found about the drugs from the internet while he was a student abroad.

To initiate treatment six of the respondents have taken some time though the rest started the ART the moment they were informed about their sero status. The six participants described how they were confronted with initiating treatment because of their deteriorating health status. The respondents experienced deterioration in clinical indicators such as a drop in CD_4 T-cell count, this created a sense of urgency for treatment, one male participant stated “I was diagnosed HIV positive 8 years ago, so it is when my CD_4 declined, when it reached 130, I started the drugs”

Beside the deterioration in health status the respondents mentioned a number of other factors which influenced their decision, even though 3 participants claimed to have no major problem confronting their decision. As part of their decision making, the informants weighed the pros and cons of whether to initiate treatment. The participants learned that without treatment, death would most likely be inevitable. One male participant said “the main reason I decide to take these medicine over our food, is that it is better for my family if I am alive, otherwise when my CD_4 keeps falling I will die, I was going that way.”

The other challenging factors to the participants were: their financial capacity to manage expenses for the treatment, the mental instability and frustration they had when diagnosis was told, and their doubts about their self -efficacy to adhere to treatment.

A female respondent who lives with her brother and two sero positive children, tearful during most of the interview time, stated “Yes, very much, a lot of things challenge me the first was the questions “how long am I going to take?” for how long are we (me and my children) going to be a burden on him (her brother) and disturb his plans. When is it going to stop? For one month some 300 Birr for the drugs only is too much, he needs to live his life, most of the time I think of stopping the treatment because of these. The other thing is my children are also HIV positive, their life worries me a lot, our problem has reached to them, and they are living in a situation they do not know.”

When they were asked about the requirements during therapy almost all were not sure about their ability to manage them.

A male respondent stated ‘‘well, I was not having much problem, but one thing I was not sure whether I can tolerate and manage all the requirements to take medicine or not”

Problems and Barriers

Only four out of the ten respondents said they paid for the drugs by themselves. For the rest cost was covered by their families or their Organization.

When we assess the impact of cost, it had enormous impact on seven participants; to them it was a decision between staying alive to keep their family together or sending them to the street. Even the remaining three participants believe it has to be free when they see the future of their current capacity to pay for the drugs.

A male respondent who witnessed the death of his friends at their organization and saw its impact to their families said "Yes, cost has a lot of impact, my only reason to start this treatment was for my family (kids and wife), even to get food I need to be healthy and do my job, otherwise they will be out on the street like my friend's family."

A female respondent for whom cost was covered partially by old friends also stated: "Yes, cost has impact, the people who pay for me are in problem, especially in these days after that propaganda released by the government medias that ART is going to be free, these friends of mine and other people who support me think I am getting it free. Even now whether you believe me or not I took the money from my children's and family budget for food to buy the drugs. The impact of the cost to me as well as to the people who supports me is worsening."

Although three of the ten participants said they did not face any obstacles to be mentioned as major problem in their stay with the ARV treatment, most spoke about numerous difficulties they experienced taking combination therapy.

The participants identified side effects and access to get the drugs among others as having a significant effect on their lives.

Medication side effects such as gastritis, loss of appetite, weakness, leg pain and swelling, vomiting, and bad dreams /night mares were identified as having a significant effect.

One female participant stated “what I see as side effect is once my leg was swollen; also I used to suffer by its (ARVs) interaction with other medications. I remember I was vomiting every thing for seven months, food can not stay inside me, and my weight dropped from 90kg to 45kg”.

When asked about problems he encountered while on HAART, a male respondent also stated “The biggest problem was at the beginning of treatment, the first 2-3 weeks, I was confused and that was because of the side effects, my dreams were very abnormal but later it stopped. In the past week getting the drugs was also difficult, that has disturbed me, and I was worried very much. Otherwise so far I am fine.”

The access problems created at the pharmacies in the past week was what was mentioned by most as a very disturbing event in their experience.

One male respondent who came from outside Addis Ababa for follow up said ‘‘well, I never took any additional medication with my ARVs, today we did not get the drugs there is a problem at the pharmacy, of course we never faced such problems in the past but now because of this they gave me only 12 tablets and told me, I have to go home and come back again, and I have a big financial problem for that.”

ART KNOWLEDGE

Almost all the participants did not mention proper education or instructions given to them at the start of treatment. Most mentioned many concepts around the combination treatment with different degrees of misconceptions and lack of clarity. But most importantly all stressed the need and importance of strict adherence, though they did not know exactly the consequences of non-adherence.

A female respondent asked to describe her treatments plan stated "I do not know the time limit, I think there has to be something which says, for 3 or 6 months, I do not know that, always I plan to ask but when I reach here will be busy with other things and forgot it, but one thing I know it should not be discontinued, even exact time changed or disturbed."

Though respondents did not get or have clear knowledge, the benefits they obtained from the drugs and the positive relationships all had with their doctors made them stick with only what the doctors treating them said, forgetting the information they obtained from other sources and conflicts they had.

One male respondent stated "as to the time limit, some professionals say when your CD_4 is above 200 you can stop the ARV drugs, whereas my doctors here inform me, it is completely forbidden or is impossible to stop, so it is different information I have. But my belief is till my doctors here told me to stop, I will not stop."

Another male respondent also said "When I started the treatment I was very sick and weak, I was not that much aware. The people here informed me just recently before one month, otherwise I did not know anything about the drugs. I used to think I will finish in one year, even now I do not know, I am not sure. But as to time, I am careful; I know it has to be taken regularly, no skip"

A female participant from Addis Ababa, who believed the treatment offered her a renewed life of quality, besides the many misunderstandings she had, stated the importance of adherence as, "One should not skip doses, or take at the wrong time. If the timing is disturbed it has to be considered as the disease is disturbed. Each minutes delayed I believe will replace the virus according to me, but I do not know what is in your pot."

Adherence, though perceived by most as important, almost all admitted to not being as strict as they should be with their treatment requirements and timing.

A male respondent stated “At times I just forgot my drugs for 15-20 minutes to be exactly punctual is very difficult, you will not stop it or skip it totally but you will not be always punctual. As to the limit, it is life long, just like diabetic patients considering the difficulty to strictly follow all the restrictions.”

ART and Daily Routine

Only two respondents mentioned difficulty to incorporate the treatment into their daily routine, the first was a women who lives with her brother and her two seroproven children and taking triple ARVs stated “It is very difficult with my daily routine, people asks you when they see you taking drugs all the time. I was very sick at first, now I have gained weight and improved much, so I think that has become a question in their mind, besides I do not also want them to know, I do not want to share my secrets. When I am at home my sister always reminds me and forces me to take even when there are other people at home.

The other male participant who works at a factory also stated the difficulty with daily routine as “with the work, I do have some problems, but I know there is no other option I do not have other choice, at times I forget my doses, but mostly my wife follows me, she does not want even the timing skipped, she is the one who gives me the drugs at home”

The other participants who found the treatment convenient stated the advantages of having a twice daily regimen (morning & evening) and support from their organization and relatives to incorporate the regimen into their day to day life.

One male respondent said “up to now there is no problem, I have support from my organization, I do not have much problem, and my drugs are also at the morning and at night.”

Another male respondent also stated “I took my medicine on a twice daily basis 9:30 morning and night. I have got used to this. I will not go out in the morning before I take my drugs and I take it when I come back home. My wife also knows and reminds me, when these times come,”

Although they experienced difficulties at the beginning of their treatment, some of the informants also expressed that they eventually incorporated the medication schedule into their lives; it became a way of life as time goes.

A male respondent stated “Me, I do not worry much about it now, I know I have to take it and I am used to it. Now it is adopted, it is in my blood, it has become a behavior like I should wash my face when I wake up in the morning. That is it, it is fixed in my mind-it is not something I will forget."

Likewise another male respondent also stated “In fact, at times when I am busy it was the timing that was difficult, but I used to wake by reflex instinctively I have learnt it. Through time that also did not happen much. You will adapt it and it will be your behavior when you use it for long”

Some of the respondents claimed they have developed strategies to eliminate the difficulties of incorporating the treatment and the forgetfulness they face, a male respondent who lives alone stated “Mine, I will take one in the morning and after work go to home directly and take the night dose after dinner that is my routine I did not face problem, even if at times I forget for a while. At the beginning I had this problem of forgetting things but I remember I used to take some precautions that help me remember. Even you see this prescription paper I will copy it always before I buy the drugs and keep it on the table I was cautious with every thing just keep reminders every where and try my best to avoid stressful things, that is it just leave no open windows."

Access and support

The participants commented that social support from a variety of sources (families, friends, organizations, their doctor and support groups) was an important factor in assisting them to adhere to their drug regimen.

Six respondents stated their treating doctors were their primary source for any treatment problems they face as well as for other supports they need. The rest mentioned families, their organization and other support groups as their source.

A female respondent stated "My brother, sisters and one very close relative helps me with everything I have, when I tell to them my problems, feel relaxed. Most of the time I just got disturbed easily, but all these relatives try their best, without them I would not have gone so far." A male respondent from "Tesfa Goh" also stated "There is one Nurse where I work, I have told him my situation also I have informed my family, my boss, all help me. I do have also advice and other information service from my organization "Tesfa Goh". My informing them has helped me, so far I can get any support I need, I do not have problem".

Their doctors and appointment schedules are the only sources of support for some.

Two male respondents stated "I do not have any one to consult except my doctor here, whom I will see on my date of appointment" "I consult my doctor here, second step I do not have any one to talk to directly with him only."

Eight of the respondents assured they have access to support any time they want. A female respondent said ‶yes, I can get from both my husband and the health professionals any time I want, and I am happy with that. I do not have a problem any time I want to get these people and their support."

Another respondent also stated “Yes, any time I can get, for any problem I face. I am going to come here and tell to my doctor, no problem, and other people only my sister, when I tell her that I do have such a problem she just will advise me to see my doctor here.”

Two male respondents, from Black Lion Hospital who were disappointed by the pharmacy problems created in the previous week and their doctor’s absence being on leave, stated the problems they faced as, the first “Up to now I do have, I just use the schedule here and get what I want. Of course out of the schedule I do not have access. Just like what happens this week, my doctor on leave, no substitute, no drugs in pharmacy so that tells you can not come any time you want.”

And the other said “I visit my doctor here on a monthly basis. I came here on Monday before three days, they told me, my doctor is out of town on leave, there is another doctor assigned and I can find him in the library, we tried to find this doctor repeatedly but we did not. In the mean time I just run out of medicine I have already taken the last pill in the morning when I came, finally after I tried many places and understand that there is no support here. As a last trial I went to the pharmacist with that paper I told you, I keep the photocopy of the prescriptions and told him my situation, I do not want to see again all that misery/sickness and begged him in God’s name, God bless him he sold me the drugs and that is why I came today when I here after three days that our doctor is back.”

As the participants discussed their experience with ARV drug treatment, they described a positive relationship with the health care providers. The relationship with the health care professionals is an important assistant to their adherence and stay on treatment. The informant spoke about their relationships with the healthcare providers as one of trust, faith, admiration, and respect.

A female respondent said “Meeting with the health care provider is good, their advice gives hope, we are together with them for long, and our relationship is good we are together by all, advice, support and others, they are touched by our situation, and openly we talk good things.” A male respondent also confirmed a good relationship by saying “what we have is just like family relationship, of course previously there were many rumors about health professionals on many aspects, but now here they support us considering our sickness as if it is theirs. I never faced any problem; my relationship with the health care providers is good.” Sharing the rumors mentioned by the above respondent and expressing her disappointment on the doctors she visited some months back for her leg problem, another respondent also stated her relationship with the health care professionals at the ART unit as “But the people here they have good approach, we like them, they see everybody as human, according to me I feel they came here selected by God, they are very good”

When the respondents were asked how convenient was the ART unit location and service for them, they offered different answers, even those who are from the same hospital gave contradicting and conflicting opinions.

The four respondents from St.Paul’s hospital ART-Unit setting gave the following responses.

The two male respondents who are the members of “Tesfa Goh” said, the first “Ok! This is what I say always, this place may not be convenient for some people, it is not good, if you say why? some people do not want to be noticed by others when they come for such service so for this reason I do not think it is good place but for me I don’t feel it much. Because many people already know me, they know where I work, for those who came hiding when told to go to office number 32 (ART unit) every body knows his/her sero status so that will create some discomfort” and the other “Its being separated is good, other people could be different from me.

For me whether it is isolated or not I do not care I have known myself and got the strength to disclose to others. But for those who come hiding it is good, for the others like me it has no problem, we are not afraid of anything."

For the three respondents at Zewditu hospital the ART-unit is good and convenient to them. Only the female respondent mentioned the difficulty for other patients saying "- It has no problem for me, but for some of the patients who are very weak- the stairs are difficult to climb for them, the laboratory is very far from here."

At Black Lion Hospital the two male and female respondents stated different opinions about their ART unit convenience and service.

The female respondent said "At this time there is a problem of giving the service according to our sequence of arrival, I think it is good if they correct that, those who come first should be seen first. The place is good; it is not something to be mentioned as very inconvenient. Of course at time it will be crowded and people can have many problems like cold, cough and other, so to avoid this it will be better if not crowded."

And the two male respondents stated "- It is being here first on the gate is not good I did not mean to exaggerate what is said in our culture – hide your personal secrets /problems. Even though you can manage your own conflicts from inside the others which come from outside – like when somebody turns back and see you with a question like, who are these people, how could it happen to them something like that? Some are married and we do not have much concept because of these you know it just strikes something inside and create discomfort." and the other "It is not a problem for me"

Quality of Life

The participants viewed HAART as life enhancing, thus offering them a renewed quality of life. All the participants in the study stated that their disease progression was halted or slowed since they initiated combination therapy.

A female respondent experienced a dramatic response to treatment and to subsequent feelings of wellness and normality stated "I feel I am normal, I am in good condition, now I have returned back to the old day's situation even I feel it has changed my life much better than that. I found the medicine on the good side"

Another female respondent who remembered the numerous sicknesses and weakness she used to have also said "As I told you I had many health problems, my CD_4 was 5; there were many, many problems. Now that pain has gone, I have got strength, and eat my foods well. In general my full health is coming back. I am able to walk alone without support, go to the toilet by myself, get out of bed without help and drink water fetching by myself." Likewise, a male respondent shared that he experienced a significant improvement in biological markers. The respondent stated "It has brought change in my life; my CD_4 was 130 now I think has reached around 300. Has changed my quality of life – I mean if I was not using it my CD_4 could have declined and I could have died, at least it prolonged my life. All the symptoms I had, now I do not have them. Of course there were no major problems even at the beginning, but when I compare from my initial condition it has brought very, very much change."

An enhanced quality of life gave the participants an opportunity to reflect back on their lives. A female respondent who found increased energy and weight gain stated "I started treatment some 10 months ago. I am changed, my leg pain, back pain and others all gone; life is changed, taking the drugs is good. Now I can work like I was healthy".

The participants also experienced a positive response to treatment and thus expressed hope and optimism about their future. The ART offered them a chance at longevity.

Two male participants stated, "Yes, I have obtained many good changes, now I have taken it for three months, with this time I gained weight, internally I am peaceful, I have good appetite, even though at times I have some mild problems. Cumulatively the drug is good for me, I am coming back to normal, I think now my CD_4 also will be more than 100." and the other "I am very happy, it has brought many changes. Now however bad HIV is thought to be I do not say it is bad. That is because taking the drugs I am healthy. I used to be sick so frequently, now I am healthy, now I do not feel anything. Earlier when I was a sportsman my weight was 50kg now it is above 70 kg with all the strengths."

The improvement in the participant's health gave them a sense of more control in combating HIV. A male participant stated "It has improved my quality of life, even increased my confidence. I do not feel anymore I will face any problem because of HIV. It has helped me, how? One I have developed confidence, and second the things I used to feel has improved for example I am energetic now, before 8 months I can not play football now I can do that play Tennis too, I feel healthiness. In summary now all I feel and act is normal."

A male participant who had never put his hope up that there would be effective treatment for HIV stated "Now, I am healed, even you know what I think at times, "I think my problem was not HIV, maybe the doctors did not know it properly" this is because I just become fully strong, and healthy. First I was not even able to stand by myself without support, now many changes, I can play any game I want, work my job actively and keep myself busy."

Results of the cross-sectional survey

We invited consecutive patients who came to the ART units for follow-ups. A total of 431 HIV infected patients responded to the structured interview questionnaires of the survey after giving informed verbal consent.

Patients in a moribund state or who refused to give informed consent were excluded. Two patients were very sick and one other refused to participate.

The study participants ranged in age from 18 years to 76 years (median 36 years). An equal number of male and female subjects participated in the study. The majority, 79% belong to Amhara and Oromo ethnic group i.e. 54.4% and 24.5% respectively. 54% of the participants were Orthodox, followed by Catholic (24.4%), Muslim (11.4%) and Protestant (9.5%). 39% of the patients interviewed were married. Their average educational attainment was relatively high, with 77% having high school and some with college degree. 47.8% were employed and work active with 25.1% reporting to have less than 500 birr per month income, 44.5% unpredictable and variable income and 21.6% income between 500 and 1000 birr. Only 3.7% reported active substance use, among the active substance users 53% chewed khat, 29% smoked cigarettes, and 18% drank alcohol while on HAART.

Some 18.3% lived alone while the rest 81.7% lived with someone close. Sixty eight percent claimed to have no social support, 23.7% had support and were satisfied and 8% had support but were not satisfied. Around two thirds (60.5%) had disclosed their serostatus to their partners and other close relatives.

Though 13.2% claimed they had some doubts about ARV drugs, 98.4% believed the ART would benefit them and when asked about their ability to adhere, 95% were sure and had no doubts on their ability to adhere to the ART.

Based on the Beck's depression inventory, 25.1 % were found to be depressed having score of > 14.

Before HIV diagnosis and HAART treatment 36.4% had never heard of HIV/AIDS, whereas 63.1% had some awareness about HIV/AIDS.

The source of information about ART for 63.3% was the health care professionals at the institutions they were diagnosed, 33.4% mentioned mass media and the rest 3.3% other sources, like AIDS clubs, friends, family etc. Before starting HAART, 35.8% knew the benefits of the regimen, though 63.3% had no knowledge. 96.75% claimed the regimen had benefited them, 29% saying it had improved their total quality of life, 20.7% obtained improvement in symptoms with decreased frequency of morbidity and hospitals visit, and 47% had both and were satisfied.

For those who had their CD_4 count measured, the initial and most recent median CD_4 counts were 92 (ranging 1 to 500) and 237 (ranging 13 to 895) /mm3 respectively. The average ARV treatment duration for the participant was nine months, ranging from one month to four years.

The proportion of participants having good knowledge (that is all answers correct) on issues concerning ART adherence was found to be excellent (90.1 %), but knowledge concerning the benefit and eligibility of ART was found to be relatively low, 44.5% and 45.1% respectively.

Almost all (99.3%) claimed they started the ART by their own decision though were informed and assisted by the health care professionals. 48.7% had no discomfort when taking their drugs in front of others, though 41.5% had some discomfort and the rest not sure.

For 92.8% the regimen was convenient and easy to fit to their daily routine, but 6.5% found it inconvenient and difficult to fit to their daily routine.

Among the participants some 22.6% had an adverse reaction to one or more of the ARVs they were prescribed, the rate being 5.8% in the adherent and 16.8% in the non-adherent patients. The rest (76.5%) claimed no adverse reaction and only 4 (0.9%) did not remember.

Forty percent of the participants with adverse reaction to the ARVs had it in the first two weeks of the treatment, while the rest had it after two weeks with the treatment.

Though from the information available in patients' records and through recall we did not get full data, among the numerous adverse events mentioned, skin rash and itching accounted for 27.4%, vomiting for 13.3 %, nausea for 11.2%, bad dreams/nightmares for 9.2%, liver problems for 7%, anemia for 7%, gastritis for 5%, leg pain and swelling for 4%, and numbness for 5%. With the same limitation (i.e. difficulty obtaining full data), for 37.8% of the patients the responsible drug was not identified, but 42.9% mentioned Neverapine, 14.3% Combivir, 9.2% Lamivudine, 9.2% Stavudine, and 8.2% Efavirenz, as the responsible drugs for their adverse reactions.

When they had the problem 91.8% consulted their doctors immediately, 2% discontinued all their drugs totally, and another 2% discontinued treatment till their date of appointment.

At the time of interview, 39.3% had additional medicines with their ARVs, the rest did not.

Most of the patients interviewed (96.5%) stated they had an excellent relationship with health care professionals and (96%) felt they had good open discussion and agreement with their doctors. 98.4 % of the patient claimed that their doctors were capable and they trusted them. 98.6% and 96.3 % were satisfied by the benefit they obtained from the ARV drugs and by their ART unit appointment and confidentiality respectively.

97% had regular follow up, visiting the ART unit every month, 2 months or 3 months, whereas 3% had irregular visits and appointments.

97.4% of participants faced no problem so far to obtain the professional assistance they need from the health units, 88.8% also assured they had access to reliable pharmacies any time they want.

At the time of survey 46.5% had at least one child under their care, when asked about the serostatus of their last child, for 7.4% they were seropositive, 22.8% seronegative, and 69.8% did not test them.

Patient reported rate of adherence and the barriers / reasons for non adherence.

Adherence assessments to ARV therapy are summarized in Table 4. 81.2% of patients were adherent by self report in the week before the assessment, based on the definition outlined in the methods above. 78.9% claimed never to have missed a single dose over the past week duration of therapy.

The patients were also asked open ended and structured questions to pick the principle reasons or barriers for their skipping a dose of ARV drugs.

The reasons cited by the patients for dose skipping while on treatment or their barriers to adherence were many. 33.9% of patients asserted that they missed their doses due to being too busy with other things or having simply forgotten; while 27.5% listed being away from home as the primary reason for treatment non-adherence. Other barriers to treatment included: felt sleepy (16%), there was a change in their daily routine (4.6%), felt depressed or overwhelmed (4.6%) and they didn’t want others to notice that they are taking medicine (4.6%). (Fig 1).

Table2: Basic sociodemographic and psychosocial variables of the cross sectional survey

Variable	FR (%)
Sex Female	212(49.2)
Male	213(49.4)
Age	
18-24	14(3.4)
25-45	346(83.2)
>45	56(13.5)
Marital Status	
Married	169(39.2)
Single, Separated, Widow	262(60.8)
Education	
Illiterate	7(1.6)
Elementary	46(10.7)
Secondary	282(65.4)
Diploma and above	96(22.3)
Income (Birr)	
<500	108(27.5)
501-999	53(13.5)
>1000	40(10.2)
Unstated	192(48.9)
Work/Employment	
Work active/Employed	206(47.8)
Unemployed	225(52.5)
Active Substance Use	
Yes	16(3.7)
No	415(96.3)
Depression (*BDI>14)	
Yes	108(25.1)
No	323(74.9)
Disclosure of Serostatus	
Yes	260(60.5)
No	170(39.5)
Belief ARV Benefits	
Yes	424(98.4)
No	4(0.9)
Not Sure	3(0.7)
Doubts on ART Service	
Yes	57(13.2)
No	374(85.4)
Not Sure	6(1.4)
Perceived Self Efficacy	
Yes/No Doubt	410(95.1)
Yes but Doubtful	17(3.9)
No	2(0.5)
Not Sure	2(0.5)

Table 3: Treatment, Clinical, and Health Care System related variables of the cross sectional survey

Variable	Fr (%)
Treatment Duration (months)	
1-6	159 (37.4)
7-12	145 (34.1)
13-24	106 (24.9)
25-36	10 (2.4)
>36	5 (1.2)
CD4 counts (starting)	
>500	385 (92.3)
200-499	31 (7.5)
<200	1 (0.2)
ART Benefit knowledge	
Good	174 (44.5)
Unsatisfactory	217 (55.5)
ART Eligibility knowledge	
Good	203 (47.1)
Unsatisfactory	228 (52.9)
ART Adherence knowledge	
Good	414 (96.1)
Unsatisfactory	17 (3.9)
Perceived Satisfaction by the relationship with the *HCP	
Yes	415 (96.5)
No	13 (3)
Not sure	2 (0.5)
Perceived Access to reliable pharmacy	
Yes	382 (88.8)
No	39 (9.1)
Not sure	9 (2.1)

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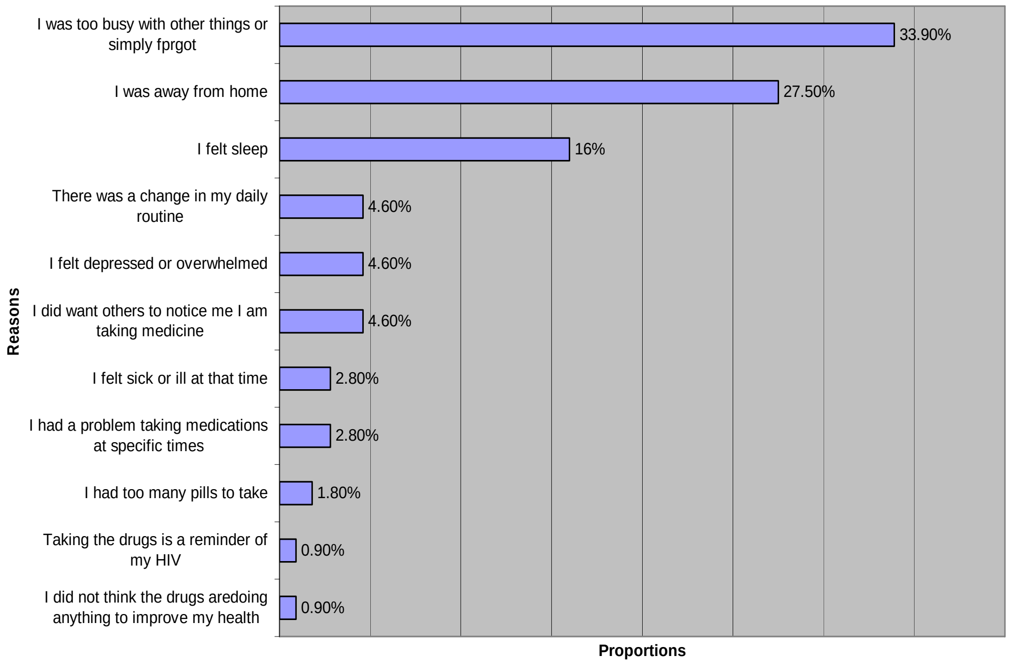
*** HCP-Health Care Providers**

Table4: Patient Adherence by Self-report.

	Adherent No (%)	Non-adherent No (%)	Total
Previous day	389 (90.3%)	42 (9.7%)	431
Past 3 days	365 (84.7%)	66 (15.3%)	431
Past 7 days	350 (81.2%)	81 (18.8%)	431

Fig 1:Reasons for misssing ARV doses



Variables associated with adherence: Univariate and Multivariate Logistic regression Analysis.

Table 5 shows the crude ORs for variables identified as correlates of adherence, which were statistically significant in the univariate binary logistic regression analysis. Non-adherence was commoner among those; With irregular follow-up, who were depressed, who had adverse reaction to ARVs, whose treatment did not fit to their daily routine, who were not satisfied by their relationship with the health care professionals, who perceived their doctors were not capable and trustworthy, and who perceived had no access to assistance from their ART Unit or a reliable pharmacy.

All the other variables included under sociodemography, individual, health status/clinical and environmental/system related variables ware not found to be significantly associated with adherence at $P< 0.05$.

Variables significantly associated with ARV adherence in the univariate binary logistic regression analysis at $P< 0.05$ were also reevaluated again separately with adherence as a dependent variable and controlling for the effect of sociodemographic variables (age, sex, religion, ethnicity, marital status, educational status, employment, income, and living situation).

All the variables found to be associated with adherence on the univariate analysis remained significantly associated with adherence on the multivariate analysis, having a relatively increased OR in all the comparison groups of the variables. (Table 5)

Table5. Univariate and Multivariate Logistic Regression analysis: variables associated with adherence[*]

[*] Univariate unadjusted OR

†Adjusted OR for sociodemographic variables: age, sex, religion, ethnicity, marital status, income, employment, educational status, and living situation.

Discussion

Variables	Crude OR* / 95% CI	P-value	† Adjusted OR/95% CI	P-Values
Appointment				
Regular	5.4 (1.8,16.6)	0.003	6.9(2,22.9)	0.002
Irregular				
Depression				
Non Depressed	1.8 (1.1,3)	0.03	2.8 (1.5,5.4)	0.002
Depressed				
Side effect				
No	1.7 (1,2.9)	0.049	2.4 (1.2,4.6)	0.012
Yes				
Treatment fit to daily routine				
Yes	2.6 (1.2,5.6)	0.02	3.4 (1.4,8.3)	0.008
No				
Satisfaction with relationship				
Yes	4 (1.4,11.5)	0.009	7.5(1.9, 28)	0.003
No				
Physicians capacity and trust				
Yes	6 (1.3,27.3)	0.021	10.8 (1.4,86)	0.025
No				
Perceived access to education and other support				
Yes	3.8 (1.1,12.6)	0.032	10(2.03,49.7)	0.005
No				
Perceived access to pharmacy				
Yes	2.2 (1.1,4.2)	0.022	3(1.32,6.95)	0.009
No				

The ten participants in the in-depth interview provided a wider insight into living with combination therapy. Almost all heard about ARVs from health care providers, except one who found out about the drugs from internet. The decision to start treatment took time for most, and many factors entered into the decisions they made. Some of the important obstacles for their decisions were cost of drug and other requirements, the mental instability and frustration they had when their diagnosis was first told, and their self-efficacy, that is the doubts they had about their ability to adhere to treatment.

All made a deliberate decision, because they learned that without treatment, death would most likely be inevitable. These facts remind us that involving patients in the decision making of initiating HAART should be an important aspect of their care. As part of their decision-making the participants as mentioned previously weighed the pros and cons of whether to initiate treatment, their involvement is mandatory because health care providers cannot know the life circumstances that patients will weigh when deciding about a possible therapy. Patient characteristics are important considerations when one is working with a patient to develop an individualized plan (8)

There were many problems and barriers cited by the participants while living with HAART and they demonstrate that adhering to combination therapy is difficult. The difficulties that one can have managing combination therapy can lead to non-adherence.

The cost of the drugs had numerous impacts to almost all the participants, for seven it was a decision between using the drugs, staying alive and keeping their family together or dying early and sending them to the street.

A number of them also thought of stopping the treatment because of guilt about the difficulties the cost brought to the people who paid for them and the problems they saw in their family.

Recent studies from African settings as well as other resource rich settings have shown also the tremendous impact of cost on the adherence to combination therapy of PLWHA (36).

Though the majority of our participants were highly satisfied by ART benefits and their relationship with their doctors they were not found to be knowledgeable about their diagnosis, and other treatment related issues. Beside complete lack of awareness some had also different and conflicting ideas obtained from different sources. The health care providers at the ART units need to recognize that they are not the only sources of information that patients use. The finding underscores the need for an ongoing patient-provider relationship because questions and issues will arise as patients take these medications. Their characteristics also contribute to whether PLWHA are adherent or non-adherent to their therapy (8).

In general, patients cannot be expected to adhere to a treatment plan if they do not understand it properly. The treatment plan needs to be explained to patients in terms that they can comprehend, that the objectives of ART are suppression of viremia, restoration and preservation of immune function, reduction of HIV-related morbidity and mortality, and minimization of drug toxicity, disruption of lifestyle, and risk of resistance.

Patients need to understand exactly what the effect of non-adherence is likely to be on their ability to reach these objectives. In this regard, giving patients feedback on their status of the biological markers like, HIV RNA levels and CD_4 cell counts, where feasible on an ongoing basis can be helpful. Education about medications should be provided with use of varied media, including photographs, and it should be individualized to the patients' literacy level and primary language (3)

The participants, who found the ART convenient to their daily routine, stated the advantage of having a twice daily regimen and strong social support from their relatives. This suggests the need to simplify treatments and involve family members where possible when initiating combination antiretroviral treatments.

Our study also provides some preliminary evidence to suggest that an intervention that targets habit formation and problem solving may be appropriate to promote adherence. As the informants described living with combination therapy, they identified the development of a habit. Because of the need to take these medications as prescribed, habit formation was very important so that they did not forget.

All aspects of quality of life are affected as a person lives with HIV infection. Part of living with HIV infection is adhering to a complex medication regimen. Although the informants in this study described some of their struggles with their regimens, they also looked on the positive side, noting that now they were not sick and that now they can make and implement plans.

Even though taking combination therapy complicated their lives, the informants recognized that their options were limited without combination therapy. Our study provides preliminary evidence that combination therapy offers the benefits of an enhanced quality of life, as well as a second chance at life. Quality of life has become more important because the length of survival is increasing.

IMPLICATIONS

The finding in this study suggests implications for research and practice.

As adherence and combination therapy are dynamic and continuous process there is a need for more research. The study needs to be replicated with a more diverse sample and different settings to see if the issues related to adherence are similar across this patient population.

In particular, further research is necessary to understand the interrelationship of adherence and quality of life from different angles and assumptions.

From the practice perspective, health care providers need to recognize that partnership with the patient is very important and essential.. To promote good adherence requires that the patient be involved in decisions. When that occurs, there is a greater likelihood that the patient will be successful. Therefore, health care providers will need to take time with their patients so that they feel free to ask questions and to seek information. In addition, as these participants indicated, there needs to be ongoing support available to the patient.

Health care providers need to work with the patient to individualize the plan for medication taking (43). This means that the health professional needs to have the patient describe the living arrangements and the usual daily schedule. Together, they need to draw up the plan that considers the everyday events that occur and that also has some latitude so that the patient can handle emergency or unplanned situations. Nonspecific plans or ones that are imposed on the patient are less likely to promote adherence because they are not individualized to the patient.

Finally, health care providers need to consider simplifying regimens as far as possible, even though choices are limited and decisions about specific regimens are to some extent patient driven. Also, since forgetfulness has been found in many studies, as well as in this study, to be the most formidable enemy of adherence, the use of memory aids like; pillboxes, diaries, alarms should be considered for every patient(9).

This study also has found an overall prevalence of adherence with antiretroviral drugs by self report higher than the findings in most developed countries. Measuring adherence by self report, in our study 81.2% of patients were adherent with > 95% prescribed doses. In comparable studies conducted in developed countries, rates of adherence by self-report ranged from 40% to 70% (3). Though our rate is higher, despite the numerous challenges and patients had to overcome great odds to adhere to treatment, data from studies in other African settings supports our finding (11, 46, 47).

These data from other African settings suggest that patients of low socioeconomic status are able to achieve excellent rates of adherence with access to routine medical care, subsidized ARV therapy, and free laboratory monitoring. In a recent cohort study of ARV adherence among semi urban South African living in extreme poverty, Orrell et al found that lower socio economic status was not a predictor of adherence for patients with fully subsidized therapy. In fact, adherence levels were similar to or better than those found in industrialized countries (11).

Similarly, high levels of adherence (78%) were reported by Laurent et al (47) in a resource-poor setting in Senegal and by Byakika-Tusiime (66%) in 3 treatment centers in Kampala, Uganda (46). Adherence in our study was lower than the levels reported by Orrell et al but higher than that reported by Laurent et al and Byakika Tusiime et al that leave our adherence rate within the range of adherence rates of PLWHA to ARV therapy in African settings.

The assessment of adherence in this study was done through patients' self report although self-reporting could overestimate the rate of satisfactory adherence to medication (30). Some authors have suggested that self-report has the potential to be one of the most accurate measures of behavioral adherence because only the patient can report actual behavior, particularly when collected using carefully constructed, administered and customized measures (13).

From our data we have identified a number of psychosocial, individual, treatment and environmental variables which were significantly associated with adherence after controlling their sociodemographic difference, such as depression, side effects, appointment timing, satisfaction with relationship with health care providers, perceived access to support from ART-units and a reliable pharmacy, treatment fitting to daily routine, and patient perception of health care providers' capacity and trust.

Although social support was not significantly associated with adherence in our study, social support in general may enhance adherence, either directly (through encouragement, reassurance, reinforcements, systemic cues, bolstering of competence, and motivation) or indirectly (by buffering the effect of those variables that might interfere with adherence, e.g. life's stresses, anxiety, and depression).

Social support must also be conceptualized in terms of not merely availability but also its perceived adequacy, support may not be considered helpful unless the individual perceives it as being supportive. We have assessed both perceived social support and satisfaction with support. Both lacks significant association with adherence, but since the relative number in one group (those perceive having social support but not satisfied) was small; we may have lacked the power to show a difference in their adherence.

But, though our survey data lacked the power to show significant difference, when I see my findings in the in-depth interview, participants acknowledged the support of their relatives in enabling them to adhere and stay with their ARV treatment, I believe adherence-enhancing measures for HIV-infected patients must ensure that their social support needs are met.

Depression, which is related one way or the other with social support as mentioned above, was found to be significantly associated with adherence. Depression has been shown to be associated with devaluation of self-worth, lack of mastery of one's environment, and unhealthy self-caring behaviors, including inability to transform information into effective self-care strategies (15). In a previous study of HIV infected patients, depression was significantly associated with non-adherence with Zidovudine therapy (25). The lack of fighting spirit, loss of motivation, and hopelessness were identified as characteristics of the patients at risk of non-adherence with therapy. This suggests that efforts to improve adherence should run in parallel with adequate management of depression by multidisciplinary teams. Although we do not have data about the level of awareness of depression by health care providers, since it is one of the modifiable predictors of adherence that could be targeted in interventions, awareness of depression among health professionals caring for HIV positive patients needs to be increased in order to intervene appropriately.

Side effects in this study was found to be significantly associated with adherence, which agrees with the recent results from resource-rich settings, where medication side effects have been shown to be a significant predictor of adherence (35) but it was not mentioned by many as a barrier in our study when they were asked their reasons for dose skipping. Patients may have been more accepting of side effects than their counterparts in resource-rich settings due to the financial sacrifice required to secure therapy combined with the well known physical, social, and emotional morbidity associated with untreated AIDS patients.

Clinicians are often concerned that discussing antiretroviral side effects will increase their likelihood to frighten patients. However, these concerns are usually unfounded. On the contrary; failing to prepare patients for medication side effects can compromise credibility and trust and can lead to patients unilaterally discontinuing an antiretroviral regimen.

Adherence is usually increased by letting patients know at the outset which side effects are possible with a given regimen and assessing for such effects within the first or second week of treatment, which is likely to be the most troublesome(8,10).

The convenience or perceived “fit” of medication regimens with daily routine was significantly associated with improved adherence. Regimen convenience could be improved by identifying and resolving conflicts between daily routine and scheduled medication.

Patient education as to the correct use of medication relies on health care providers. Even when patients have received proper instruction, it may be difficult to remember to take medications as prescribed. In these situations, the practitioner can work with the patient to incorporate the individual drug regimen into a daily schedule. Several strategies have been suggested: timed pill dispensers, alarm clocks, and having someone else to act as a reminder (49)

Levels of knowledge about ART (Benefit, Eligibility, and Adherence), satisfaction with health care providers, perceived access to support from health care providers, and drugs from a reliable pharmacy were high in our sample, and except knowledge, all were significantly associated with adherence.

The improvement in the quality of patients' lives and motivation for adhering to treatment is influenced by the behavior of both patient and clinician. If the objective of ART is to prolong life, prevent disease progression and improve the quality of life, it is essential that patients are provided with as much education and support as possible, given the need for maximal long term adherence to currently available treatments. Beyond the obvious medical, pharmacokinetic, and safety issues, the patient's life style, motivations and resources should also be considered (8).

Knowledge about ART adherence was very high in our study, though knowledge of ART benefits and eligibility was relatively low. Patients' lack of knowledge of their diagnosis, and treatment related issues have been associated with decreased adherence (49).

Our results indicate the tremendous need to educate patients when ART is provided and at subsequent follow up appointments. A number of studies have suggested more active involvement by health-care providers in providing support and educating patients about diagnosis, disease course and treatment. Methods may include closer supervision by scheduling more visits or calling patients periodically.

The other factor significantly related to adherence in our study was the timing of appointments for patients; those with regular follow-ups were more adherent than the irregular visitors. Though our survey lacks detailed information to elaborate the specific reasons for the observed pattern of visit, we believe putting patients on regular follow up schedules will assist their adherence to the prescribed regimens.

The reasons patients cited for missing ARV doses in our study were almost identical to what is found by many others. Fig 1 the most frequently given reason is simply forgetting.

Among participants in the adult AIDS clinical trial group (AACTG) study (16), 66% of patients cited forgetting as their reason for non-adherence: almost the same percentage (64%) cited forgetting in a study by researchers at John Hopkins University (18). Other reasons cited by patients in both these studies included being away from home without medication, having difficulty with the timing of medications, feeling too ill or tired to take medication, feeling depressed or overwhelmed, and having too many medications or too many pills to take.

As noted in our study, as well as these studies, patients have a range of reasons for failing to adhere to their antiretroviral regimens. These reasons should be assessed for each patient so that an appropriate adherence-enhancing intervention can be undertaken. If the patient is just forgetting, for example cues and memory aids such as pillboxes, diaries, and alarms are likely to help.

STRENGTHS AND LIMITATIONS OF THE STUDY

In our study we have utilized a combination of methodologies, which has helped us to cover wider concepts related to ARVs adherence and complement our findings in each method by the other. The presence of a locally validated Beck's Depression Inventory and social support assessment tool has enabled us to assess depression and social support in a more valid way. Our sample sizes were also adequately achieved.

However, we feel that this study has several limitations that must be acknowledged:

First, a “gold standard” for assessment of adherence dose not exist, in this study adherence was measured using self-report, studies suggest self-report tends to overestimate adherence. Nevertheless, structured self-report has been reliably associated with both objective measures of adherence and viral load (17, 30). The same limitation i.e. lack of "gold standard" to assess self-efficacy, quality of life, belief, satisfaction…etc has made us also shift to participants' perceived assessment.

Another limitation of our study is that we were unable to corroborate patient self-report of adherence with viral loads and CD_4 cell responses because of financial and logistic barriers. The beginning and most recent CD_4 results we found from the patients' record were done at different private institutions. Besides not being able to assess the validity of the measurements, we found most contradicting patients' complaints and other biological markers, so we decided to exclude them from detailed analysis and just describe what is found in the records.

Finally, since our study was performed only in governmental hospitals in Addis Ababa, (the private hospitals providing ART service were not willing to let us assess the patients in their institutions) the generalizability of our findings may be limited. Whether the study findings would differ in other subpopulations of PLWHA remains to be determined.

CONCLUSIONS AND RECOMMENDATIONS

At 81.2% over 7-days, the adherence rate of our study participants was higher than the rates seen in developed countries. However determinants like social support, self-efficacy, and treatment knowledge found to consistently associated with adherence in many studies were not found to be significantly associated with adherence in our study.

Depression, side effects, treatment "fit" to daily routine, satisfaction with relationship with health care providers, patient's perception of their doctor's capacity, and their perceived access to support from their ART-unit and reliable pharmacies to get their ARVs, were significantly associated with combination therapy adherence in our study.

The lack of significant association of social support and treatment knowledge with adherence in our study needs to be rechecked with coverage of more institutions at different settings.

Since adherence is a dynamic process and patient's behavior can change over time, there is also a need to have a follow up design, which would yield a more valid average measure of adherence as well as its determinants than a cross-sectional self-reported adherence assessment.

The adherence rate in this group of patients may be considered as success, but we believe there is a tremendous need to strengthen the existing qualities and keeping in mind the correlates identified in our study, adherence has to be improved and monitored using multifaceted and repetitive interventions.

The current HIV/AIDS prevalence and the degree of behavioral changes brought by the groups at higher risk (adolescents), unless adherence is closely monitored, the dangers of non adherence especially the drug resistance may eliminate the only hope available to prolong survival of PLWHA.

Finally in summary from our findings I would like to recommend that:

>Health care providers need to

- detect and manage depression among patients on ART with a multidisciplinary approach,
- provide accessible information to the patients about their treatment plan,
- as far as possible keep the ARV regimens simple,
- involve the patients in the treatment plan so that it fits into their daily routine easily, and
- ensure patients are offered regular appointments in their ART units.

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>The health care system also needs to

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- improve patients' confidence, trust, and satisfaction with their relationship with health care providers, and
- eliminate the problem of access to the assistance and service patients need.

> Health care financers must design strategies to minimize the impact of ARV drug costs on patients and their families.

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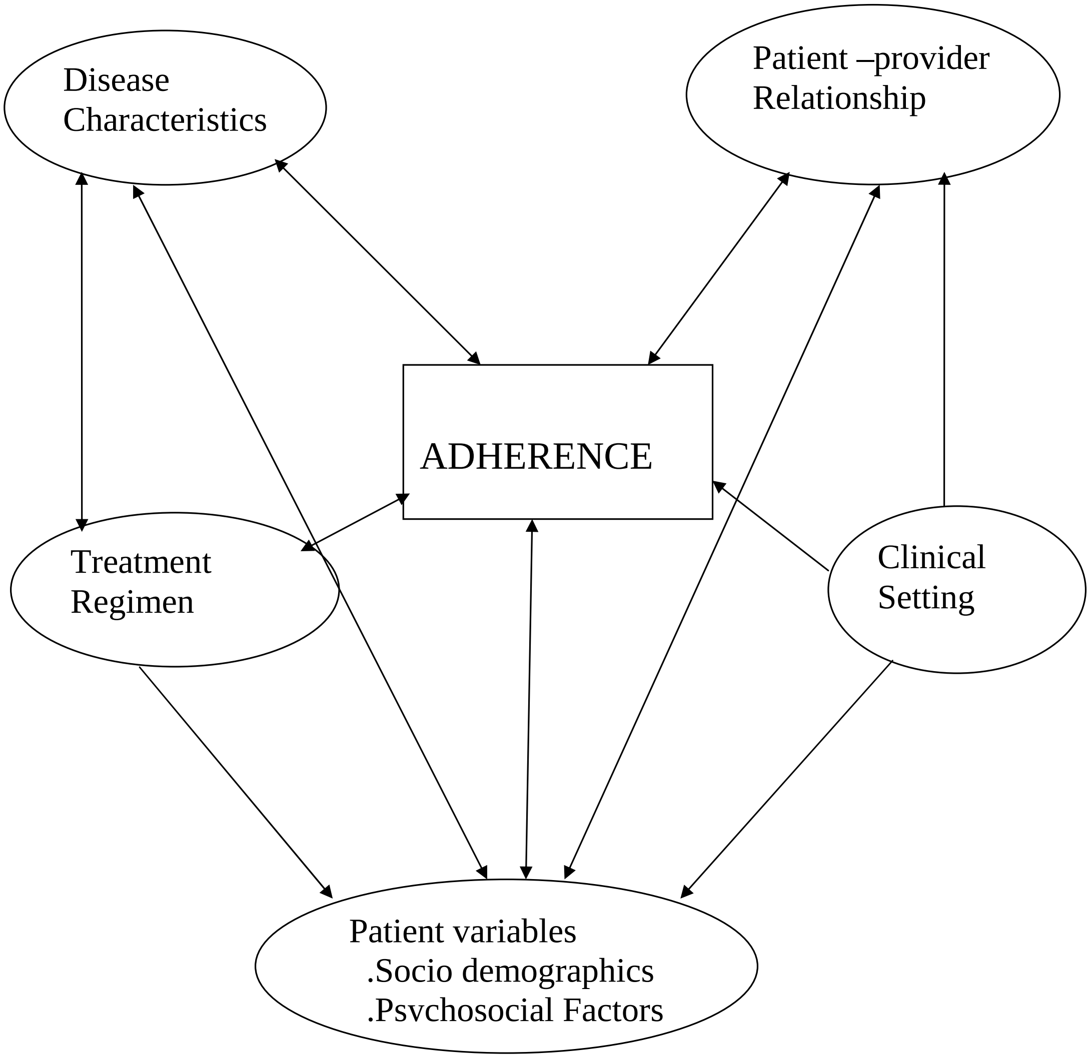
Annex-I

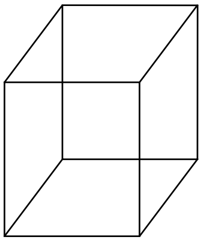
DETERMINANTS 0F ADHERENCE



Annex II

HIV Dementia Scale: A Rapid Screening Test

Max	Score	HIV Dementia Scale
		MEMORY-REGISTRATION **Give four words to recall (dog, hat, green, apple)** **1 second to say each. Then ask the all the 4 after you have said them.**
4	**( )**	**ATTENTION** Anti-saccadic eye movement: 20 (twenty) commands. -------------errors of 20 trials < 3 errors= 4; 4 errors =3; 5 errors =2; 6errors=1; >6 errors=0
6	**( )**	**PSYCHOMOTOR SPEED** Ask patient to write the alphabet in upper case letters horizontally across the page(use back of this form)and record time :-------------- seconds. <21 sec=6; 21.1-24=5; 24.1-27sec=4; 27.1-30sec=3; 30.1-33sec=2; 33.1-36sec=1; .36sec=0
4	**( )**	**MEMORY -RECALL** Ask for 4 words from the registration above. Give 1 point for each correct. For words not recalled, prompt with a “semantic” clue, as follows: Animal (dog); piece of clothing (hat); color (green); fruit (apple). Give ½ point for each correct after prompting.
2	**( )**	**CONSTRUCTION** Copy the cube below; record time: ---------seconds <25sec=2; 25-35=1 ;> 35sec=0



TOTAL SCORE: -----------------------/16

The **HDS** cut-off score of <10 is used for identifying HIV Dementia , with a sensitivity of 80%, specificity 91% and 78% positive predictive value. (35)

Department of Neurology
Johns Hopkins University

Annex III

English In-depth interview Guide

Introduction

Welcome to the interview

My Name is ------------------------and I work for ---------------------and I come from--------.We are here to discuss the antiretroviral treatment and adherence to the drugs used for the treatment. There is no right or wrong answers .All comments, both positive and negative, are well come. We would like to have many points of view. I would like this to be open interview, so feel free to express your opinion honestly & openly. In order not to miss any points of the interview /discussion, I will be using a tape recorder .I would like to confirm to you that all your comments are confidential and used for research purpose only ,even your treating doctor will not be informed about any thing you express.

Your name will not be recorded to protect your confidentiality.

Are you willing to participate in the interview?

If, yes, Thank you for your willingness.

Questions & Instructions for the Interview

-From whom /where did you here /obtain the information about ARV

-After how long of diagnosis you decide to start ARV

-What were the factors which influence your decision making?

-Who pays for the drugs?

-Describe the impact of the cost to you /your family

-Describe your understanding of your treatment plan

-Describe your daily routine when taking combination ARV

-Have you experienced any problems –like side- effects, access, cost, interaction with other medications, dosing schedules--?

-Whom do you consult in case of treatment problems?

-Do you have access any time you want advice /support for your problems

-How do you describe your relation ship with health care providers?

-How convenient is the treatment unit location /services for you, and-Has taking combination ARV treatment changed the quality of your life; if so, in what ways?

Annex IV

Questionnaire for the Cross- Sectional assessment

Introduction

I am --------------------------------working as data collector in this study that assess what is the antiretroviral adherence and its correlates in the ART unit in -------------------hospital. The study is run by AAU, DCH, in collaboration with----------------------------.On this questionnaire your name will not be written and I am going to ask some questions that touch personal life and secretes; in which all your answers will be kept completely confidential. You do not have to answer question that you do not want to answer; even you may end this interview any time you want too. However ,your honest answer to these questions will help us understand better how patients are adhering to the antiretroviral on use and what barriers they have for their non-adherence, in order to develop good strategies and solve the problems for the future. We would greatly appreciate your truthful and keen participation in responding to this questionnaire.

Identification Number---------------------------------------

Date of Interview--

Interviewer Name--

Supervisor--

Section I: Sociodemographic characteristics

No	Questions	Coding Categories	code

101	Sex of respondent	1. Male 2. Female	
102	Age (Incomplete years)	-________________	
103	Ethnic group	1. Amhara 2. Oromo 3. Tigirie 4. Gurage 5. Other specify____________	
104	Marital status	1. Unmarried 2. Married 3. Divorced 4. Separated 5. Widowed	
105	Religion	1. Orthodox 2. Catholic 3. Protestant 4. Mission 5. Other specify __________	
106	Education	1.Illitereate 2. Real & write 3. Elementary 4. High school 5. Diploma Of above	
107	Monthly income(birr)	1. 200-250 2.251-500 3. 501-999 4. 1000 & above 5. Variable	
108	Working situation	1. Work active 2. Unemployed (Jobless) 3. Pensioner 4. Student	
109	Active substance use	1. Yes 2. No	
111	What substance you use	1. khat, 2. cigarette 3. Alcohol 3. Other specify________	
112	whom do you live with	1. Live alone 2. My family 3. My parents 4. unstable 5.No Answer	

Section II: Psychological variables

No	Questions	Coding categories	code

201	Do you have a sense of care, safety, security of support from your family, co-workers, fewer do or other people in your common	1. Yes 2. No	
202	what kind of support or care you obtain from the above people,	1. Material / practical 2. Information / advice 3. Other specify	
203	Are you satisfied with their help	1. Yes 2. No	
204	Are you esteemed or valued for you skills or abilities by other	1. Yes 2. No	
205	Are you satisfied with the way people hold you in esteem or value for your skills or abilities	1. Yes 2. No	
206	Are you fully convinced that you are infected I HIV and needs ARV	1. Yes 2. No	
207	Do you have any doubts about HIV/ ARV, HCP	1. None 2. Some 3. Many	
208	Do you think this treatment benefits you	1. Yes 2. No	
209	Do you feel confident about your ability to lake the medication accordingly to the regimen of restrictions or do you have some duet or difficulties	1. Yes 2. No	

Section III Beck Depression Inventory

No	Coding Categories

301	0. I do not feel sad 1. I feel blue or sad 2. I am blue or sad al the time and I can't snap. 3. I am so sad or unhappy that I can't stand it
302	0. I am not particularly pessimistic or discouraged about the future 1.I feel discouraged about the future 2. I feel I have nothing to look forward to 3. I feel that the future is hopeless and that things cannot improve
303	0. I do not feel like a failure 1. I feel I have failed more than the average person 2. As I look on my life all can see is as lot of failures 3. I feel I am a complete failure as a person (Parent. Husband, wife)
304	0. I am not particularly dissatisfied 1. I don't enjoy things the way I used to 2. I don't get satisfaction out of anything any more 3. I am dissatisfied with everything
305	0. I don't feel particularly guilty 1. I feel I bad or unworthy a good part of the time 2. I feel bad or unworthy practically all the time now 3. I feel as though I am very bad or worthless
306	0. I don't feel I am being punished 1. I have a feeling that something bad may happen to me 2. I feel I am being punished or will be punished 3. I feel I deserve to be punished
307	0. I don't feel disappointed in myself 1. I am disappointed in myself 2. I am disgusted with myself 3. I hate myself
308	0. I don't feel I am any worse than anybody else 1. I am very critical of myself for my weaknesses or mistakes

	2. I blame myself for everything that goes wrong 3. I feel I have many bad faults
309	0. I don't have any thoughts of harming myself 1. I have thoughts of harming myself but I would not carry them out 2. I have definite plans about committing suicide 3. I would kill myself if I could
310	0. I don't cry any more than usual 1. I cry more now than I used to 2. I cry all the time blow. I can't stop it 3. I used to be able to cry but now I can't cry at all even though I want to
311	0. I am no more irritated now than I ever am 1. I get annoyed or irritated more easily than I used to 2. I feel irritated all the time 3. I don't get irritated at all at the things that used to irritate me
312	0. I have not lost interest in other people 1. I am less interested in other people now than I used to be 2. I have lost most of my interest in other people and have little feeling for them 3. I have lost all my interest in other people and don't care about them at all
313	0. I make decisions about as well as ever 1. I am less sure or myself now and try to put off making decisions 2. I can't make decisions any more without help 3. I can't make any decisions at all any more
314	0. I don't feel look any mowers than I used to 1. I am worried that I am looking old or unattractive 2. I feel that there are permanent chants in my appearance and they make me look unattractive 3. I feel that I am ugly or repulsive looking
315	0. I can work about as well as before 1. It takes extra effort at get started at doing something

	2. I have to push myself very hard to do anything 3. I can't do any work at all
316	0. I can sleep as well as usual 1. I wake up more tired in the morning than I used to 2. I wake up 1-2 hours earlier than usual and find it hard to get back to sleep 3. I wake up early every day and can't get more than 5 hours sleep
317	0.I do not get any more tired than usual 1.I get tired more easily than I used to 2.I get tired from doing anything 3. I get too tired to do anything
318	0. My appetite is no worse than usual 1. My appetite is not as good as it used to be 2. My appetite is much worse now 3. I have no appetite at all any more
319	0. I haven't lose much weight, if any, lately 1. I have lost more than 5 pounds 2. I have lost more than 10 pounds 3. I have lost more than 15 pounds
320	0. I am no more concerned about my health than usual 1. I am concerned about aches and pains or upset stomach or constipation or other unpleased 2. I am so concerned with how I feel or what I feel that it's hard to think of much else 3. I am completely absorbed in what I feel
321	0.I have not noticed any recent change in my interest in sex 1. I have not noticed any recent change in my interest in sex 2. I am so concerned with how I feel or what I feel that it's hard to think of much 3. I have lost interest in sex completely

Section IV: Illness change and Health Status

No	Questions	Coding categories	Code

401	were you aware of HIV/AIDS when you first meet your doctor	1. Yes 2. No	
402	when did you hear about ARV	1. Before my illness, 2. After my illness 3. During my illness 4. Recently	
403	From where did you get the information about ARV	1.HealthcareProfessionals 2.MassMedia 3. Others____________	
404	were you aware of the benefit of ARV	1. Yes 2. No	
405	Do you know the importance of adherence before you stat ART	1. Yes 2. No	
406	How long you have been on HAART	______________________	
407	What benefits does it gives you	_____________________	
408	what was your CD4 count	Initial_______________ Recent_________________	
409	Have you disclosed you HIV status to your family and relatives	1. Yes 2. No	

Section V: knowledge and Attitudes to the regimen

No	Question	Codify categories	Code
501	when taking ART, AIDS will be delayed	1. Yes 2. No	
502	when levis ART, an HIV- infected person will be cured fun AIDS	1. Yes 2. No	
503	When taking ART, it can happen that one may get sick from the Rx itself.	1. Yes 2. No	
504	when taking, ART, an HIV - infected person will live longer than when is not	1. Yes 2. No	

505	All HIV - infected persons can cake ART	1. Yes 2. No	
506	Only when the body's defense system extreme low (very low WBC) is a person entitled to reserve ART	1. Yes 2. No	
507	When one takes ART, has to be taken at specific time	1. Yes 2. No	
508	When one takes ART, the daily doses should not be escaped	1. Yes 2. No	
509	You need to take pills the rest of your life to delay AIDS	1. Yes 2. No	
510	Are you committed/convinced before stating ART	1.Yes 2.No 3. Not sure	
511	Do you feel comfortable when taking ART infant of others	1.Yes 2.No 3.Not sure	
512	Does the Rx schedule fit you daily routine	1. Yes 2. No 3.Not sure	
513	Have you ever had any side effect to ART	1.Yes 2.No	
514	When was that	________________	
515	What was the side effects symptom	________________	
516	What was the responsible drug	________________	
517	What did you do when you had side effect	________________	
518	Are you taking any other medication now with your ARV	1.Yes 2.No	

Section VI: Patient Providers Relationship

601	Are you satisfied with the clinicians	1. Yes 2. No	

	service	3.Not sure	
602	Do you feel the health care providers treating you are capable	1.Yes 2.No 3.Not sure	
603	Do you have open communication with HCP treating you	1.Yes 2.No 3.Not sure	
604	How frequent do you visit your doctor	1.every month 2.every 2 month 3.every 3 month 4.Variable	
605	Do you obtain the education or assistant you need during your visits.	1.Yes 2.No 3.Not sure	

Section VII: Health care system and Clinical Setting

701	Do you have access to reliable pharmacy any time you want	1.Yes 2.No 3.Not sure	
702	Are you satisfied by the changes/ improvements you obtain for your treatment	1.Yes 2.No 3.Not sure	
703	At present do you have a child under your care	1.Yes 2.No	
704	Child tested for HIV	1.Yes, positive 2.Yes, negative 3. Not tested	
705	Are you satisfied in the scheduling appointments and confidentiality of the treatment unit	1.Yes 2.No 3.Not sure	

Adherence assessment & Reasons for skipping doses

Adherence Assessment

I. Patient Interview

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Ask questions about number of doses skipped & unmet restrictions, i.e. like food required with drug, time schedule, with empty stomach . . . etc

Today, number of doses skipped ______________________
Yesterday, number of doses skipped ____________________
In the past three days, number of doses kipped _________________
In the past seven days, number of doses skipped _____________________

II. Pill Count

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For patients who brought their pills, count the pills remaining in the pill bottle & calculate the difference between actual & exacted number of pills remaining.

Number of pills remaining ____
Number of pills dispensed last time _______________________________
Expected number of pills remaining _______________________________

III. Reasons for skipping the doses

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NB: More than on answers is possible

No	Tick	Reasons for skipping doses
1>		I was too busy with other things or simply forgot.
2>		I was a way from home.
3>		There was a change in my daily routine.
4>		I felt asleep.
5>		I felt depressed or overwhelmed.
6>		I had problem taking medication at specific times.
7>		I felt sick or ill at that time
8>		I ran out of medication.
9>		I had too many pills to take.
10>		I felt the drug is too toxic/ harmful and want to avoid side effects.
11>		I did not want other to notice me I am taking medicine.
12>		Taking the drugs is a reminder of my HIV.
13>		I was confused about the dosage directions at that time.
14>		I did not think the drug is doing anything to improve my health.
15>		People told me the medicine is no good.

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1®2	vKð¨< ¾MÅƒ k”- c”ƒ ›Sƒ- ’u[		
1®3	¾ƒ—¨< wH@[cw ›"M •ƒ	1. ›T^ 2. *aV 3. ƒÓ_ 4. K?L -----------------	
1®4	¾ƒÇ` G<’@ - U”É”¨<	1. ÁLÑv 2. vKƒÇ` 3. ðƒ 4. ¾}KÁ¾ 5. vLD/T>c~ ¾V}‹uƒ/vƒ	
1®5	NÃT•ƒ- U”É” ”¨<	1. *`„Ê¡e 2. "„K=¡ 3. –a+e ”ƒ 4. S<eKK=U 5. K?L -------------------------------	
1®6	¾ƒUl`ƒ Å[Í- e”ƒ ”¨<	1. U”U ÁM}T[2. T”uw“ Séõ ¾T>‹M 3. ¡õM 1 - 6 4. ¡õM 7 -12 5. Ç=–KAT“ Ÿ³ uLÃ	
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201 - Ÿ²=I u ‹ Ÿ}²[²\ƒ ²SÊ‹-“ ÕÅ™‹- ”¡w¡vu? ÅI”’ƒ“ SŸ ›Ñ—KG< wK¨< ÃÑU K<;

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204	uzÃ[c< SÁ´I”“/ i”“ ¾ ÉT@ T^²T>Á SÉH’>~ ”ÅT>ÁeðMÓI/i S<K< KS<K< ›U’Iu M /iu M;	1.›- 2. ›LS”Ÿ<uƒU 99. ›L¨Ÿ<U
205	uzÃ[c< / ›?‹ ›Ãy= / u ÉT@ T^²T>Á SÉH’>„‡“ uÖ?“ vS<Á-‡ LÃ Ø`× ›KI;	1. ›- 2. ¾K˜U 99. ›L¨Ÿ<U
206	SÉH’>„‡” u ²²uƒ SS]Á Sc[ƒ S¨<cÉ eS‰MI/i `ÓÖ—’I/’i ¨Ãe Ø`× ›KI/i	1. ›- `ÓÖ— ”˜ Ø`× ¾K˜U 2. ›- `ÓÖ— ”˜ Ó” Ø`× ›K” 3. U‹M ›ÃSeK˜U Ø`× ›K˜ 4. U‹M ›ÃSeK˜U Ø`× Ó” ¾K˜U 99. ›L¨Ÿ<U

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	2	’@ G<K? ÃŸó—M /›´“KG< /ÃÅw}—“M/
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	3	¨Åò*ƒ* ¾T>S×¨< G<K< }eó ¾T>Áeq`Ø“ ’Ña‹U ¾TÃhhK< SJ“†¨< ÃcT—M::
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3®4	®	”Åuò~ ŸG<K<U ’Ñ`/ `" ”/Åe}” ›Ñ—KG<::
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305	®	U”U ¾}K¾ Øó}˜’*ƒ*/ Ö=›}˜’*ƒ* ›ÃcT˜U::
	1	›”Ç”É Ñ>²? Øó}˜’*ƒ*/ Ö=›}˜’*ƒ* ÃcT—M:
	2	›w³—¨<” Ñ>²? S<K< Øó}˜’*ƒ* Ö=›}˜’*ƒ* ÃcT—M::
	3	G<M Ñ>²? Øó}˜’*ƒ*/ Ö=›}˜’*ƒ* ÃcT—M::

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	2	”ÅUk× ÖwnKG</ ÑU KG<::
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	2	’@’, ÁeìÃð—M::
	3	’@’,” ÖLKG<::
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31®	®	Ÿ¨ƒa ¾uKÖ ›LKpeU::
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	2	u›G<’< Ñ>²? G<K? ›KpXKG<::
	3	Éa TMke ‹M ’u`'›G<” Ñ” wðMÓ TMke ›M‹MU::
311	®	Ÿ¨ƒa u}K¾ / uuKÖ ›MudßU / ›M“ÅÉU::
	1	Ÿ¨ƒa ¾uKÖ ukLK< “ÅÇKG< / uXÝKG</
	2	u›G<’< Ñ>²? G<K? udÝKG< / “ÅÇKG< ::
	3	Éa ¾T>ÁuXÛ˜ /’Ña‹ ›G<” uõì<U ›ÁuXÛ˜U /›Á“ÉÆ˜U::
312	®	KK?KA‹ c-‹ ÁK˜ ´”vK? / õLÑAƒ ›Mk’cU ::
	1	KK?KA‹ c-‹ LÃ ÁK˜ õKÑAƒ /Ÿ¨ƒa¨< uSÖ’< /uØm~ k”dªM::
	2	KK?KA‹ c-‹ ÁK˜ õLÑAƒ / ´”vK? u›w³—¨< Öõ…›M::
	3	KK?KA‹ c-‹ ÁK˜ /´”vK? Ú`f Öõ…›M::
313	®	”ÅÉa ’Ña‹” S¨c” ‹LKG<::
	1	Ÿ¨ƒa¨< ›G<” ¨<d’@-‹” KK?L Ñ>²? ›e}LMóKG<::
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314	®	SMŸ? / p`í@” Ÿ¨ƒa¨< ¾}K¾ }uLg ¨ÃU ÁeŸóM::
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315	®	”Å¨ƒa¨< c^KG< ::
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	2	T”—¨<”U ’Ñ` ¾Uc^¨< ^c?” u×U uSÑóóƒ ”¨<::
	3	U”U ’Ñ` SY^ƒ ›M‹MU::
316	®	”Å¨ƒa¨< }—KG<::
	1	”Å¨ƒa¨< ›M}—U::
	2	Ÿ¨ƒa¨< u1 - 2 c¯ƒ kÉT@ ’n“ }SMf S}—ƒ Áe†Ó[—M::
	3	Ÿ¨ƒa¨< w²< c¯ƒ kÉT@ ’n“ 'Ÿ²=ÁU S}—ƒ ›M‹MU ::
317	®	Ÿ¨ƒa¨< ¾}K¾ É"U ›ÃcT˜U::
	1	Ÿ¨ƒa¨< ÃMp ›G<” ukLK< ÃÅ¡S—M::
	2	U”U ’Ñ` wc^ ÃÅ¡S—M::
	3	u×U eKT>Å¡S˜ U”U SY^ƒ ›M‹MU::
318	®	¾UÓw õLÑA, ŸÉa ›Mk’cU ::
	1	¾UÓw õLÑA, ”ÅÉa Ø\ ›ÃÅKU::
	2	¾UÓw õLÑA, u×U k”dDM::
	3	U”U ¾UÓw õLÑ<ƒ ¾K˜U::
319	®	up`u< w²<U ¡wÅƒ ›Mk’eŸ<U::
	1	Ÿ5 þ¨<”É /2 Ÿ=KA Ó^U uLÃ k”hKG< ::
	2	Ÿ1® þ¨<”É / 5 Ÿ=.Ó. uLÃ k”hKG<::
	3	Ÿ15 þ¨<”É /7 Ÿ=.Ó. uLÃ k”hKG<::
		Ã‹”U SMe ÃSMc< ' ›¨<o J’ wÂ KSk’e ƒ”i uLKG< ☐ ☐ ›-” ¾KU
32®	®	Ÿ¨ƒa¨< ¾}K¾ KÖ?“Â ›McÒU::
	1	eK›"L© Å« cÒKG< / ”ÅlSU '¾JÉ S[ui 'JÉ É`kƒ /
	2	eK›"L© Å« u×U cÒKG< 'K?L ’Ñ` TcwU Ã†Ó[—M::

	3	eK›"L© Å« u×U ›evKG< 'K?L 'Ñ` TcwU ›M‰MŸ<U::
321	®	¾¨c=w õLÑA, up`u< K¨<Ø ›L¾G<U::
	1	¾¨c=w õLÑA,Ÿ¨ƒa k"dDM::
	2	¾¨c=w õLÑA, u×U k"dDM:1
	3	U"U ¾¨c=w õLÑAƒ ¾K˜U::

¡õM ›^ƒ: ¾}d ò-‹" ¾ISU Å[Í " uI¡U" ¾}Ñ–¨<" K¨<Ø ¾}SKŸ} SÖÃp

}.I	SÖÃp	SMe	¢É
4®1	uSËS]Á ŸGŸ=V Ò` c=Ñ"–< eK ›?‹ ›Ãy= ›?Ée Á¨<I 'u` ::	1. ›¨<nKG< 2 ›L¨<pU 99. SMe ¾KU::	
4®2	eK ›?‹ ›Ãy= ›?Ée ÉT@ T^²T>Á SÉH'>„‹ SŠ "¨< ¾cS<ƒ ::	1. ŸS ST@ uòƒ 2. Ÿ SUŸ< uGªL 3. ISU LÃ ÁK¨< 4. up`u< 99.›Le ¨<eU	
4®3	eK SÉH'>„‡ ¾cS<ƒ Á¨Iƒ Ÿ¾ƒ "¨< ::	1. Ö?" vKS<Á-‹ 2 . Ç=Â 2. ‚K?y=»" 4 .Ò²?× 3. Ÿu?}cxŠ 6 .ŸÕÅ™Š 7. Ÿ›?Ée ¡Kx‹ 99.›Le ¨<eU	
4®4	SÉH'>„‡" ŸSËSa uòƒ eK ÖnT>' †¨< Á¨<I 'u`	1. ›- 2. ›L¨<pU 99. '@"Í	
4®5	SÉH'>„‡" dÁs`Ö< uc¯~" u ²²¨< SW[ƒ S¨cÉ u×U ›eðLÑ> "ÅJ' Á¨<nK< ::	1. ›- 2. ›L¨<pU 99. '@"Í	
4®6	¾ ÉT@ T^²T>Á SÉ '>„‡" KU" ÁIM Ñ>²? }ÖkS<	--	
4®7	¾ ÉT@ T^²T>Á SÉH'>„‡ U" ÖkT@ ›eÑ–<KAƒ	1. uÖpLL QÃ¨, uØ\ }kÃbM 2. ¡wÅƒ ÚU ›KG< 3. ƒŸ<dƒ k"fM—M 4. Jeú M S}—‚" k"dM:: 5. }pTØ k"fM—M:: 6. u›ÖnLÃ ui " k"fM—M	

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		7. K?L ----------------------------	
4®8	SËS]Á c=S[S\ ¾'uaƒ c=Ç= ö` lØ` e"ƒ 'u` ::	¾SËS]Á ---------¾}c^uƒk"---------- up`u< ¾}e^ ŸK--------- k"--------------	
409	uzÃ[c< }Öm SJ•"" ¾ ÉT@ T^²T>Á SÉ '>„‡" "ÅT>¨eÆ KK?KA‹ TKƒU KÕÅ™-/i /Ku?}cw ›e ¨<kªM::	1. ›- 2. ›Le -Lu 3.uŸòM	

¡õM ›Ueƒ: eK ›?‹ ›Ãy= ›?Ée" ¾ ÉT@ T^²T>Á SÉH'>„‹ ¨<kƒ" ›SK"Ÿƒ" ¾}SKŸ} SÖÃp

}.l	SÖÃp	SMe	¢É
5®1	¾ ÉT@ T^²T>Á SÉ'>ƒ c=¨eÆ ¨Å ›?Ée Å[Í ¾T>ŸÉuƒ õØ'ƒ Ãk"dM ::	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	
5®2	¾ ÉT@ T^²T>Á SÉG'>„†c=ÖkU uyÃ[c< ¾}Á² c¨< ðêV ÃÉ"›M	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	
5®3	¾ ÉT@ T^²T>Á c=ÖkS< ›"Ç"È uSÉ '>„‡-U¡'>Áƒ K= SS< K=ÑAÆ Ã‹LK< ::	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	
5®4	TT>-‹ ¾ ÉT@ T^²T>Á SÉ '>„‡" c=ÖkS< ŸTÃÖkS<ƒ ÃMp [²U LK< Ñ>²? Ã•^K<::	1. ¨<'ƒ 2. Ocƒ 99. '@"Í	
5®5	¾ ÉT@ T^²T>Á SÉ '>„‡" e"ÖkU zÃ[c< Ÿc¨<' ‹" S<K< uS<K< ÃÖó›M ::	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	
5®6	T"—¨<U uzÃ[c< ¾}Á² c¨< SÉ '>„‡" SÖkU Ã‹LM	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	
507	¾c¨<' ‹" ui " ¾SŸLŸM ›pU u×U c=Å¡U w‰ "¨< ¾T>ÁeðMÑ"	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	
508	SÉ '>„‡" e"ÖkU uk" ¨<eØ u}¨c' c¯ƒ "¨< S¨<cÉ ÁKw"	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	
509	SÉ '>„‡" e"ÖkU ¾¾k'<" SÉ '>„‹ ðêV S²KM S}¨< ¾Kv†¨<U::	1. ¨<'ƒ 2. Ncƒ 99. '@"Í	

510	›?Ée” KT²Ó¾ƒ SÉH’>„‡ K ÉT@ M¡ S¨cÉ ›Kv†¨< ::	1. ¨<’ƒ 2. Ncƒ 99. ’@”Í	
511	SÉH’>~” uƒ¡¡M KS¨<cÉ SK< KS<K< ¨c”¨< q`Ö¨< ’¨< ¾ËS\ƒ	1. ›- 2. ›ÃÅKU 99. ’@”Í	
512	uc-‹ òƒ SÉH’>„‡” c=¨eÆ U”U SÚ’p ›ÃcT-ƒU	1. ›- ›ÃcT–U 2. ›Ã ÃcT—M 99. ›L¨Ÿ<U	
513	¾SÉH’>„‡ ›¨dcÉ c`¯ƒ Ÿ Kƒ } Kƒ ”penc?- Ò` ÃcTTM::	1. ÃeTTM 2 ›ÃeTU 99. ””Í	
514	¾ ÉT@ T^²T>Á SÉH’>„‡” c=ÖkS< u’c< U¡”Áƒ ¾Å[cx- dÃÉ ô¡ƒ ›K	1. ›- 2. ¾KU	
515	dÃÉ ›=ò¡~ ¾Å[cxƒ SŠ ’¨<	--	
516	¾dÃÉ ›=ò¡~ UM¡ƒ U” ’u`	--	
517	KdÃÉ ›=ò¡~ S”c›? ’¨< ¾}vK¨< SÉH’>ƒ T” ’u` ::	--	
518	u¨p~ U” ›Ã’ƒ `UÍ ¨cÆ	1. ¨Ç=Á¨< SÉH’>~” ›qUŸ< 2. eŸkÖa k’@ ›s[ØŸ< 3. ¨Ç=Á¨<’< KÊŸ} ›TŸ`Ÿ< 4. SÉH’>~” uS<K }¨<Ÿ<“ uK?L Ñ>²? ËS`Ÿ< 99. ›Le ¨<eU	
519	u›G<’< c¯ƒ Ÿ ÉT@ T^²T>Á SÉH’>„‡ u}ÚT] KK?L ui ¾T>¨eÆƒ SÉH’>ƒ ›K	1. ›- ›K 2. ›M¨eÉU	

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¡õM eÉeƒ: u TT>-‹“ ›ÑMÓKAƒ cÜ vKS<Á-‹ S"ŸM eLK Ó”– <’ƒ ¾}SKŸ} SÖÃp ::

}.l	SÖÃp	SMe	¢É
6®1	ŸT>Á¡Vƒ HŸ=U Ò` ¨ÃU ŸK?KA‹ ¾Ö?“ vKS<Á-‹ Ò` vKAƒ Ó”–<’ƒ [¡}ªM::	1. [¡‰KG< 2. ›M["G<U 99. ›L¨Ÿ<U/ ’@”Í	
6®2	¾T>Á¡Vƒ” Ö?“ vKS<Á-‹ wl “†¨< wK¨< ÁU“K< u’c<e LÃ ›S’@ ›KAƒ	1. wl “˜¨< ›S’@ ›K˜ 2. wl “†¨< ›S’@ ¾K˜U 3. wl ›ÃÅKU ›S’@ ¾K˜U 99. SMe ¾K˜U	
6®3	ŸT>Á¡Vƒ ¾Ö?“ vKS<Á-‹ Ò` ÓMê ¾J’ ¨<ÃÃƒ SÓvvƒ ›KAƒ	1. ›K˜ 2. ¾K˜U 99. ›L¨Ÿ<U	
6®4	kÖa- u¾e”ƒ Ñ>²?¨< ”¨<	1. u¾¨\ 2. u¾G<Kƒ ¨\ 3. u¾feƒ ¨\ 4. ÃKÁÁM	
6®5	ukÖa- k” ¾T>ðMÑ<ƒ”“ ¾T>ÖÃIƒ ƒUI`ƒ“ ÉÒõ ÁÑ—K<	1. ›- ›Ñ—KG< 2. ›LÑ˜U 99. ›L¨Ÿ<U	

¡õM cvƒ : ¾Ö?“ ›ÑMÓKAƒ Y`¯ƒ”“ ¾S ŸT>Á ¡õKA‹” ¾}SKŸ} SÖÃp

}.l	SÖÃp	SMe	¢É
7®1	uðKÑ<ƒ Ñ>²? Ÿ ¨k ó`Tc= SÉH’>ƒ ¾TÓ–ƒ ÉM ›KAƒ	1. ›- 2. ¾K˜U 99. SMe ¾KU / ›L¨Ÿ<U/	
7®2	uQ¡U“ª“ u ÉT@ T^²T>Á SÉH’>„‡ vÑ–<ƒ K¨<Ø [’¡}ªM	1. ›- [¡‰KG< 2. ›M["G<U 99. SMe ¾KU /›L¨Ÿ<U/	
7®3	u›G<’< c¯ƒ u `f ”¡w"u? Y` ÁK lí” MÏ ›KAƒ	1. ›- ›K˜ 2. ¾K˜U 99. SMe ¾KU /›L¨Ÿ<U/	
704	MÐŒ/ MÐ }S`U[ªM	1.›--þ²+õ 2.›--’@Ò+õ 3.›M}S[S\U	

7®5	u¡ƒƒM“ l¡U“ ¡õKA kÖa ›ÁÁ´“ T>eØ^©’ƒ [¡}ªM	1. [¡ŠÁKG< 2. ›M["G<U 99. SMe ¾KU /›L¨Ÿ<U/	

Declaration

I the undersigned, declare that this thesis is my original work, has never been presented in this or any other university, and that all resources and materials used herein, have been duly acknowledge.

Name: Yonas Tadios Asfaw (MD)

Signature ________________________

Place: Addis Ababa University, Ethiopia

Date of submission: April 2005

This thesis has been submitted for examination with my approval as a University advisor.

Name: Dr. Gail Davey (MRCP MRCGP MD MSc Assistant Professor)

Signature __________________