

GLOBAL COOPERATIVE
 AGREEMENT FOR TECHNICAL ASSISTANCE
 SERVICES (PROJECT DELTA)

An Evaluation of Project ECHO in Malawi

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LIGHTHOUSE

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ROLES AND RESPONSIBILITIES

U.S. Centers for Disease Control and Prevention (CDC) lead the project design and protocol development, provided technical assistance and financial support for the implementation of the ECHO model in Malawi. CDC Malawi provided coordination among collaborators in Malawi.

Ministry of Health Malawi participated in the design and implementation of the project ECHO model in Malawi. Provided coordination and project management support among collaborators.

The Lighthouse Trust lead the implementation of the intervention including identification of subject matter areas for the ECHO sessions, subject matter experts to prepare and facilitate didactic sessions, provided clinical expertise in the content of the subject matter sessions and training of clinic staff in using the ECHO model. The Lighthouse managed the teleconferencing equipment and training of IT staff in using and managing the technology.

The University of New Mexico provided technical advisement on using the TeleECHO technology and implementation of the ECHO model in Malawi.

Elizabeth Glaser Pediatric AIDS Foundation had overall responsibility for implementation of the evaluation of the ECHO model in Malawi. EGPAF Malawi provided direct implementation and US based EGPAF staff provided general oversight and technical advisement in implementation of the evaluation including data analysis and interpretation of results, and contributing to the dissemination of evaluation results.

EXECUTIVE SUMMARY

INTRODUCTION

At the end of December 2018, 805,232 patients were alive and receiving antiretroviral therapy (ART) in Malawi. This translates to 76% of the estimated 1,064,676 individuals living with HIV in Malawi receiving ART, 68% (45,450 / 66,948) of children and 76% (759,782 / 997,727) of adults. An estimated 2,117 ART clinicians and nurses were providing services in 758 ART clinics in Malawi with an estimated 3.9 million ART patient visits per annum[1]. In order to sustain coverage of ART services, Malawi must invest in innovative methods for ensuring access to all.

Continued scale-up requires opening new sites for ART provision at lower levels of the health system or expanding the capacity of clinicians who may be non-physicians with little or no experience in HIV treatment. The Malawi Ministry of Health's (MOH) policy support for task-sharing ART initiation to nurses and para-medical cadres is one of the key interventions that facilitated the rapid scale-up of Option B+ in 2011. For health workers who received task-sharing clinical mentorship, this was an essential form of building competencies, reinforcing skills, and ensuring that health workers have the knowledge and confidence to deliver high quality ART services.

The Extension for Community Healthcare Outcomes (ECHO) model, developed by the University of New Mexico (UNM), is a platform for clinical mentorship through case-based learning. Project ECHO uses proven adult learning techniques and interactive video technology to connect groups of community providers with specialists at centers of excellence in regular real-time collaborative sessions. The sessions, designed around case-based learning and mentorship, help local health care workers gain the expertise required to provide needed services, in this case, related to the care and management of patients living with HIV.

Through Project DELTA, a five-year (2013-2018) CDC funded global cooperative agreement for technical assistance services, the Elizabeth Glaser Pediatric AIDS Foundation (EGPAF) collaborated with the Ministry of Health, and the Lighthouse Trust to pilot and evaluate Project ECHO in Malawi. This pilot used a hub and spoke approach to distance learning. The Lighthouse Trust, a local nonprofit organization providing clinical HIV services in Lilongwe, was the hub site and four spoke sites from participating districts. EGPAF facilitated the evaluation component, while Lighthouse Trust facilitated project implementation of the ECHO training and mentorship model in Malawi. Together the collaborating partners formed the Malawi Project ECHO Consortium.

The aim of the evaluation was to determine the feasibility and acceptability of the ECHO model in Malawi and measure the impact of the ECHO model on the health care providers' knowledge, perceived behavioral capability and professional satisfaction. Results of the evaluation will be used to inform national scale up of the ECHO intervention.

METHODS

The ECHO evaluation used a pre/post design to assess the feasibility of a 6-month pilot of a Tele ECHO distance learning model in 5 health facilities in Malawi. The evaluation took place in five selected high-volume HIV care and treatment sites with internet connectivity. Based on a predetermined schedule of topic areas, weekly sessions were conducted including didactic presentations and case studies from the sites. The focus of the ECHO sessions included in the curricula covered five broad areas: viral load monitoring and treatment failure; adult HIV medicine covering a comprehensive set of topics areas in HIV-related lung, heart, and neurology, and cryptococcal meningitis; opportunistic infections complex; and tuberculosis and pediatric and adolescent HIV medicine.

The evaluation was conducted between November 2018 and September 2019. Both quantitative and qualitative methods were used. Participants in TeleECHO sessions were consented and asked to complete paper questionnaires and surveys as a pre-assessment before the launch of the ECHO project to establish a baseline, and after the completion of the pilot in order to measure changes in key outcomes. Focus group and in-depth interviews were conducted at midpoint of the ECHO sessions and again after the last session was completed. Individual interviews were conducted with eight mentors, facilitators, and clinic administrators from participating sites to qualitatively assess the feasibility of implementing the ECHO model in Malawi.

SUMMARY OF FINDINGS

A total of 29 health care providers from five health facilities across the three Malawi administrative regions participated in the pre-test and post-test evaluations. Sixty-two percent of participants were from project sites located in central tertiary level hospitals. Of the five participating sites, the Lighthouse ART clinic had highest number of participants of 28%, followed by Thyolo District Hospital which had 21%, while Rainbow clinic from Mzuzu Central Hospital had 17%, Martin Preuss Centre (MPC) from Bwaila Hospital in Lilongwe had 17% and Umodzi from Queen Elizabeth Central Hospital in Blantyre had 17%. Of the 29 participants in the project, 21(72%) were nurses and 8 (28%) were physicians. The most frequently attended sessions were those on pulmonary TB, first line ART regimen and ART side effects with over 69% of the participants included in the evaluation attending these sessions.

Change in knowledge across subject areas showed that knowledge gains were highest in ART treatment failure for first- and second-line regimens (41%), contraception and family planning (32%) and pulmonary TB (31%). Knowledge declined by 50% in the area of HIV and Hepatitis B, by 19% in HIV and neurology, and by 17% in HIV effects on the heart. The topic areas with decreases in knowledge were poorly attended, with participation during those sessions ranging just above 50% or less, which may have contributed to poor knowledge outcomes in these topic areas.

Participants showed improvement in the behavioral capability assessment in all topics, with the most improvements noted in the topic on management of Hepatitis/HIV-infected children and adolescents. There was an increase in the number of those who

considered themselves to be experts in various fields when comparing the pre-test and post-test scores. In summary, 87% of the participants thought the ECHO session should continue as a national program, compared to 13% who thought the ECHO project should be discontinued.

Focus group discussions and in-depth interviews highlighted a number of successes and challenges regarding the ECHO sessions. Some of the highlights included that participants felt the ECHO program enhanced communication and offered practical opportunities to learn by sharing with other providers. Participants were motivated to use the innovative technology and saw this as a good way to expand communication among health care providers. However, some noted that they experienced challenges with internet connectivity and that the discussions were too clinical; while others reported having conflict with the scheduled time because the clinics were still busy attending to patients.

CONCLUSION

Following the completion of the pilot project and evaluation, the recommendation is to scale up the ECHO model beyond pilot sites in order to increase access to high quality HIV care services in Malawi. This can be done through the leadership of the Government of Malawi. There should be a clear review of the country specific acceptability and feasibility of this model to improve continuous learning and improve patient health care beyond this project scope.

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LIST OF ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ART	antiretroviral therapy
ARV	antiretroviral drugs
CDC	U.S. Centers for Disease Control and Prevention
CPD	continuous professional development
CPT	Cotrimoxazole preventive therapy
DHA	Department of HIV and AIDS
DGHT	Division of Global HIV and TB
ECHO	Extension for Community Healthcare Outcomes
EGPAF	The Elizabeth Glaser Pediatric AIDS Foundation
FGDs	focus group discussions
HBV	hepatitis B virus
HCV	hepatitis C virus
HCWs	health care workers
HIV	human immunodeficiency virus
HIV/HBV	co-infection human immunodeficiency virus and hepatitis B virus
ICT	information and communication technology
IDIs	In-depth interviews
IRB	internal review board
IRIS	immune reconstitution inflammatory syndrome
MOM	Medical Council of Malawi
MOH	Ministry of Health
NMCM	Nurses and Midwives Council of Malawi
NCD	non-communicable diseases
NGO	non-governmental organization
OIs	opportunistic infections
PEPFAR	U.S. President’s Emergency Plan for AIDS Relief
PLHIV	people living with HIV
PMTCT	prevention of mother-to-child HIV transmission
QI	quality improvement
SEV	scientific ethics verification
SME	subject matter experts
STI	sexually transmitted diseases
TB	tuberculosis
TB/HIV	Co-infection human immunodeficiency virus and TB
Tele ECHO	training session during ECHO project implementation
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNM	University of New Mexico
US	United States of America
WHO	World Health Organization
VL	viral load

BACKGROUND

GLOBAL ART SCALE UP

In June 2014, Ambassador Birx announced The U.S. President's Emergency Plan for AIDS Relief (PEPFAR)'s commitment to continue aggressive scale-up of adult and pediatric antiretroviral therapy (ART) across PEPFAR countries, with a goal to achieve 'epidemic control' in 5-10 countries over the next several years.

Continued scale-up requires opening up new sites for ART provision at lower levels of the health system or expanding the capacity of clinicians who may be non-physicians with little or no experience in Human Immunodeficiency Virus (HIV) treatment[3]. For these health care workers, clinical mentorship is an essential form of building competencies, reinforcing skills, and ensuring that they have the knowledge and confidence to deliver high quality ART services.

COUNTRY LEVEL ACCESS OF ART

The Department of HIV and AIDS (DHA) of the Malawi Ministry of Health (MOH) is expanding the clinical mentoring program to support the delivery of high quality HIV prevention, care, and treatment services. As of December 2018, 805,232 patients were alive and on ART. This means that 76% of the estimated 1,064,676 HIV positive population was on ART. ART coverage was 68% (45,450 / 66,948) for children and 76% (759,782 / 997,727) for adults. 2117 ART clinicians and nurses were providing services in 758 ART clinics in Malawi[1].

Despite chronic human resource shortages, Malawi's public health approach has resulted in a rapid decentralization of ART services and increased HIV treatment uptake. An estimated 275,000 deaths have been averted and 1.4 million life-years have been gained due to scaling up implementation of HIV provision to all people living with HIV (PLWHA)[1].

The Malawi MOH's policy support for task-sharing to expand provision of ART initiation for patients living with HIV from physicians to nurses and para-medical cadres is one of the key interventions that facilitated this rapid scale-up. National level supportive supervision is conducted quarterly to validate site-level data, perform physical inventories of essential HIV commodities, and provide mentoring.

Given the large number of ART clinics in Malawi, PEPFAR-funded implementing partners have recruited a minimum of one mentor per district to complement the MOH district clinical mentors and provide additional on-the-job training to improve compliance with the national guidelines and PEPFAR quality standards. The paradigm shift from an acute to chronic care model for HIV and the adaptation of the World Health Organization (WHO) 2015 recommendations on universal ART eligibility through the "test and treat" policy [6] necessitates a reframing of service delivery approaches that will require additional capacity building.

Malawi currently has only one center of excellence, and given the growing cohort of patients on ART, there is need for additional sites to be established with the clinical capacity to manage more complicated cases with advanced HIV or chronic sequelae of HIV. Although CD4 is not routinely done in Malawi since the adoption of test and treat, recent estimates suggest that about 24% of people living with HIV starting ART at two high volume ART clinics in Lilongwe have a CD4 cell count of less than 200 cells/mm³, and 13% have a CD4 cell count of less than 100 cells/mm³. In some settings, up to 50% of people present to care with advanced HIV disease[7].

ECHO MODEL

Project ECHO is a platform for practice-based education and training, service delivery, and outcomes evaluation developed at the University of New Mexico (UNM). The model has four components: 1) technology (multipoint videoconferencing and internet) to leverage scarce healthcare resources; 2) disease management model focused on improving outcomes by reducing variation in processes of care and sharing best practices; 3) case-based learning to establish and develop communities of practice and encourage the collaborative management of patients between providers and subject matter experts (SMEs); and 4) monitoring outcomes using a web-based database. The Project ECHO is distance learning model using teleconferencing to connect subject matter experts to providers in a hub and spoke approach.

PREVIOUS STUDIES EVALUATING ECHO MODEL

HEPATITIS C VIRUS ECHO IN NEW MEXICO

From 2003 to 2011, UNM Project ECHO staff evaluated the effectiveness of the ECHO model in New Mexico by assessing the impact on rural clinicians participating in Tele ECHO sessions on Hepatitis C virus (HCV). Impact measurements included effect on treatment rates, perceived behavioral capability, and overall professional satisfaction. The results of this research were first published in Hematology in September 2010. This article illustrated the Project ECHO model's impact on the current healthcare system in three major areas: 1) access to specialty healthcare, 2) expanded delivery of evidence-based best practice care, and 3) a new paradigm for team-based interdisciplinary professional development[3].

Patient outcomes were also evaluated via a prospective cohort study demonstrating that the Project ECHO model can deliver treatment for HCV that is as safe and effective as an academic medical center. The study compared treatment of HCV at the University of New Mexico Health Sciences Center HCV clinic to treatment by primary care clinicians at Project ECHO partner sites in rural New Mexico. The sustained viral suppression results were comparable (57.5% for specialists versus 58.2% for primary care clinicians) and the occurrence of serious adverse events experienced by patients managed by the primary care clinicians were half the rate experienced by patients managed by specialists (6.9% of 18 patients versus 13.7% of 20 patients, respectively),[3].

PURPOSE OF ECHO IN MALAWI

The purpose of this project was to pilot the Project ECHO model to increase the workforce capacity of the national ART program of Malawi to provide high quality HIV care and treatment through twinning of existing centers of excellence to other referral level ART clinics through hub-and-spoke knowledge-sharing networks that use multi-point videoconferencing. Project ECHO's goal was to develop local expertise by linking less-experienced providers with SMEs in a mentoring relationship through the use of videoconferencing technology, promotion of best practices, and case-based learning. Subject matter experts received training and regular feedback on videoconferencing techniques and group mentorship skills through "Tele ECHO" sessions. In weekly Tele ECHO sessions that engaged staff from multiple HIV care and treatment sites across the country, an interdisciplinary team of SMEs from the hub site guided local interdisciplinary teams from each spoke site through didactics, joint case review, and problem-solving.

ECHO MALAWI CURRICULUM

Through funding provided by CDC/DGHT, Lighthouse collaborated with the MoH of Malawi, CDC Malawi, the UNM and EGPAF and conducted a 6-month pilot, from November 2018 to September 2019, of the Project ECHO virtual training and mentorship model in Malawi. The Malawi Project ECHO Consortium selected 5 HIV care and treatment sites for the pilot program in selected regions with high HIV prevalence and with internet connectivity (Figure 1). These were the spoke sites that connected to a hub at the Lighthouse clinic in the capital city of Lilongwe.

This pilot used a curriculum that covered adult and pediatric HIV/AIDS management. This includes TB complex, non-communicable diseases (NCDs) and HIV, ART monitoring and failing complex, HIV medicine and opportunistic infection complex, and pediatric HIV medicine. Appendix B shows the didactic topics and objectives covered during the implementation of Malawi's TeleECHO.

OBJECTIVES OF THE EVALUATION

In view of the TeleECHO implementation, this evaluation was done to address the following objectives:

OBJECTIVE 1: TO DETERMINE THE FEASIBILITY AND ACCEPTABILITY OF THE ECHO MODEL IN MALAWI

OBJECTIVE 2: TO MEASURE THE EFFECT OF PROJECT ECHO ON PROVIDERS' A) KNOWLEDGE, B) PERCEIVED BEHAVIORAL CAPABILITY, C) PROFESSIONAL SATISFACTION, AND D) ACQUISITION OF CPD CREDITS

OBJECTIVE 3: TO DETERMINE THE COST OF IMPLEMENTING PROJECT ECHO IN MALAWI

METHODS

EVALUATION DESIGN

The ECHO evaluation was done using a pre- and post-intervention design with mid- and end-line quantitative and qualitative data collection components. The evaluation was conducted between November 2018 and September 2019. The evaluation was based on a pilot of the TeleECHO clinical training and mentorship model in Malawi for providers of adult and pediatric HIV prevention, care, and treatment services.

Methods applied include collection of process measures to assess fidelity to the intervention; a quantitative questionnaire to assess knowledge of clinical HIV case management; a questionnaire to assess self-efficacy in performing clinical HIV case management and quality improvement activities, and professional satisfaction. Focus group discussions (FDGs) and in-depth interviews (IDI) were used to gather feedback on experiences of participation in ECHO and feasibility of implementing this model in Malawi. Results of this evaluation inform whether the ECHO model improves the knowledge and skills of health care providers and teams to provide high quality care in Malawi, and if it should be expanded from a pilot to a nationwide program.

The evaluation findings were based on 5 HIV care and treatment sites purposively selected from the existing HIV care and treatment sites across all the three regions of Malawi.

PROJECT SETTING

This pilot used a hub and spoke approach to distance learning. The Lighthouse Trust, a local nonprofit organization providing clinical HIV services in Lilongwe, was the hub site. Four other facilities were involved as HIV care and treatment spoke sites. The sites are presented in Figure 1. Sites were selected based on prevalence of people living with HIV, internet connectivity in the region and/or poor access to clinical mentorship.

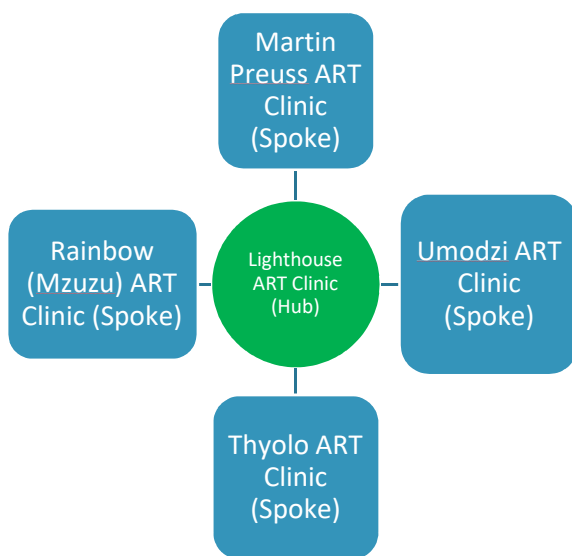


Figure 1: ECHO Project Hub and Spoke Sites

PROJECT POPULATION

Health workers aged 18 years or older were recruited from pilot project facilities using convenience and purposive sampling methods. At each of the pilot sites, physicians, nurses, pharmacists, community counselors and other members of the health care team were encouraged to participate in TeleECHO sessions and are referred to as “TeleECHO participants.” A subset of health workers were purposively selected for focus group discussions or for in-depth interviews. Site facilitators, mentors, clinic administrators, and TeleECHO participants were recruited from all sites for verbal questionnaires regarding the feasibility of the ECHO model in the Malawi context.

ELIGIBILITY CRITERIA

The following eligibility criteria applied to each component of the evaluation:

1. **Pre-assessment (baseline) of knowledge and perceived behavioral capability:** Physicians, nurses, laboratory personnel and pharmacists at each pilot site and participated in the TeleECHO sessions.
2. **Post-assessment (endline) of knowledge and perceived behavioral capability:** Physicians, nurses, lab personnel and pharmacists who completed the pre-assessment and participated in the TeleECHO sessions
3. **Focus groups:** Participants that attended 40% of the sessions that included Physicians, nurses and pharmacists who completed the pre-assessment participated in the TeleECHO sessions.
4. **In-depth interviews:** Physicians, nurses and pharmacists who participated in TeleECHO sessions and were unable to schedule time to participate in a focus group.
5. **Subject Matter Expert (SME) interviews:** TeleECHO faculty and mentors, clinic administrators as well as TeleECHO participants.
6. **Session evaluations:** Physicians and nurses who participated in a TeleECHO session and were eligible to earn CPD credit for their participation.

SAMPLE SIZE

The number of pilot project sites were selected to reflect the number of prioritized regions with a high burden of HIV prevalence and with internet connectivity. Data collection included a convenience sample of 29 participants across all five ECHO sites, one hub and four spoke sites (See Fig 1).

A total of two FGDs were conducted with purposively selected participants during the post evaluation. A total of eight participants were reached for the FGDs. Two participants who were not able to join the FGD were interviewed individually.

A total of eight subject matter experts and clinic administrators were purposively selected for individual interviews during the post evaluation.

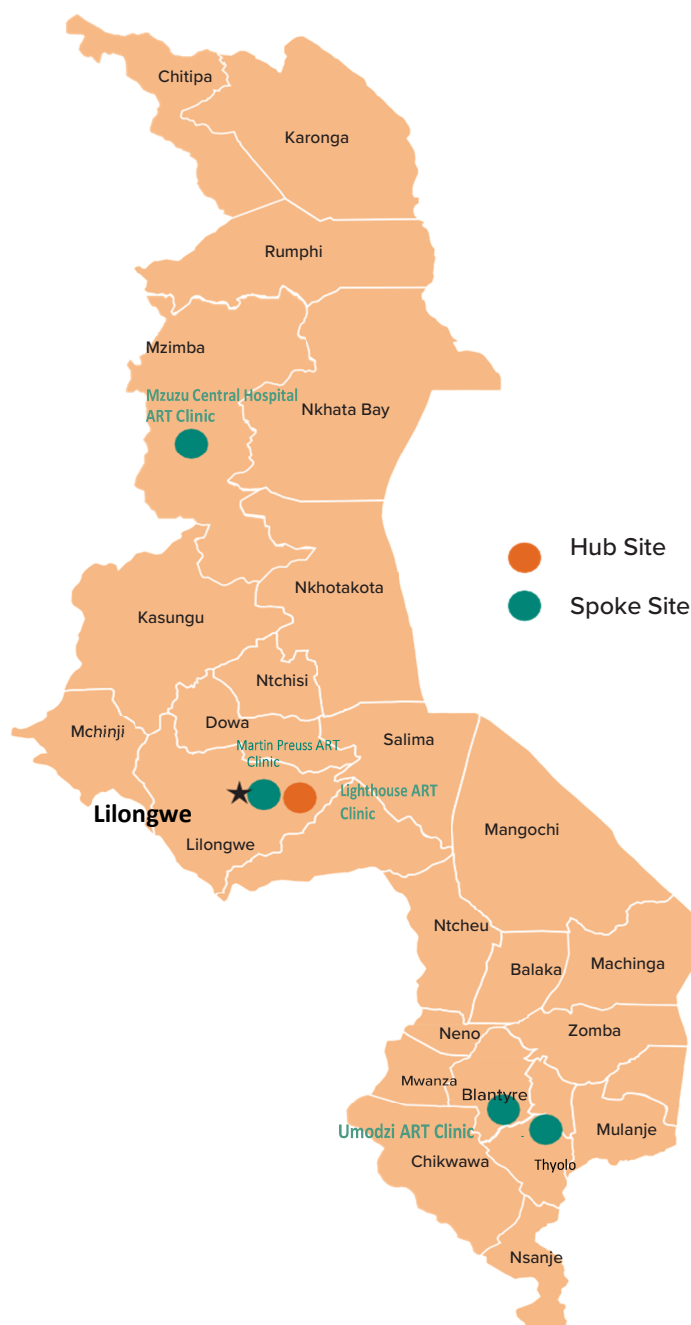


Figure 2: Project ECHO Hub and Spoke Sites in Malawi

EVALUATION PROCEDURES

PROCESS OUTCOMES

Key process indicators were tracked to assess project fidelity during implementation. These indicators cover number of sessions taking place, who registered to participate versus who actually participated, who is facilitating, how many didactic sessions and patients' cases were presented and how the TeleECHO sessions were staffed. Using the Project ECHO software application, "iECHO," a web-based partner relations management tool that is used to track data for TeleECHO sessions and activities, de-identified participant data was recorded and reported in aggregate for analysis of project implementation.

A project administrator for the Malawi Project ECHO team routinely entered data into iECHO. During each session, the project administrator was able to view the name of each participant at each site that participated in the session. Documentation of individual participants was through verbal or electronic roll call during the session. Information was entered and stored in the iECHO application. The data stored in iECHO is protected with encryption. Secure user logins and passwords were required to access iECHO.

CPD CREDITS

The number of CPD credits awarded to participants were tracked through CPD booklets documenting session attendance with participants signing at each spoke site by ECHO staff and approved by both the Malawi Medical and Nurses Council. Each week, the participants completed a brief, paper-based TeleECHO session evaluation. After completion of the session evaluation, the participants were issued a CPD certificate if the requisite CPD credits were accumulated.

COST OF PROJECT IMPLEMENTATION

Operational costs for TeleECHO sessions during the pilot were documented using an activity-based costing tool. CDC and Lighthouse Trust Strategic Information staff provided data on costs of in-person training and mentorship of providers. The CDC, Lighthouse Trust and EGPAF informational technology teams tracked costs related to upgrading internet bandwidth at the pilot sites. Any mentorship provided to the sites was documented in detail, including frequency, depth, and breadth of mentorship offered to participants.

QUANTITATIVE ASSESSMENTS

Prior to implementation of the ECHO project, project staff briefed the spokes lead at all the 5 sites about the ECHO project. Project staff were provided a specific date, time and room to approach ART clinicians and nurses about the ECHO project at their respective ART clinics. Project staff administered the informed consent to health care providers who were willing to join the evaluation. A pre-test evaluation was then administered by project staff to project participants who provided consent. The same process and assessment were administered at post-intervention.

QUALITATIVE ASSESSMENTS

During the ECHO sessions project participants were informed that focus group discussions and in-depth interviews will be conducted at the mid-point in implementation of the ECHO sessions, and after the last session was completed. The focus groups were conducted with purposively selected ECHO participants. If participants were not available for the focus group, an in-depth interview was scheduled at a more convenient time.

Site facilitators, mentors and clinic administrators were interviewed using semi-structured question guides after the last TeleECHO session was completed.

Participants for focus groups and individual interviews were selected by project staff from providers who participated in TeleECHO sessions. Selection of the participants for focus group discussions included those who had attended the most and the least sessions in order to gain a comprehensive understanding of the feasibility, acceptability, and relevance of iECHO.

Providers selected to participate in focus groups were contacted directly by project staff in person, and asked if they wished to participate in a focus group. Project staff discussed the content of the consent forms with potential participants and answered any questions. Consent forms were administered to those who expressed an interest in participating. Signed consent forms were signed and collected back by the project staff. Focus groups and in-depth interviews were conducted by project staff using distance-based technology and took place over the phone or using video-conferencing software.

DATA COLLECTION METHODS

Data collectors were trained by EGPAF staff. All data collectors attended a five-day training covering the evaluation goals and objectives, data collection procedures, human subject protections and the informed consent process, and in using the quantitative data collection tools during the pre- and post- evaluation.

Data was collected on paper for survey questionnaires, using distance technology for focus group discussions, via phone for individual interviews, and electronically through iECHO software for process measures.

Quantitative pre/post questionnaires covered HIV case management knowledge; perceived behavioral capability in performing case management; and professional satisfaction.

HIV case management knowledge assessment included 50 questions with multiple choice responses. Perceived behavioral capability as measured using 16-item scale with 7-point Likert scaled responses (Appendix D)

FGDs and IDIs with providers collected feedback on how the sessions were organized and structured into their weekly schedules. Probes into their perspectives covered session usefulness; how they were able to integrate learning from TeleECHO session participation to their practices; how they selected patient cases to present in a TeleECHO session; and quality gaps in patient care, among other topics.

Individual interviews with site facilitators, mentors, and clinic administrators gathered feedback on overall feasibility of the ECHO model, including internet connectivity and using iECHO technology, engagement with providers and health providers, and other practicalities of operating the TeleECHO sessions.

DATA MANAGEMENT AND MONITORING

Paper-based survey data was collected and reviewed for completeness at the time of data collection by project staff administering the questionnaires. The survey data was then entered into an electronic database designed specifically for this project. Databases had logic and range checks to ensure quality of data entry. Data were cleaned by the project coordinator and any queries were resolved prior to analysis. The pre- and post-intervention data were merged into a single database for analysis.

FGDs and IDIs were conducted in English and focus groups were digitally recorded with the consent of the participants, and transcribed by the research assistants. Audio and video recordings or transcriptions were reviewed by the project staff after the first interviews for quality control, appropriateness of the probes, and opportunities for exploring and generating emerging themes. Feedback was provided to data collectors in person before the next interviews were conducted. Interviewers prepared transcripts of the interviews they conducted. The transcripts were reviewed by the project staff for completeness and accuracy of the transcripts. Transcripts were then used for analysis.

DATA ANALYSIS

Quantitative data was analyzed using STATA version 15.0. Descriptive statistics were used to summarize categorical (proportions, frequencies) and continuous variables (medians, standard deviations, interquartile ranges, and minimum and maximum values). Analysis of the knowledge assessment survey data included a subset of 25 questions randomly selected. A total score was calculated for each individual. Each correct response was assigned a value of 4 points, for a total possible score of 100 points for each individual. Any other response other than the correct one was not awarded. Paired test with a margin of error of 5% using Mann-Whitney U tests were used to determine statistically different scores pre-compared to post intervention. Only those respondents who answered all 25 randomly selected knowledge questions were included in the analysis.

Perceived behavioral capability for performing HIV case management was measured using 16 items on a 7-point Likert scale. The response categories ranged from “none or no skill” to “expert, teach others”. Responses were assigned values from 1 to 7 with 7 being the most positive response. Statements were reverse coded as needed to ensure the highest value was assigned to the positive response. Tests of significance using Mann-Whitney U tests were used to test statistical significance in scores comparing pre and post intervention with a 5% margin of error.

Professional satisfaction was measured using 12 items with 5-point Likert scale response categories ranging from “strongly agree” to “strongly disagree”. Responses were assigned values from 1 to 5 with 5 being the most positive response. The categories of the responses were reduced to “Disagree, Neutral and Agree” from initial category of “Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree” responses. This was due to small sample size for responses on strongly agree and strongly disagree response options.

Statements were reverse coded as needed to ensure the highest value was assigned to the positive response. Tests of significance using Mann-Whitney U tests were used to statistically significantly differences in scores comparing pre and post intervention.

Qualitative data analysis was conducted using deductive coding. Initially the FGD and IDI transcripts were coded in Nvivo to produce a matrix for further coding. Themes discussed in the field guides informed the coding for analysis. Coded text was summarized, identifying major themes, as well as divergent experiences and opinions.

ETHICAL CONSIDERATIONS

All potential evaluation participants were provided information about the purpose of the evaluation and evaluation objectives and were given an opportunity to ask questions. Informed consent was gathered from all evaluation participants before data collection. Participants possibly benefited from the exposure to subject matter experts and the presentation of HIV cases for discussion.

Potential risks included breach of confidentiality among health workers who may not feel comfortable with asking questions about clinical content that they feel they should understand or know.

Focus group participants did not include supervisors and their supervisees in the same group. In-depth interviews were conducted in private, and results are reported by cadre of health worker rather than by facility to avoid accidental identification of any individual in the project.

EVALUATION FINDINGS

IMPLEMENTATION OF ECHO

It was noted that the attendance throughout all the sessions totaled to 243 participants with the highest attendance at Thyolo District Hospital (63 participants), with peak of attendance being Thyolo District Hospital in February (Table 1).

Table 1: Monthly Participation in All Sites

SITE	Nov	Dec	Jan	Feb	March	April	May/June	Total
Lighthouse Hub	12	8	6	9	7	8	6	56
Thyolo district hospital	11	5	14	23	5	5	6	69
Martin Preuss	5	4	5	3	5	5	3	30
Umodzi FC	11	8	12	10	7	8	7	63
Rainbow clinic	7	5	3	3	2	4	1	25
TOTAL	46	31	40	48	26	30	23	243

CHARACTERISTICS OF THE PARTICIPANTS

A total of 29 health care providers from 5 Health Facilities across the three Malawi administrative regions participated in the pre-test and post-test evaluations. Table 2 shows the demographic characteristics of the evaluation population.

Among all participants, 62% were from project sites located in central hospitals. Out of all the five participating sites, Lighthouse Hub clinic was the most represented with 28%, while Rainbow clinic from Mzuzu, Martin Preuse Clinic from Lilongwe and Umodzi from Blantyre had lowest proportions of participants at baseline and endline (17%). Out of the 29 participants in the evaluation, 52% were females. Nurses represented the largest proportion of participants in the evaluation with 72%. Most of the participants reported to have received some form of HIV training, with 90% of participants reported to have received HIV training through university training and 72% of the participants reporting to have received continuing and in-company training on HIV. The average duration of work experience in HIV care was eight years with some reporting to have worked for up to 22 years (range 0-22). The average number HIV-positive patients that were attended to in a one-week period by the health care staff was about 120.

Table 2: Patient demographic characteristics, N=29

Variable	N (%)
Facility	
Umodzi Clinic	5 (17)
Rainbow Clinic	5 (17)
Martin Preuss Clinic	5 (17)
Thyolo District Hospital	6 (21)
Lighthouse Clinic	8 (28)
Sex	
Male	14 (48)
Female	15 (52)
Age (Years)	
Range	24-59
Median	35
Cadres	
Clinicians	8 (28)
Nurses	21 (72)
HIV Outpatient Clinic	
Yes	26 (90)
No	3 (10)
Years of experience providing HIV care (median (range))	8 (0-22)
HIV patient seen per week median (median (range))	120 (4-1000)
Where received HIV training	
Medical University or MCHS	26 (90)
Continuing training or in-company training courses	21 (72)
Distance learning course	1 (4)
HIV clinical mentor	1 (4)
ART training	1 (4)
HIV care classroom course	1 (4)

Of the evaluation participants, 86% knew about the ECHO project because their sites were chosen to participate, while 7% of the participants found out from colleagues and 7% found out about the project from information about training courses.

PROVIDERS ACCESS TO INFORMATION TECHNOLOGY (IT) EQUIPMENT

Common IT commodities available at the sites were access to a computer (93%), internet connection (90%) and a projector (90%). Only 39% of participants considered themselves to have above average computer skills, and 52% having access to a laptop and 93% owned a smart phone (Table 3).

Table 3: Access to IT Equipment and Commodities, N=29

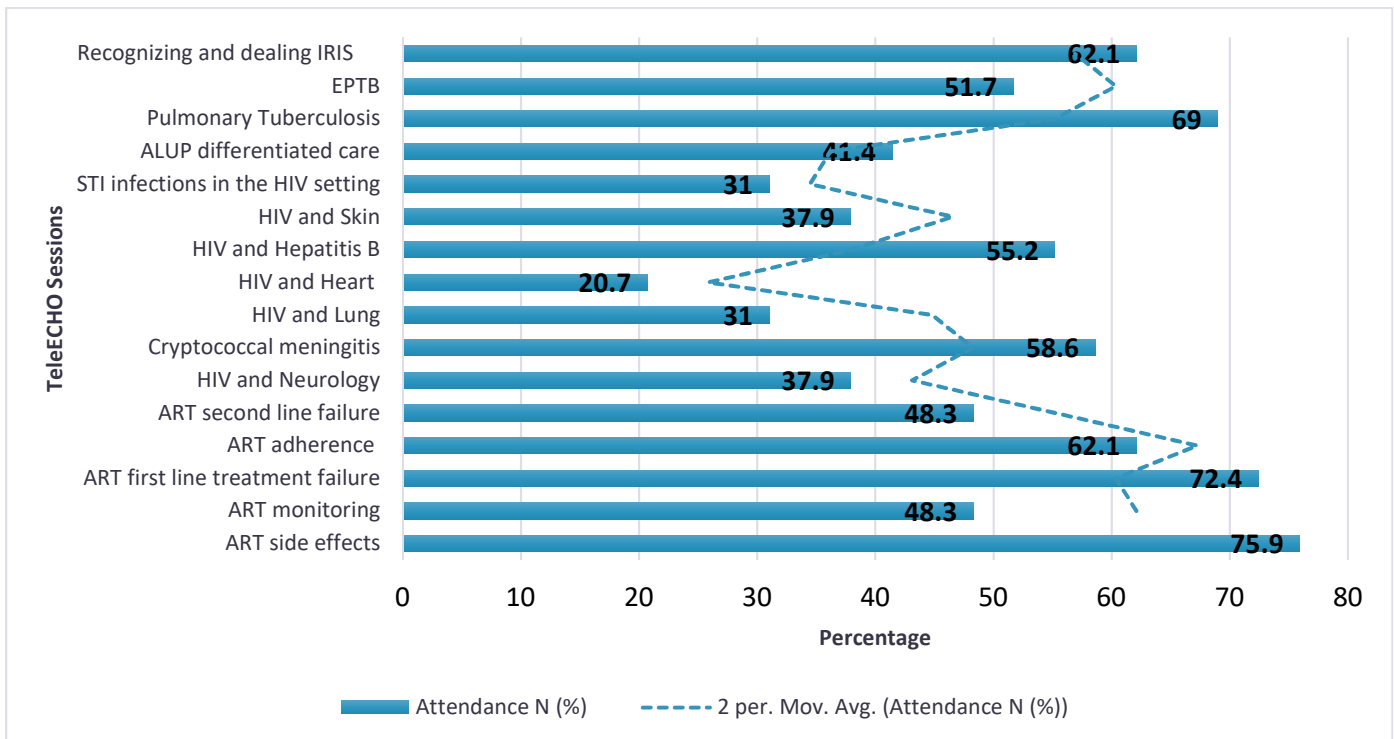
Variable	n (%)
Access to a desktop computer or a laptop	

Variable	n (%)
Yes, a desktop computer	5 (17)
Yes, a laptop	15 (52)
No	9 (31)
Has a smartphone or tablet	
Yes	27 (93)
No	2 (7)
IT commodities available at the clinic (yes)	
Computer	27 (93)
Webcam	11 (38)
Microphone	11 (38)
Computer speakers	18 (62)
Internet Connection	26 (90)
Projector	26 (90)
Computer skills	
Above average user	11 (38)
Average user	8 (28)
Beginner or new user	7 (24)
Advanced user	3 (10)
Regular Access to E-mails	
Yes	20 (69)
No	9 (31)

ATTENDANCE OF ECHO SESSIONS

Sessions on “ART side effects”, “First line ART treatment failure” and “Pulmonary TB” were the most popular with more than 69% of the participants attending the sessions. The sessions which had the least participation were on “HIV and Heart” and “Contraception and Family Planning” with less than 21% in attendance (Figure 3).

Figure 3: Attendance of the TeleECHO sessions (N=29)



FEEDBACK ON ECHO SESSIONS

All (29) of the participants thought the sessions were practical to their work, with 86% of the participants noting that the ECHO sessions should be continued (Table 5). Most participants (79%) reported to use a clinic or hospital computer in order to attend the ECHO sessions. The majority (55%) of participants particularly liked the case scenario portion of the ECHO sessions. Of the participants, 72% thought the duration of the ECHO session was appropriate, while 14% thought the sessions were long and 14% thought the sessions were too short. The majority (52%) of participants thought other sessions should be added to the ECHO curriculum, with 68% noting that other specialty topic areas should be added to present ECHO sessions. Most (79%) participants felt that they would not want to change the amount of time of the ECHO session while 21% thought they would want to change the amount of time of each ECHO session (Table 4).

Table 4: Assessment of Practicality of TeleECHO Sessions

Session Evaluation Questions, N=29 n (%)					
How practical were the session topics to your work?	Not practical	Practical			
	0	29 (100)			
Which device did you most often use to participate in the Project ECHO?	PCs/ Laptop	Clinic/hospital computer	Smartphone	Tablet	Other
	2 (7)	23 (79)	0	0	4 (14)
How do you generally evaluate the technical quality (internet access, sound, and picture) of the sessions?	Weak	Good			
	12 (41)	17 (59)			
Do you think the project should be continued?	Yes	No			
	25 (86)	4 (14)			
Which segment of the sessions do you like most?	Case conference/Case presentations	Seminar/ Lecture	Quality Improvement	I liked all sessions equally	
	16 (55)	0	0	13 (45)	
What do you think about the length of each session?	Too long	Just enough	Too short		
	4 (14)	21 (72)	4 (14)		
Would you like other topics presented in additional to sessions?	Yes	No			
	15 (52)	14 (48)			
Would you like to change the time of day in the week the sessions are held?	Yes	No			
	10 (35)	19 (66)			
If yes, what time of day in the week is the most appropriate?	Morning	Noon	Afternoon	Missing	
	3 (30)	2 (20)	5 (50)	0	
Would you like to change the amount of time for each session?	Yes	No			
	6 (21)	23 (79)			
If yes, how much time is the most appropriate?	Average 2.2 hours				
Do you think other providers from other specialties need to be invited? If yes, which specialty?	Yes	No	Missing		
	19 (66)	9 (31)	1 (4)		

FEEDBACK ON PROFESSIONAL SATISFACTION

Most participants provided positive feedback concerning their professional satisfaction with ECHO sessions with 93% of the participants noting that the TeleECHO sessions provided them with useful up-to-date knowledge; 96% of the participants noting that ECHO was a useful tool for improving the sharing of information and 96% of the participants noting that ECHO was a useful tool for national experts to provide technical assistance in HIV care and treatment (Table 5). Furthermore, 86% felt that the ECHO sessions have improved quality of care in their clinics of operation, and 83% felt ECHO reduced their professional isolation. The majority (83%) indicated they would like to continue participating in ECHO sessions after the pilot ends, and 90% were interested in joining ECHO programs for other diseases.

Table 5: Providers' Professional Satisfaction

Providers' professional Satisfaction n (%) N=29	Disagree	Neutral	Agree
Project ECHO has reduced my professional isolation	1 (4)	4 (14)	24 (83)
My participation in the TeleECHO sessions has enhanced my professional satisfaction	1 (4)	4 (14)	24 (83)
Access to the TeleECHO sessions has improved the quality of care I provide to the patients at my clinic	0	4 (14)	25 (86)
Access to HIV specialist expertise and consultation is a major area of need for me and my clinic	2 (7)	4 (14)	23 (79)

Providers' professional Satisfaction n (%) N=29	Disagree	Neutral	Agree
The presentations during the TeleECHO sessions provide me with useful up-to-date knowledge	0	2 (7)	27 (93)
The case-based discussions during the Project ECHO sessions were not always relevant to my clinical practice and how I care for patients in my clinic	17 (59)	4 (14)	8 (28)
ECHO is a useful tool for improving the sharing of information among HIV providers	0	1 (4)	28 (97)
ECHO is a useful tool for national experts to provide technical assistance in HIV care and treatment	0	1 (4)	28 (97)
I would like to join Project ECHO programs for other diseases, if the program existed	0	3 (10)	26 (90)
After the pilot project is completed, I do not want to join any more TeleECHO sessions	24 (83)	3 (10)	2 (7)
TeleECHO sessions were not always easy to access from my clinic	18 (62)	2 (7)	9 (31)
Project ECHO has improved the quality of care in my clinic	1 (4)	3 (10)	25 (86)

When comparing pre and post-test measures, 86% of the participants agreed that they had timely access to clinical support in post-test the evaluation compared to 62% at pre-test (Figure 4). Eighty-nine percent of participants agreed that they had an opportunity to share clinical experience on a regular basis at post-test evaluation compared to the 69% that noted this at pre-test evaluation.

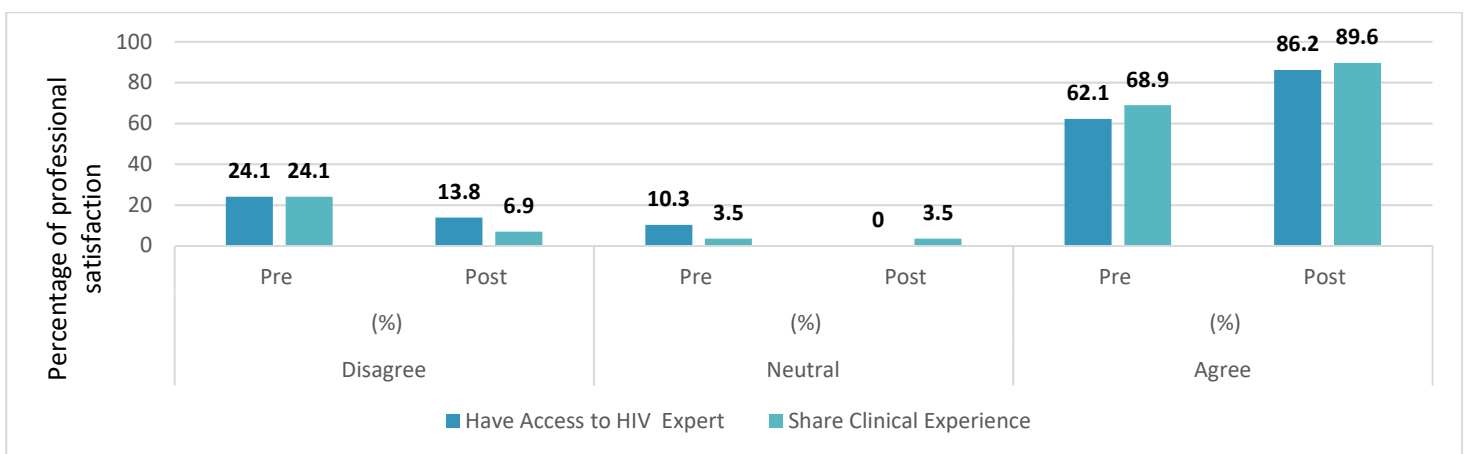


Figure 4: Self-Assessment on Professional Satisfaction

PERCEIVED BEHAVIORAL CAPABILITY PRE-TEST EVALUATION AND POST-TEST EVALUATION RESPONSES

Table 6: Perceived Behavioral Capability for HIV Case Management, N=29

Behavioral Capability	Pre Mean score [∞]	Post Mean score [∞]	Wilcoxon signed-rank test P-Value
Ability to identify children and adolescents who should be tested for HIV	5.0	5.8	<.001**
Ability to determine eligibility for ART in children and adolescents	5.3	5.9	<.001**
Ability to prescribe 1 st line ART regimens for children and adolescents	5.6	6.1	.005*
Ability to recognize and manage side effects of ART in children and adolescents	5.3	6.0	<.001*
Ability to provide prophylaxis, diagnose, and manage common opportunistic infections (OIs) for children and adolescents	5.3	5.7	.003**
Ability to diagnose and manage treatment failure in children and adolescents, including prescribing 2 nd line regimens	5	5.5	<.001**
Ability to counsel pregnant women for ART (PMTCT)	5.6	6.3	.002*
Ability to provide and interpret early infant diagnosis and management of infants perinatally exposed to HIV	5.1	5.6	.001*
Ability to interpret the results of viral load testing in children and adolescents	5.6	6.2	.002*
Ability to provide age-appropriate adherence counseling to children and adolescents	4.9	5.6	.001*
Ability to manage tuberculosis co-infected in HIV-infected children and adolescents	4.7	5.5	<.001**
Ability to manage Hepatitis B co-infected in HIV-infected children and adolescents	4.2	5.1	.001*
Ability to counsel HIV-infected adolescents on sexual and reproductive health issues, such as contraception and STIs	5.0	5.8	.001*
Ability to guide caregivers through the HIV disclosure process, leading to successful HIV disclosure to children	4.5	5.3	.008*
Ability to counsel adolescents in their transition for pediatric to adult care and treatment	4.7	5.4	.001*

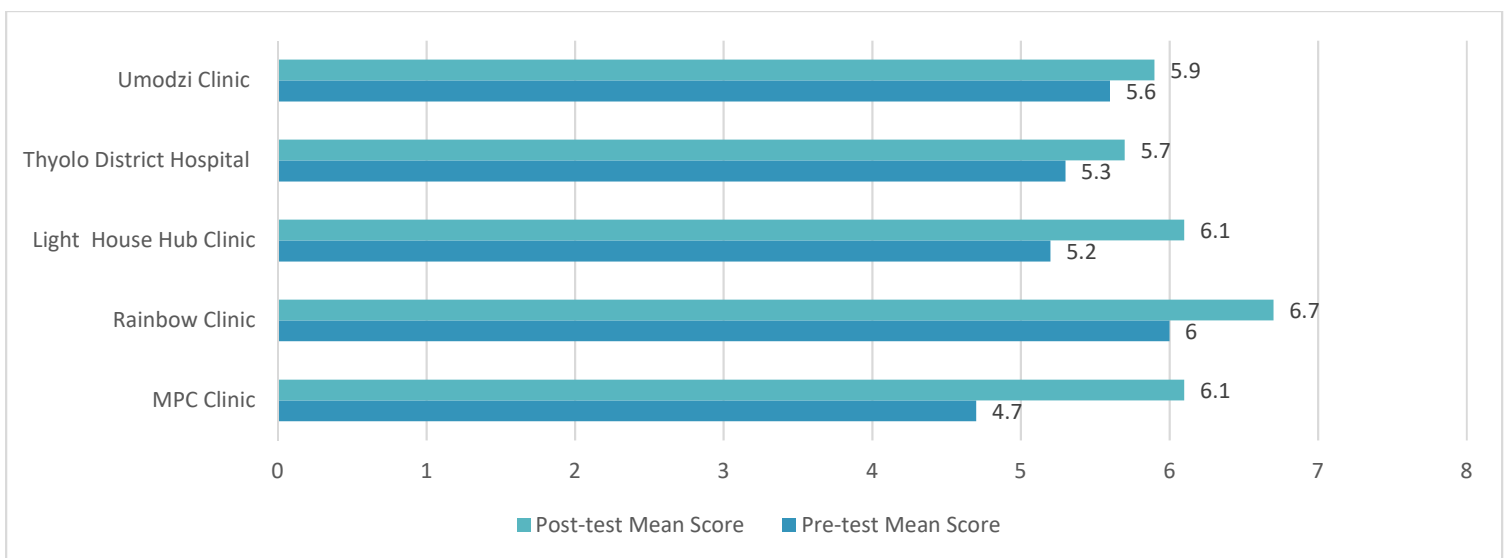
Ability to screen for and manage malnutrition in HIV-infected children and adolescents	4.7	5.5	.001*
Ability to serve as the HIV expert in your district/region	4.8	5.4	.001*
Total mean scores	5.3	6.1	<.001**

Results of perceived behavioral capability measures are shown in Table 6. Participants showed improvement in the behavioral capability assessment in all topics, with the most improvements noted in the topic on management of Hep B/HIV-infected children and adolescents. There was an increasing number of those who considered themselves to be experts in various fields when a comparison was made between the pre-test and post-test evaluation. All the differences between pre-test evaluation and post-test evaluation were statistically significant, including the mean score of 5.3 pre-test and 6.1 post-test (p value <0.001).

∞Scale of 1 (no skill) to 7 (expert, could teach others) for each item

- *p value < 0.05
- **p value < 0.001

When stratified by facilities, the mean score difference of all the facilities also showed a positive behavioral capability increase between pre-test and post-test. The highest improvement in behavioral capability comparing pre-test evaluation and post-test evaluation was noted in Martin Preuss Clinic (MPC). It is noted that MPC had the scale range change above 1.0 (4.7 to 6.1), while the other facilities had a positive change but within a range less than 1.0 (Figure 5).



∞Scale of 1 (no skill) to 7 (expert, could teach others) for each item

Figure 5: Self-assessment for Perceived Behavioural Capability by Facility

PRE- AND POST-KNOWLEDGE ASSESSMENTS

The results for pre- and post-test knowledge assessments are shown in Table 7. There was an improvement in the test scores in most of the topic areas, with a mean post-test score of 67% compared to the pre-test score of 59%, though this was not statistically significant. Of the 25 question randomly selected for the purposes of the knowledge assessment, 15 had statistically significant change, of which three of the 15 had a negative knowledge change (Stroke symptoms in HIV patients, Diagnosis of Toxoplasmosis and statements on ART treatment of HIV/HBV co-infected patients).

Table 7: Pre and Post Knowledge Assessment per Question N=29

Knowledge Assessment Questions		Pre-ECHO Project Evaluation	Post-ECHO Project Evaluation	P-Value Wilcoxon signed-rank test
		Correct Response n (%)	Correct Response n (%)	
Q1	Describe and recognize the most important side effects of ART and CPT used in Malawi	8 (28)	14 (48)	.001*
Q2	On patient newly started on tenofovir/lamivudine/efavirenz (TDF/3TC/EFV) and Cotrimoxazole (CPT) is developing a red itchy rash, which increasingly blisters and involves the mucosal surfaces	21 (72)	23 (79)	.210
Q4	Statements on “targeted VL”	25 (86)	29 (100)	<.001**
Q5	A case of a patient on tenofovir/lamivudine/efavirenz (TDF/3TC/EFV) for 4 years is complaining of newly developing oral thrush	9 (31)	16 (55)	<.001**
Q7	Factors least likely to affect adherence	18 (62)	17 (59)	.520
Q8	Patients at the highest risk of poor adherence	26 (90)	29 (100)	.066
Q9	Protease inhibitors (PI) that are risk factors for quicker resistance development to ritonavir-boosted PIs?	13 (45)	20 (69)	<.001**
Q10	The main reason 3TC is given as part of 1st, 2nd and even 3rd line treatment	15 (54)	17 (59)	.036*
Q11	Stroke symptoms in HIV patients	19 (66)	14 (48)	.003*
Q12	Diagnosis of Toxoplasmosis	18 (62)	16 (55)	.211
Q14	Patients with high intracerebral pressure lumbar puncture	18 (62)	23 (79)	.035*
Q18	Treatment of HIV-associated cardiomyopathy	18 (62)	15 (51)	.263
Q20	Statements on ART treatment of HIV/HBV co-infected patients	2 (7)	1 (4)	.002*
Q21	Skin conditions, blisters and ulcers	17(59)	15 (52)	.210
Q23	Genital HSV	21 (72)	23 (79)	.001*
Q24	Syndromic STI treatment	15(52)	16 (55)	.021*
Q27	Latent TB and HIV	9 (31)	14 (48)	.001*
Q28	nusual chest X-ray changes in “post-primary” TB	7 (24)	7 (24)	1.0
Q29	Typical ultrasound changes suggesting disseminated TB	22 (76)	28 (97)	.001*
Q31	Most common time to expect IRIS symptoms	18 (62)	22 (76)	.021*
Q32	Diseases that very rarely cause clinically relevant IRIS	21 (72)	25 (86)	.016*
Q33	Commonly used ART drugs that is not compatible with RHZE	25 (86)	28 (97)	.651
Q34	Rifabutin; a treatment option increasingly available in Malawi	20 (69)	22 (76)	.211
Q43	Disclosure as an important step that is encountered by adolescence	20 (69)	23 (79)	.063
Q50	Describe methods of family planning	19 (66)	25 (86)	.001*
Average		59	67	0.16

- *p value< 0.05
- **p value < 0.001

The knowledge assessment varied by cadre, with clinicians scoring higher than nurses (Figure 6). However, the knowledge change was higher in nurses than clinicians (+9% among nurses compared to +7% among clinicians).

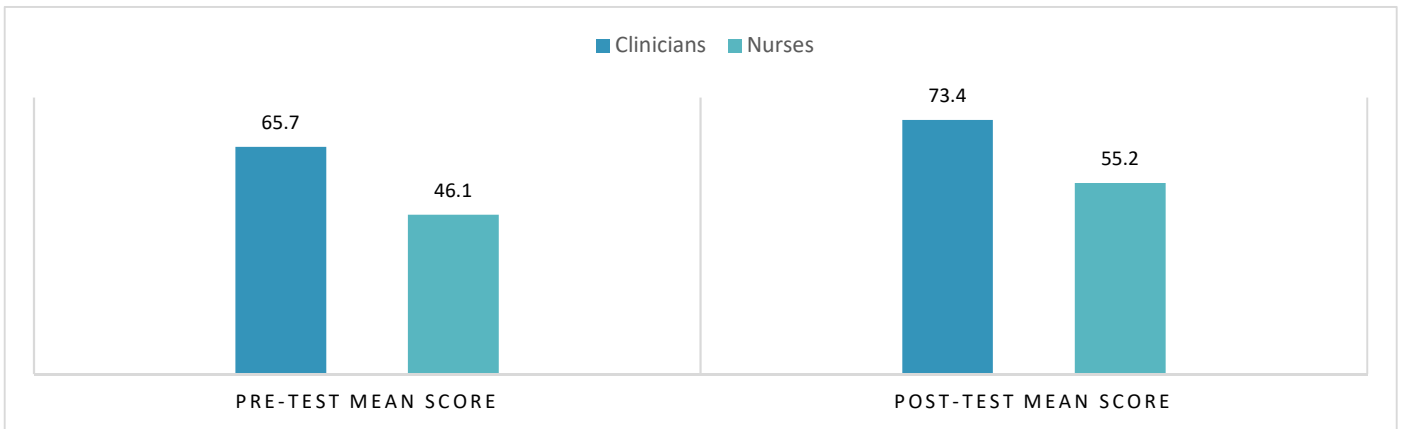


Figure 6: Knowledge Change by Cadre

Change in knowledge across subject areas are presented in Figure 7. Knowledge gains were highest in ART treatment failure first and second line (41%), contraception and family planning (32%) and pulmonary TB (31%). Declines in knowledge mean scores were observed in topics covering HIV and hepatitis B (-50%); HIV and neurology (-19%); effect of HIV on the heart (-17%) and HIV and skin (-12%).

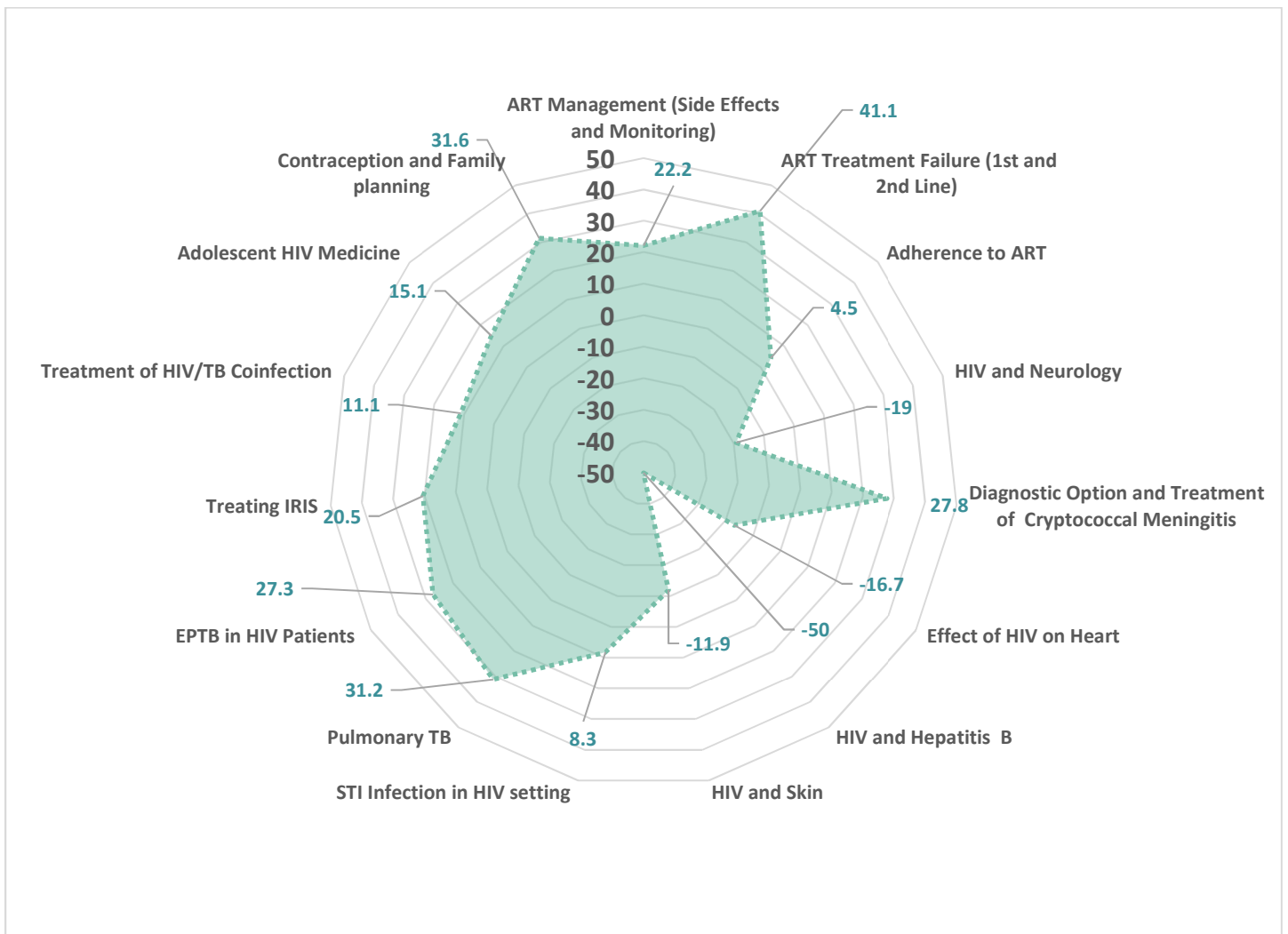


Figure 7: Knowledge Change Across Subject Areas

FEEDBACK FROM CLINIC MENTORS ON FEASIBILITY OF THE ECHO PROJECT

Most of the clinic mentors and administrators were from the Central region of the country. The mean age of the mentors was 42 years old. Most of the mentors worked at a central hospital (62.5%), with experience of serving up to 1500 clients per week (30-1500) (Table 8).

Table 8: Clinical Mentors Demographic Characteristics

Characteristic		N (%)
Region	North	1 (12.5)
	Centre	4 (50)
	South	3 (37.5)
Facility	Central Hospital	5 (62.5)
	District Hospital	3 (37.5)

Participants Age (Years)	Mean age	42
	Range	27-60
Number of clients tested per week	Mean	616
	Min	30
	Max	1500

FACILITY LEVEL ADJUSTMENTS TO ACCOMMODATE ECHO SESSIONS

The mentors and clinic administrators noted several points relating to whether patients and staff were affected by the ECHO sessions. It was noted that it was not possible to stop the clinic to attend Tele-ECHO sessions. Some noted that service to patients was not significantly affected because the clinic staff made sure to continue providing the service. One point was that sessions were well accommodated since the patients came in the morning and were served by the afternoon. Another point was that some clinic staff were required to provide cover for the clinic while other providers and staff members attended the Tele-ECHO sessions.

However, some noted that the fact that sessions were occurring every week and attendance was an obligation affected clinic coverage. Two of the mentors noted that they had to adjust their clinic schedule because they have a lot of clients on Thursdays, and so some had to stay to keep assisting patients while others attended the tele-ECHO session. Some mentors and administrators also noted that they had to generate a special schedule to ensure staff alternated in attending the ECHO sessions. It was also noted that sometimes the clinic would be busier than other days and the staff stationed to cover the clinic while others are attending the tele-ECHO session would be overwhelmed; the reduction in staff to attend ECHO meant a reduction in the efficiency of patients being seen.

All the respondents noted that the ECHO sessions had occurred in the afternoon, with 3 of the respondents noting that this posed as a barrier to participation because the clinic was serving patients as patients come at any time up to 7 pm; with others noting that the sessions occurred at knock-off or break time or when the clinic was busy. Six of the mentors noted that the afternoon was the best time for the ECHO sessions while the remaining two noted that “noon” was the best time.

PREPARATION OF THE SITES FOR ECHO

Some respondents noted that the orientation was enough for the preparation of ECHO, while others noted that there should have been permanent installation of equipment to avoid constant removal of the plugs of devices. Other reported activities that should have been done in preparation for ECHO included improvements in the staffing while others noted that Project ECHO have created enough space as part of preparation for the ECHO sessions. Involvement of ECHO providers in preparation of presentations made during sessions was noted as one area which should have been carried out as part of preparatory activities, while others noted that that clarification of the evaluation form given at the beginning of the evaluation should have been done and that clarified, due to lack of clarity participants were not able to get some responses on the form correct. Others noted that briefing to colleagues or awareness should have been done in the preparation of sites for ECHO, while others noted that snacks should have been provided.

CHALLENGES WITH IT EQUIPMENT

Most respondents (7/8) noted poor connectivity as a challenge in use of the IT equipment, and one noted that a broken camera caused a challenge in connection of the ECHO sessions.

IMPACT OF ECHO ON PARTICIPATING PROVIDERS

The respondents noted that ECHO had improved knowledge and skills, particularly in: patient management; a better understanding of cases and to avoid ART/TB combinations; improved patient care and treatment; provided a platform for the exchange of knowledge and applying new things learnt; and positive impact as people were able to express themselves.

CHANGE IN QUALITY OF CLINICAL SERVICES REQUIRED

Regarding whether there was any change in the quality of services provided, some participants noted that they were not sure whether there was a change in the quality of services provided. Others noted that they were no changes per se while others noted that there was enhancement of quality services provision. It was noted that the presentation of cases discussed during the sessions has helped manage different cases, while others noted that ECHO has been a learning point that refreshed health providers on matters affected.

CHANGE IN JOB SATISFACTION AMONG PROVIDERS

Respondents noted that some providers were very satisfied because many difficult cases have been managed through ECHO. Other respondents noted that providers were managing patients with confidence because they knew what they were doing. Other respondents noted that providers are now confident to manage complex cases. Some respondents noted that there has been improvement in job satisfaction, as ECHO sessions have expanded knowledge of health care workers. Other participants however noted that they were not sure on whether there was a change in satisfaction among providers.

ALL PROVIDERS ATTENDING ECHO

Most of the respondents thought all providers in the clinic should attend ECHO sessions. The respondents noted that nurses and clinicians should attend all the ECHO session because it kept them updated at all time. Some noted that it provided new perspective

and knowledge for all to attend with some noting that “medicine was dynamic and no one needs to be left behind”. Others noted that all providers attending the ECHO sessions would ensure that they develop the same standards. However, others thought that not everybody needs to be part of the ECHO session, as some sessions are clinical and this would also reduce unnecessary shortages if not all people attended. Other respondents noted that many of the issues discussed were too clinical for all to fully benefit from the content.

HOW CAN THE PROJECT ECHO TEAM MAKE TRAINING AND MENTORING MODEL AS USEFUL AS POSSIBLE TO CLINICAL STAFF IN HEALTH FACILITIES?

Respondents noted that improvement on internet connectivity, time of the ECHO sessions and provisions of snacks during the sessions would make the training and mentoring model as useful as possible. Other comments included involvement of policy makers and diverse subject matter experts. Another comment was that cases should be brought for management concerns aside from teaching reasons. Decrease in the frequency of the sessions from weekly sessions, which were too much, could also help in making the model to useful. Others noted that it should be implemented as a learning process, while some noted that the ECHO project needs to make assessment of topics that seem difficult to the providers.

THE BENEFIT FOR PROVIDERS TO EARN CME/CPD CREDITS THROUGH TELEECHO CLINIC SESSIONS AT THE SITES

Some respondents noted that the CME/CPD credits were part of a requirement they needed to fulfill while others noted the earning of CPD points were of benefit because they were directly dealing with patients, and that the more CPD point you have ,the more skilled you are and the more improved quality of care that you deliver to patients.

Other respondents added that this was one of the easiest ways to get CPD points, since trainings elsewhere are very limited. It was noted that more CPD skills meant improvement of their skills. However, some respondents noted that earning the CME/CPD points was not very useful, as they do not need to submit CPD points and it is not an incentive.

THE NUMBER OF CPD EARNED AT THE FACILITY OR ON THE INTERNET IN THE NINE MONTHS’ PRIOR THE PILOT (

Some respondents noted that they did not sign in for CDP credits while others reported that they did not earn any CPD points as they were only participating without converting the sessions into points. Others reported that they earned 16 points with one reporting that he/she earned 50 points. Others reported that they were not sure if they have earned any points.

THE NUMBER OF CPD CREDITS EARNED FROM PARTICIPATING IN THE TELEECHO SESSIONS

Some respondents noted that they did not sign in for CDP credits while others reported that they did not earn any CPD points as they were only interested in the sessions and forgot to convert them into CPD points. Others reported that they earned 10 points with one reporting that he/she earned 13 points. Others reported that they were not sure if they have earned any points.

BENEFIT FOR PROVIDERS TO EARN CPD POINTS AT THE SITE

Other respondents noted that it is of benefit to earn CDP points because you gain experience. Some respondents noted that topics and knowledge “score” a person reducing cost which one would have incurred if done outside the clinic site. Other respondents noted that it was not beneficial.

USEFULNESS OF THE MENTORING MODEL

The following points were raised on how to make the model more useful: updating the curriculum with more participation; sharing journal articles that are relevant; ensuring timing during the day is perfect; regular contacts even without sessions; involve providers in the planning of the sessions; include staff from other wards; and improve internet connectivity.

FOCUS GROUP AND IN-DEPTH INTERVIEWS AMONG ECHO PARTICIPANTS

HEARING ABOUT ECHO

Participants heard about ECHO through an invitation by EGPAF staff to an ECHO orientation held by Lighthouse in Lilongwe. Some participants did not attend the ECHO orientation in person but learned from colleagues or friends who attended. Factors motivating participation were to build on their existing knowledge and to update on new guidelines or procedures to improve patient care.

STRENGTHS OF ECHO

Participants felt the ECHO program enhanced communication and offered practical opportunities to learn by sharing with other providers. After the sessions began, some participants said they were motivated by receiving updated information, and sharing and learning from their colleagues dealing with similar patient care challenges in other facilities. In particular, participants appreciated having access to subject matter experts, as this participant said,

“Yeah, subject matter experts I think they were really key to this project case aah, you know our profession, that’s how we actually gain up to date information...from the people who are really experts in the field.” (Clinician, IDI participant)

Participants were motivated to use the technology and saw this as a good way to expand communication among providers. One participant remarked on the cost savings aspect of using distance learning for providers who were dispersed geographically,

“The strength is that I feel like it [ECHO] is cheaper. Previously if we had to present cases, we need to bring people from Blantyre, from Zomba, and come in together at the Lighthouse and start presenting the cases but now everyone can join in from their various working places. That’s brilliant.” (Clinician, IDI participant)

VIEWS ON THE FORMAT

Both didactic and case presentations were highly acceptable formats for learning among participants. One participant described this combination of didactic and case presentations as a “very, very powerful approach to learn”. Participants emphasized that each format was effective in different ways.

Participants appreciate that the didactic sessions were useful for learning new procedures, receiving updated information on guidelines. In addition, some participants said the didactic sessions offered an opportunity to hear about results of research that lead to conclusions about different drugs or treatments, as this participant said,

“I remember a certain presentation by doctor X about viral load and DTG, ...that presentation showed some values [statistics] on how they came up with the decision that DTG is better, can be used, even is better than the PIs [protease inhibitors], so I liked that presentation including the statistics and how they came up with that conclusion.” (Clinician, FGD participant)

For another participant, the didactic session encouraged innovation on improving patient care,

“I would say I use 80 percent of what we usually discuss and the other 20 percent I would say is what as a clinician I feel might also be beneficial after sieving out the ideas from the ECHO session. I would give an example of this guy [who] present[ed] on hepatitis B and the use of DTG that could flare up hepatitis. So we had a similar case here and we applied what was presented in project ECHO. We managed [the case] accordingly and we even tried to start coming up with innovations to see if we could be screening for hepatitis for everyone who is coming in to start DTG, so that is still in the pipeline, but that is the extent to which we are using ECHO session.” (Clinician, IDI participant)

For other participants, the updates included reminders on procedures routinely provided in the clinic, but providers were not necessarily following the proper procedures any longer. The didactic sessions served as a reminder for the previously learned, but not necessarily always practiced procedures.

On the other hand, participants said the case presentations offered the opportunity to learn, share, and discuss with colleagues the best management approaches for different types of cases, particularly complicated cases. Participants thought the case presentations were “practical” and providers could present active cases that they could then go back and provide the recommended case management.

“...because the cases that we have had [in case presentations] were real cases and not cases that were being created out of the blue. They were real patients so actually, we had to get back to the patients and implement [case management] discussed [during the ECHO session]. I had a patient in the TB ward with suspected renal failure and we discussed on dose adjustments and we did that and it really worked and right now the patient is fine and good, so it has helped me in managing patients, [more] than if we had a discussion with a fellow clinician because we had many inputs from other people [during the ECHO session] on how to go about it [patient management].” (Clinician, IDI participant)

SHARING INFORMATION

Generally, participants shared information learned in the ECHO sessions with other clinicians and nurses in the facility where they worked. This was shared informally during patient care consultations and discussions. Participants who were health providers at referral hospitals shared information learned through ECHO sessions with providers who had patients referred to their facility, which was written in the patient’s health passport so referring clinicians from other facilities could review the information. One participant noted sharing information with their patients as part of the patient education they provided. Interestingly for one participant, they felt more confident sharing information from ECHO sessions with colleagues when the information was presented along with data to back up what was presented.

EXAMPLES OF PRACTICAL APPLICATIONS OF LEARNING

Participants shared many examples of how information learned in didactic sessions as well as through case presentations was used in their own patient care practice. Examples ranged from Hepatitis B case management to pediatric HIV, second line regimen, and viral load monitoring. The following examples illuminate the range of practical application of knowledge gained through participation in the ECHO program.

“...we had a case and this case was presented at [health facility] by my colleague. She was a lady who had pancreatitis and she had two operations because of the mentioned problem and was actually positive with renal complication. So we had a problem on how we can actually decide which regimen can this patient take. The case was presented and we learnt how to manage this case and actually it’s when I started to know that we should not always think inside the box, ...that we do have a guideline but sometimes we can jump out of the guideline and manage the case according to the way the case has presented itself. This one [patient] we gave ...a nonstandard regimen... as I am talking now the patient is ok, physically fit, walking and is on [her] regimen.” (Clinician, IDI participant)

“...there was this presentation [on] TB in adults, TB in children. So after this presentation, I got some points whereby we were looking at those people at risk of getting TB, we were looking at these children who were under five that were at risk of contracting TB.

Therefore, [based on the ECHO session presentation] I was able to give counseling to our colleagues to say if you have contact with say a relative, mother or whoever, these children they need to come to the hospital for screening of TB. All this information we were able to share, to give maybe prophylaxis before things get worse or just to come for screening.” (Nurse FGD participant)

CHALLENGES AND AREAS OF IMPROVEMENT

Challenges to participation in the ECHO sessions related to technology, timing, and available space. While participants like using the video conferencing technology, internet stability prevented or limited facilities ability to join ECHO sessions. Facilities were assessed for internet connectivity during the initial set up phase of the program, and all of the facilities involved in the pilot were considered to have good internet connectivity, but participants recognized that internet stability is a general problem in Malawi. One of the pilot facilities in particular consistently experienced internet connectivity problems and missed the majority of the ECHO sessions because of audio or other internet related problems.

When video conferencing equipment used for the ECHO sessions breaks, there are delays in repairing it. One participant said,

“...when an instrument is faulty for it to be repaired or replaced it takes time, for example here at [health facility] we have a camera that is not functioning now, but for it to be repaired or replaced, I don't know when this will be done. We have been attending sessions without a good camera for several months now.” (Nurse, IDI participant)

In addition to the internet and technology concerns, facilities were also constrained by space limitations and had to hold ECHO sessions in the same area where patients come for services. One participant said,

“...the area [where we were] actually doing our ECHO sessions [was the same] area where we were having our clinic, so we tried, we tried on some limited sessions to divert the patients to the electrician room...So the other challenge was the issue of connectivity there were times when we, aah, we really failed to join the session because of the [connectivity] issue.” (Clinician, IDI participant)

Participants felt that more time was needed during the ECHO sessions for asking questions, clarifying information and to have more discussion for case presentations and for the didactic portion of the session. Many said there was not sufficient time in the one-hour session for questions and discussion, as this participant said,

“...we normally have didactic and case presentation within a space of one hour and in most cases because of technology problem we actually start late, probably 3:10 or 3:15, so within the space of one hour discussing two topics or two presentation is where people end up listening and having no time for questions or no time for discussions or no time for comments...” (Nurse, IDI participant)

ECHO sessions occurred weekly, and participants felt they did not have enough time to prepare case presentations or to come across interesting cases to present, resulting in presentation of cases that are routinely seen in the clinic, rather than more complicated cases that are difficult to manage. Participants suggested making the sessions less frequent, monthly or every two weeks, rather than weekly, and extending the time of each session to one and a half or two hours. Other suggestions were to dedicate each session to one format, case presentation or didactic session, and alternating these formats for each ECHO session, so that one ECHO session focuses only on case presentation and the next session is dedicated to a didactic presentation. One participant suggested that subject matter experts present cases as well as provide didactic sessions. This participant suggested expanding subject matter experts to other specialty areas such as pediatrics, general medicine and surgery.

Several participants noted a lot of talking during the case presentation sessions, which made it difficult for the moderator to manage the discussion well. Participants sent in questions or comments electronically and the moderator was not always able to keep up with moderating as well as monitoring questions coming in electronically.

“...there is a lot of talking and not everyone can talk at the same time, so sometimes when you write a text to the moderator to say that I feel like we can do ABC, you will find that maybe they have missed that so I feel like during the sessions we can have someone just to be looking at the messages, so that the person can be reminding the moderator to say that you have these messages from people.” (Clinician, IDI participant)

Limited attendance was an issue. Participants said that the content was more clinical, and of less interest to pharmacy or surgical staff, for example. Some felt the content was too clinical for nursing staff, but participants generally agreed that the sessions could benefit anyone involved in HIV patient care. Some of the cases presented were very complex and not typical cases that presented in the facilities.

Facilities were juggling staff to cover the clinics, noting that the frequency of the sessions could negatively impact patient care as staff are absent from the clinic to attend ECHO sessions.

“...we think at least for a month we can do two ECHO sessions, so it can give us good time to prepare for those. If we do each and every Tuesday, we create gaps at our various work places, which affects our clients as well.” (Nurse, FGD participant)

Participants noted that health providers often had limited time and energy for attending ECHO sessions, and suggested offering refreshments as a way to encourage attendance.

“I think the sessions also lacked some sort of motivation because ...the timing of like on a Thursday and this time when, aah, mostly the health workers are really tired. And then there were not really any drinks or snacks during the sessions.” (Clinician, IDI participant)

Others noted that while sessions were useful and everyone providing HIV care to patients should attend, there was an impression that not all staff felt “ownership” of the ECHO program and therefore not motivated to attend the sessions.

“We would like the MOH guys to be attending the ECHO sessions in large number but we don’t know how [to motivate them]. Maybe if we were kind of make them own this initiative, like they should be the ones in the forefront, maybe it would move their hearts to be attending the ECHO sessions, they think this is an EGPAF thing.” (Nurse, FGD participant)

COST OF IMPLEMENTING PROJECT ECHO IN MALAWI

Table 9: Cost of Implementing Project ECHO in Malawi

EQUIPMENT PER SPOKE			EQUIPMENT PER HUB	
DESCRIPTIONS	AMOUNTS MWK	AMOUNTS \$	AMOUNTS MWK	AMOUNTS \$ (USD)
EQUIPMENT PER SPOKE				
Loud Speaker	MWK 37,995.00	\$51.83	MWK 37,995.00	\$51.83
Amplifier	MWK 49,995.00	\$68.21	MWK 49,995.00	\$68.21
Conference Kit	MWK 1,561,750.00	\$2,130.63	MWK 1,561,750.00	\$2,130.63
KVA UPS	MWK 640,750.00	\$874.15	MWK 640,750.00	\$874.15
Laptops	MWK 990,250.00	\$1,350.95	MWK 990,250.00	\$1,350.95
Projector	MWK 867,925.00	\$1,184.07	MWK 1,988,072.00	\$2,712.24
Installation Cost	MWK 238,513.00	\$325.39	MWK 238,513.00	\$325.39
Total cost	MWK 4,387,178.00	\$5,985.24	MWK 5,507,325.00	\$7,513.40
ADDITIONAL COSTS				
Annual Supplies Cost per spoke				
DESCRIPTIONS	AMOUNTS MWK	AMOUNTS \$		
Annual Supplies Cost per spoke	MWK 13,450.00	\$18.35		
Internet Cost per session on a spoke				
DESCRIPTIONS	AMOUNTS MWK	AMOUNTS \$		
Internet Cost per session on a spoke	MWK 8,000.00	\$10.91		

Table 9 outlines the costs required to set up and implement TeleECHO session in Malawi. Main setup costs calculated included:

1. Total cost of the equipment installed at a spoke site
2. Total cost of the equipment installed at a Hub site

An estimated cost required for the equipment set up is estimated to be around \$5,985.24 per spoke site and about \$7,513.40 per hub site. Additional cost also required included annual suppliers that comprised of stationery for data collection and CPD booklets for one spoke for a period of one year (\$18.35) per spoke site and about \$10.91 cost of internet per session per spoke site (Table 9).

DISCUSSION

This report presents the evaluation results of the ECHO distance learning model in Malawi. The report provides supporting evidence of the feasibility and acceptability of the TeleECHO model with significant increase in knowledge, perceived capability and job satisfaction of HIV care providers.

HEALTH CARE WORKERS` PARTICIPATION IN THE ECHO PROJECT

Analysis of the project showed that majority of the participants (72%) were nurses, which is not surprising because task-shifting of responsibilities in HIV clinical care in Malawi have led to nurses filling the role of main provider of ART services..

KNOWLEDGE, PERCEIVED BEHAVIORAL CAPABILITY, AND JOB SATISFACTION OF PROVIDERS

One of the objectives of the evaluation was to measure the impact of the teleECHO model on the provider`s knowledge, behavioral capability and professional satisfaction. This evaluation has demonstrated that the teleECHO distance learning model can lead to increase in knowledge, behavioral capability and professional satisfaction as has been shown in other settings.

Knowledge change assessed by comparing a pre-test and post-test evaluation showed an average positive net change in knowledge, even though it was not statistically significant. This was associated with a statistically significant increase in perceptions of behavioral capability in performing HIV case management, although the sample size is small, and an increase job satisfaction. Providers were satisfied with the didactic and the case presentation, and they thought ECHO session should continue as they acquired knowledge from the sessions that has aided them to better manage patients. Additionally, the ECHO sessions provided a forum for providers to share information with others who did not attend these sessions

However, a negative change in knowledge was observed on some topics when comparison was made between the pre-test and post-test. The negative change in knowledge noted on topics on “HIV and Heart” and “HIV and Neurology” can be attributed to the low attendance in the sessions where their topics were covered or the more complex material presented during these sessions such

as in “HIV and Hepatitis B”. Conversely, a high net positive change in knowledge observed for topics such as ART side effects and Pulmonary TB, sessions that had higher attendance.

The knowledge scores were higher among clinicians than nurses. Although the more clinical orientation of the sessions may have been an advantage to clinicians, the largest knowledge change was observed in the nurses, indicating that the ECHO model specifically works well in reaching out to a variety of healthcare cadres.

FEASIBILITY AND ACCEPTABILITY OF THE TELEECHO IN MALAWI

The population included in the Malawi teleECHO evaluation were from various backgrounds and had varying experience in providing HIV care. Despite variability in qualifications, the ECHO model was appreciated by everyone and was noted to be feasible with slight adjustments to accommodate ongoing provision of clinical services in some sites. The attendance at each session was good, with more than 50% of the participants attending 8 out of 16 topics. Motivation to attend the sessions including gaining knowledge. Competing factors which may have hindered the ECHO sessions included a having a “busy clinic”.

Initial start-up costs of setting up the ECHO equipment is an investment of an estimated \$5,985.24 per spoke site and about \$7,513.40 per hub site, but cost per internet ECHO session once the equipment was installed was less than \$11 per session. Distance learning can provide an economic alternative to in-person trainings, eliminating travel and other logistical costs. For facilities bearing a heavy patient care burden and limited number of healthcare providers providing HIV care and treatment services, onsite mentoring support reduced the time providers might spend away from the facility.

ZOOM TECHNOLOGY

All ECHO sessions were held over Zoom, an innovative cost-reduction technology. However slow/poor internet connectivity posed a major challenge, with failure to connect to Zoom being noted to be “embarrassing” at times. While the internet connectivity should not be understated as a challenge in ensuring participants are able to join the ECHO sessions, there may be alternatives for improving how Zoom is used. Zoom is a technology that can be used on Smart phones as well as laptop computers. The use of Zoom on alternative devices may provide more practical ways to find a location with more adequate internet connectivity in order to join the ECHO sessions. Additional training may be warranted for scale up at facility sites for IT staff to manage and repair cameras and other equipment. Considering that 93% of ECHO participants reported access to the internet and computers at their facility, this innovation presents a feasible, less costly alternative to traditional in-person training and mentoring programs.

RECOMMENDATIONS

Based on the findings of this evaluation and the experiences of the Malawi ECHO Project Consortium in piloting this innovative program, several recommendations have been developed for scale up in the future.

TECHNOLOGY

- Improve training of IT staff in using and maintaining the teleconferencing technology
- Provide training to participants on how to use Zoom on Smart phones, laptop computers and other devices

SESSION FORMAT AND CONTENT

- Consider reducing frequency of ECHO sessions to allow more time for providers to prepare more complex or interesting cases presentations
- Provide PowerPoint slides and materials on paper or electronically for providers’ future reference
- Simplify the materials shared during the ECHO sessions to make it “too clinical”
- Allow providers to take part in preparation of the ECHO curriculum by identifying the key topic areas and case presentations that they may be interested to learn about
- Increase the duration of the session to accommodate all questions that may be raised
- Include a moderator in the sessions
- Diversify the case presentations and include other SMEs and colleagues from other departments

INCENTIVES AND COORDINATION

- Consider providing small incentives such as refreshments during the ECHO session
- Emphasize potential to receive CPD credits for participation
- Provide designated physical space in the facility (that is not a clinical area) for holding ECHO sessions
- Improve coordination of the timing of ECHO sessions to avoid peak hours for service delivery in ART clinics

CONCLUSION

The evaluation of the ECHO project in Malawi demonstrated that the ECHO model is feasible in Malawi with the majority of the healthcare providers who participated in the TeleECHO sessions being satisfied with the sessions and knowledge gains identified. The ECHO model is relevant to the country’s health system, as it builds the capacity of workers who were specifically assigned task shifting in an efficient way using technological innovation.

ECHO sessions improved the knowledge of health care providers and assisted them to provide improved/correct care to patients.

Some difficulties exist in establishing an internet connection. This is a general problem that may have an effect on how the ECHO model is implemented in Malawi. However, most participants felt that the ECHO sessions should continue.

The main success of the project was the attendance of the TeleECHO sessions by providers, which lead to improvements in their knowledge and can improve quality of patient care. Building on these successes, lessons learned, the following considerations and next steps can be made:

- Consolidate the achievements of the pilot phase and consider expanding ECHO to other sites
- Build the institutional framework for making the e-learning approach an efficient and preferential alternative for building in-service human resource capacity
- Advocate for resource mobilization with governments and development partners

APPENDICES

APPENDIX A: EVALUATION PLAN

Goals of Evaluation	Methods	Metrics
<p>1. Determine feasibility and acceptability of ECHO model in Malawi</p>	<ul style="list-style-type: none"> • Process Evaluation – Document inputs, activities and outputs • Focus groups with participants (Appendix F) • In-depth interviews with mentors and clinic administrators (Appendix F) • Survey with Providers, Mentors, Clinical Administrators (Appendix G) 	<ul style="list-style-type: none"> • # trainings, # cases presented, # registered for ECHO, # receiving log-in IDs, # in each session, frequency and content of trainings • Focus group data • Feedback from mentors and administrators on impact on building skills, improving teamwork and clinic operations
<p>2. To measure the effect of ECHO on providers' knowledge, perceived behavioral capability, professional satisfaction and acquisition of CPD points through surveys.</p>	<ul style="list-style-type: none"> • Knowledge, perceived behavioral capability and professional satisfaction pre/post questionnaire for providers (Appendices C and E) • TeleECHO session evaluations (Appendix K) 	<ul style="list-style-type: none"> • Knowledge pre- and post-test scores • Perceived behavioral capability and professional satisfaction pre- and post-test scores • Feedback from participants on quality and content of trainings
<p>3. To determine the cost of implementing Project ECHO in Malawi</p>	<ul style="list-style-type: none"> • Costing data will be collected using standard tools with defined cost categories. Cost categories will include personnel, supplies, training, equipment, travel, and other costs not covered by one of these categories.. The cost analysis will be performed to evaluate the financial costs at two stages of the iECHO program: start-up 	<ul style="list-style-type: none"> • The total cost of the package of Project ECHO will be estimated by cost category, by participant, and by type of cost (start-up or recurring cost)

APPENDIX B: CURRICULUM FOR DIDACTIC SESSIONS

Session Number	Title	Objectives	Proposed topics
ART monitoring and failing complex			
1	ART - side effects	To be able to describe and recognize the most important side effects of ART and CPT used in Malawi	Side effects, lipodystrophy, gynecomastia, lactic acidosis, PNP, psycho effects of EFV, skin reactions, GI side effects
2	ART – monitoring	To be able to explain current monitoring of ART effect, VL measurements and how to act on high VL	VL measurements, POC-VL,
3	ART - 1st line treatment failure	To understand required interventions on patients with high VL	High routine VL, Targeted VL, failing 1st line
4	ART- adherence	To describe problems of adherence in ART patients and possible mechanisms to deal with them	adherence interview and counseling
5	ART- second line failure	To be able to understand implications of resistance testing especially in respect to 3rd line treatment	mutations, resistance, 3rd line treatment options
HIV medicine OI complex			
6	HIV and Neurology	To understand the most common causes of neurological diseases in HIV patients and how to diagnose them in the resource-limited setting	CM, TB meningitis, bact meningitis, Toxo, TB spine, PNP, stroke
7	Cryptococcal meningitis	To be able to describe the clinical picture, diagnostic options and treatment of CM	CM, CSF results, CrAg test, Ampho, Fluco, pressure management, prophylaxis
8	HIV and Lung	To be able to describe the most common opportunistic infections (other than PTB) of the respiratory system of HIV patients	PCP, pneumonia, pulmonary KS,
9	HIV and Heart	To understand the effect of HIV infection on the heart as well as the most common presentations and treatment of opportunistic infections	HIV associated CMP, TB Pericarditis, Cor pulmonale, other common cardiac comorbidities (LVH, failure MS)
10	HIV and Hepatitis B	To understand the effect of hepatitis B co-infection and its diagnostic and therapeutic implications	Hep B epidemiology, Hep B virology, disease course, cirrhosis, HCC, TDF and 3TC treatment

Session Number	Title	Objectives	Proposed topics
11	HIV and Skin	To be able to describe skin changes using dermatological vocabulary,.To be able to recognize and understand the most common skin conditions seen in HIV patients	PPE, folliculitis, scabies, HSV, Zoster, eczema, psoriasis, seborrheic dermatitis, SJS
12	STI infections in the HIV setting	To be able to describe and to use the syndromic approach in STI management and name the most important pathogens	ulcer, bulbo, discharge, PID, Neisseria, Syphilis, Chlamydia, HSV
13	ALUP differentiated care	To be able to the relevant diagnostic steps and prophylaxis for newly initiating or failing very immunosuppressed patients	WHO Staging, CD4, ALUP, CPT, azithromycin, fluconazole, IPT, Cr Ag LAM
TB complex			
14	Pulmonary Tuberculosis	To understand the mutual effect of TB and HIV infection on the clinical course, To understand the cause of TB, its clinical stages and diagnostic options	MTB, primary and post-primary, respiratory transmission, smear positive, smear negative, AFB, GeneXpert, LAM
15	EPTB	To be able to describe the most common manifestations of EPTB seen in HIV patients	Disseminated TB, pericardial TB, LN TB, TB meningitis, pleural TB
16	Recognizing and dealing with IRIS	To be able to describe the most common IRIS phenomena and how they should be treated	TB IRIS, CM IRIS, KS IRIS
17	Treatment of HIV/TB co-infected patients	To be able to describe diagnostic and therapeutic problems of HIV/TB co-infected patients	Smear results, GeneXpert, FASH, boosted PI, shared toxicity
Pediatric HIV medicine complex			
18	Pediatric HIV testing and EID	To describe the testing and diagnosis of HIV in HIV exposed children.	Diagnosing and follow up of perinatally exposed children and infants and those breastfeeding. Rapid HIV testing/ELISA. Virological testing.
19	TB in children	To describe the clinical features, diagnosis, and treatment of TB in children. To present the differences with adult TB and common manifestations of EPTB.	Common presentations and history. Diagnostic methods. Treatment of TB. Approach to TB treatment in those with HIV. PTB, LN TB, CNS TB.
20	Pediatric ART and supportive care	To describe the approach to initiating, monitoring, and side effects to ART. To present additional information on routine care of pediatric patients.	When to initiate ART, formulations for peds, dosing, side effects (IRIS), viral load monitoring, when to switch

Session Number	Title	Objectives	Proposed topics
			regimen. 2nd and 3rd line regimens. Nutrition , infant feeding and immunizations
21	Adolescent HIV medicine	To describe the treatment and challenges of treating adolescents with HIV.	ART regimens, issues surrounding compliance, disclosure, mental health. Transition from child to adolescent care. Transition to adult care.
Non-communicable diseases			
22	HIV and NCD	To be able to describe the effect of HIV on age related NCD, to describe screening strategies and treatment options	HTN, arteriosclerosis, diabetes
23	Kaposi Sarcoma	To be able to describe the pathophysiology of KS, the typical clinical presentations, diagnostic pathways and therapeutic options	KS, HSV-8, skin manifestation, visceral KS, punch biopsy, pathology, chemotherapy
24	HIV and Kidney	To understand the effects of HIV and ART on kidney function	HIVAN, AKI, creatinine clearance, urine dipstick, TDF effects, ACE-I
25	Contraception and family planning	To describe methods of family planning available and understand advantages and disadvantages	Pills, Depoprovera, IUD, TL
26	Transition of adolescents to adult care		

APPENDIX C. PRE- AND POST-ECHO KNOWLEDGE ASSESSMENT

ART - side effects

To be able to describe and recognize the most important side effects of ART and CPT used in Malawi

- 1) Which of the following statements on gynaecomastia is TRUE?
- a) It is only seen in male patients and should not lead to ART switch as it is not life threatening.
 - b) It is seen in male and female patients (especially recognized in young girls) and needs to be taken seriously.
 - c) It is only seen in male patients and should lead to an immediate ART switch in all cases for the risk of breast cancer.
 - d) It is seen in male and female patients but in female patients, it is irrelevant as they have breasts anyway.
 - e) Don't Know

Correct: B

- 2) A patient newly started on tenofovir/lamivudine/efavirenz (TDF/3TC/EFV) and cotrimoxazole (CPT) is developing a red itchy rash, which increasingly blisters and involves the mucosal surfaces. Almost all drugs can cause this, but which are the two most likely causative drugs?
- a) lamivudine (3TC) and efavirenz (EFV)
 - b) Tenofovir (TDF) and cotrimoxazole (CPT)
 - c) Efavirenz (EFV) and cotrimoxazole (CPT)
 - d) Tenofovir (TDF) and efavirenz (EFV)
 - e) Don't Know

Correct: C

ART - monitoring

To be able to explain current monitoring of ART effect, VL measurements and how to act on high VL

- 3) A patient with high VL (140.000 copies/ml) on TDF/3TC/EFV is seen. The patient is intensively counseled on adherence and is instructed to take his ART in the next month very exact. If his ART is still effective what do you expect after one month?
- a) The VL will not increase further
 - b) The VL will fall by a factor of 3
 - c) The VL will be suppressed
 - d) The VL will fall by a factor of 10
 - e) Don't Know

Correct: D

- 4) Which of the following statements on "targeted VL" is TRUE?
- a) They should be done after 6 month, 24 month and then every 24 month
 - b) They should be done at any time when a patient is suspected to fail on ART
 - c) They are costly and should therefore be done in a very restricted way
 - d) They can only be done on POC machines and are rarely available

- e) Don't Know

Correct: B

ART -1st line treatment failure

To understand required interventions for patients on 1st line ART with high VL

- 5) A patient on tenofovir/lamivudine/efavirenz (TDF/3TC/EFV) for 4 years is complaining of newly developing oral thrush, extensive warts on the hands and feet and a recurrent anemia (Hb = 6.5 g%). The patient believably reports good adherence especially as the drugs helped her so well in the beginning. The VL was taken a few months ago but the result was never received. The turn-around-time for VLs at your clinic is approximately 8-10 weeks. What would you suggest?
- a) Give fluconazole and switch the patient to ABC/3TC/ATV/r on clinical ground
 - b) Give fluconazole, take another VL sample and refer for intense adherence counseling
 - c) Give fluconazole and refer the patient to hospital for transfusion
 - d) Give fluconazole and reassure the patient
 - e) Don't Know

Correct: A

- 6) What is the main risk of prolonged 1st line treatment with continuous low viraemia (VL fluctuating between 1000-6000 copies/ml)?
- a) The virus can cause opportunistic infections
 - b) The virus can acquire resistance mutations
 - c) The ART can have side effects
 - d) The virus can convert from CCR-5 to CXCR-4 strain
 - e) Don't Know

Correct: B

ART- adherence

To describe problems of adherence in ART patients and possible mechanisms to deal with them

- 7) Which factors are least likely to affect adherence?
- a) Provider related factors
 - b) Medication related factors
 - c) Virus related factors
 - d) Patient related factors
 - e) Don't Know

Correct: C

- 8) Which of the following patients is at the highest risk for poor adherence?
- a) A 16-year old boy going to boarding school
 - b) A 32-year old married pregnant mother
 - c) A 45-year old male engineer
 - d) A 6-year old son of a school teacher

e) Don't Know

Correct: A

ART- 2nd line treatment failure

To be able to understand implications of resistance testing especially in respect to 3rd line treatment

9) Protease inhibitors (PI) are relatively stable to resistance development and resistance only develops after a long time on a failing regimen. What are risk factors for quicker resistance development to ritonavir-boosted PIs?

- a) Concomitant TB treatment
- b) An ATV-based regimen
- c) Concomitant antihypertensive treatment
- d) Previous NVP treatment
- e) Don't Know

Correct: A

10) 3TC is given as part of 1st, 2nd and even 3rd line treatment. The main reason is

- a) 3TC is present in all fixed-drug combinations available
- b) 3TC cripples the HIV even when resistance mutations are existing
- c) 3TC increases the drug levels of other drugs ("boosting")
- d) 3TC does not induce resistance mutations
- e) Don't Know

Correct: B

HIV and Neurology

To understand the most common causes of neurological diseases in HIV patients and how to diagnose them in the resource-limited setting

11) Stroke symptoms in HIV patients

- a) Are mainly due to hypertension
- b) Only occur in older adults
- c) Can have a variety of causes including infectious reasons
- d) Are usually transient
- e) Don't Know

Correct: C

12) Toxoplasmosis

- a) Should be always diagnosed by brain CT
- b) Can be diagnosed by resolution of symptoms during few days of toxoplasmosis treatment
- c) Is mainly a serological diagnosis
- d) Is associated with CD4 cell counts $>350/\text{mm}^3$
- e) Don't Know

Correct: B

Cryptococcal Meningitis

To be able to describe the clinical picture, diagnostic options and treatment of CM

13) Which regimen would you optimally use to treat cryptococcal meningitis in Malawi:

- a) Fluconazole 1200 mg for 2 weeks followed by fluconazole 400 mg for 8 weeks followed by fluconazole 200 mg for life
- b) AmphotericinB 1 mg/kg + fluconazole 1200 mg for 1 week followed by fluconazole 1200 mg for 1 week followed by fluconazole 400 mg for 8 weeks followed by fluconazole 200 mg for life
- c) Flucytosine 25 mg/kg qds + fluconazole 1200 mg for 7 d followed by fluconazole 1200 mg for 7 d followed by fluconazole 400 mg for 8 weeks followed by fluconazole 200 mg for life
- d) Fluconazole 800 mg for 2 weeks followed by fluconazole 400 mg for 8 weeks followed by fluconazole 200 mg for life
- e) Don't Know

Correct: B

14) Which of the following statements is TRUE:

- a) In patients with high intracerebral pressure lumbar puncture should not be done as there is a risk of herniation
- b) Intracerebral pressure in cryptococcal meningitis treated with pressure relief leads only to symptomatic improvement and is of unclear benefit
- c) Intracerebral pressure in cryptococcal meningitis treated with pressure relief leads to reduced mortality and morbidity
- d) With optimal antifungal treatment pressure relief is not necessary.
- e) Don't Know

Correct: C

HIV and Lung

To be able to describe the most common opportunistic infections (other than PTB) of the respiratory system of HIV patients

15) Which of this lung infections occur in patients with high (>200 CD4 cells)

- a) CMV
- b) PCP
- c) Atypical mycobacteria
- d) Bacterial pneumonia
- e) Don't Know

Correct: D

16) Symetric interstitial "ground-glass" infiltrates are typically a sign for

- a) TB
- b) Cryptococcosis of the lung
- c) PCP
- d) Lymphoma

e) Don't Know

Correct: C

HIV and Heart

To understand the effect of HIV infection on the heart as well as the most common presentations and treatment of opportunistic infections

17) Which of the following statements on the treatment of pericardial effusion is correct:

- a) Pericardiocentesis should always been done before treatment to find the diagnosis
- b) The most common cause is pericardial TB so presumptive treatment is an option
- c) KS does cause pleural effusion, but no pericardial effusion
- d) Steroids should never be given a the are an immune-suppressive drug
- e) Don't Know

Correct: B

18) Which of the following drugs plays no role in the treatment of HIV-associated cardiomyopathy?

- a) ACE-Inhibitors e.g. enalapril
- b) Diuretics e.g. furosemide (Lasix)
- c) Theophyllin
- d) Spironolactone
- e) Don't Know

Correct: C

HIV and Hepatitis B

To understand the effect of hepatitis B co-infection and its diagnostic and therapeutic implications

19) Which of the following complications are NOT commonly seen in patients with HIV/HBV co-infections?

- a) Hepatocellular carcinoma
- b) Liver cirrhosis
- c) Drug induced liver injury (jaundice)
- d) Obstructive biliary dilatation
- e) Don't Know

Correct: D

20) Which of the following statements on ART treatment of HIV/HBV co-infected patients is true.

- a. TDF/3TC based regimen do not pose problems as they are active against both viruses
- b. TDF/3TC based regimen can pose problems especially when starting or stopping the regimen
- c. There is HIV resistance to TDF or to 3TC but resistance in HBV does rarely develop
- d. An HIV/HBV co-infected patients should be treated with a ATV or LPV based regimen
- e. Don't Know

Correct: B

HIV and Skin

To be able to recognize and understand the most common skin conditions seen in HIV patients

21. Which of the following skin conditions does NOT typically present with blisters and ulcers?
- HSV Infection
 - VZV Infection
 - HPV Infection
 - SJS Steven-Johnson Syndrome
 - Don't Know

Correct: C

22. Which of the following statements is TRUE?
- Papular puritic eruptions (PPE) is an infectious condition caused by fungal pathogens of the skin.
 - The best treatment for papular puritic eruptions (PPE) is symptomatic and ART.
 - Papular puritic eruptions (PPE) is a highly contagious condition affecting whole families and is predominately intertriginal and on the finger webs.
 - Papular puritic eruptions (PPE) is usually a sign of advanced HIV illness and most people will die.
 - Don't Know

Correct: B

STI infections in the HIV setting

To be able to describe and to use the syndromic approach in STI management and name the most important pathogens

23. Which statement on genital HSV is correct?
- There is no difference on the course of HSV diseases in HIV infected and non-infected patients
 - When the patient has no ulcers he or she is not infective for HSV
 - Treatment is with acyclovir or valacyclovir
 - HSV co-infection lowers the risk of HIV transmission
 - Don't Know

Correct: C

24. Which of the following syndromic STI treatments is correct?
- Urethral discharge – gentamycin+doxycycline
 - Pelvic inflammatory disease- gentamycin+doxycycline+acyclovir
 - Genital ulcer - gentamycin+doxycycline+metronidazole
 - Inguinal bulbo - gentamycin+doxycycline+fluconazole
 - Don't Know

Correct: A

ALUP differentiated care

To be able to describe the relevant diagnostic steps and prophylaxis for newly initiating or failing very immune-suppressed patients

25. Which of the following tests is most relevant for patients with with CD4 counts >100?

- a. Urine-LAM for disseminated TB
- b. Serum-CrAg for cryptococemia
- c. Skin exam for KS
- d. Ophthalmoscopy for CMV retinitis
- e. Don't Know

Correct: C

26. Patients with advanced HIV disease, especially CD4 counts < 100 profit from a variety of prophylactic measures. Which would you recommend?

- a. Cotrimoxazole, multi-vitamins and zinc
- b. Cotrimoxazole, IPT and monthly depot penicillin
- c. Cotrimoxazole, azithromycin, albendazole and IPT
- d. Cotrimoxazole, therapeutic feeding, IPT
- e. Don't Know

Correct: C

Pulmonary Tuberculosis

To understand the mutual effect of TB and HIV infection on the clinical course

To understand the cause of PTB, its clinical stages and diagnostic options

27. Which of the following statements on patient with latent TB and HIV is TRUE?

- a. The lifetime risk to develop clinical TB is 10%.
- b. Latent TB and HIV have no relevant interactions.
- c. The annual risk of progression to active TB is 10%.
- d. Patients with proven latent TB and HIV should be treated with 2RHZE/4RH.
- e. Don't Know

Correct: C

28. Which following chest X-ray changes is unusual in "post-primary" TB?

- a. Cavitation
- b. Upper lobe infiltrates
- c. Lymphadenopathy
- d. Fibrotic changes
- e. Don't Know

Correct: C

EPTB

To be able to describe the most common manifestations of EPTB seen in HIV patients

29. Typical ultrasound changes suggesting disseminated TB are
- Enlarged lymph nodes and spleen micro-abscesses
 - Enlarged echogenic liver
 - Splenomegaly > 16 cm
 - Dilated bile ducts
 - Don't Know

Correct: A

30. Which of the following are NOT typical signs and symptoms of disseminated TB?
- Loss of weight
 - Anemia
 - Night sweats
 - Headaches
 - Don't Know

Correct: D

Recognizing and dealing with IRIS

To be able to describe the most common IRIS phenomena and how they should be treated

31. When is the most common time to expect IRIS symptoms?
- Immediately after ART initiation
 - 4-8 weeks after ART initiation
 - 6-8 month after ART initiation
 - IRIS is commonly seen after years of ART treatment
 - Don't Know

Correct: B

32. Which of the following diseases does very rarely cause clinically relevant IRIS?
- TB-IRIS
 - Syphilis-IRIS
 - KS-IRIS
 - Cryptococcal-IRIS
 - Don't Know

Correct: B

Treatment of HIV/TB co-infected patients

To be able to describe diagnostic and therapeutic problems of HIV/TB co-infected patients

33. Which of the following commonly used ART drugs is not compatible with RHZE?

- a. EFV
- b. TDF
- c. 3TC
- d. ATV/r
- e. Don't Know

Correct: D

34. Rifabutin is a treatment option increasingly available in Malawi. What is the advantage?

- a. It is better tolerated
- b. It is compatible with ATV/r
- c. It allows shorter treatment regimens (4 month)
- d. It is better absorbed orally
- e. Don't Know

Correct: B

Pediatric HIV testing and EID

To describe the testing and diagnosis of HIV in HIV exposed children.

35. Which of the following statements on HIV antibody tests in children less than 24 months of age is true?

- a. A positive HIV antibody test indicates that the child has acquired HIV infection.
- b. Use of this test in this age group is not helpful, especially in the inpatient setting.
- c. Infants can have their mother's HIV antibodies for up to 18-24 months of age.
- d. The specificity of the HIV antibody test decreases as the child becomes older.
- e. Don't Know

Correct: C

36. A 6-month old male who is currently breastfeeding with an HIV positive mother who started ART during the last trimester of her pregnancy would be considered presumed severe HIV disease (PSHD) in which of the following situations.

- a. Infant with positive rapid antibody test PLUS cryptococcal meningitis
- b. Infant with positive rapid antibody test PLUS severe pneumonia
- c. Infant with oral thrush and DNA PCR sent for suspected HIV infection.
- d. Infant with severe sepsis and DNA PCR sent for suspected HIV infection.
- e. Don't Know

Correct: A

37. In which scenario would you perform **ONLY** DNA PCR to diagnose HIV infection (not including confirmation testing)?

- a. 15-month old baby who is breastfeeding with an HIV infected mother on ART.
- b. 7-month old baby presenting for the first time, who is well-appearing and breastfeeding with an HIV infected mother on ART.

- c. 19-month old baby who discontinued breastfeeding to an HIV-infected mother at 17 months of age.
- d. 4-month old baby who presented to the hospital acutely ill and found to have pneumonia and oral thrush.
- e. Don't Know

Correct: B

TB in children

To describe the clinical features, diagnosis, and treatment of TB in children.

To present the differences with adult TB and common manifestations of EPTB.

38. In what ways does TB in childhood differ to adults?
- a. TB in children is harder to diagnose through sputum and/or chest x-ray and often presents as extrapulmonary/disseminated TB.
 - b. TB in children is easier to diagnose through sputum and/or chest x-ray and often presents as extrapulmonary/disseminated TB.
 - c. TB in children is easier to diagnose through clinical exam and often presents as pulmonary TB.
 - d. TB in children is harder to diagnose through clinical exam and the chest x-ray often displays cavities.
 - e. Don't Know

Correct: A

39. Which of the following statements is TRUE regarding pediatric TB?
- a. Children require a different regimen of TB treatment when newly diagnosed than do adults.
 - b. BCG vaccination should be provided to all children who are exposed to a mother with TB.
 - c. Children being treated for TB should be placed on a protease inhibitor based ART regimen.
 - d. Risk factors for TB in children include household or other close contact with a case of PTB, age less than 5 years, HIV infection, and severe malnutrition.
 - e. Don't Know

Correct: D

Pediatric ART and supportive care

To describe the approach to initiating, monitoring, and side effects to ART.

To present additional information on routine care of pediatric patients.

40. Which of the following statements is FALSE regarding HIV exposed newborns?
- a. Nevirapine prophylaxis should be given to all children born to HIV infected mothers for 6 weeks.
 - b. BCG and oral polio vaccine should be provided to all babies at birth who are born to an HIV infected mother.
 - c. Replacement feeding (formula) is recommended for women who are HIV infected in Malawi.
 - d. All babies should take nevirapine prophylaxis for the same duration regardless of the mother's ARV regimen and regardless if the mother was taking ARV's at all.
 - e. Don't Know

Correct: C

41. Of the following Nucleoside Reverse Transcriptase Inhibitors (NRTIs), which should be avoided in children less than 35 kg's?
- Zidovudine (AZT)
 - Tenofovir (TDF)
 - Lamivudine (3TC)
 - Abacavir (ABC)
 - Don't Know

Correct: B

Adolescent HIV medicine

To describe the treatment and challenges of treating adolescents with HIV.

42. Which of the following is NOT considered a barrier to good adherence in adolescence?
- Multi-month prescriptions of ARVs.
 - Conflicts at home or at school.
 - Alcohol or drug abuse.
 - Low self-esteem
 - Don't Know

Correct: A

43. Disclosure is an important step that is encountered by adolescence. Which of the following is NOT an important outcome associated with those who disclose their status?
- Adolescents who disclose their status show more positive outcomes in their HIV care.
 - Teenagers of parents who wait to disclose their own HIV positive status often exhibit riskier behaviors and encounter more negative effects on family relationships.
 - Teenagers who have a good support system, including people who are aware and accepting of their diagnosis, have greater self-esteem and more positive outcomes.
 - Teenagers who are disclose their status display riskier sexual behavior.
 - Don't Know

Correct: D

HIV and NCD

To be able to describe the effect of HIV on age related NCD, to describe screening strategies and treatment options

44. Which statement on the treatment of hypertension for patients on ART is TRUE?
- Patients on ART can be treated according to standard hypertension guidelines
 - Due to interactions between ARTs and amlodipine this combination is not recommended
 - HCT should not be combined with TDF as it increases the risk of renal failure
 - Patients should only be treated in specialized hypertension clinics
 - Don't Know

Correct: A

45. Which of the following blood pressure values on a sitting calm patient would you consider stage 1 hypertension?
- a. 126/94 mmHg
 - b. 139/86 mmHg
 - c. 162/103 mmHg
 - d. 162/90 mmHg
 - e. Don't Know

Correct: A

Kaposi Sarcoma

To be able to describe the pathophysiology of KS, the typical clinical presentations, diagnostic pathways and therapeutic options

46. Which treatment regimen would you prefer for an HIV positive patient with disseminated KS (T1/S1)?
- a. ART
 - b. Vincristine + ART
 - c. Bleomycin/vincristine
 - d. Bleomycin/vincristine +ART
 - e. Don't Know

Correct: D

47. Which of the human herpes viruses is associated with Kaposi's sarcoma?
- a. HSV-1
 - b. EBV
 - c. CMV
 - d. HHV-8
 - e. Don't Know

Correct: D

HIV and Kidney

To understand the effects of HIV and ART on kidney function

48. Which are the most important tests in patients with suspected renal disease on ART
- a. Creatinine and protein in urine dipstick
 - b. Erythrocytes and protein in urine dipstick
 - c. Urine microscopy and creatinine
 - d. Creatinine and blood urea nitrogen (BUN)
 - e. Don't Know

Correct: A

49. Which statement about TDF is NOT true?
- a. It should not be used with a creatinine clearance <50 ml/min
 - b. It can cause Fanconi syndrome with glycosuria
 - c. It can cause renal failure

- d. It should never be combined with streptomycin because of overlapping toxicity
- e. Don't Know

Correct: D

Contraception and family planning

To describe methods of family planning available and understand advantages and disadvantages

50. Which of the following statement on contraception for female patients on ART is correct?

- a. Hormonal methods are rarely needed as patients need to use condoms.
- b. The recommended method is the daily pill.
- c. Various methods are available and the woman should choose which one suits her most.
- d. IUD have a high risk of infection in HIV patients and should be discouraged.
- e. Don't Know

Correct: C

APPENDIX D: PRE AND POST PROVIDER QUESTIONNAIRE FOR TELEECHO

Date (dd/mm/yyyy): ___/___/___

Section 1: Background Information		
Please answer the following questions about yourself.		
1	ECHO ID number (Completed by interviewer)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
2	Sex (Completed by interviewer)	Male.....1 Female.....2
3	What was your age on your last birthday?	_____
		(years)
4	Are you currently working in an HIV outpatient clinic?	Yes.....1 No.....2
5	Where is your HIV clinic situated?	Central hospital.....1 District hospital.....2 Health center.....3 Other.....4
6	What district is the clinic located in?	
7	What type of diploma do you have? (Check all that apply)	Medical degree.....1 Pharmacy degree.....2 Pharmacy assistant degree.....3 Nursing degree.....4 Bachelor in Public Health.....5 Laboratory training.....6 Other.....7 Specify _____
8	Where did you receive your HIV education/training? (circle all that apply)	Medical university or nursing college.....1 Malawi College of Health Sciences In-service training course.....2 Distance learning courses (e.g. University of Washington (UW) HIV Management course; UW Principles of STD/ HIV course.....3 Online courses.....4 HIV clinical mentor.....5 Other.....6 Specify _____

9	How many years of experience do you have taking care of HIV patients?	<hr/> (years) If less than 12 months, Record months <hr/> (months)	
10	How many days per week do you provide ART services?	<hr/> (days per week)	
11	On average, how many HIV patients do you provide care for per week?	<hr/> (number of clients)	
Section 2: Internet and IT Resources, and Training			
12	Do you have access to a desk top computer or a laptop?	Yes, computer.....1 Yes, laptop.....2 No.....3	
13	Do you have a smart phone or tablet?	Yes.....1 No.....2	
14	At your facility, do you have the following equipment?	Computer..... 1 Webcam..... 2 Microphone..... 3 Computer speakers.....4 Internet connection.... 5 Projector..... 6	
15	How would you rate your computer literacy?	Never used a computer before.....1 Beginner or new computer user.....2 Average user.....3 Above average user....4 Advanced user.....5	
16	Do you have regular access to emails?	Yes.....1 No.....2	
17	Have you ever participated in an on-line learning course?	Yes.....1 No.....2	

Now I will read to you a series of statements. For each statement, please tell me how much you agree or disagree with each statement.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree			
18	When I need clinical support or assistance I have timely access to an HIV expert								
19	I have an opportunity to share clinical experience with my colleagues on a regular basis								
20	In the last 12 months, what course topics of HIV training have you attended? (Tick all that apply)	ART.....1	Opportunistic Infections (OI).....2	Tuberculosis (TB).....3	Pediatric HIV.....4	Adolescent HIV.....5	Multi-Drug Resistant (MDR) TB.....6	Pediatric HIV.....7	Other.....8

Section 3: Exposure (Post-test only)

21 Which of the following Project ECHO sessions did you join and in which did you present a case?

		Session Topic	Joined	Presented a case?
A	Week 1	ART - side effects	<input type="checkbox"/>	<input type="checkbox"/>
B	Week 2	ART – monitoring	<input type="checkbox"/>	<input type="checkbox"/>
C	Week 3	ART - 1st line treatment failure	<input type="checkbox"/>	<input type="checkbox"/>
D	Week 4	ART- adherence	<input type="checkbox"/>	<input type="checkbox"/>
E	Week 5	ART- second line failure	<input type="checkbox"/>	<input type="checkbox"/>
HIV medicine OI complex				
F	Week 6	HIV and Neurology	<input type="checkbox"/>	<input type="checkbox"/>
G	Week 7	Cryptococcal meningitis	<input type="checkbox"/>	<input type="checkbox"/>
H	Week 8	HIV and Lung	<input type="checkbox"/>	<input type="checkbox"/>
I	Week 9	HIV and Heart	<input type="checkbox"/>	<input type="checkbox"/>
J	Week 10	HIV and Hepatitis B	<input type="checkbox"/>	<input type="checkbox"/>
K	Week 11	HIV and Skin	<input type="checkbox"/>	<input type="checkbox"/>
L	Week 12	STI infections in the HIV setting	<input type="checkbox"/>	<input type="checkbox"/>
M	Week 13	ALUP differentiated care	<input type="checkbox"/>	<input type="checkbox"/>
TB complex				
N	Week 14	Pulmonary Tuberculosis	<input type="checkbox"/>	<input type="checkbox"/>
O	Week 15	EPTB	<input type="checkbox"/>	<input type="checkbox"/>
P	Week 16	Recognizing and dealing with IRIS	<input type="checkbox"/>	<input type="checkbox"/>
Q	Week 17	Treatment of HIV/TB co-infected patients	<input type="checkbox"/>	<input type="checkbox"/>
Pediatric HIV medicine complex				
R	Week 18	Pediatric HIV testing and EID	<input type="checkbox"/>	<input type="checkbox"/>
S	Week 19	TB in children	<input type="checkbox"/>	<input type="checkbox"/>
T	Week 20	Pediatric ART and supportive care	<input type="checkbox"/>	<input type="checkbox"/>
U	Week 21	Adolescent HIV medicine	<input type="checkbox"/>	<input type="checkbox"/>

Non-communicable disease and oncology				
V	Week 22	HIV and NCD	<input type="checkbox"/>	<input type="checkbox"/>
W	Week 23	Kaposi Sarcoma	<input type="checkbox"/>	<input type="checkbox"/>
X	Week 24	HIV and Kidney	<input type="checkbox"/>	<input type="checkbox"/>
V	Week 25	Contraception and family planning	<input type="checkbox"/>	<input type="checkbox"/>
Z	Week 26	Transition of adolescents to adult care	<input type="checkbox"/>	<input type="checkbox"/>
AA	Week 27		<input type="checkbox"/>	<input type="checkbox"/>
AB	Week 28		<input type="checkbox"/>	<input type="checkbox"/>
AC	Week 29		<input type="checkbox"/>	<input type="checkbox"/>
AD	Week 30		<input type="checkbox"/>	<input type="checkbox"/>

Please report how much you agree or disagree with each of the statements below.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
22. Project ECHO has reduced my professional isolation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. My participation in the TeleECHO sessions has enhanced my professional satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Access to the TeleECHO sessions has improved the quality of care I provide to the patients at my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Access to HIV specialist expertise and consultation is a major area of need for me and my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. The presentations during the TeleECHO sessions provide me with useful up-to-date knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. The case-based discussions during the Project ECHO sessions were not always relevant to my clinical practice and how I care for patients in my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. ECHO is a useful tool for improving the sharing of information among HIV providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. ECHO is a useful tool for national experts to provide technical assistance in HIV care and treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. I would like to join Project ECHO programs for other diseases, if the program existed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. After the pilot project is completed, I do not want to join any more TeleECHO sessions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. TeleECHO sessions were not always easy to access from my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
22. Project ECHO has reduced my professional isolation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. My participation in the TeleECHO sessions has enhanced my professional satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Access to the TeleECHO sessions has improved the quality of care I provide to the patients at my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Access to HIV specialist expertise and consultation is a major area of need for me and my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. The presentations during the TeleECHO sessions provide me with useful up-to-date knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. The case-based discussions during the Project ECHO sessions were not always relevant to my clinical practice and how I care for patients in my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. ECHO is a useful tool for improving the sharing of information among HIV providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. ECHO is a useful tool for national experts to provide technical assistance in HIV care and treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. I would like to join Project ECHO programs for other diseases, if the program existed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. After the pilot project is completed, I do not want to join any more TeleECHO sessions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. TeleECHO sessions were not always easy to access from my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Project ECHO has improved the quality of care in my clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

General evaluation on the Project ECHO
Please contribute your opinions to improve the program.

34. How did you find out about the Project ECHO?	Because my facility was chosen to participate...1 Introduction from training courses and conferences.....2 Introduction from colleagues/friends.....3 Other (specify).....4
35. How practical were the session topics to your work?	Not practical at all.....1 Not practical.....2 Somewhat practical.....3 Practical.....4 Very Practical.....5
36. Which device did you most often use to participate in the Project ECHO?	Personal computer or laptop.....1 Clinic/hospital computer.....2 Smartphone.....3 Tablet.....4 Other: specify.....5

37. How do you generally evaluate the technical quality (internet access, sound, and picture) of the sessions?	Very Weak.....1 Weak.....2 Average.....3 Good.....4 Very Practical.....5
38. Do you think the project should be continued?	Yes.....1 No.....2
39. Which segment of the sessions do you like most?	Case conference/Case presentations.....1 Seminar/Lecture.....2 Quality Improvement.....3 I liked all sessions equally.....4
40. What do you think about the length of each session?	Too long.....1 Just enough.....2 Too short.....3
41. Would you like other topics presented in additional sessions?	Yes.....1 No.....2 go to 43
42. If yes, what topics do you think are necessary for your clinical practice?	Specify: _____
43a. Would you like to change the time of day in these sessions are held?	Yes.....1 No.....2 go to 44
43b. If yes, what time of day in the week is the most appropriate?	Specify: morning, noon or afternoon?
44a. Would you like to change the amount of time for each session?	Yes.....1 No.....2 go to 45
44b. If yes, how much time is the most appropriate?	Specify (how many hours?)
45. Do you think other providers from other specialties need to be invited? If yes, which specialty?	Specify: _____
46. Other opinions:	

Please rate your knowledge, skills or competencies based on the following anchors and questions:

1 = none or no skill 2 = vague knowledge, skills or competence 3 = slight knowledge, skills or competence
 4 = average among my peers 5 = competent 6 = very competent 7 = expert, teach others

Pediatric HIV ability, skills, knowledge	Rate your skills, knowledge or competence to address the following issues and topics BEFORE you participated in Project ECHO							Rate your skills, knowledge or competence to address the following issues and topics TODAY						
47. Ability to identify children and adolescents who should be tested for HIV.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
48. Ability to determine eligibility for ART in children and adolescents	1	2	3	4	5	6	7	1	2	3	4	5	6	7
49. Ability to prescribe 1 st line ART regimens for children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
50. Ability to recognize and manage side effects of ART in children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
51. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections (OIs) for children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
52. Ability to diagnose and manage treatment failure in children and adolescents, including prescribing 2 nd line regimens.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
53. Ability to counsel pregnant women for ART (PMTCT).	1	2	3	4	5	6	7	1	2	3	4	5	6	7

Pediatric HIV ability, skills, knowledge	Rate your skills, knowledge or competence to address the following issues and topics BEFORE you participated in Project ECHO							Rate your skills, knowledge or competence to address the following issues and topics TODAY						
54. Ability to provide and interpret early infant diagnosis and management of infants perinatally exposed to HIV.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
55. Ability to interpret the results of viral load testing in children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
56. Ability to provide age-appropriate adherence counseling to children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
57. Ability to manage tuberculosis co-infected in HIV-infected children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
58. Ability to manage Hepatitis B co-infected in HIV-infected children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
59. Ability to counsel HIV-infected adolescents on sexual and reproductive health issues, such as contraception and STIs.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
60. Ability to guide caregivers through the HIV disclosure process, leading to successful HIV disclosure to children.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
61. Ability to counsel adolescents in their transition for pediatric to adult care and treatment.	1	2	3	4	5	6	7	1	2	3	4	5	6	7

Pediatric HIV ability, skills, knowledge	Rate your skills, knowledge or competence to address the following issues and topics BEFORE you participated in Project ECHO							Rate your skills, knowledge or competence to address the following issues and topics TODAY						
62. Ability to screen for and manage malnutrition in HIV-infected children and adolescents.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
63. Ability to serve as the HIV expert in your district/region.	1	2	3	4	5	6	7	1	2	3	4	5	6	7

APPENDIX E: FOCUS GROUP AND/OR INTERVIEW QUESTIONS FOR HIV ECHO CLINICAL PROVIDERS

Date: _____

Site: _____

You are being asked to participate in an evaluation of TeleECHO, a distance learning program being led by the Lighthouse Trust in partnership with the Malawi Ministry of Health Department of HIV, AIDS and Viral Hepatitis, the Centers for Disease Control and Prevention (CDC) Malawi, CDC Atlanta, and the Elizabeth Glaser Pediatric AIDS Foundation.

The TeleECHO program is being tested in Malawi to see if it is a feasible strategy for expanding access to HIV services in Malawi. I will ask you a few questions today about your experiences participating in TeleECHO. You are free to choose whether to join the project or not. Before the interview (or focus group discussion) begins, you will be provided a consent form to read with the interviewer (or moderator). You will have time to ask any questions before you decide whether you will participate or not. You will be offered a copy of the consent form for you to keep.

If you agree to participate in the focus group discussion, you will attend an audio and video conference focus group conducted by a trained moderator. There will be 4-6 providers in each focus group and these may last up to 90 minutes.

Focus group discussion will be transcribed verbatim with all names omitted from the transcripts. All recordings and transcriptions will be stored in a locked cabinet on a password protected computer in a secure location in the Lighthouse office. All data will be securely stored until data analysis and project report has been finalized. All data will be destroyed 5 years after the completion of the project.

Question	Responses
1. How many Project ECHO sessions have you had the opportunity to attend?	
2. What motivated you to participate in the Project ECHO sessions?	
3. How did you find out about Project ECHO?	
4. Please think about the case-scenario presentations by clinicians (the ones you presented and ones presented by your peers).	
4a. How well do the discussions and recommendations on the case-scenario address your needs?	
4b. In what ways do you use what you learn from the case-scenarios? Please give an example.	
4c. What could be improved in the case-scenario presentations and discussions?	
5. Please think about the short didactics included in the weekly sessions.	

5a. How well did the didactic sessions address your needs?	
5b. In what ways do you use what you learn from the didactic sessions? Please give an example.	
5c. What could be improved in the didactic sessions?	
6. To what degree are you able to apply concepts presented in Project ECHO sessions to patients with similar problems in your practice? Please give an example.	
7. Much of medicine involves a team of providers involved in the care of patients.	
7a. Did other members of the ART clinical team members participate in the ECHO clinic which you attended?	Y/N
7b. What information from the ECHO sessions have you shared with others in the ART clinic or other service delivery points?	
7c. Please describe what facilitates or what inhibits sharing information and practices from Project ECHO at your site.	
7d. Should every ART provider in this clinic participate in the ECHO sessions? Why do you say that?	
7e. How could you help to encourage better participation by ART providers in ECHO sessions at your site?	
8. What are the strengths of ECHO sessions teaching approach?	
9. What are the weaknesses of the teaching approaches?	
10. What, if any, were the challenges you encountered in participating in the ECHO pilot program? What were solutions you came up with to resolve these challenges?	
11. Can you comment on the IT/ ZOOM technology so far (e.g. internet, speakers, screens and utility)?	

12. Did you have enough information about the schedule for the ECHO sessions ahead of time to be able to participate?	Y/ N
13. Do you have any additional comments about anything we did not discuss or any additional suggestions?	

Thank you to each of you for your time and your suggestions.

APPENDIX F: SURVEY QUESTIONS FOR ECHO PROVIDERS, MENTORS AND/OR CLINICAL ADMINISTRATORS

The following demographic and background information will be collected for each participant:

A	Interviewer ID	
B	Date	
C	Region	
D	District	
E	Facility name	
F	Start time: _____ Finish time: _____	
Section 1: Background Information		
1	Age:	_____ Years
2	What kind of qualification do you have? (tick all that apply)	<input type="checkbox"/> Diploma <input type="checkbox"/> Certificate <input type="checkbox"/> Doctor 1 <input type="checkbox"/> Pharmacist 2 <input type="checkbox"/> Pharmacist's assistant 3 <input type="checkbox"/> Laboratory technician 4 <input type="checkbox"/> Nurse 5 <input type="checkbox"/> Bachelor in Community Health 6 <input type="checkbox"/> Other _____ 7
4	For how many years have you been providing services for HIV patients? (round up to nearest whole number)	_____ (years)
5	Where is your HIV clinic situated?	<input type="checkbox"/> Central hospital <input type="checkbox"/> District hospital <input type="checkbox"/> Other
6	On average, how many HIV patients do you provide services to per week? (Suggest placing this into brackets)	_____ (number of patients)
7	Clinic staff may have needed to block out time during clinic hours to participate in teleECHO sessions. Please describe how the clinic, its staff and its patients have accommodated this adjustment.	
8	Did you have to make any adjustments to the clinic scheduling times?	Yes.....1 No.....2 If yes, please explain _____

9	Did you have to make any adjustments to the staff duty roster?	Yes.....1 No.....2 If yes, please explain _____
10	Were any changes made as a result of ECHO sessions that affected patients being seen?	Yes.....1 No.....2 If yes, please explain
11	What time were the ECHO sessions held, were they held in the morning, at noon, or in the afternoon?	Morning.....1 Noon2 Afternoon.....3
	b) Was the timing of the sessions a barrier for participation?"	Yes.....1 No.....2 If no, go to 12 "If yes, please explain
12	Which time of the day would work better for a Project ECHO session in this facility?	Morning.....1 Noon.....2 Afternoon.....3
13	What could the Malawi Project ECHO team have done to better prepare your site for participation in ECHO?	
14	The regular use of teleconferencing and video technology is a requirement of ECHO. Please describe any challenges with the use and maintenance of the technology or internet connectivity.	
15	What impact have you seen ECHO have on the providers who participate?	
	a) Please describe any change in quality of clinical services provided	
	b) Please describe any change in the clinical outcomes of patients receiving services at your site	

	c) Please describe any change in sense of job satisfaction among providers at your site	
	d) Should all providers in your clinic be a part of ECHO? Why or why not?	
16	How can the Project ECHO team make this training and mentoring model as useful as possible to clinical staff in this facility?	
	a) How beneficial is it for providers to earn CME/CPD credits through teleECHO clinic sessions at your site?	
	b) How many CPD credits were you able to earn at your facility or on the internet in the nine months prior the pilot?	
	c) How many CPD credits did you earn from participating in TeleECHO sessions?	
17	How can the Project ECHO team make this training and mentoring model as useful as possible to clinical staff in this facility?	
	a) How beneficial is it for providers to earn CME/CPD credits through TeleECHO sessions at your site?	

APPENDIX G: INFORMED CONSENT FORM FOR FOCUS GROUP DISCUSSION FOR PARTICIPATING PROVIDERS IN TELEECHO

INTRODUCTION

You are being asked to participate in an evaluation of TeleECHO, a distance learning program being led by the Lighthouse Trust in partnership with the Malawi Ministry of Health Department of HIV, AIDS and Viral Hepatitis, the Centers for Disease Control and Prevention (CDC) Malawi, CDC Atlanta, Elizabeth Glaser Pediatric AIDS Foundation and the This evaluation has been approved by the (Malawi IRB) and by an ethical review board in the USA.

You are free to choose whether to join or not to join. You will be offered a copy of this consent form for you to keep.

The purpose of this evaluation is to assess the practical impact that TeleECHO sessions have on the participating providers' clinical practice and information sharing.

You are being asked to participate in this focus group because you regularly attend TeleECHO sessions.

What will happen if I decide to participate?

If you agree to participate, you will attend an audio- and/or video-conference focus group conducted by a Project ECHO® focus group facilitator. The focus group attendees will include ECHO staff to facilitate and record information during the focus group, as well as other TeleECHO participating providers whom you may or may not know. There will be 4-6 providers in each focus group. You will be asked about your opinion of ECHO sessions and how you use what you learn from them. Focus groups may last up to 90 minutes.

The results will be discussed with the Ministry of Health and other public health professionals, and will be presented at meetings and conferences. The results may be published in scientific reports. Your name and any other identifying details will not be included in reports from this evaluation.

Are there any risks, and how will my privacy be protected?

There are minimal risks to you in answering these questions, and the questions do not ask you to share any personal information.

The evaluation team will make every effort to protect your privacy and maintain the confidentiality of all your information. There is no way to protect privacy completely from other participants in the focus group, but everyone participating will be asked not to discuss any information that they heard during the focus group with anyone once they leave the focus group. Participants will be scheduled so that no person in the focus group reports professionally to any other participant. All information collected in this project will be kept in a locked file or password secured computers in EGPAF offices.

Focus group conversations will be digitally recorded and transcribed verbatim with all names removed from transcriptions. Digital recordings and transcriptions will remain in a locked, secure location within the Project ECHO® office and destroyed immediately after transcription and validation.

All presentations of the results of this evaluation will present data in summary form only. No individually identifying information will be presented with the results and there will be no way to link you as an individual with any information that was provided during the focus group discussions. Your name will not be used in any published reports about this evaluation.

What are the benefits to being in this focus group?

You will not receive any compensation for your participation in this focus group. But by participating in a focus group, you will be helping to determine the practical impact of the TeleECHO sessions. This information will be used to determine how best to provide the ECHO program.

Your participation is completely voluntary. You have the right to choose not to participate or to withdraw your participation at any point during this focus group without affecting your job or post assignment as a health provider or your future participation in the ECHO program.

Whom can I call with questions or complaints about this focus group?

If you have any questions about the TeleECHO project, you may call the Principal Investigator, Dr Sam Phiri , (+265) 088- 889-2523 or samphiri@lighthouse.mw.org . If you have any complaint about your participation in this evaluation, you may call the Chairperson of the National Health Sciences and Research Committee, **Dr. Ben Chilima, (+265) 888 554 201 or bchilima2@yahoo.com** .

Certificate of Consent: I have read this Informed Consent for this project. I have received an explanation of the planned research, procedures, risks and benefits and privacy of my personal information. I agree to take part in this project. I understand that my participation in this project is voluntary.

Print Name of Participant: _____

Signature of Participant: _____ Date: _____

Statement by the researcher/person taking consent: I confirm that the participant was given an opportunity to ask questions about the project, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent _____

Signature of Researcher /person taking the consent _____

Date _____

APPENDIX H: INFORMED CONSENT FOR IN-DEPTH INTERVIEW FOR CLINIC ADMINISTRATORS AND PROVIDERS IN TELEECHO

Introduction

The Lighthouse Trust in partnership with the Malawi Ministry of Health Department of HIV, AIDS and Viral Hepatitis, the Centers for Disease Control and Prevention (CDC) Malawi, CDC Atlanta, Elizabeth Glaser Pediatric AIDS Foundation and the University of New Mexico in the United States. The Malawi Project ECHO is conducting an evaluation of the practical impact that TeleECHO sessions have on the participating providers' clinical practice and information sharing. You are being asked to participate in this interview because you regularly attend TeleECHO sessions.

What will happen if I decide to participate?

If you agree to participate, you will attend an audio- and/or video-conference interview conducted by a Project ECHO® staff member. There may be other ECHO staff members present to take notes during the interview. Interviews may last up to 1 hour.

What are the risks or side effects of being interviewed?

There are minimal risks of discomfort when answering questions. Discussions about sensitive personal information will be discouraged.

What are the benefits to being interviewed?

Participants in this interview will not receive any compensation for their participation. But by participating in an interview, you will be helping to determine the practical impact of the TeleECHO sessions that may be shared with other sites who are interested in joining ECHO.

How will my information be kept confidential?

Interviews will be digitally recorded and partially transcribed with names removed from transcriptions. Digital recordings and transcriptions will remain in a locked, secure location within the Project ECHO® office and will be destroyed immediately after transcription and validation.

To protect your privacy, you will be assigned a unique number that will be linked your responses and to your name. To keep your answers confidential, names associated with the unique numbers are stored separately from the hard copy surveys in a secure and locked cabinet in the Malawi Project ECHO® office, with access limited to Project ECHO® staff. The responses are securely stored as data that is encrypted. All data will be kept in a locked file in the locked office of Project ECHO staff and/or secured database on password-protected project servers until the evaluation results are analyzed and results completed (approximately five years). The data will then be destroyed.

Data will be grouped together before being reported or presented and will not include individually identifying information about respondents. Individual respondents will not be linked to the information they provided for the evaluation.

Can I stop the interview once I begin?

Your participation is completely voluntary. You have the right to choose not to participate or to withdraw your participation at any point during this interview without affecting your future participation in Project ECHO®. The decision to participate in the interview is yours alone. Your decision not to participate will not affect you in any way. Your employment or post assignment will not be affected by your decision to participate or not participate in this interview.

Whom can I call with questions or complaints about this interview?

If you have any questions about the TeleECHO project, you may call the Principal Investigator, Dr. Sam Phiri , (+265) 088- 889-2523 or samphiri@lighthouse.mw.org . If you have any questions or concerns about your rights as a research participant, you may call the Chairperson of the National Health Sciences and Research Committee, Dr. Ben Chilima, (+265) 888 554 201 or bchilima2@yahoo.com

Certificate of Consent: I have read this Informed Consent for this project. I have received an explanation of the planned research, procedures, risks and benefits and privacy of my personal information. I agree to take part in this project. I understand that my participation in this project is voluntary.

Print Name of Participant: _____

Signature of Participant: _____ Date: _____

Day/month/year

Statement by the researcher/person taking consent: I confirm that the participant was given an opportunity to ask questions about the project, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent _____

Signature of Researcher /person taking the consent _____

Date _____

APPENDIX I: INFORMED CONSENT FOR PRE-AND POST-TEST PROVIDER QUESTIONNAIRE FOR TELEECHO PILOT PROJECT ECHO® IN MALAWI

What is this about?

The Malawi Project ECHO® is led by the Lighthouse Trust in partnership with the Malawi Ministry of Health Department of HIV, AIDS and Viral Hepatitis, the Centers for Disease Control and Prevention I (CDC) Malawi, CDC Atlanta, Elizabeth Glaser Pediatric AIDS Foundation and the University of New Mexico in the United States. Project ECHO is conducting an evaluation of the pilot program to find out if it helps health care teams provide high quality HIV care. The evaluation includes a survey where we ask you about your experiences with TeleECHO to help us assess how useful it is for providers.

You are being asked to participate in this interview because you regularly attend TeleECHO sessions.

What will happen if I participate?

If you participate, you will be asked to complete a survey about TeleECHO® sessions. You will be asked to complete a survey at the beginning of the pilot, before the first TeleECHO session. You will be asked to complete a survey again after the last TeleECHO session of the pilot program is completed. The surveys will help us know about your experiences with TeleECHO, your opinions of the TeleECHO sessions and ways to improve the TeleECHO sessions. The survey will take about 45 minutes each time to complete.

Must I participate?

Your involvement in the evaluation is voluntary, and you may choose not to participate. You may choose to complete one, some, all or none of the surveys. You may skip any questions you do not want to answer. The decision to participate in the surveys is yours alone. Your decision not to participate will not affect you in any way. Your employment or post assignment will not be affected by your decision to participate or not participate in these surveys.

How will my information be kept private?

To protect your privacy, you will be assigned a unique number that will be linked your responses and to your name. To keep your answers confidential, names associated with the unique numbers are stored separately from the hard copy surveys in a secure and locked cabinet in the Malawi Project ECHO® office, with access limited to Project ECHO® staff. The responses are securely stored as data that is encrypted. All data will be kept in a locked file in the locked office of Project ECHO staff and/or secured database on password-protected MOH and CDC servers until the evaluation results are analyzed and results completed (approximately five years). The data will then be destroyed.

Data will be grouped together before being reported or presented and will not include individually identifying information about respondents. Individual respondents will not be linked to the information they provided for the evaluation.

What are the risks to participating?

There are no known risks in this evaluation, but some participants may feel uncomfortable answering questions. The findings from this evaluation will help inform improvements in the training and mentorship for HIV providers in Malawi. If published, results will be presented in summary form only.

What are the benefits to participating?

Participants in these surveys will not receive any compensation for their participation. But by participating, you will be helping to determine the practical impact of the TeleECHO sessions that may be shared with other sites who are interested in joining ECHO.

Whom can I call with questions or complaints about this survey? If you have any questions about the TeleECHO project, you may call the Principal Investigator, Dr. Sam Phiri, (+265) 088- 889-2523 or samphiri@lighthouse.mw.org . If you have any questions or concerns about your rights as a research participant, you may call the Chairperson of the National Health Sciences and Research Committee, Dr. Ben Chilima, (+265) 888 554 201 or bchilima2@yahoo.com

Certificate of Consent: I have read this Informed Consent for this project. I have received an explanation of the planned research, procedures, risks and benefits and privacy of my personal information. I agree to take part in this project. I understand that my participation in this project is voluntary.

Print Name of Participant: _____

Signature of Participant: _____ Date: _____

Day/month/year

Statement by the researcher/person taking consent: I confirm that the participant was given an opportunity to ask questions about the project, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent _____

Signature of Researcher /person taking the consent _____

Date _____

APPENDIX J: TELEECHO SESSION EVALUATION FORM

Clinic Title: _____ Date: __/__/____

Facilitator: _____

Objectives: _____

Your Credentials: (Please tick)

Physician	Clinical Officer	Nurse	Pharmacist	Other: (Specify) _____

Please rate this TeleECHO® clinic on the statements listed below: (circle appropriate)

	Poor	Fair	Good	Very Good	Excellent
1. How well were the stated objectives met?	?	?	?	?	?
2. How well did the clinic deliver balanced and objective, evidence-based content?	?	?	?	?	?
3. Opportunities to ask questions were:	?	?	?	?	?
4. The pace of the clinic was:	?	?	?	?	?
5. The organization of the presenter's presentation was:	?	?	?	?	?
6. The presenter's ability to clearly communicate was:	?	?	?	?	?
7. The relevance of the presentation to this clinic's objective was:	?	?	?	?	?

	Yes	No
8. Did you feel that this clinic endorsed/favored a certain commercial product or business?	<input type="checkbox"/>	<input type="checkbox"/>

Changes that I am going to make in my practice: _____

If no changes, what are the barriers? _____

Did you present a patient case today? Y/N

If yes, how would you rate the value of the discussion/input that occurred?
(1-5, not valuable to very valuable)?

Did the case discussion change your care plan for this patient? Y/N

If yes, how? _____

If no, why not? _____

Did you learn something new from the discussions of cases presented by others today? Y/N (Please circle)

If yes, did you learn something that will be useful in caring for your patients? Y/N (Please circle)

If yes, in what way? _____

What feedback or suggestions do you have about how to make the case discussions more useful?

What did you like best about this TeleECHO® session?

What did you like least about this TeleECHO® session?

Please list topics of future interest and additional comments regarding this session

APPENDIX L: BUDGET TEMPLATE FOR PROJECT ECHO

Instructions: Excel will calculate costs

Data included based on US cost estimates

Part 1: Budget template for implementing a Project ECHO clinic			
US costs/ US dollars	Start Up Costs	Recurring implementation Costs	Notes
Personnel for running an ECHO clinic			
Supplies			
Training			
Equipment			
Travel			
Other			
Subtotal			
Total			

APPENDIX M: FIELD BUDGET AND JUSTIFICATION

Items	USD	Justification
Lead Evaluators	13,400.00	Personnel costs of those conducting the research
Training	1,000.00	Protocol and data collection training for Research Assistants
Research Assistants	6,700.00	Data collection and transcription
Data Entry	2,000.00	Entering of data from qualitative and quantitative collection
Travel	4,670.00	International and domestic travel for quality assurance
NHSRC Protocol Review fee	150.00	Protocol review and approval
Total	27,920.00	
NHSRC Capacity Building at 10% total budget	2,792.00	Capacity building for NHSRC

COLLABORATING INSTITUTIONS:

U.S. Centers for Disease Control and Prevention (CDC) Atlanta and Malawi

The Elizabeth Glaser Pediatric AIDS Foundation

Lighthouse Trust

Funding Source: U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) through the United States Centers for Disease Control and Prevention (CDC)

APPENDIX N: ECHO PRE-SESSION CURRICULUM

Session	Title	Objectives	Topics
1	Summary of New Policies in the 2018 Guidelines	To understand the major changes to the previous guidelines and the evidence supporting its implementation.	Introduction of dolutegravir based regimens and transition; treatment for HIV-related diseases; choosing ART regimens; HIV/TB cotreatment; VL testing; PEP
2	Treatment of HIV-related Diseases	To review the significant additions to the new guidelines for diagnosing and treating many HIV-related diseases.	Introduce the use of CD4, Urine LAM, and CrAg testing; new drugs introduced into the guidelines (CM, KS, etc...)
3	Understanding the New Regimens	To understand dolutegravir based regimens and transitioning to dolutegravir and to review other 1 st line and 2 nd line regimens.	To review side effects, indications, and contraindications for dolutegravir; transitioning to dolutegravir; and VL monitoring; regimens under special circumstances.
4	HIV/TB Cotreatment	To review the new guidelines on the treatment of HIV during rifampicin based TB treatment.	To introduce ARV adjustments to those on rifampicin based TB treatment for all age groups.
5	VL Monitoring	To understand the changes to VL monitoring in the 2018 guidelines.	Resistance testing for those on DTG or PI based regimens.
6	MDR TB	To review the assessment and management of side-effects.	Clinical management of MDR-TB - the old and the new regimen (including monitoring treatment outcomes). Infection control practices - in and outside the hospital (including the community). Coordination around management of MDR/XDR-TB.

APPENDIX O: CASES PRESENTED FROM NOVEMBER 2018 TO JUNE 6

MONTH	CASES PRESENTED
November	<ul style="list-style-type: none"> • Kaposi sarcoma/Tuberculosis • Toxoplasmosis/HIV encephalitis
December	<ul style="list-style-type: none"> • Management of renal failure vs hepatitis B patient on TDF based regimen • Gynacomastia management • TB screening in low BMI patients
January	<ul style="list-style-type: none"> • Second line failure • Management of diabetic patients on metformin and dolutegravir • Disclosure and adherence issues in adolescents (Case scenario) • Management of 2nd line failure patients on TB treatment and third line assessments
February	<ul style="list-style-type: none"> • Suspected Pancreatitis • ART options for a 13year old child weighing 14kgs on TB treatment and failing on 1st line • ART options in a patient with pancreatitis with underlying renal and liver failure • Cryptococcal meningitis IRIS in a patient with high viral load while transitioning to DTG • Bloody ascites in a patient on TB treatment with suspected malignancies
March	<ul style="list-style-type: none"> • Management of hyper pigmented skin in a patient who is on TB treatment • Extra pulmonary TB Patient vs Lymphoma • Management of a patient failing to swallow LPV/r with esophageal candida and persistence diarrhea • Discordant HIV results in Cryptococcal meningitis patient management
April	<ul style="list-style-type: none"> • Hemiparesis in TB Patient • KS patient with massive pericardial effusion whether to continue TB Treatment • HIV/TB case with and kidney disease • ART option in newly diagnosed HIV patient with acute hepatitis

May to June 6th

- TB patient with neurological problems
- A rapid HIV test negative patient with CD4<200C/μ, suspected of TB and unknown lung pathology
- Management of a multiple kidney cystic masses patient with kidney failure due to HIV associated nephropathy or Tenofovir and EPTB
- Management of TB pericarditis vs cardiac failure patient

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