

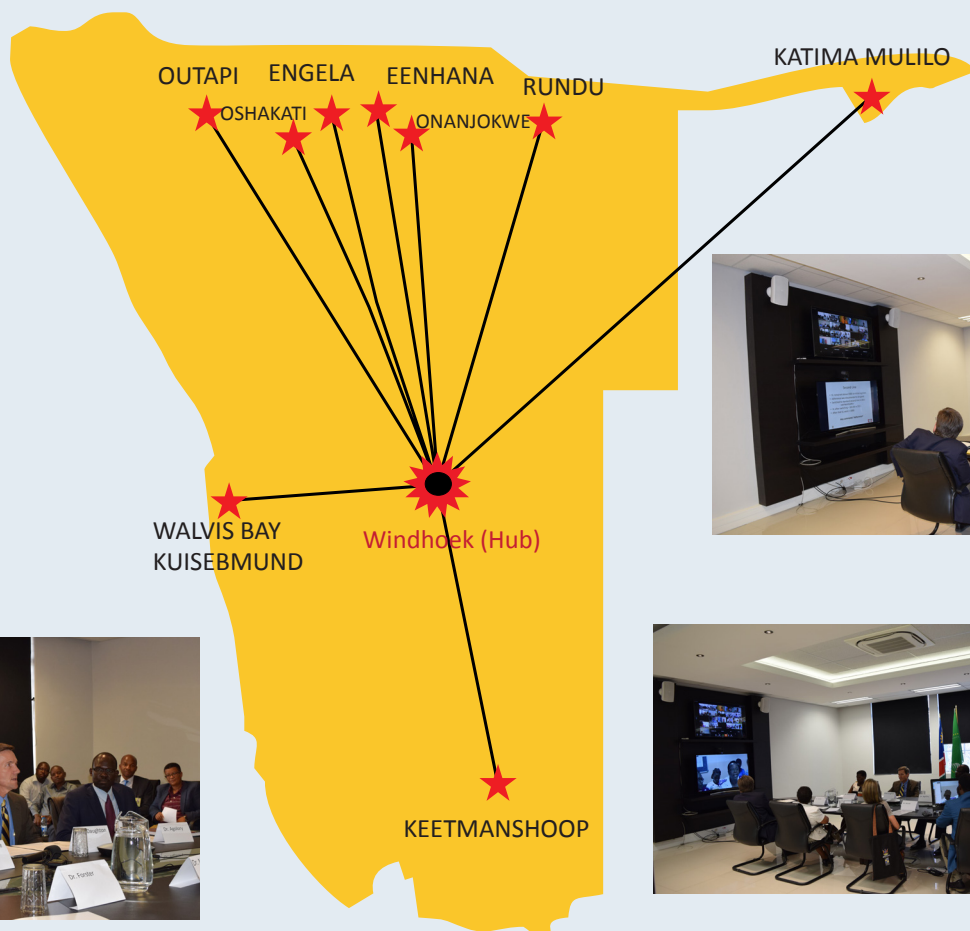


Republic of Namibia
Ministry of Health and Social Services

The Namibian Extension for Community Health care Outcomes (ECHO™) Pilot Evaluation Report



NAMIBIANS AND AMERICANS
IN PARTNERSHIP TO FIGHT HIV/AIDS
PEPFAR



Namibia HIV ECHO Pilot from November 2015 to September 2016

The Namibian Extension for Community Health care Outcomes (ECHO) Pilot Evaluation Report



**Ministry of Health and Social Services of Namibia,
Directorate of Special Programmes, Sub-division HIV
and STI Control**

In Collaboration with:

- The U.S. Centers for Disease Control and Prevention in Namibia
- The U.S Centers for Disease Control and Prevention in Atlanta
- The International Training and Education Center on Health
- The University of New Mexico
- Elizabeth Glaser Pediatric AIDS Foundation
- University of Washington
- The Namibia Institute of Pathology



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Abbreviations

ANC	Antenatal care
ART	Antiretroviral therapy
ARV	Antiretroviral
CCM	Chief clinical mentor
CD4	Cluster of differentiation 4 (T-helper cells)
CDC	Centers for Disease Control and Prevention
CPD	Continuous professional development
CPT	Cotrimoxazole preventative therapy
DGHT	Division of Global HIV and Tuberculosis
DSP	Directorate of Special Programs
ECHO	Extension for Community Health care Outcomes
EGPAF	Elizabeth Glaser Pediatric AIDS Foundation
ePMS	electronic Patient Management System
FGD	Focus Group Discussions
FTE	Full time employment
HAART	Highly active anti-retroviral therapy
HCV	Hepatitis C virus
HCW	Health care worker
HIV	Human immunodeficiency virus
HPCNA	Health Professions Council of Namibia
IPT	Isoniazid Preventive Therapy

I-TECH	International Training and Education Center for Health
MoHSS	Ministry of Health and Social Services
PEPFAR	The President’s Emergency Plan for AIDS Relief
eMTCT	Elimination of mother-to-child transmission
QI	Quality improvement
SME	Subject matter experts
STI	Sexually transmitted infections
TB	Tuberculosis
UNM	University of New Mexico
UW	University of Washington
USAID	United States Agency for International Development
WHO	World Health Organization



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HIV tele-mentoring program was completed by the Namibia Ministry of Health and Social Services (MoHSS) in collaboration with the US Centers for Disease Control and Prevention (CDC) in Atlanta, CDC Namibia, the Elizabeth Glaser Pediatric AIDS Foundation (EGPAF), the University of New Mexico (UNM) ECHO Institute, the International Training and Education Center for Health (I-TECH), Namibia Institute of Pathology (NIP), and the University of Washington (UW). The project implementation and preparation of this report was supported through funding provided by CDC/Division of Global HIV and Tuberculosis (DGHT) under the President’s Emergency Plan for AIDS Relief (PEPFAR), via the Global Technical Assistance Cooperative Agreement with EGPAF 5U2GGH000985-02. The contents of this report are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the U.S. Department of Health and Human Services.

The overall focus of this ECHO project - the first in Africa - was to determine feasibility and acceptability of mentoring through the ECHO model™ of virtual case-based learning and collaboration, as well as to expand access to high-quality health care in underserved communities by strengthening workforce capacity, offering continuing professional development (CPD), improving provider satisfaction and reducing professional isolation. Project ECHO served as an extension and enhancement of in-person training that most providers in Namibia have already received.

Thirty-four weekly video-teleconference sessions occurred from November 2015 to September 2016. National experts connected with regional clinical mentors, doctors, nurses, pharmacists, laboratorians, and health assistants from 10 clinical sites across Namibia. Sessions consisted of didactic training, case presentation scenarios and discussions.

Project ECHO staff documented whether teleECHO sessions had occurred as planned, who registered to participate versus who actually participated, who facilitated the sessions, how many didactics and case scenarios were presented and how the teleECHO sessions were staffed. To measure effectiveness, participants of teleECHO sessions were asked to complete paper questionnaires examining self-efficacy, as well as a knowledge assessment, both before and after the project pilot to measure changes. Focus group discussions (FGD) and interviews were conducted eight months after initiating the pilot. Pre- and post-pilot knowledge assessment scores were compared using a linear mixed model that accounted for between-site variation. Surveys measured changes in self-efficacy, access to CPD, and professional satisfaction.

Overall, participants reported improved self-efficacy in managing HIV patients, increased professional satisfaction, and reduced professional isolation. Participants earned significantly more CPD credits during the pilot period than during a similar period of time before the pilot. Participants also reported better access to HIV expertise for clinical support and increased opportunities for peer to peer interaction and education. Qualitative analysis indicated minimal barriers to participation, enthusiasm and motivation to participate, and favorable attitudes toward expansion of ECHO in Namibia.

Implementation of the first ECHO tele-mentoring program in Africa was successful in a sub-Saharan setting with minimal barriers. In Namibia, Project ECHO enhanced opportunities for peer-to-peer support and significantly improving knowledge, skills and self-efficacy of HCWs to manage HIV-infected individuals. This HIV tele-mentoring program demonstrated itself as an effective means of improving access to specialty and inter-professional support.

Introduction



This evaluation report depicts the experiences and lessons learned from the 9-month pilot between November 2015 to September 2016 of the teleECHO clinical training and mentorship model in Namibia for providers of adult and pediatric HIV prevention, care, and treatment services.

The Extension for Community Health care Outcomes (ECHO) model, developed by the University of New Mexico (UNM), aims to strengthen capacity for health care providers to treat complex and chronic health conditions in underserved communities by linking less-experienced providers with subject matter experts. Providers engage in weekly meetings via video and teleconference (teleECHO sessions) during which they listen to a short didactic session, share challenging cases, ask questions and discuss best practices. This evaluation report depicts the experiences and lessons learned from the 9-month pilot between November 2015 to September 2016 of the teleECHO clinical training and mentorship model in Namibia for providers of adult and pediatric HIV prevention, care, and treatment services.

The aim of the evaluation was to determine if the ECHO model improved the knowledge and skills of health care providers and teams to provide high quality HIV care and treatment services in Namibia, and if this model should be expanded from a pilot to a nationwide program. The goals and methods of this evaluation were to:

1. Determine the feasibility and acceptability of the ECHO model of virtual training and mentoring in Namibia by documenting inputs and activities (process measures), as well as through interviewing and conducting FGDs with participants and by surveying participants.
2. Measure the effect of ECHO on providers' knowledge, self-efficacy, professional satisfaction and acquisition of Continuing Professional Development (CPD) credits through questionnaires, surveys and a pre/post-pilot knowledge assessment.



Background

In June 2014, Ambassador Birx announced the President's Emergency Plan for AIDS Relief (PEPFAR)'s commitment to continue aggressive scale-up of adult and pediatric antiretroviral therapy (ART) across PEPFAR-supported countries and programs, 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 community-based levels of the health system and expanding the capacity of non-physician health care providers with limited or no experience in HIV treatment. 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 HIV care and treatment services.

The MoHSS of Namibia with support from PEPFAR (CDC and USAID) is expanding the in-person clinical training and mentoring program to support the delivery of high quality HIV prevention, care, and treatment services. The Namibian MoHSS also began task shifting of HIV care and treatment from physicians to nurses as early as 2014 with a demonstration project that informed policy decision-making.

With the MoHSS commitment to increasing decentralization of ART services to peripheral facilities, the continued promotion of task shifting, scaling up of trainings, and fostering professional confidence of medium and lower level health care worker cadres in HIV care and treatment is increasingly important. The ECHO model is expected to augment this existing model by offering virtual training and mentoring.



¹O'Malley G, Asrat L, Sharma A, et al. Nurse task shifting for antiretroviral treatment services in Namibia: implementation research to move evidence into action. *PLoS One* 2014; 9(3)

²Namibia Ministry of Health and Social Services, Directorate of Special Programs. (2016). Surveillance Report of the 2016 National HIV Sentinel Survey. Windhoek, Namibia.

³Namibia MoHSS DSP (2015). TeleECHO™ Manual: MoHSS HIV ECHO Pilot Programme. Windhoek, Namibia

Namibia has an estimated population of 2.11 million people and is the second most sparsely populated country of the world (2.6 people/km²). Despite rapid urbanization, Namibia remains mainly a rural country. Regional population densities vary enormously, with almost two thirds of the population living in the northern regions and less than one tenth of the population living in the south.

According to a 2013 report by the Presidential Commission of Inquiry into Namibia's Health Service, a severe shortage of health care workers (HCWs) is one of the reasons for poor health outcomes. Per 2015 WHO data, life expectancy in Namibia is 65.8 years (ranking 136/183 globally).

According to the 2016 Namibia National HIV Sentinel Survey (NHSS), there are an estimated 230,000 people living with HIV with a prevalence reported at 14% (ranking 6th in the world). Adults aged 15-49 years have prevalence of 17.2%, representing a decline from the peak ANC clinic prevalence estimate of 22% reported in 2002. Namibia has achieved high coverage with its elimination of mother-to-child transmission (eMTCT) and ART programs. The roll-out of option B+ has allowed all pregnant women who are HIV-infected to be enrolled into and maintained for life on ART, and with implementation of universal test and treat Namibia continues put programmatic measures into place to ensure they reach the goal of zero infants being born with HIV.

However, chronic shortages of doctors and pharmacists in Namibia threaten to impede the future success of the national HIV care and treatment program. The Workload Indicators of Staffing Need (WISN) method, a human resource management tool developed by the WHO, was comprehensively applied in Namibia in 2012. It clearly and objectively highlighted health worker shortages, as well as inequities in their distribution, with the most profound deficits amongst doctors and pharmacists, and a nurse workforce that is heavily skewed towards hospitals. Therefore, building local medical and nursing expertise while expanding access to high-quality HIV care and treatment remains essential.

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 health care resources; 2) a 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 an excel database.

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 teleECHO sessions on Hepatitis C virus (HCV). Impact measurements included effect on treatment rates, self-efficacy, and overall professional satisfaction. The results of this research were first published in *Hepatology* in September 2010. This article illustrated the Project ECHO model's impact on the current health care system in three major areas: 1) access to specialty health care; 2) expanded delivery of evidence-based best practice care; and 3) a new paradigm for team-based interdisciplinary professional development.

Patient outcomes were also evaluated via a prospective cohort study demonstrating that clinicians engaged in and supported by 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 virologic response (SVR) results were comparable (57.5% for specialists vs. 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 vs. 13.7% of 20 patients, respectively).



⁴Ministry of Health and Social Services 2013. Report of the Presidential Commission of Inquiry: Ministry of Health and Social Services to His Excellency, President Hifikepunye Pohamba. Windhoek, Namibia.

⁵WHO Country Profile: Namibia (2015). Retrieved from: <http://www.who.int/country/nam/en>

⁶Namibia MoHSS DSP.

⁷McQuide P, Kolehmainen-Aitken R, and Forster N. Applying the workload indicators of staffing need (WISN) method in Namibia: challenges and implications for human resources for health policy. *Human Resources for Health* 2013; 11:64



Project Justification

While Namibia has a relatively high level of national adult ART coverage when compared to other countries in sub-Saharan Africa, services can be concentrated in hospitals and health centers often located far from grass root communities. There is a need to improve the capacity to provide high quality adult and pediatric HIV care and treatment services for all levels of providers so that decentralization of services can continue to happen without compromising the quality of services. Providers are often caring for high volumes of patients and time for continuing professional development can be limited. Namibia has a successful MoHSS clinical mentoring program, but physician and nurse clinical mentors are not universally available to help address questions regarding the management of patients living with HIV.

Also, best practices and treatment guidelines change regularly and busy providers need an easily accessible, low-cost means of staying up-to-date. Project ECHO can deliver a consistent, regular extension of in-person training that most providers in Namibia already receive on a less frequent basis. The human resource challenges of Namibia's health system have been documented over a number of years, and the fact has been repeatedly emphasized that people are the most important resource within Namibia's health sector. The MoHSS has realised that the utilisation and application of new methods of health worker training and continuous professional development need to be actively explored and Project ECHO represents one such innovative method.

Implementation of the Project ECHO model can help address the demand for accessible, routine and cost-efficient continuing professional education, and offers an opportunity to develop professional HIV communities of practice. Considering the Namibian context where task sharing is essential, especially in rural and remote areas, the potential of ECHO to provide interprofessional education (IPE being any type of educational, training, teaching or learning session in which two or more health and social care professions are learning together and interactively) is substantial, with good capability to enhance professional practice and health.

The Project ECHO model in Namibia also aims to further promote the decentralization of clinical services and task-shifting from physicians to nurses. Project ECHO can assist in strengthening connections between local, regional, and central MoHSS HIV clinical teams while developing peer networks, or communities of practices. Such communities of practices are meant to decrease provider isolation and increase provider satisfaction – important considering medical staff turnover can be common in Namibia. Implementation of the Project ECHO model, focused on HIV care and treatment in Namibia, can help train providers in best practices, initiate quality improvement (QI) projects, help to integrate QI perspectives into clinical discussion, reduce costs related to travels to didactic training sites, and reduce absence of providers from their posts.



Objectives of the Pilot

The purpose of the Namibia Project ECHO pilot was to increase the workforce capacity of the national ART program of Namibia to provide high quality HIV care and treatment through hub-and-spoke knowledge-sharing networks that use multi-point video conferencing. Project ECHO's goal was to develop local expertise by linking less-experienced providers with subject matter experts (SME) in a mentoring relationship through the use of videoconferencing technology, promotion of evidence-based best practices, and case-based learning. Over the course of the pilot, SMEs received training and regular feedback on video conferencing techniques and group mentorship skills from UNM Project ECHO staff as well as formal written feedback related to implementation of the ECHO model for each session. In weekly teleECHO 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 didactic presentations, joint case review, and problem solving.



⁸Arora S, Thornton K, Murata G, et al. Outcomes of treatment for hepatitis C virus infection by primary care providers. *NEJM*. 2011; 364(23):2199-207.

⁹Obeid S, Mendelsohn J, Lejars M, Forster N and Brule G. Health In Namibia - Progress and Challenges, pp54-57 and 85, *RAISON*. 2001: Windhoek.

¹⁰Reeves S, Zwarenstein M, Goldman J, et al. Interprofessional education: effects on professional practice and health care outcomes (update). *Cochrane Database Syst Rev*. 2013;(3):CD002213.



Preparations for the Namibia ECHO Pilot Implementation

Through funding provided by CDC/DGHT, EGPAF collaborated with the MoHSS of Namibia, CDC Namibia, the UNM, the UW, and I-TECH to conduct a 9-month pilot, between November 2015 to September 2016, of the Project ECHO virtual training and mentorship model.

The 9-month pilot period occurred over 11 months total due to scheduled national holidays and several cancelled weekly sessions. The Namibia MoHSS selected 10 HIV care and treatment sites with high HIV prevalence and with established internet connectivity (Table 1).

Table 1. HIV Care and Treatment Facilities Initially Selected for Participation in Project ECHO

Facility	Region
Katima Mulilo Hospital	Zambezi
Rundu Hospital	Kavango
Eenhana Hospital	Ohangwena
Engela Hospital	Ohangwena
Onandjokwe Hospital	Oshikoto
Outapi Hospital	Omusati
Oshakati Hospital	Oshana
Walvis Bay Hospital	Erongo
Keetmanshoop Hospital	Karas
Katutura Health Center	Khomas

Over the course of the pilot an additional 12 sites took the opportunity to join the ECHO sessions and were granted approval by the MoHSS pilot ECHO hub to participate. These spoke sites connected to a hub at the MoHSS national office in the capital city of Windhoek.

Based on the initial MoHSS, CDC, EGPAF, I-TECH and UW joint assessment visit, the Namibia MoHSS selected suitable sites for the Project ECHO pilot implementation. In March 2015, each proposed site was assessed for internet connectivity and readiness to engage in the pilot program.

CDC, through the Namibia Institute of Pathology, (NIP) supported extension of fiber-optic cables from regional laboratories to the selected pilot ART clinics to provide high bandwidth ensuring strong and consistent connectivity during ECHO sessions. The Project ECHO pilot established telehealth infrastructure (both hardware and software) at sites that also were being leveraged to benefit other MoHSS programs (including the HIV Drug Resistance Central Clinical Committee meetings, Clinical Mentors' routine program coordination meetings, etc.).

Consultation with providers, mentors, other technical experts and managers led to the development of the 9-month ECHO pilot curriculum and establishing the hub faculty (clinical facilitator and IT support staff).

How the ECHO pilot project was staffed

The national hub was staffed by the MoHSS Chief Clinical Mentor, Chief Nurse Clinical Mentor and an ECHO Administrator. Spoke sites were staffed by ECHO site coordinators (usually a lead nurse or physician for the site), IT support staff (usually a data clerk) and a nurse and/or physician clinical mentor. Besides core staff, technical advisors from CDC Namibia provided continuous close technical support throughout the pilot.

Use of zoom.com to create a video conferencing platform

Zoom.us is a web-based video conferencing platform that was utilized by Namibia Project ECHO. Zoom can combine cloud video conferencing, online meetings, group messaging, and a software-defined conference room solution on one platform. Zoom provides a video, audio, and wireless screen-sharing experience across Windows, Mac, Linux, Chrome OS, iOS, Android, Blackberry, Zoom Rooms, and H.323/SIP room systems (desktop, laptop and smart phone applicable). Because Zoom is cloud-based, it is particularly useful in settings with lower bandwidth or variable internet connectivity. Zoom training is available from UNM and Zoom.us, and the platform is straightforward and user-friendly. Zoom personal accounts are free to download and a basic hosting subscription for up to 100 participants is less than N\$300/month (USD\$15-20/month).

Internet infrastructure

All 10 pilot sites were able to take advantage of the significant 2015 MoHSS internet upgrade by NIP so that, generally speaking, the internet was stable and adequately fast for supporting the Zoom video conference platform. There are 40 laboratory-based sites across Namibia that benefitted from the NIP fiber optic internet upgrade; these sites should have similar IT infrastructure capable of supporting Project ECHO participation. Sites not included in the NIP internet upgrade may have a challenge with internet speed and stability which are necessary for participation. However, cellular infrastructure continues to generally improve across Namibia.



Methods

Preparatory Methods, Evaluation Methods, and Data Collection Processes

Please refer to Appendix A: Evaluation Plan for Project ECHO.

Process Evaluation

An evaluation of a pilot project requires documentation of whether a program has been implemented as intended. Namibia Project ECHO staff examined whether teleECHO sessions were taking place, who registered to participate versus who actually participated, who was facilitating, how many didactics and patient cases were presented and how the teleECHO sessions were staffed. The Namibia Project ECHO team tracked individual weekly participation of health care workers in an Excel spreadsheet, a weekly ECHO sessions registry (Weekly Registry).

The Namibia Project ECHO Administrator routinely entered data into the Weekly Registry. During an ECHO session, the Project Administrator was able to view the name of each site that was participating in the session. Documentation of individual participants occurred by participants entering their names on a sign-in sheet at their sites, and sending the sign-in sheet by mail to the Project Administrator.

Each participant was assigned a unique ECHO identification (ID) number that was linked to their name and Health Professions Council of Namibia (HPCNA) number. The ECHO ID numbers were entered in the Weekly Registry. Aggregated reports of de-identified data were generated from the Registry for analysis. The number of CPD credits awarded to participants could also be tracked through this Registry.

Administrative support from UNM Project ECHO was provided to enter and store site-level participation and estimated number of individual participants in the local registry. Furthermore, didactic topics, length of sessions, and notes on technical issues were captured. The data that was stored in the ECHO registry at the national hub was protected with 128 AES bit encryption, Secured Socket Layer encryption. Secure user logins and passwords administration was required.

Aggregated reports of de-identified data were generated from the national ECHO registry and analyzed. The data collected helped to troubleshoot all processes, particularly information technology (IT) and connectivity issues. It also helped inform process improvement and the standardization of processes related to preparing, managing, and coordinating teleECHO sessions.

At the end of the pilot, the CPD credits were awarded through the Health Professions Council of Namibia. The Project Administrator for the Namibia Project ECHO team tracked the number of CPD credits earned by participants during the pilot.

Operational costs for teleECHO sessions during the pilot were documented (see Appendix B as an example of the budget template). The CDC and MoHSS information technology teams tracked costs related establishing the ECHO program in Namibia, including costs related to upgrading internet bandwidth at the pilot sites to assure connectivity to participate in ECHO and the ongoing maintenance of the pilot program.

Project setting and duration

This 9-month pilot project involved the teleECHO session hub at the MoHSS offices in Windhoek and 10 HIV care and treatment spoke sites (Table 1). The 10 sites were selected based on a high burden of people living with HIV and reliable internet connectivity. Self-selected enrollment in Namibia Project ECHO by additional sites occurred during the pilot as the success of the pilot at the initial 10 sites became known nationally. However, sites or participants that were not selected for the initial pilot and that choose to join Project ECHO later were not included in the evaluation process.

Project population

At each of the formal pilot sites, physicians, nurses, pharmacists, community counselors and other members of the MoHSS health care team were encouraged to participate in the Project ECHO evaluation process.

The following inclusion criteria were applied to select participants for each component of the evaluation:

- Pre-assessment (baseline) of knowledge and self-efficacy: Physicians, nurses and pharmacists at each pilot site.
- Post-assessment of knowledge and self-efficacy: Physicians, nurses and pharmacists who completed the pre-assessment and participated in at least two teleECHO sessions.
- Focus groups: Physicians, nurses and pharmacists who participated in at least two teleECHO sessions.
- In-depth interviews: Physicians, nurses and pharmacists who participated in at least two teleECHO sessions and were unable to schedule time to participate in a FGD.
- Verbal/written questionnaires: teleECHO faculty and mentors, clinic administrators and teleECHO participants.

Sample size

The number of pilot sites selected reflected the number of prioritized regions with a high burden of HIV infection and with workable internet connectivity. The total of 10 sites also seemed to be a feasible number from an operational perspective, to provide adequate support and technical assistance during this pilot phase.

Similarly, the number of FGDs and in-depth interviews reflect an appropriate balance of effort and what can be learned from the process. Based on 10 pilot sites with an average of 2-3 regular teleECHO participants per site who meet the criteria for participation, we estimated that half might be interested and available to participate in a FGD (total of 10-15 participants). Seven individuals participated in two FGDs, one with three and another with four individuals, to allow for diverse representation across sites which led to saturation of themes presented during the FGDs.

TeleECHO participants who were unable to join the FGD were offered the opportunity to participate individually in in-depth interviews. A total of seven individual interviews were conducted; some potential interviews were not conducted due to scheduling challenges.

Practical Implementation of Focus Group Discussions and In-Depth Interviews

Eight months into the 9-month pilot, candidates for participation in FGDs and individual interviews were conducted with providers who participated in two or more teleECHO sessions. Participant attendance and patient presentation data were collected and maintained by Project ECHO staff for all teleECHO sessions and these data, along with suggestions from regional clinical mentors, were used to identify providers and clinical sites that were active in teleECHO sessions on a regular basis.

Providers selected to participate in FGDs were contacted directly via email, during teleECHO sessions, or over the phone to ask if they wanted to participate in a FGD. Providers who were interested in participating, but unable to attend a FGD due to scheduling conflicts were arranged to have individual in-depth interviews. The number of FGD groups and individual interviewees were purposively selected. In-depth interviews supplemented what was learned in FGDs. FGDs and in-depth interviews were carried-out using the Zoom video conferencing software, the same as for the ECHO sessions. Verbal informed consent for audio-recording and video-recording was obtained prior to initiation of the FGD or interview.

- Two FGDs each contained 7 participants + two FGD moderators, and 2 staff involved in equipment operation and transcription.
- Individual in-depth interviews were conducted with 7 participants + 2 interviewers, and 2 staff involved in equipment operation and transcription.

All FGD were conducted by the same moderators to avoid variability in style and methods of data collection. Similarly, all interviews were conducted by the same interviewers.

FGDs and in-depth interview questions collected feedback from providers on the practicalities of operating teleECHO sessions and how the sessions had been organized and structured into their weekly schedules. FGDs probed into participant perspectives on session usefulness, how they were able to integrate learning from teleECHO session participation into their practices, how they selected patient case scenarios to present in a teleECHO session, and reflection on the quality gaps in patient care, etc.

In-depth interviews lasted approximately 1 hour. FGDs lasted approximately 90 minutes and were audio and video-recorded, with participants' consent. The audio-recordings were transcribed by professional transcriptionists and the transcriptions contained de-identified information only.

Focus group and/or interview questions for ECHO clinical providers is attached in Appendix D. The FGD, teleECHO interview consent forms are attached in Appendix K and L.

Development and Implementation of Paper Questionnaires/Surveys

Participants in teleECHO sessions were asked to complete paper questionnaires and surveys as a pre-assessment before the launch of Project ECHO to establish a baseline, and at the completion of the pilot to measure changes. All assessments were carried out either at a pre-launch orientation session or at teleECHO session sites. Paper questionnaires and surveys addressed four areas:

1. Knowledge
2. Self-efficacy
3. Professional satisfaction
4. CPD credits

Multiple-choice knowledge assessment

The knowledge assessment was based on the MoHSS defined core competencies and scope of practice for key clinical providers, both physicians and nurses. Since pharmacists often attend the same trainings as nurses and physicians in Namibia and were encouraged to attend teleECHO sessions, they were also asked to complete the knowledge assessments.

The knowledge assessment was derived using the National HIV Treatment Guidelines and a list of topics generated for the curriculum for Namibia Project ECHO sessions (see Appendix E for the curriculum schedule). A draft questionnaire template was provided to MoHSS and I-TECH by UNM Project ECHO staff after UNM had sought input from other members of the Namibia ECHO Consortium. This template was then adapted by MoHSS and I-TECH for Namibia, with final curriculum topics selected after a rapid needs assessment was conducted with providers at the pilot sites, as well as from suggestions by local subject matter experts.

Multiple-choice questions addressed the following topics:

- HIV testing and interpretation of test results
- Evaluation and management of patients with common and serious opportunistic infections such as tuberculosis (TB) of the central nervous system, Toxoplasmosis, Cryptococcal Meningitis etc.
- HIV/TB co-infection
- Interpretation of viral load results
- First and second-line ART regimens
- ARV toxicities
- ART drug-drug interactions
- ARV drug resistance
- Management of HIV-Hepatitis B virus co-infection
- Management of HIV during pregnancy
- Management of HIV-exposed infants
- Pediatric HIV management
- Malaria in HIV
- Common long-term complications of HIV and ARVs
- Quality management

The knowledge assessment was conducted at two points in time: once just prior to the first teleECHO session (pre-test), and again at the completion of the pilot (post-test). Scores from the post-test were compared with scores from pre-test for each individual for a measurement of change in each individual's performance on the knowledge assessment. Providers who completed the pre-tests and participated in at least two of the teleECHO sessions during the pilot were eligible to complete the post-test. See Appendix F.

Self-efficacy assessment

Self-efficacy surveys were distributed to all teleECHO session participants in the form of a baseline and follow-up survey. Survey questions centered on providers' perceptions of their own skills and level of expertise in serving as a clinician (see Appendices F and G for examples). Participants selected their level of competency from a Likert Scale ranging from "none or no skills" to "expert, able to teach others." Scores were tabulated and compared pre- and post-pilot to assess for any change in individuals' self-efficacy. Providers who participated in at least two of the teleECHO sessions during the pilot were eligible to complete the post-pilot assessment. See Appendix H and I.

Professional satisfaction assessment

Professional satisfaction questions in the provider baseline and follow-up survey evaluated providers' level of job satisfaction and the impact of their participation in Project ECHO. Specifically, the assessment asked participants about their perception of professional isolation and opportunities for self-learning and education (see Appendices F and G for examples). Levels of professional satisfaction were measured pre- and post-pilot to assess for any change as a result of participation in teleECHO sessions. See Appendix H and I.

CPD credits

Participants received CPD points through the MoHSS for their participation in the teleECHO sessions.

At two points in time – prior to the pilot and at the end of the pilot – a survey was conducted asking providers about their perceptions of the benefits of Project ECHO and their CPD credits (see examples in Appendices H and I). The MoHSS and HPCNA acknowledged that clinicians in remote locations are often challenged to earn the required 30 CPD credits per year due to limited opportunities for self-learning. Prior to the launch of the pilot, participants were asked how many CPD credits they were able to earn during the nine months prior to the pilot. They were also asked where and how they managed to earn them if they were not earned at the facility. At the conclusion of the pilot, participants were asked how many CPD credits they earned from participating in teleECHO sessions and about other opportunities at their facility. Participants also were asked about the category of the CPD credit (i.e., law and ethics, patient management, etc.). A list of trainings offered by MoHSS Directorate of Special Programs and the National Health Training Centre in the twelve months before the inception of the ECHO pilot and the eleven months during the pilot were provided to participants to help limit recall bias.

The percent change in acquisition of CPD credit before, versus at the end of the pilot, were calculated. Participants were also asked about their reaction to teleECHO as a means of earning CPD credits. If Project ECHO was well-received by participants as an easy method to earn a higher number of CPD credits earned at the facility, this was taken as showing an important benefit of the project.

ANALYSIS

Qualitative methods

The qualitative portion of the evaluation aimed to assess the usefulness of teleECHO sessions, participants' ability to integrate learning from sessions into their clinical practice, and the acceptability and feasibility of the Project ECHO model among health care providers in Namibia. Fourteen individual health care providers in Namibia who participated in the pilot sessions of the HIV Project ECHO during the past year shared their opinions in two separate FGDs. Seven individuals participated in each FGD, and seven individual interviews were held in July 2016. Interviews and FGDs occurred after 25 of the 34 sessions were held to obtain formative feedback for the pilot program.

Participants for FGDs and individual interviews were selected from providers who had participated in at least two teleECHO sessions. The participants included 10 registered nurses (RNs), 1 pharmacist, and 3 physicians. Participants were from 7 ART clinical sites including Eenhana Hospital (1), Engela Hospital (1), Katutura Health Centre (2), Onandjokwe Hospital (3), Outapi Hospital (2), Rundu Hospital (1), and Tamariskia Health Centre in Walvis Bay (4). These sites represent 7/10 of the HIV care and treatment sites included in the pilot program. Sites not represented in the qualitative results of the evaluation were Katima Mulilo Hospital, Oshakati Hospital, and Keetmanshoop Hospital.

FGDs and interviews were facilitated by two individuals, one from CDC Namibia and one from the University of New Mexico School of Medicine.

Assistance with logistics and recording was provided by a technology administrator supported by I-TECH Namibia. All interviews and FGDs were conducted using video conferencing equipment and the Zoom.com platform. All participants joined the FGDs from their remotely-located facilities. The facilitators and technology administrator participated from the Namibia MoHSS Directorate of Special Programs boardroom that served as the hub for the Namibian HIV Project ECHO during the pilot phase. For two of these interviews, one of the two facilitators participated in the FGD from Albuquerque, New Mexico using the same format, with the second facilitator and administrator participating from the Namibia Project ECHO pilot hub.

The two FGDs lasted approximately 90 minutes, while the seven interviews lasted approximately 60 minutes each. An interview guide containing five questions with sub questions was developed and approved by the MoHSS and CDC (questions included in Appendix A). However, based on the results of the first FGD session, several additional questions were added to obtain a more robust picture of how Project ECHO has contributed to the continuous learning of health care workers, as well as to elicit challenges and barriers to participation. Verbal informed consent for video and audio recording was obtained prior to initiation of each FGD and interview.

Audio recordings were transcribed by a local professional transcriptionist. The transcribed discussions and interviews were de-identified and contained no personal identifying information. After an initial review of the data, a code-book was developed. Two individuals independently generated a set of themes and codes, discussed discrepancies in codes generated, established consensus on revisions, and finalized the codebook. A single coder used the code-book to analyze, and extract themes and representative quotes from all FGDs and interview transcripts.

Quantitative methods

With the aim to compare pre-test and post-test HIV clinical knowledge assessment scores, the test score results for participants that took both tests was analyzed. For each of these participants, the difference between post-test score and pre-test score was calculated, and mean differences were evaluated using a paired t-test. The mean difference was also calculated by site, profession, and number of CPD points. Because sub-groups defined by these characteristics involved small numbers of participants, we also used the Wilcoxon signed-rank test to evaluate the difference between pre- and post-test scores. In all analyses, a p-value < 0.05 was considered significant.

To account for variation in test score results between sites in evaluating the overall mean difference in pre- and post-test scores, we applied two different methods. A linear mixed model that included site as a random effect and time of test (pre, post) as a fixed effect was fit using the MIXED procedure in SAS software version 9.4. We also applied the generalized estimating equations approach using the GENMOD procedure in SAS.



Findings

Objective 1: Determine the Feasibility and Acceptability of The Project ECHO Model of Virtual Training and Mentoring in Namibia

A. Costs

A budget sample template for building Project ECHO in Namibia is detailed in Appendix B. Estimated costs for conception and pre-pilot planning, pilot implementation, and routine operation are summarized in Appendix C.

B. Process evaluation report findings

In addition to the Weekly Registry based on sign-in sheets, session participation was tracked by visual headcount. Participants joining late were counted as being present. Head counts include observers of the sessions from the U.S. As this record is only based on a visual headcount, no data on participation by cadre was collected. The number of pilot session held was 34, and each site attended between 18 and 33 sessions (Table 2).

Table 2. Number of ECHO Sessions Attended, by Site

ECHO Site	Number of Sessions
Katutura	18
Walvis Bay	26
Eenhana	30
Engela	32
Oshakati	33
Outapi	27
Onandjokwe	30
Rundu	18
Katima Mulilo	33
Keetmanshoop	18

The number of case presentations per session was also tracked. Often case presentations were case scenarios for learning purposes, but not cases that needed actual expert recommendations at the time. The format for how cases were presented varied. Sometimes the case presentation template was used, at other times very little information on a case was provided within the didactic slideshow. Sometimes spontaneous case discussions were initiated from the spoke sites. These may not have been counted. Table 3 summarizes the total number of cases presented during the pilot period. Twenty-three cases were presented overall, with an average of 1 case presented per session to an average of 79 participants (Table 3).

Table 3. Overall Didactic Topics, Total Number of Participants And Number of Cases Presented

Date	Didactic Topic (Actual)	Total # of participants counted through observation including U.S. observers	# of cases recorded per session
10-Nov-15	Mock ECHO	N/A	
24-Nov-15	PMTCT Option B+	133	0
1-Dec-15	Safe Conception in the Context of HIV including Family Planning	69	1
8-Dec-15	ART for Children	no data*	no data*
15-Dec-15 to 5-Jan-16	Sessions cancelled during holiday break	N/A	
12-Jan-16	First and Second Line ART Regimens for Adults	89	0
19-Jan-16	Transitioning to Preferred First Line ART Regimens	88	1
26-Jan-16	HIV Disclosure to Children & Transitioning to Adult Care	112	1
2-Feb-16	STI Screening & Management	87	0
9-Feb-16	Post-Exposure Prophylaxis (Occupational and Rape)	81	1
16-Feb-16	Interpretation of HIV Viral Load	91	1
23-Feb-16	QI Part 1: HealthQual Model	91	1
1-Mar-16	Management of TB in HIV-infected Individuals	89	1
8-Mar-16	ART Drug Resistance Basics I	70	1
15-Mar-16	ART Drug Resistance Basics II	88	0
22-Mar-16	Approach to Patients Failing Second-Line Regimens	93	1
29-Mar-16	ART Toxicities	57	0
5-Apr-16	Skin Conditions in HIV Patients	84	2
12-Apr-16	ART Drug Interactions in Namibia	90	0
19-Apr-16	Performance Measurement for Quality Improvement	84	1
26-Apr-16	3 I's Strategy for TB Infection Control	60	0
10-May-16	Presentation and Diagnosis of TB	106	0
17-May-16	TB Screening & Prophylaxis in HIV	75	1
24-May-16	HIV-HBV Co-infection	99	1
14-Jun-16	Anemia in HIV	68	0
21-Jun-16	STI Screening & Management	77	1
5-Jul-16	HIV Testing: Methods & Interpretation in Adults & Children in Namibia	81	0
12-Jul-16	Challenges in Interpretation of Testing Results in Namibia	69	2
19-Jul-16	QI Part 3: Quality Improvement Principles and Prioritization of QI Improvement Projects In Namibia	71	0
26-Jul-16	Management of Cryptococcal Meningitis in HIV	44	0
2-Aug-16	Evaluation and Management of Patients with TB Meningitis	44	1
9-Aug-16	Other HIV-associated CNS Opportunistic Infections and Conditions	73	1
16-Aug-16	"Skin Clinic" Part 2: Skin Conditions in HIV Patients	82	3
30-Aug-16	Common Long-term Complications of HAART in Namibia	70	0
6-Sep-16	ART Adherence Counseling in Namibia	61	0
13-Sep-16	Voluntary Medical Male Circumcision in Namibia	47	0
20-Sep-16	No didactic - Case presentation on patient with TB Pericarditis, Upcoming Evaluation Overview	74	1
	Total	2697	23 cases
	Average:	79 participants per session	1 case per session

*attendance data for this session was lost

C. Findings from Focus Group Discussions (FGDs) and in-depth interviews

FGDs and in-depth interview questions collected feedback from providers on the practicalities of operating teleECHO sessions, as well as how the sessions were organized and structured into their weekly schedules. The FGD and in-depth interviews probed perspectives on session usefulness, how providers were able to integrate learning from teleECHO session participation into their practices, how providers selected patient cases to present in a teleECHO session, where are the quality gaps in patient care, etc. A complete list of questions is included in Appendix D.

FGD and in-depth interview participants appreciated both the didactic PowerPoint and case scenario presentations, although some participants had difficulty describing how these two elements contributed differently to their learning. Participants stated they valued the didactic PowerPoint presentations, which they used later as clinical resources and reference materials. Participants also expressed that the case scenario presentations were relevant to cases they see in their day-to-day clinical practices.

Some significant barriers that posed challenges to providers while participating in the weekly pilot HIV teleECHO sessions included clinic-level factors (patient overload and staff shortages which limited participation), conflicting schedules with the dates and time of teleECHO sessions, and poor internet connectivity.

The most frequently cited reason for attending teleECHO sessions was to learn from colleagues at other facilities. Some participants mentioned learning best practices with demonstrated results from facilities around the country that could be applied to problems identified at their facility.

Several participants mentioned the promoting of task shifting of HIV care from physicians to nurses as a motivator for joining the pilot HIV teleECHO sessions. Related to this, some participants mentioned increasing the confidence of medium and lower level health care workers in the management of HIV care and treatment as a reason for participating. Participants cited the contribution of teleECHO sessions to increasing their knowledge about tasks that can be managed by non-physicians, and for correctly identifying when an aspect of care needs to be escalated to the level of a physician. Participants cited knowledge gained around a diverse set of topics related to the care and treatment of HIV-infected individuals in Namibia. Specific areas of knowledge gain included pediatric disclosure, anemia, skin conditions, ART regimen changes, IPT, providing services to discordant couples, etc.

Participants also stated that all members of the clinical team should be enabled and supported to participate in the weekly HIV teleECHO sessions. Many participants mentioned extending the opportunity to participate in the ECHO sessions to additional audiences including clinicians who participate in HIV patient care outside of the ART Clinics and in the private sector, providers from peripheral facilities, and additional cadres of health care workers including health assistants and other cadres who have support functions to the health systems, including data clerks.

Some participants mentioned that sessions should be tailored both in language and content to lower level cadres of health care workers, especially given that more than 50% of the participants were nurses and another 35% were other non-physician cadres. They felt that the sessions were often tailored to the level of understanding and expertise of physicians, instead of nurses, pharmacists, or health assistants. Additionally, it was mentioned that sometimes the discussions during teleECHO sessions were seen as being dominated by physicians. Participants suggested increasing the ownership, accountability, and participation of lower level cadres of health workers in choosing session topics and presenting didactic lectures and case presentations.

Participants also acknowledged that there could be improvements in technology (both internet connectivity and equipment), but all recognized the significant advantages that participation in a distance learning platform afforded them. Select responses, by question, from the Focus Group Discussions (FGDs) and in-depth interviews

1. How many of the 25 teleECHO sessions held so far in Namibia have you been able to participate in?

This question was added to the interview guide following the first FGD to get a better understanding of how many teleECHO sessions the FGD and individual interview participants had been able to attend. Eleven out of 14 participants reported to have attended 2-24 teleECHO sessions. Participants responding to this question identified significant challenges to participation in teleECHO sessions, which was repeated in responses to other questions (questions 3c, 6a, c, and d, and 8). Key identified barriers to participation included: clinic-level factors such as heavy patient load, staff shortage, timing of patient visits to the clinics later during the afternoons conflicting with timing of teleECHO sessions; perception by health care workers operating in clinics outside of the ART clinics that Project ECHO is solely a resource for health care workers in the ART clinic; and internet connectivity as well as a limited number of people understanding how to work the equipment. Several participants added that they were able to attend partial sessions, but were required to leave early or arrive late due to clinic-level factors.

“Unfortunately I could not attend most of them due to network problems at our side number one, and also maybe the facility due to shortage of staff. We will maybe attend for 10 minutes and then we are out because we are told the facility is busy and we need to attend to patients.”

2. What are the primary reasons you participated in this specific session in Project ECHO?

Several categories or themes of motivators were identified in interviews and discussions including: to gain knowledge and skills to provide better quality of care to HIV infected individuals; to develop communities of practice that promote the sharing, implementation, and troubleshooting of best practices; to receive immediate feedback from, and interaction with specialists, and to immediately apply the learning into clinical practice; to promote task shifting of HIV care from physicians to nurses, and increase the confidence levels of lower level health care worker cadres in providing HIV care and treatment; and to earn continuing professional development (CPD) credits that were otherwise difficult to attain with the existing mechanisms.

The majority of participants identified the desire to gain knowledge and skills from the teleECHO sessions to improve the quality of care of HIV-infected individuals at their facility.

“To gain more knowledge on HIV and to equip myself also with knowledge to help the patients.”

“Because I want to gain knowledge and to get a better understanding of the ART guidelines.”

“In order to improve quality of care of the patient.”

Participants identified that a large motivator contributing to their participation in the teleECHO sessions was to participate in peer-to-peer learning. Participants appreciated learning about creative approaches that their peers at other sites used to address similar issues they faced in their own clinics.

“Because it is always good to learn from others’ experiences, because we are all involved in patient care and we are challenged whether other people are successful. You are challenged so you can learn from others to incorporate best practices also at your facility.”

“It [ECHO] is very important, you are getting a lot of ideas from each other, you are sharing ideas, and you are also knowing what you do not know from others.”

“The other thing about participating, it is ...about networking also, to help us to know who is doing what...so if I have a problem I know who to consult, who to talk to or refer the patient with.”

“The ones I have participated in are set up because of the few challenges we were meeting with some of the management of the patients. So we wanted to get more information from other sites, and help, on how they [are] dealing with some of those cases. That was the main motivating factor for attending some of the sessions.”

Several participants highlighted the feedback and applicability of the teleECHO sessions as a motivator for participation. Both the application of what was learned in the teleECHO session to clinical practice, and the immediate feedback and response from clinical experts were appreciated.

“The other thing is we were able also to communicate with the facilitators, we can raise questions and other people who have experiences, they are able to answer us there and then.”

“But this information, we got it straight through the ECHO session. Therefore, now we are getting new information and straight [away] we are going to apply [it].”

The weekly HIV ECHO sessions gave nurses confidence to manage some clinical issues without consulting the doctor/s on site. Nurses indicated that the sessions also helped them understand what issues needed to be escalated to the level of a physician and who to contact for different clinical issues.

“The reason I attend these ECHO session [is] it helps me manage some of these minor cases which cannot be attended to/cannot send to doctor, but the major cases we send to doctors, it helps a lot.”

“They help us to manage the minor cases like those cases where we were supposed to refer to a doctor every time, now from [the] ECHO sessions we manage to deal with some cases.”

Many participants mentioned the possibility of earning CPD credits as a large motivator for participation. Participants shared that earning CPD credits through teleECHO sessions provided a way for health professionals to receive these credits in a time and resource efficient manner. Themes related to importance of CPD credits to participation and as a resource to participants were explored in more detail in question 5a.

“And the other thing about [the] ECHO Project, I think [they are] usually providing us with CPD Points. I know sometimes it is difficult to get CPD Points, you need to travel somewhere [to get] the CPD Points.”

3. Case Scenario presentations by clinicians (ones that you present and the ones presented by your peers) and short lectures or updates are typically part of an ECHO session.

- a. How well do these case scenarios and didactic presentations address your needs?

All participants found both the case presentations and the didactics helpful. There was some difficulty for participants in separating the case presentations and didactics, thus the responses to questions asked separately for the two components were often repetitive or overlapping.

Participants found the pilot HIV ECHO sessions case scenario presentations extremely relevant to their clinical practices. Participants thought that the case presentations explored the complexities of the national guidelines and helped participants when they had questions or unusual clinical cases. Hearing case presentations from colleagues at other facilities around the country was reported as being especially helpful. This highlighted again the importance of creating communities of practice where colleagues can engage in peer-to-peer learning. Another theme repeated in responses to the usefulness of case presentations was promotion of task shifting and confidence, with participants learning from the case scenario presentations which aspects of HIV care can be managed by non-physicians and how to escalate elements of care that needed to be addressed by physicians.

"Those case studies in the discussion, now we know whom we should go to if we have some problem with the condition of the patient."

"What I can say is because most of these cases, [they are] actually cases that we are also seeing in our clinics."

"It addresses our issues, what we are facing, because the guidelines can enlighten [us to] do number one, two, three, but case scenarios in the clinic you have to think and rethink. So they address all of the issues, and the quality was good, and the knowledge was also good... I remember there was one case from Katima Mulilo [about] the children. It was a controversial case, it was presented well, and everyone understood."

"So you can treat your patient with confidence because the cases were thorough and discussed."

Participants agreed that the didactic presentations were mostly useful as a resources that can be referred back to in meetings and discussions following the teleECHO session. One participant shared the difficulty that some cadres had in following the didactic sessions as they were presented. This participant was able to use the PowerPoint slides as a reference to remain engaged in the discussion. Other participants added that the PowerPoint didactic slides could be used as a reference during clinical meetings as a method of sharing information (information sharing through clinical meetings is further detailed in question 6b).

"The PowerPoint is helpful because you [can] follow by yourself... sometimes if someone cannot understand [the facilitator's] pronunciation, you can follow the PowerPoint."

"And the other thing about the didactic sessions, sometimes we use it as a reference because we present also during our meetings... we can use that material as a reference when we are presenting for our colleagues during our different meetings."

- b. In what ways do you use what you learn from them?

Participants used what they learned from the teleECHO sessions in a multitude of ways. The first, and most widely cited in FGDs and interviews was to improve the quality of care provided to HIV infected individuals in their care. One participant also mentioned that what he learned from the ECHO session helped to improve the confidence with which he treats HIV patients.

"I learn how to manage [the patient] when I have a similar case, I will use the information I got [from the case presentation] to manage a case in my area... So I gain a lot of knowledge and I think I am equipped enough now to handle cases when I get them in my area."

"To improve the quality of patient care, because when we discuss cases what we want is just to get the lessons for what we have, so when we discuss then we are going to practice like we are improving about the patient's care, you know what I have to give this patient and proper way of managing patient that is one."

"You are becoming confident [about] how you can treat patients because the case was already discussed."

One participant also mentioned that they used what they learn from the sessions as a form of quality control to ensure that what was being done at other facilities around the country was in line with what their own facility was doing.

"We want to find out if what we are doing currently could be in-line with what is happening out there, is there any new information which might need to be used in our management of that patient."

c. What could be improved in each format?

Participants had a variety of insightful ideas of how to improve the HIV ECHO sessions to better meet their needs and to reduce barriers to participation.

A significant barrier to applying what was learned from the ECHO sessions to clinical practice was around access to information, change management, and communication. Some participants shared their experiences that after applying concepts learned in the teleECHO session to clinical practice, they were questioned by superiors who had not attended sessions. This concerning issue was one reason why participants thought that all providers at the facility should participate in teleECHO sessions. Participants had a number of ideas of how to address this problem so that everyone at the facility has access to the same information, including encouraging all providers to participate in teleECHO sessions, sharing information from sessions through proper channels of hierarchy within the clinic, and issuing official directives and guidance such as circular or standing order for all providers to routinely attend teleECHO sessions.

"...because sometimes you do something, and later it brings a problem. Then they will ask, 'Who told you to do this?' But if there is a standing order in the unit then it won't be a problem."

"It is just known as something for someone who is working at the HIV [clinic], other staff they are not part of them. So I do not know how we can make a circular..."

"...but if it is coming from the top, through the right channels, so that all of us can follow the same guidelines and do the same things, it will also be helpful."

Participants had a variety of ideas of how the logistics of teleECHO sessions could be altered to reduce barriers and improve participation among providers. Many participants recommended changes to teleECHO sessions to accommodate providers' busy schedules, as well as busy clinic hours and days. Some participants recommended changing the day and time of teleECHO sessions, rotating ECHO participation among providers based on availability and patient burden, repeating sessions at other times during the week or the following week, recording sessions so that those who couldn't attend the real-time interactive session could watch the didactic and case presentation at a later time (possibly on YouTube).

"The problem is only the time because the clinic is always full on the day they are choosing. I do not know who is choosing the day, I cannot to say is wrong, but rather other days are better so that more nurses can participate."

"I also want to ... talk about the date, or if not can we make this ECHO session in the morning? Since especially for our facility, we are very busy [in the] afternoon because we are getting new patients. ... Then we can continue with our work, instead of disturbing us [during] that time after lunch [when] we will be busy and cannot attend. ... due to workload we are not able to attend them."

"At our Hospital we have Wi-Fi so you find people are on YouTube. ... So those look to me like the easiest [methods], either you put [the sessions] on paper or you put it online and people can really access it because I think people go on YouTube quite often. So it might be one other platform where people can easily access it."

"The recorded sessions they might not be live but if we can have the recorded sessions easily accessible."

Other improvements suggested by participants were related to session logistics including keeping better track of session time, not going over the time allotted for the sessions; providing participants with a hard copy of the didactic PowerPoint slides; having longer sessions or repeated sessions to better understand a complicated topic; and allocating more of the ECHO session to case scenario presentations.

"Yes, you need to improve on your time. Because we have a lot of patients this side and you used to take a lot of our time."

"And at least let [us] stick to the time rather than go[ing] beyond time. ... So you end up leaving the session before the [session's end] time and sometimes there will be a very important question which will come after 17h00 when you have left the session already. So I think we need to improve also on our time."

"Because most of the cases are very difficult and ... it also takes time. So if we increase the time on case scenarios because that is really what is happening [in the clinic]. Because everyone has the guidelines, everyone has read the guideline, but when you come to the cases, when it is practical which is really what we want, we really need it, the practical session."

Participants had a variety of suggestions on how to improve the content of the weekly HIV ECHO sessions, with two main themes identified.

The first theme was around focusing session content and language to the intended audience. Many participants felt that some of the session topics and languages were too high-level for the lower levels of health care worker cadres participating. Participants also felt that physicians too often dominated the discussions.

“What I think needs to be improved, I think mostly the doctors ... dominate the session. You find that, to be honest, [the] people who are working hand in hand with patients everyday are the nurses. ... I agree that of course nurses are having limited knowledge and skills in some things, but I think nurses need to be given a chance to share their views and their opinions, rather than the doctors dominat[ing] the sessions most of the time.”

“So the ECHO Program caters all people, the Counselors, the Nurses and the Doctors, so when you compare the level of knowledge about the guidelines [between them] it is different. So there are some topics which you can attend but you think this is too simple for me, like you already know everything. But for the nurses it will be new for them. But sometimes if there could be scenarios for accommodating the nurses and other staff, like the counselors.”

“What I think maybe the clinical mentors ... need to go to the nurses and ask what topic they really need discussed in the ... ECHO Session. Sometimes you are just having your one question that you think is important but you cannot come up with it as a topic. Maybe you need clarity on just one question so I think we also as the health care workers maybe we need to come up with questions ... we list them and then we hand it in.”

The second theme was around involvement of spoke sites in selection of topic areas for the sessions and in case scenario presentations. One participant suggested that the MoHSS clinical mentors could solicit session topics from health care workers at spoke sites based on what they identify as their greatest needs. Another participant suggested that spoke sites could be made responsible for preparing elements of the teleECHO sessions (case scenarios and/or didactics). Presentation of both case scenarios and didactics by spoke sites could increase participation, enthusiasm, and feelings of accountability and ownership.

“...at least for all the hospitals to be participating in [development of topic] presentation[s]. ...maybe all the hospitals can bring up [develop] the topics that people want to discuss.”

“If ... the organizer of the ECHO System, they could say, okay this Tuesday or this coming Tuesday we want Onanajokwe group to prepare this, you know to make people have responsibility.”

4. How do you apply concepts presented in Project ECHO sessions to patients with similar problems in your practice?

Participants provided a number of examples of how they are able to apply what they learned in teleECHO sessions to their clinical practice. One participant mentioned that they were able to use what they learned in the teleECHO discussions in their everyday clinical practice.

“When I learned about disclosure for pediatrics and adolescents it also helped us in our facilities. Because Friday is not our busy day, we have actually assigned Fridays for all our kids to come into the clinic. Then we do all the disclosures with their parents or the caregivers, and we are also recording in our books/registers at the sites so that we know that the child is fully disclosed [to] or how far this child has gone with [the] disclosure [process]. And most of our kids now are aware that they are taking ARV treatment and also are adhering to it...”

“Okay, the PowerPoints have helped us a lot because sometimes ... we were in a dilemma and we do not know what to do. For example, when to start IPT and to whom it should not be given. But when we attend [the ECHO sessions], it helps us a lot because we know that if a patient suffers from TB from this age he must not be give IPT and he must start after how many years. It helped a lot.”

“Now we can monitor the [patient’s] viral load by even giving health education to our patients ... nurses can attend [to this] now, not only referring them to the doctors.”

“I remember there was a presentation where they were discussing sores on the lips of patients and previously ... we use to think that ... this sore had to do with the use of alcohol or maybe the lack of vitamin C and from there, I mean from the session when they were presenting about those sores and cuts ... now [I’m] able to advise my patients accordingly.”

“What I have learned from the discussion I have put in practice every day because it will help me.”

5. How does Project ECHO serve as a resource to you?

a. A resource for Continuing Professional Development credits

Participants reported earning CPD credits was a major motivator for participation in the teleECHO sessions (as detailed in question 2). At the time of the interviews, participants hadn't received any information about how many CPD credits and when they were being awarded, information which was important to them. They felt that this lack of information could be discouraging to participation.

"Yes, we have received the information that we will get the CPD points, but we do not know if we going to be informed when, and how many are we going to get per session that we attend, that we do not know."

"Sometimes people can be discouraged if they were promised something and they did not get it, especially the CPD Points. If you promise that people will get CPD Points, then later people will be discouraged and they will not attend as much as possible."

"ECHO became a very big resource for us to get the CPD Points...it is cost effective, you do not even need to travel."

The desired frequency of CPD awarding varied greatly, with participants requesting information be shared weekly, monthly, quarterly, or yearly. The most frequent responses were monthly and quarterly.

b. Project ECHO as a resource for learning

Participants agreed that ECHO is a valued learning platform. Participants appreciated that ECHO afforded them a low cost way to learn and earn CPD credits.

"...if you enroll for a course, you actually have to have money and to pay for these studies. So in a way it helped us learn new things without us having to pay anything out of our pockets."

"I think it is a very good program especially for us who are a bit far from the capital city where we cannot attend all of the trainings."

6. Much of medicine involves a team of caregivers involved in the care of patients.

a. How much do others on your clinical team participate in the ECHO session in which you participate?

Participants shared that many providers wish to participate in the teleECHO sessions but were unable to do so due to various barriers previously mentioned. The most significant barriers preventing participation of clinical teams were that teleECHO sessions were being held during busy clinic days and times, and that providers often have competing duties on their time with high patient loads. Participants also highlighted one of the barriers identified in response to question 1, the incorrect perception that the HIV ECHO Clinic is only a learning platform for providers working in the ART Clinic. Promoting participation of providers from throughout the facility who contributed to the management of HIV patients would help foster interprofessional clinical service provision.

"The problem which can hinder our presence [in the ECHO sessions] is ... our Centre is full and sometimes to leave the patient and come and sit for the ECHO system, the patients are complaining and they end up tarnishing our name in media and newspaper...There are topics that you do not want to miss but sometimes there are patients in the Centre so one of us has to stay with the patients and the rest come and sit for the session."

b. How are you able to share the information from Project ECHO session with others on your team or on the clinical staff?

Participants were able to share the knowledge and skills gained in the pilot HIV ECHO Clinic with colleagues via existing information sharing channels at the clinics, such as routine meetings, on-site case presentations, and on-site trainings.

"Normally we have a clinical meeting every Friday.One of the agenda items ...is that we update and explore more on the presentation of that week."

"The other thing which is also motivating us is when you have a Clinical presentation because we present the cases or present the topics. So since we are presenting ... we share information because when you present you cite the source of information. So it motivates us to share information just by presenting, and when we are discussing our different cases scenarios or different topics, or when we are treating patients especially those complicated cases."

Other methods of transferring knowledge gained from ECHO sessions included holding meetings directly following teleECHO sessions, communication between peers as issues arose in the provision of care, and utilizing the expertise of MoHSS clinical mentors stationed at sites who participate in the weekly sessions.

"We [who work together] discuss after the ECHO session the same day or the next day. We used to talk about things that we learned, and we see also where we can incorporate some of these things [presented in the ECHO sessions] into our own clinics. So it was just amongst us as a group working at the ART clinic."

"After the session we used to discuss and give examples that we have come across within our Centre with our patients."

"We are so very lucky that our mentor, the clinical mentor, is based here in Facility X. ... We used to bring [cases from ECHO] to his attention, and he is so very helpful, he is always taking time to explain."

- c. Please describe what facilitates or what inhibits sharing information and practices from Project ECHO at your site.

Participants cited the applicability of case scenarios presented in teleECHO sessions to cases seen in clinical practice at their facilities as a motivator for sharing information. Because participants were encountering cases similar to those presented in the teleECHO sessions, they were motivated to share their knowledge with colleagues to improve the quality of care they provide their patients.

"Okay there are ways which ... motivate us in sharing the information, like when we are getting a complicated case and we want to discuss [it]. That one is like a motivator because you may include your points and you can also use ECHO discussions as a reference."

Many participants agreed that the predominant factors inhibiting the sharing of knowledge gained from ECHO sessions were the same barriers to participation in sessions described in question 1, 3c, and 6a and d.

"What makes it difficult is only the manpower because the clinic is overloaded. ... It is only the manpower which is making it difficult."

One participant shared that lack of complete understanding of the topic also inhibited the sharing of content from the teleECHO sessions with the larger facility.

"... Sometimes there are presentations and a topic that maybe you do not understand exactly... I can give you example, they were discussing the topic of how to identify the cause of resistance ... It was not easy for me, so far up to now I cannot explain exactly to my colleagues."

- d. What do you think about including every provider in your clinic be part of Project ECHO?

Participants agreed that all providers should participate in the HIV teleECHO sessions. Participants cited various additional audiences that should be included in ECHO sessions, including health assistants and data clerks; health care workers outside of the ART clinics who interact with HIV patients, and health care workers at peripheral facilities. Reasons cited for extending Project ECHO participation to all providers at the clinic were variable.

"The sessions are good, to improve is only, I do not know, to have more staff who will attend because it is useful. I do not know now how we will manage to get more staff to attend. Most of the people now who are attending are the students but the permanent staff must also attend."

"I think when all of us are in ECHO sessions we do not really get what others are getting, so I think we all are supposed to be there sharing ideas and also [to] ask where I cannot understand. I can ask my colleagues who attend since we cannot all hear the same thing or we do not have the [same] level of understanding at the same time. So what I understand, my colleagues might understand it different way. So for both of us to attend will help us in sharing the ideas after the sessions."

"Yes, I wish everyone at our clinic could attend the ECHO Sessions, and not just our clinic but if possible those at distant clinics and peripheral clinics. When we started ECHO we managed to get some people from the peripheral clinics to come and attend the sessions, but it was not possible... so, sometimes there are some challenges of coming to the clinic. Maybe they are having a lot of patients waiting for them But I think if possible all of us can attend the sessions."

Responding to this question, participants again brought up barriers that restricted participation in routine ECHO sessions including the ECHO sessions being held during busy clinic days and times, and high patient burden.

"It is good for everyone to be part of ECHO but unfortunately at our side the day that the ECHO was going on, every Tuesday, is one of our busy days. So unfortunately, all of us were not able to attend. But if one nurse can attend, one of the health assistant can attend, one pharmacist can attend, at least three people from different disciplines, it will be better. All those people will be able to impart information to the other colleagues who are busy with patients because all of us will not be able to attend, it is not possible."

7. How do you compare the advantages and disadvantages of learning and sharing information via Project ECHO versus traditional in-person training?

Participants identified a number of advantages to using the Project ECHO model of virtual training and mentoring as compared to traditional in-person trainings. Advantages cited by participants included less time away from the clinic with reduced possibility of staff shortage, saved money, and increased participation as well as increased active participation. The advantage of increased participation by site was significant as it may help address some of the challenges identified with implementing lessons learned during teleECHO sessions that not all providers have access to the same information about patient management.

"ECHO is good because it saves money [as opposed to] workshops where people [are] supposed to travel long distances and book accommodations. But with ECHO you are at your working place, you take your available time to attend and then you get the information."

"...With a workshop, it is only one or two people who can attend from the whole facility, but with ECHO, a lot can attend and can have also [share] ideas. One person can go to the workshop and he/she might not give clear feedback from what he/she really got from the workshop."

"..It helps that even the human resources at the clinic are not affected. Workshops usually make staff go and patients remain, in a way it actually helps reduce the movement of staff at the hospital but at the same time they will be learning."

"I have attended some workshops where participation is not that active. ...That is why I am saying some sessions I have seen at ECHO are quite good. Related the participation that you can get in a workshop where you might find okay, what people are thinking, how many more hours before it finishes [and] we go. ... I think is the biggest challenge in workshops is that people are many, their minds are set on other things. You travel and come and your mind is thinking of travelling back, 'I need this done.' So you might [lose] your concentration. But when it is an ECHO Session ... it is just hour then it is done."

The only disadvantage identified with using the Project ECHO distance learning model was around time allocation. Participants agreed that having dedicated time away from the workplace during an in-person training or workshop was useful to promote understanding of complicated topics. Additionally, participants identified that an advantage to multiple-day in-person trainings is the ability to review materials and compose questions to be asked the following day.

"To have a workshop face to face or when you are sitting in the same room, you are having enough time to think and also if you are having a question you can park it somewhere so that you ask it later. But during the ECHO session if you leave the session, maybe because sometimes the question has come later while people are going forward with a new topic. During the ECHO System I think you will just concentrate on what is presented at that time, but the workshop you will recall something and then you can ask anytime, even the next day during the workshop session."

"There are some topics which the ECHO Sessions can cover very well, but then there are some other topics which will need more time for you to really go into detail..."

8. Please comment on the use of technology and how well it worked.

Challenges were identified in the use of technology during the teleECHO sessions. Internet connectivity was reported to be an occasional barrier to participating in sessions. However, trouble with internet connectivity seemed to be largely site dependent, with some sites experiencing few problems. The most significant problems with internet connectivity were identified by participants in Walvis Bay where they were using a 4G device during the pilot. Some participants provided examples of strategies employed to mitigate poor internet connectivity including the use of private internet sources.

"Yes with the area which has internet ECHO is okay, the problem is only when the power goes off, when internet is not available. But it is easy to use. It is okay in our area."

"Here at our site internet is okay, the sound is better but like now our internet is off. The one we are using today is a private one, is not for the Government."

"Our suggestion is just to have a big screen and the speaker so if many people come to attend they can hear very well, and can see very well, and the PowerPoint to be emphasized every time."

"So the connection was a problem and then you find people give up. I think if the connection would be a bit more reliable ... I think that was one of our biggest concerns."

Data clerks at sites were usually tasked with initiating the ECHO sessions and troubleshooting issues in connectivity and technology. Some participants cited that when the data clerks were not available, it was difficult for the providers participating in the ECHO sessions to use the technology or respond to technological issues.

“Yes we have this new technology. If we do not have this, sometimes we find it a bit difficult it will be good if our ePMS guys can have time to show us how to zoom and do everything so that even in their absence we can go ahead [attending the ECHO sessions] without any problems.”

“The logging in I think it is more complicated. ... It is simple but then you see a number connection ... you just feel ‘... too many numbers.’ Especially when you have to switch it off, restart, [the] connection is lost, [and] reconnect. Usually you give up and say ah okay connection reconnection lost and all that ... The data clerk does it but at any given time if I were to do it I will not even know really.”

The application of the Zoom platform beyond the Project ECHO HIV Clinic was brought up by one participant. That participant described the utility of the Zoom platform in holding the MoHSS HIV Drug Resistance Central Clinical Committee meetings. The use of hardware and software established for the teleECHO sessions for other purposes highlighted how these technological features can continue to be leveraged to benefit other MoHSS programs.

“But also, like the other time we presented HIV resistant cases to the panel and we used ECHO or Zoom technology to present our cases. Before it was not like this, it was very difficult to present the cases, but with the Zoom technology the clinicians can come together and discuss our different cases and different [patient] management.”

Objective 2: Measure the Effect of Project ECHO on Participants’ A) Self-Efficacy, B) Acquisition of CPD Credits, C) Professional Satisfaction and D) Acquisition of HIV Knowledge

A) Provider Baseline and Follow Up Self-Efficacy Survey Results

A total of 122 health care providers from 12 districts within eight regions participated in the baseline survey. The average age of participants was 38.9 years and 63.1% of HCWs who participated were female.

Participant experience baseline survey

Overall, 66.4 % of participants were working in the HIV Outpatient Clinics during the survey and 80.3% of the clinics were located in district or intermediate hospitals. Close to 60% of the participants were nurses by profession, followed by doctors (13.1%), health assistants (9.8%), pharmacist assistants (9%) and pharmacists (4.1%). Other cadres included in the survey were three administrative officers, and one each of the following: social worker, data clerk, and HIV Testing Services (HTS) quality assurance officer.

The majority of participants said they had received trainings in HIV prevention, care and treatment either from in-service trainings (39.3%) or medical university/nursing college (36.1%). The remaining participants had received their training from either distance learning courses, HIV clinical mentors, or others sources such as Secure Health, or the non-governmental organization LifeLine/ChildLine.

The average length of professional experience was 5.7 years (range 0-15 years). On average, it was reported that one health care professional was taking care of 263 HIV patients per week. The maximum number of HIV-positive patients receiving care in the facilities where participants worked was 1700 per week (some high-volume HIV facilities in Namibia care for over 10,000 PLHIVs).

The majority (68%) of participants reported to have a smart phone or tablet, while 54.1% had a personal computer or laptop. Computers were reported to be available at 73.8% of the health facilities that participated in the HIV ECHO pilot, and internet connection was readily available in 50.8% of the facilities.

However, the availability of computer accessories such as speakers, projector and webcam was reported to be low. More than 80% of the participants regarded themselves as computer literate, whereas 11.5% of the participants reported to have never used a computer before and 15.6% reported to be beginners. In addition, the majority (81.1%) of the participants said they check their emails regularly. Only 45.1% of the participants reported to have participated in online or distance learning courses before the pilot.

Access to an HIV expert and clinical sharing, baseline and follow up survey response comparisons

During the baseline survey, 67.2% of participants reported to have timely access to an HIV expert in their respective regions when they needed clinical support or assistance; as compared to 79.3% of the participants during the follow up survey. Baseline survey response indicated 70.5% of participants reported having opportunities to share clinical experience with their colleagues on a regular basis, this increased to 88.7% of respondents in the follow up survey after participating in the Project ECHO pilot.

Attendance of HIV-related trainings by participants and where CPD credits were earned, before and after Project ECHO

Before ECHO started, most participants reported to have earned CPD credits from trainings at their facilities and in classroom based didactic training courses. At the end of the Project ECHO pilot, participants reported earning two-thirds (66.0%) of their CPD credits through participation in the weekly HIV teleECHO sessions.

As well, participants reported exposure to more HIV-related topics after participation in the Project ECHO, with the exception of HIV counseling and testing which was similar pre- and post-ECHO experience (Table 4).

Table 4. Participant Exposure to HIV-Related Topics, Pre- and Post-Participation in ECHO

In the last 12 months, what course topics of HIV training have you attended?		
	Baseline % (n)	Follow up % (n)
ART	25.4% (31)	41.5% (22)
HIV Counseling and Testing	17.2% (21)	17.0% (9)
TB	13.9% (17)	30.2% (16)
PMTCT	13.9% (17)	34.0% (18)
NIMART (nurse initiated management of ART)	12.3% (15)	30.2 (16)
HIV disclosure to children	11.5% (14)	28.3 (15)
Adolescent HIV	10.7% (13)	15.1% (8)
Pediatric HIV	10.7% (13)	13.2% (7)
Multidrug-resistant TB	8.2% (10)	11.3% (6)
Nutrition	7.4% (9)	15.1% (8)
NACS (nutritional assessment counseling and support)	6.6% (8)	11.3% (6)
Opportunistic infections	4.9% (6)	15.1% (8)
RT (rapid test)	4.9% (6)	13.2% (7)
ePMS (electronic patient management system)	4.1% (5)	5.7% (3)
IMAI (integrated management of adult illnesses)	3.55 (3)	5.7% (3)
Cervical cancer screening	1.6% (2)	7.5% (4)
Early Infant Diagnosis (EID)	0.8% (1)	0% (0)

Sixty-six percent of participants responded that Project ECHO reduced their professional isolation and 83.0% (44) of the participants agreed that the teleECHO sessions improved the quality of care that they provide to their patients and enhanced their professional satisfaction.

Nearly eighty percent (79.2%) of participants cited that access to expertise of HIV specialists and inter-disciplinary consultation was a major area of need for them and their clinic. Ninety-three percent of the participants reported that the presentations during the pilot teleECHO sessions provided them with useful up-to-date knowledge. Only 11.3% responded that the case-based discussions during the Project ECHO sessions were not always relevant to their clinical practice.

According to 92.4% of the follow up survey responders, Project ECHO was a useful tool for improving information sharing among providers of HIV care and treatment services; and 86.8% agreed that Project ECHO was a useful tool for national experts to provide technical assistance in HIV care and treatment.

Most of the respondents (84.9%) indicated that they would like to join Project ECHO programs for other diseases, if such program existed. Only six (11.4%) participants said they do not want to join any more teleECHO sessions after completion of the pilot project.

Self-efficacy (competence self-ratings) baseline and follow up survey response comparisons

Self-efficacy was rated using the following rating key:

- 1 = none or no skill at all
- 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

Overall, there was improvement in reported self-efficacy, in all domains assessed, in the follow-up survey as compared to the baseline (Table 5).

Table 5. Self-Assessment for Competence Baseline and Follow Up

	Baseline average score	Follow up average score	Difference in Score: Baseline vs. Follow-up	% difference from baseline
Ability to provide prophylaxis, diagnose, and manage common opportunistic infections for adults and adolescents	3.94	5.02	1.08	27.4%
Ability to provide prophylaxis, diagnose, and manage common opportunistic infections in children	3.48	4.43	0.95	27.2%
Ability to determine eligibility for ART in adults, adolescents, and children	4.24	5.27	1.03	24.3%
Ability to counsel pregnant women for ART (PMTCT)	4.58	5.59	1.01	22.0%
Ability to provide and interpret early infant diagnosis and management of infants perinatally exposed to HIV	3.56	4.64	1.08	30.3%
Ability to prescribe first-line ARV regimens for all patients	3.8	4.46	0.66	17.4%
Ability to recognize and manage side effects of ARV medicines for all patients	3.74	4.77	1.03	27.5%
Ability to diagnose and manage treatment failure in adults and adolescents, including prescribing 2nd-line regimens	3.26	4.11	0.85	26.1%
Ability to diagnose and manage treatment failure in children, including prescribing 2nd line regimens	2.92	3.71	0.79	27.0%
Ability to interpret the results of viral load testing for all patients	4.16	5.86	1.70	40.9%
Ability to manage TB co-infection in HIV-infected adults	3.82	4.98	1.16	30.4%
Ability to manage TB co-infection in HIV-infected children	3.5	4.31	0.81	23.1%
Ability to counsel discordant couples in birth control, STIs, and conception issues	4.21	5.41	1.20	28.5%
Ability to guide caregivers through the HIV disclosure process leading to successful HIV status disclosure to children.	3.83	4.83	1.0	26.1%
Ability to counsel adolescents in their transition from pediatric to adult care and treatment	3.7	4.83	1.13	30.5%
Ability to serve as the HIV expert in your district/region	3.8	4.89	1.09	28.7%

Participants also reported having improved skills in quality management after the teleECHO session in the follow up survey (Table 6).

Table 6. Self-Efficacy in Quality Management

	Baseline average score	Follow up average score	Difference in Score: Baseline vs. Follow-up	% difference from baseline
Ability to measure quality in your clinic (performance measurement)	3.9	4.29	0.39	10.0%
Ability to understand performance measurement results	4.1	4.6	0.5	12.2%
Ability to determine the cause of a gap in quality (determine the root cause of a quality problem)	3.9	4.56	0.66	16.9%
Ability to design a plan to improve a quality problem	4	4.48	0.48	12.0%
Ability to implement and monitor a QI plan	3.9	4.4	0.5	12.8%
Ability to make change and improve the overall quality of care in your clinic	4.3	4.69	0.39	9.0%
Ability to coach others to improve quality	4.1	4.73	0.63	15.4%
Ability to serve as a QI expert in your district/region	3.9	4.13	0.23	5.9%

Participation in QI sessions

Sixty percent of participants in the follow up survey reported to have taken part in Project ECHO QI sessions. Seventy percent of these were confident that the QI sessions were of good quality. Moreover, 67.9% said the QI sessions were useful for their clinic; and 42.4 % agreed that Project ECHO has improved their access to a QI coach.

Sixty percent of the participants felt that Project ECHO contributed to improvement of the quality of HIV care in their clinics, 43.4% reported that Project ECHO also improved their motivation to carry out QI activities in their clinics, and 49.1% reported that it was a useful model for sharing QI success stories between clinics and health care providers. The majority (88.6%) of participants found the session topics to be practical for their work.

Learning about Project ECHO

The majority (56.6%) of participants during the follow up survey reported to have found out about Project ECHO because their region was selected to participate in the pilot. The remaining found out from introduction from training courses and conferences, colleagues and clinical mentors.

Most of the participants (73.6%) reported that they used the clinic/ hospital computer to participate in the Project ECHO sessions; whereas 13.2% said they used their personal computer or laptop. Only one reported to have used a Smartphone to participate in the Project ECHO teleconferences.

Rating of the overall qualities of the ECHO pilot

Most of the participants (92.5%) rated the technical quality of the Project ECHO to be average or above average, whereas 58.5% rated it to be of good or very good quality. Almost all (94.3%) participants said the project should continue, while none said that they think the project should not.

Almost half (47.2%) of the participants preferred the case scenario presentations section most, whereas 37.7% indicated they liked all part of the sessions.

Over two thirds (67.9%) of the respondents felt that the length of each session was just enough whereas 17.0% thought they were too long and 7.5% found it to be too short. Close to 50% of the participants preferred afternoon sessions and 45.3% said 1 -2 hours is the most appropriate length for the weekly session.

The majority of participants (69.8%) also said they would like other topics to be presented in additional sessions, and some suggested topics included: emergencies, ethics, internal medicine, other chronic conditions (e.g. diabetes mellitus, epilepsy mental health, HIB/TB co-infection, nutrition) as additional necessary topics suggested by the participants.

B) Acquisition of CPD Credits

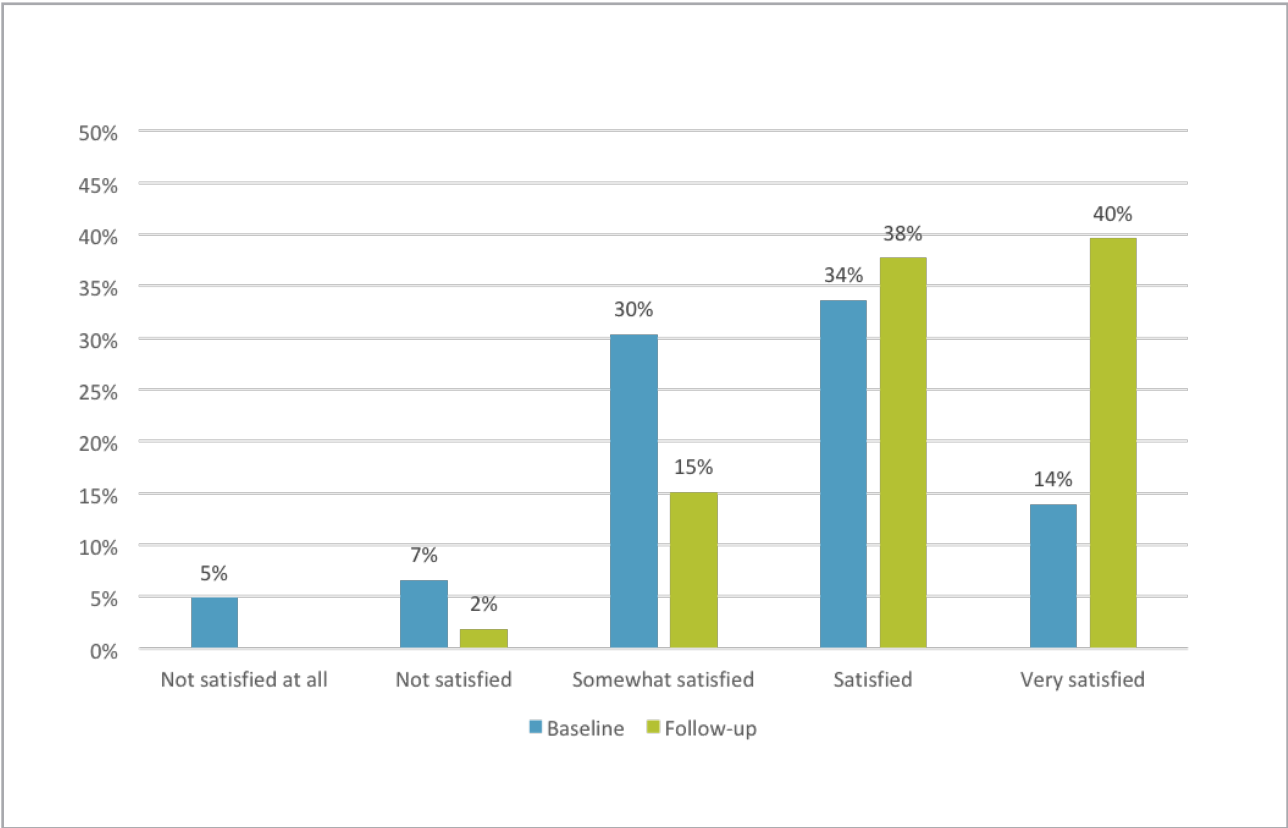
Before the introduction of the Project ECHO pilot in Namibia, participants reported accruing an average of 11.7 CPD points during the nine months prior to the launch of the pilot. During the nine months of weekly sessions participants acquired an average of 17.5 credits from Project ECHO alone. If participation continued with the same rate of attendance for 12 months, participants would have accrued an average of 26.3 CPD credits from Project ECHO participation alone, which would complement and be in addition to CPDs earned through traditional forms of training.

Overall, 56.6% participants in the follow up survey said that Project ECHO improved their access to earn CPD credits. Some of the reported barriers to obtaining CPD credits focused mainly around access to ECHO in order to earn credits including: could not attend ECHO when required to provide clinical coverage in their facility or for other health care worker colleagues; not enough courses offered; and not being informed about courses or lectures that they could have attended.

C) Professional Satisfaction Rating by Participants

During the follow up survey, 78% of the participants reported to have been satisfied or very satisfied with their professional experience as compared to only 48% during the baseline (Graph 1).

Graph 1. Professional satisfaction rating by participants

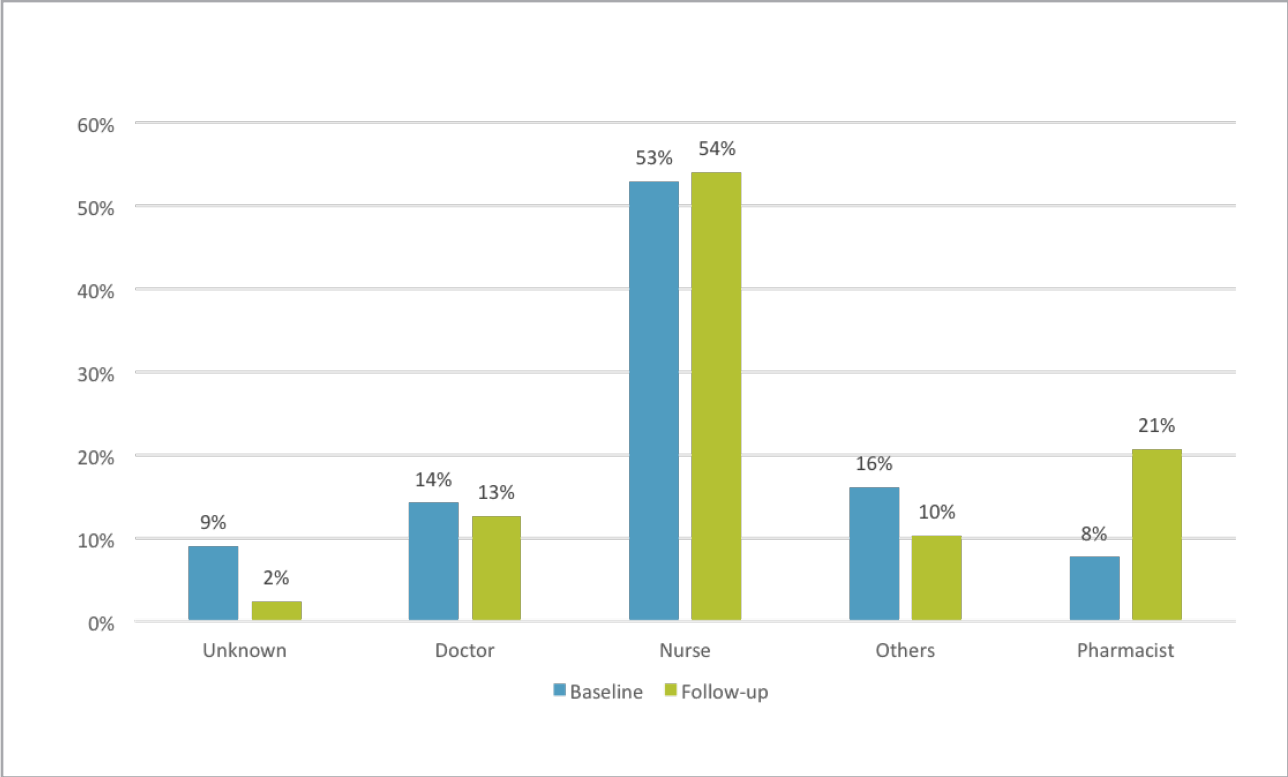


D) Analysis of the Pre- and Post-Test Data for the Knowledge Questionnaire

At the start of the project, 155 participants completed the HIV knowledge pre-test assessment. The majority of participants were nurses (53%), but other participants included physicians (14%) and pharmacists (8%). One quarter (25%) of participants were 'Other' or 'Unknown'. Following the completion of the pilot phase, the same HIV knowledge assessment questionnaire ('post-test') was administered, which was completed by 86 participants. The decreased number of participants taking the post-test vs. the pre-test was attributed to attrition of participants at 'official sites' for the ECHO pilot (additional sites that self-selected to participate in Project ECHO pilot after it was launched were not allowed to participate in the post-test. As well, ECHO participants at official pilot sites may have been rotated to new duty stations within their respective facilities or satellite facilities and were unable to participate in the post-assessment.

The composition by professional categories were largely similar during the pre-test and post-test, despite an increase in the number of pharmacists to 21%, and the number of 'Other' and 'Unknown' decreased to 13%. The increase in pharmacists taking the post-test, compared to the pre-test, was likely attributed to pharmacists entering their unique provider identification number but not denoting their profession on the pre-test (and so were listed as 'unknown'. With the post-test, it was assumed more pharmacists listed their profession, increasing the number from 12 pharmacists identified taking the pre-test to 18 identified taking the post-test. (Graph 2).

Graph 2. Pre- and post-test knowledge assessment participation by profession



There were 25 identical questions contained in the pre/post-test. The knowledge assessment was divided into six sections: (1) ARVs & Prophylactic Antimicrobials for Adults and Adolescents Living with HIV; (2) Co-infections; (3) HIV Prevention (circumcision, post-exposure prophylaxis); (4) PMTCT; (5) HIV Diagnosis and ARVs in Children & Adolescents; and (6) Quality Management. All unanswered questions, depicted by missing values, were assumed to be incorrect answers, which was reflected in the percentage points listed. The number of Project ECHO participants who completed the pre-test was 155 and 86 completed the post-test. Two participants completing the post-test answered none or two questions only and were excluded in further analysis. The number of participants who answered each question correctly, both pre- and post-test, varied by question, but only 3/25 questions demonstrated a worse performance post-test vs. pre-test. A complete summary of the unmatched pre- and post-test answers (number correct and number left blank) is summarized in Appendix G.

Pre- and post-test responses were evaluated for matching, and it was determined that 78 participants took both the pre-test and post-test. The range of and mean percentage scores for the pre-test were 16 – 88%, and 54.5% (95% CI, 51.1-57.8), respectively. In the post-test, the range of percentage scores was 4-92% and the mean 64.2% (95% CI 58.7-66.4) for all matched participants. The overall average difference for matched scores was 9.7% (95% CI, 6.7- 12.8), which was statistically significant ($p<0.01$). Pre- and post test scores were also evaluated by site, and the mean difference between pre- and post-test scores for all participating Project ECHO sites was positive, ranging between 3.0 and 17.5%. (Table 7).

Table 7. Matched Pre- and Post-Test Knowledge Assessment Scores, Overall and by Site

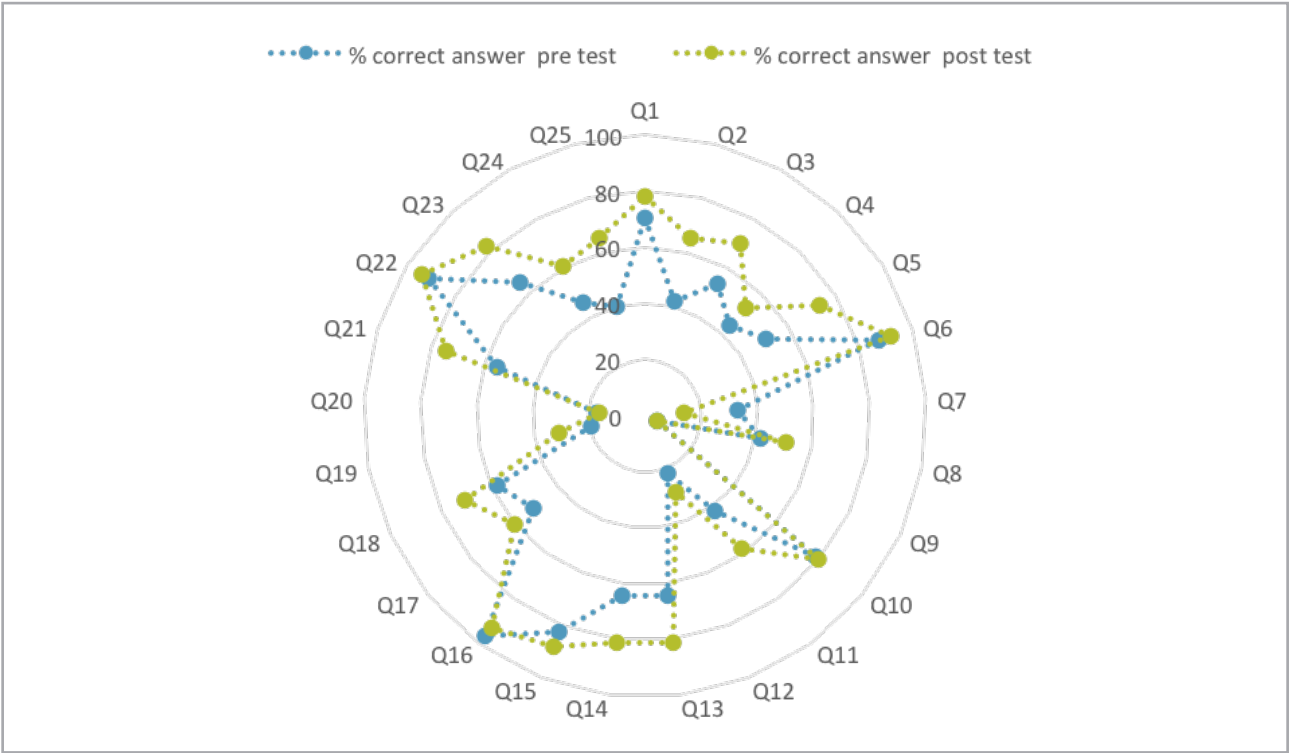
Site	Number of pairs (%)	Mean pre-test score	Mean post-test score	Mean Difference	P-value ^a	P-value ^b
All	78	54.5	64.2	9.7	<0.01	<0.01
Eenhana	2	66.0	76.0	10.0	0.34	0.50
Engela	8	57.0	65.0	8.0	0.03	0.04
Katima	3	57.3	72.0	14.7	0.05	0.25
Keetmanshoop	7	51.4	60.6	9.1	0.23	0.28
Onandjokwe	8	52.5	70.0	17.5	<0.01	0.01
Oshakati	16	57.2	68.5	11.2	0.03	0.01
Outapi	18	49.1	55.6	6.4	0.03	0.02
Rundu	8	60.0	63.0	3.0	0.20	0.22
Walvis-Bay	8	53.5	67.0	13.5	0.04	0.06

^aPaired t-test.

^bWilcoxon signed-rank test

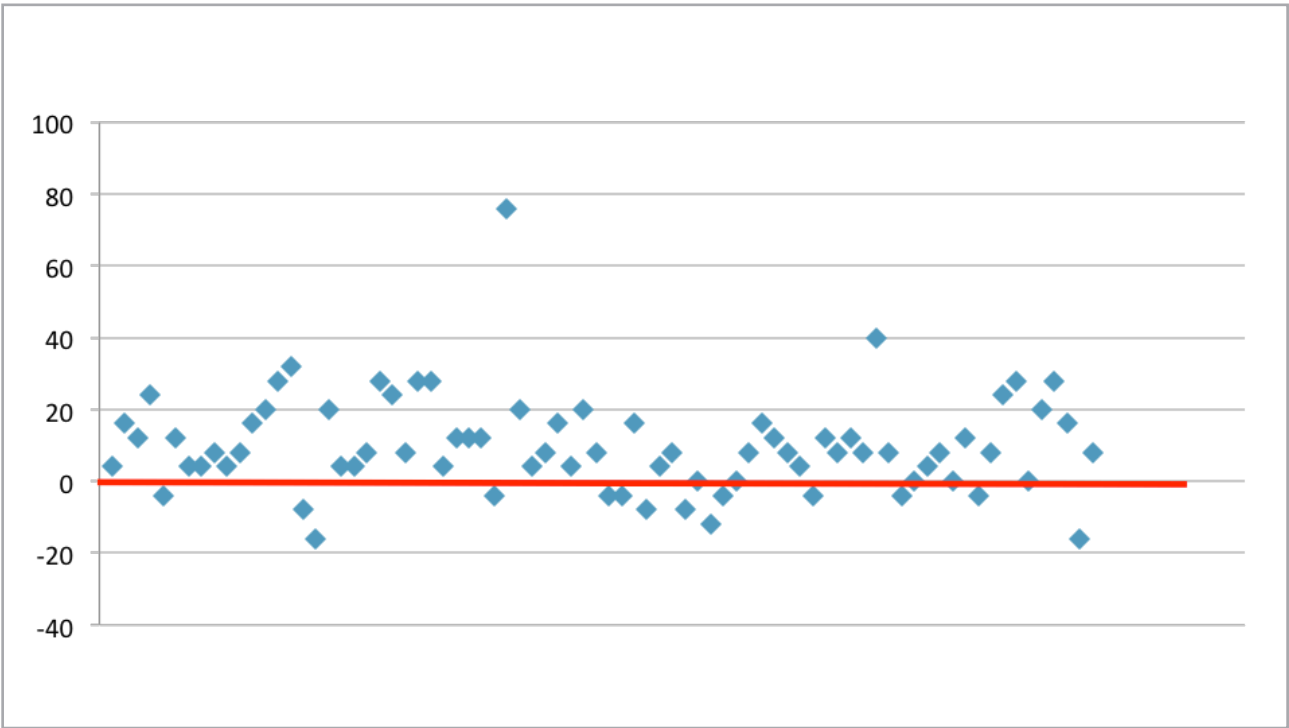
With the exceptions of questions 7, 16 and 20, the overall difference in responses increased positively, i.e., more participants answered the question correctly in the post-test as compared to the pre-test. Question 7 covered the topic of resistance testing, and questions 16 and 20 covered PMTCT. Poorer performance on the post-test could have been due to ART guideline changes that occurred during the ECHO pilot creating confusion, or participants did not routinely apply evaluation of resistance and resistance testing into their practices. As well, limited knowledge of PMTCT due to lack of application into daily practice, and the fact that PMTCT is often covered by the respective PMTCT program at participants' site of practice and so not part of their daily practice (Graph 3) may have been a reason.

Graph 3. Percentage of correct answer per question, matched pre- and post-test



Overall score difference, per participant, comparing pre- and post-test performances was also evaluated. There were 64 positive and 14 negative differences (Graph 4). This finding led to an additional completeness analysis, and paired analyses to better understand why some participants had negative performances on the post-test compared to the pre-test.

Graph 4. Score difference per participant, post- and pre-test



To evaluate whether our results were sensitive to the number of post-test questions answered, we re-ran the analysis by including only the 58 participants that answered all 25 post-test questions. The average difference changed very little (9.9%, 95% CI: 6.3 - 13.5), and this difference was also statistically significant in the linear mixed model and generalized estimating equations (GEE) analysis approaches that adjusted for between-site variation.

Paired sample statistics

Pre- and post-test scores were evaluated by profession. Overall, the mean pre-test score was 54.5% and the mean post-test was 64.2%, representing a 9.7 point change and improvement in the knowledge assessment. The majority of Project ECHO participants completing the pre- and post-tests were nurses (53.8%), and as a group they demonstrated an 11.7% change and 22.3% improvement from pre- to post-testing.

Pharmacists and those participants in the 'other' category also demonstrated improvement in knowledge assessment scores in the post-test as compared to the pre-test of 11.7% and 24.9% improvement, respectively. Doctors demonstrated the smallest improvement (2.2%) from pre- to post-test performance, but also had the highest scores for both pre and post-assessment, 72.7% (pre-test) and 74.9% (post-test). Physicians having the smallest improvement in knowledge assessment was expected, considering this cadre should have the highest baseline level of HIV training and education. The largest improvement being seen in nurses is also a positive finding, considering nurses represented the majority of Project ECHO participants, demonstrating the impact of teleECHO didactics and case reviews was in fact reaching nurse participants. Increased performance on the post-test knowledge assessment suggested nurses acquired HIV knowledge from Project ECHO during the pilot phase (Table 8).

Table 8. Pre- and Post- Mean Scores, by Profession

Profession	N (%)	Mean pre-test score	Mean post-test score	Mean Difference (% improvement from baseline)	P-value ^b	P-value ^c
All	78 (100.0)	54.5	64.2	9.7 (17.8%)	<0.01	<0.01
Doctor	11 (14.1)	72.7	74.9	2.2 (3.0%)	0.38	0.45
Nurse	42 (53.8)	52.4	64.1	11.7 (22.3%)	<0.01	<0.01
Others	16 (20.5)	45.8	57.2	11.5 (25.1%)	<0.01	<0.01
Pharmacist	9 (11.5)	57.3	64.0	6.7 (11.7%)	0.08	0.05

^bPaired t-test.

^cWilcoxon signed-rank test.

Participants accrued a wide range of CPD credits for participation in teleECHO sessions, with 40.5% of them claiming between 1 and 5 CPDs during the pilot phase. Nearly one-fifth of participants (17.9%) did not claim CPDs. Of note, CPD tracking was difficult due to multiple participants being located in more remote sites without reliable internet and ability of the hub to effectively communicate with participants and comprehensively track participation for CPD award.

The number of CPD credits earned was taken as an indirect indicator of the level of participation in the Namibia Project ECHO pilot because each one-hour session equalled eligibility to earn one CPD credit. Most participants who claimed CPD credits reported earning 1-5 credits, though up to 28 CPD credits were earned. To evaluate for an effect of participation rate on improvement in knowledge assessment scores from pre- to post-test, two CPD groupings were assigned based on the median number of participants earning credits between 1 (minimum) and 28 (maximum) credits: 1 -5 CPDs earned (n=34), and more than 5 CPDs earned (n=35). Individuals who did not claim CPDs (n=13) were excluded from these groupings (Table 9).

Table 9. Pre- and Post-Mean Scores Among 84 Participants with Both a Pre-Test Score and a Post-Test Score, by Number of CPD Points Awarded for Participation

CPD points	N	%
Did not report	15	17.9%
1 – 5	34	40.5%
6 – 10	14	16.7%
11 – 15	10	11.9%
16 – 20	7	8.3%
21 - 28	4	4.8%
All	84	100.0%

(Total participants earning CPD credits = 69. Median number of participants accruing one or more CPD credits = 34.5).

Pre- and post-test scores were then compared by the indirect participation indicator of CPD points. Gains in performance were significant and the magnitudes for the two subgroups were comparable, with a mean difference of 9.2% for participants who claimed 1 – 5 CPD points and 10.9% for those claimed 6-28 CPD points (Table 10).

Table 10. Pre- and Post-Mean Scores, by CPD Points

CPD Points	N (%)	Mean pre-test score	Mean post-test score	Mean Difference (% difference from baseline)	P-value ^a	P-value ^b
All	78 (100.0)	54.5	64.2	9.7 (17.8%)	<0.01	<0.01
Did not report	13 (16.7)	55.7	63.7	8.0 (14.4%)	0.06	0.04
1 – 5	32 (41.0)	51.6	60.9	9.2 (17.8%)	<0.01	<0.01
6 – 28	33 (42.3)	56.7	67.6	10.9 (19.2%)	<0.01	<0.01

^aPaired t-test.

^bWilcoxon signed-rank test.

To disentangle the effects of profession and number of CPD points on test score improvement, we stratified the pre- and post-scores by both of these factors together and evaluated the mean difference within each stratum. Note the total number of subjects earning CPD credits and having pre- and post-test scores decreased from 69 to 65 since four participants did not indicate their profession (Table 10a).

Table 10a. Pre- and Post-Mean Scores, by Profession And Number of CPD Points

Profession	CPD Points	N (%)	Mean pre-test score	Mean post-test score	Mean Difference (% difference from baseline)	P-value ^a	P-value ^b
Doctor	1 – 5	6	70.0	75.3	5.3	0.04	0.12
	6 – 28	3	80.0	84.0	4.0	0.48	0.75
Nurse	1 – 5	14	47.4	57.1	9.7	0.03	0.03
	6 – 28	21	54.3	67.4	13.1	<0.01	<0.01
Others	1 – 5	6	36.7	48.7	12.0	0.07	0.12
	6 – 28	7	53.7	63.4	9.7	0.08	0.12
Pharmacist	1 – 5	6	58.0	67.3	9.3	0.08	0.09
	6 – 28	2	58.0	60.0	2.0	0.80	1.00

^aPaired t-test.

^bWilcoxon signed-rank test.

The highest average difference in test scores occurred among nurses who attended >5 teleECHO sessions, with a significant increase of 13.1% ($p < 0.01$). All other mean differences were positive (range: 2.0 – 12.0) but insignificant (paired t-test and Wilcoxon signed-rank test) due to the low power associated with some CPD and professional category groupings (e.g. only 6 pharmacists earned 1-5 CPD points, compared to 2 pharmacists who earned 6-28 CPD points).



Discussion and Recommendations

The creation of a community of practice that promotes the sharing, implementation, and troubleshooting of best practices is an essential element in the application of the Project ECHO model to the Namibian context.¹¹ In 2013, a report by the Presidential Commission of Inquiry into Namibia's Health Service highlighted problems of inadequate local training capacity, uncompetitive salaries and benefits, relatively high attrition rates, and low staff motivation.¹² Professional isolation is an important factor in low health workforce retention in Namibia, especially among health care providers placed in remote rural settings, which can contribute to attrition and low motivation.^{13, 14, 15, 16} The Project ECHO attempted to address the issue of professional isolation through the development of communities of practice.¹⁷

The majority of participants reported that Project ECHO reduced their professional isolation and improved the quality of care that they could provide to their patients. Project ECHO also appeared to enhance professional satisfaction. Most participants also mentioned that Project ECHO increased access to the expertise of HIV specialists and inter-disciplinary consultation, which was identified as a major area of need. As well, at the completion of the pilot, most of the participants indicated that they would like to join Project ECHO programs for other diseases, if such programs existed.



¹¹TeleECHO™ Manual (footnote 3).

¹²MoHSS (footnote 4).

¹³Dieleman M, Cuong PV, Anh LV, et al. Identifying factors for job motivation of rural health workers in North Viet Nam. *Hum Resour Health* 2003; 1:10.

¹⁴Honforo C, Normand C. *Health workers: building and motivating the workforce. Disease control priorities in developing countries*. 2nd edn. New York, NY, Oxford University Press; 2006.

During the pilot, additional interested clinical sites were allowed to join weekly teleECHO sessions, though they were expected to ensure their own access internet connectivity and did not participate in the evaluation process. By the end of the pilot 6 additional sites (hospitals, health centers and one large clinic) had formally registered and were participating on a weekly basis, including case presentations and active discussion. Following the completion of the pilot in October 2016, 10 additional sites have informally joined the ongoing weekly teleECHO sessions with additional inquiries to join ongoing. This has brought the total spokes to 26 participating sites.

Project ECHO was designed to integrate the growing MoHSS physician and nurse clinical mentoring program. Participation of clinical mentors in the teleECHO sessions, as spoke site leaders who facilitated recruitment of and information sharing to participants at spoke sites, was best practices pioneered in the Namibia Pilot HIV ECHO which can potentially be replicated, via ECHO, for HIV care and treatment programs in other countries. The fact that presentations were rotated between the hub and spoke sites and at times facilitated by spoke participants/representatives (clinical mentors, physicians, nurses, pharmacists, etc.) added an element of broader ownership and empowerment of the periphery, which is important given Namibia's huge distances and is key for improved equity in the Namibian health system. ECHO also has imparted training and presentation skills to the regional presenters and thus enhanced their professional standing within and across the regions and country. This is a big plus of Project ECHO and the Zoom technology, which directly supports Namibia's health equity objectives and promotes staffing of more rural areas.

Logistics and Infrastructure

The ECHO model was well received by the health care workers participating in the weekly sessions, as evidenced by survey findings and *de facto* expansion to six additional sites. A nationwide expansion of the ECHO model could be considered, reaching MoHSS facilities in all districts.

In order to improve usability of the Project ECHO model of virtual training and mentoring for health care workers in Namibia, some minor areas of improvement were recommended:

- having a more flexible schedule for clinic sessions to accommodate each clinic's busy times;
- making presentations and recorded sessions readily available for participants who could not attend and replay recorded sessions at alternate times
- encourage sites to rotate teleECHO participation among providers based on their availability and patient burden;
- train non-IT staff to operate Zoom in case of absences of assigned data clerks

Other logistical recommendations that were identified included:

- emailing presentations to participants prior to sessions
- developing a better method to track session time
- develop a mechanism to better address complicated topics and questions (potentially addressing those in the following session or have longer or repeated sessions on topics that are more challenging; and
- provide more frequent (monthly or quarterly) updates participants about the number of CPD credits they have earned



¹⁵Lehmann U, Dieleman M, Martineau T. Staffing remote rural areas in middle and low-income countries: A literature review of attraction and retention. BMC Health Serv Res 2008; 8:19.

¹⁶Mangham LJ, Hanson K. Employment preferences of public sector nurses in Malawi: results from a discrete choice experiment. Trop Med Int Health 2008; 13: 1433-41.

¹⁷O'Malley (footnote 1).

¹⁸McQuide (footnote 7).

Another logistical issues raised by participants was, when data clerks were not available, it was difficult for some providers participating in the teleECHO sessions to use the technology or respond to technological issues. Possible ways to mitigate this issue are to orient multiple people at a spoke site on how to properly use the computer and audiovisual equipment, including one clinical provider in addition to the data clerk. Some sites identified challenges with infrastructure outside of internet connectivity, especially teleECHO session room size being too small and a small monitor screen size that could not accommodate increasing numbers of participants. Problems identified with small screens and sound quality were resolved with upgrading the 10 original spoke sites to large screens, projectors, speakers, and microphones installed in September and October, 2016. That said, ongoing audiovisual and internet upgrades will be necessary to accommodate a growing ECHO community in Namibia.

Timing of the sessions was also a challenge for some participants. No one time seems optimal for all providers, and additional participants are expected if the program expands. It would be good to consider having several HIV ECHO sessions each week covering the same didactic topics, but at different times so that providers can choose which time is best for their schedule. Additionally, one could consider diverting some patients currently seen on an “ECHO day” to have appointments on a “non-ECHO day” so that with time, the patient load on the ECHO day will be reduced. Ideally this would be based on a survey of participants about the optimal timing for them for the sessions. As well, the concept of zonal ECHO in Namibia has been discussed, essentially conducting separate Project ECHOs for 3-4 national zones 3 weekly sessions per month and participation in a national ECHO 1 week per month. Zonal ECHO would be facilitated by clinical mentors and could encourage additional access to teleECHO sessions for providers working in even the smallest and most remote clinical sites.

One very important finding of the Namibia Project ECHO was the diversity of professionals participating, together, in the sessions. Overall, looking at who completed pre- and post-test knowledge evaluations, the majority of ECHO participants were nurses (53.8%). One inspiring observation made by the hub faculty was the colloquial and inclusive nature of teleECHO sessions, where nurses regularly discussed medical cases and topics with physicians, pharmacists and other health care worker cadres. At the ceremony marking the completion of the pilot, participants were asked to share their impressions and one nurse stated ECHO had boosted her knowledge and confidence in providing complex care, made it easier to access specialist help when needed, and even made her feel ‘like a mini-doctor’ when discussing cases and topics with her colleagues during sessions.

Knowledge scores, overall, improved during the pilot phase for participants who took the pre- and post-assessments for HIV knowledge (9.7%). Knowledge scores improved slightly more when participants attended more than 5 sessions (10.9%) vs. participants who only attended 5 sessions or less (9.2%), though participation in any number of sessions appeared to improve understanding of HIV and HIV-related topics.

When evaluating knowledge score improvement by number of sessions attended and profession, the greatest gain was seen in nurses, who demonstrated a 9.7% improvement if they attended 5 sessions or less, and 13.1% improvement if they attended 6-28 sessions. Again, in Namibia, Project ECHO appears to offer the specific benefit of improving professional knowledge, confidence and satisfaction for nurses, creating a positive professional forum where they can engage in professional discussions and present cases with physicians, pharmacists and each other.

Participants found the pilot HIV ECHO sessions case scenario presentations extremely relevant to their clinical practices. Participants thought that the case presentations explored the complexities of the national guidelines and helped participants when they had questions or unusual clinical cases. Hearing case presentations from colleagues at other facilities around the country was reported as being especially helpful. This highlighted again the importance of creating communities of practice where colleagues can engage in peer-to-peer learning. Another theme repeated in responses to the usefulness of case presentations was promotion of task shifting and confidence, with participants learning from the case scenario presentations which aspects of HIV care can be managed by non-physicians and how to escalate elements of care that needed to be addressed by physicians.

Following the HIV ECHO Clinic pilot, the MoHSS plans to proceed with modular sessions, where different aspects of the same topic are covered over multiple weeks. This format might help to address some of the concerns over length of time dedicated to complicated topics.

Internet Connectivity Considerations

All 10 pilot sites were able to take advantage of the significant 2015 internet upgrade by NIP so that generally speaking the internet was stable and adequately fast for supporting the Zoom videoconference platform. There are 40 laboratories across Namibia that benefitted from the NIP fiber optic internet upgrade; additional future ECHO sites should have similar IT infrastructure to support participation. Sites not included in the NIP internet upgrade may have a challenge with internet speed and stability which are necessary for participation. However, cellular infrastructure continues to generally improve across Namibia.

Content and Additional Audience

Recommendations regarding session content included tailoring the session’s content and language to the level of expertise and understanding of the intended audience (lower level health care worker cadres vs. supervisory clinical staff) and involving spoke sites more heavily when selecting session topics and case presentations to encourage active participation. Project ECHO should be made available to providers who participate in HIV care and treatment outside of the ART clinics, including providers on inpatient services and to providers in the private sector in Namibia.

ECHO should also encourage participation of different cadres of health care workers involved in HIV care and treatment (medical and nursing students, health assistants, pharmacists, and data clerks).

Universal access to information should be promoted so no barriers to implementing knowledge gained through Project ECHO occurs, including encouraging all providers at a facility to participate in teleECHO sessions, and ensuring sharing of information from teleECHO sessions through proper channels of hierarchy within the clinic. Based on participant feedback, establishment of an ECHO follow-up question board could be considered so that unanswered questions from previous sessions can be addressed at the opening of the next session. As well, Namibia Project ECHO should consider establishing 'notes from the field' sessions where individual sites discuss their experiences and can choose to address a specific topic, issue, or question.

To facilitate and encourage ongoing dialogue about clinical and programmatic issues, participants could consider the use of a secure messaging application in between weekly ECHO sessions. An online web-based collaboration platform such as Sharepoint, Teamwork, etc. could also be helpful for sharing ideas and articles, guidelines, and other relevant documents across the learning community.

Recommendations

1. Maintain Namibia Project ECHO weekly telehealth sessions, with focus on HIV-related topics and case presentation.
2. Consider expansion of the number of participating spoke sites to include at least one site in every health district in Namibia. With 40 NIP laboratories across Namibia benefitting from the recent fiber optic internet upgrade, additional co-located ECHO sites could have similar IT infrastructure to support participation.
3. Continue to tailor Project ECHO session content and language to the level of expertise and understanding of the intended audience (lower level health care worker cadres vs. supervisory clinical staff).
4. Involve spoke sites when selecting session topics and case presentations in order to encourage active participation, especially for nurses.
5. Evolve the ECHO model so that all providers at participating spoke sites have an opportunity to participate in teleECHO sessions. Ensure sharing of information from teleECHO sessions through proper channels at each health care facility level.
6. Develop a follow-up question board to address unanswered questions at the start of the following teleECHO session.
7. Promote spoke site participation and 'buy-in' of Namibia Project ECHO by rotating in guest facilitators, presentations by spoke site participants and 'notes from the field' sessions detailing lessons learned and challenges faced by specific spoke sites.
8. Consider use of secure messaging (e.g. WhatsApp™) and/or a web-based collaboration platform to encourage sharing of information and ideas related to ECHO sessions, while also enhancing growing peer networks and communities of practices.

Final Statement

At the end of 2016, more than 26 spoke sites were participating in the Project ECHO platform on a weekly basis, often with 150-200+ participants. There is potential to add 20-26 additional sites to the program. Demand and popularity of ECHO in Namibia is strong, and the foundation built by this Project ECHO pilot has helped to create an inclusive professional community of practice that is lessening the effects of geographic distance and professional isolation in this sparsely-populated nation. Namibia Project ECHO has established itself as a model for telehealth in Africa, encouraging the establishment of additional Project ECHOs on the continent.



Appendices

Appendix A: Evaluation Plan for Project ECHO

Goals of Evaluation	Methods	Metrics
1. Determine feasibility and acceptability of ECHO model in Namibia	<ul style="list-style-type: none">• Focus Process evaluation – document inputs, activities, outputs• Groups with participants• Survey of mentors and clinic administrators	<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
2. Measure the impact of ECHO on providers <ul style="list-style-type: none">a) Knowledgeb) Self-efficacyc) Professional satisfactiond) CPD credits	<ul style="list-style-type: none">• Knowledge Test Questionnaires for providers• Self-Efficacy and Satisfaction Questionnaire for providers• Tracking CPD credits• TeleECHO session evaluations	<ul style="list-style-type: none">• Knowledge Pre- and Post-test scores• Self-Efficacy and Professional Satisfaction• Questionnaire Pre- and post-test scores• Number of CPD credits earned• Feedback from participants on quality and content of trainings

Appendix B: Sample Budget Template for Building Project ECHO in Namibia

Appendices/Personnel	FTE					Comments
		Year 1 (start-up)		Year 2 (maintenance)		
		\$NA	USD	\$NA	USD	
Coordinator/Administrator						
IT User Support						
Program Director						
Specialists						
Evaluation Expert/Researcher						
Subtotal						
Training (per participant)		Year 1 (start-up)		Year 2 (maintenance)		Comments
		\$NA	USD	\$NA	USD	
Airfare or in-country transport						Costs for training vary depending on location, local or international. Recommendation is for the Program Director, Coordinator/Administrator, and IT User Support to attend at a minimum
Hotel						
Training Costs						
Per diem						
Subtotal						
Equipment		Year 1 (start-up)		Year 2 (maintenance)		Comments
		\$NA	USD	\$NA	USD	
Teleconferencing hardware for Hub						
High speed internet for Hub						
Hardware installation						
Spoke site equipment						Depending on what exists and the number of sites and expected participants
High speed internet service for spoke sites						
Equipment installation						
Teleconferencing software (Zoom)						Zoom service is free through 2017 for ECHO partners
Subtotal						
Spoke Site Recruitment		Year 1 (start-up)		Year 2 (maintenance)		Comments
		\$NA	USD	\$NA	USD	
Recruitment trips						
CPD credits						
Subtotal						
Evaluation		Year 1 (start-up)		Year 2 (maintenance)		Comments
		\$NA	USD	\$NA	USD	
Survey Tools (ECHO Institute, other on-line survey tools)						
Consultant/TA						
Subtotal						
Other Costs		Year 1 (start-up)		Year 2 (maintenance)		Comments
		\$NA	USD	\$NA	USD	
Curriculum development per disease/focus area						
Technical assistance from ECHO Institute at UNM						
½ day mini conference for Spoke Site leaders (mentors)						
Subtotal						
Total						

Appendix C: Cost Estimate for Namibia Project ECHO Pilot

Activity	Itemized (USD\$)	Total (USD\$)
CONCEPTION AND PRE-PILOT PLANNING		
First country visit in December 2014 with site visits in the North and March visit with partners.	Partner A: 44,600.00	59,440.00
	Partner B: 440.00	
	Partner C: 14,400.00	
	Partner A: 5369.00 Partner B: 2,400.00 Partner C: 2685.00	10,454.00
	Hub: 9684.00 Spokes (#10): 36,578.00 DSP Storage: 5652.00	51,914.00
	Hub: \$350.00/month Spokes (x10): 3500.00/month	34,650.00 (9 months)
		Subtotal: 156,458.00
ECHO PILOT IMPLEMENTATION		
October 2015 : Visitors from Namibia visit for pre-launch (soft launch) training	Partner A: 6420.00 Partner C: 5820.00	12,240.00
34 sessions held by the end of September 2016 (end of pilot)	ECHO Administrator: 1.0 FTE salary (x 9 months): 10,125.00 CCM: 0.1 FTE salary (x9	16,355.00
July 2016: Focus group interviews and discussions ('midterm assessment')	Partner A: 14,002.00 Partner B: 2685.00 Transcription: 2410.00	19,097.00
September 2016: Post tests and Surveys	Participant incentives: 780.00	3190.00
		Subtotal: 50,882.00
TECHNICAL ASSISTANCE		
Human resources for pilot (salary + fringe +/-operating costs)	Partner A: 50,000.00 Partner B: 52, 000.00 Partner C: 59,000.00	161,000.00
		Grand Total: 368,340.00

Apart from the cost estimates above there were also direct and in-kind contributions associated with the following:

- Cost related to MoHSS travel for the initial site readiness assessment visits to all 10 pilot sites
- Staff time for MoHSS, CDC and ITECH in the soliciting input to the curriculum, and development of the curriculum
- MoHSS cost for transportation of pilot site staff from all 10 pilot sites to Windhoek for the initial orientation to ECHO training
- Staff time for MoHSS Clinical Mentors who facilitated weekly sessions
- Physical space and power utilities -Weekly ECHO sessions took place at designated venues at MoHSS district hospitals
- Staff time for local faculties and experts who presented during ECHO sessions

Appendix D: Focus Group and/or Interview Questions for ECHO Clinical Providers

1. There have been approximately 25 ECHO sessions so far in Namibia. How many have you had the opportunity to attend?
2. Why do you participate in this HIV specific clinic in Project ECHO?
3. Please think about the case-scenario presentations by clinicians (the ones you presented and ones presented by your peers).
 - How well do the discussions and recommendations on the case-scenarios address your needs?
 - In what ways do you use what you learn from the case-scenarios?
 - What could be improved in case-scenario presentations and discussions?
4. Please think about the short didactics included in the weekly sessions.
 - a. How well do the didactic sessions address your needs?
 - b. In what ways do you use what you learn from the didactic sessions?
 - c. What could be improved in the didactic sessions?
5. To what degree are you able to apply concepts presented in Project ECHO clinics to patients with similar problems in your practice?
6. How is ECHO a resource to you in relation to acquiring Continuing Professional Development credits (CPD points), continuous medical education, and improving quality of patient care?
 - a. How often would you like to receive information about the CPD points?
7. Much of medicine involves a team of caregivers involved in the care of patients.
 - a. Please comment on the participation of others on your clinical team in the ECHO clinic in which you participate.
 - b. Are there ways for you to share the information from the ECHO clinic with others on your team or on the clinical staff?
 - c. Please describe what facilitates or what inhibits sharing information and practices from Project ECHO at your site.
 - d. Should every provider in your clinic be part of ECHO?
 - e. If yes, how would you help ensure that all your clinic be part of ECHO?
8. How do you prefer to learn and share information? ECHO or in person?
Rephrased: What do you see as advantages or disadvantages of ECHO sessions vs. workshops?
 - a. Please explain your preference for either method.
9. Can you comment on the ZOOM technology so far (e.g. internet, speakers, screens and utility)?
10. Do you have any additional comments or suggestions?

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

Appendix E: Curriculum for TeleECHO Sessions

DATE	DIDACTIC TOPIC (15min)	LEARNING OBJECTIVES	Notes	Didactic Presenter
10-Nov-2015	Namibia TeleECHO Clinic Orientation	<ol style="list-style-type: none"> 1. Introductions of entire group 2. Orientation to Project ECHO format 3. Case presentation form, CPD credits etc. 		Chief Medical Officer Dr. Struminger Dr. Tadesse
24-Nov-2015	PMTCT Option B+	<ol style="list-style-type: none"> 1. Management of HIV during pregnancy 2. Management of HIV during labour, delivery and breastfeeding 3. Management of HIV-exposed infants 	(Case Presentation by MoHSS)	Mrs. Shoopala and Dr. Agabu
1-Dec-2015	Safe Conception in the Context of HIV including Family Planning	<ol style="list-style-type: none"> 1. Family planning recommendations for HIV-infected women 2. Safe conception guidelines for HIV-concordant and discordant couples 		Dr. Mpariwa
8-Dec-2015	ART for Children	<ol style="list-style-type: none"> 1. Preparation of children for ART, eligibility criteria for first and second line 2. First and second line regimens including in children TB/HIV co-infection 3. Monitoring physical and cognitive development, nutritional monitoring 		Dr. Brandt
15-Dec-2015	Canceled for Holiday			
22-Dec-2015	Canceled for Holiday			
29-Dec-2015	Canceled for Holiday			
5-Jan-2016	Canceled for Holiday			
12-Jan-2016	First and Second Line ART Regimens for Adults	<ol style="list-style-type: none"> 1. Identify eligibility criteria for initiation of first and second line ART for adults 2. Identify important risk reduction messages 3. Identify eligibility for CPT initiation, for stopping CPT, for use in malarious areas. 4. Identify the preferred first and second line ART regimens for adults 	(case vignettes, voting)	Dr. Tadesse
		<ol style="list-style-type: none"> 5. Identify routine laboratory monitoring recommended by guidelines for pre-ART, baseline and those on ART 		

DATE	DIDACTIC TOPIC (15min)	LEARNING OBJECTIVES	Notes	Didactic Presenter
19-Jan-2016	Transitioning to Preferred First Line ART Regimens	<ol style="list-style-type: none"> 1. Rationale for transition 2. Criteria to transition 3. Transition process 	case vignettes, voting	Dr. Bikinesi
26-Jan-2016	HIV Disclosure to Children & Transitioning to Adult Care	<ol style="list-style-type: none"> 1. HIV disclosure to children - when and how? 2. Adolescent-friendly health services - key service elements (team-building, life skills, adherence to treatment, sexual and reproductive health, etc.) 3. Transitioning to adult care - milestones to be reached 		Dr. Brandt
2-Feb-2016	Ethics/Law: HIV testing in comatose & cognitively impaired	<ol style="list-style-type: none"> 1. Recognize Namibia HIV testing laws 2. Identifying surrogate decision makers 		TBD
9-Feb-2016	Post-Exposure Prophylaxis (Occupational and Rape)	<ol style="list-style-type: none"> 1. Identify recommendations for universal precautions 2. Identify potent high-risk occupational exposures 		Sr. Hans
16-Feb-2016	Interpretation of HIV Viral Load	<ol style="list-style-type: none"> 1. Explain how a viral load is measured. 2. Recognize that a detectable HIV viral load may mean that the ARV regimen is failing or that the patient has poor ARV adherence. 	case vignettes, voting	Dr. Mpariwa
23-Feb-2016	QI Part 1: HealthQual Model	<ol style="list-style-type: none"> 1. Understanding the HealthQual Model: quality management structure, performance measurement and quality improvement 2. Application of HealthQual Model in HIV care and treatment. 		Dr. Bassanero, Dr. Toubed
16-Feb-2016	ART Resistance Basics I	<ol style="list-style-type: none"> 1. Discuss why ART resistance occurs 2. Understand how mutations are selected 		Dr. Tadesse, Dr. Brandt
23-Feb-2016	ART Resistance Basics II	<ol style="list-style-type: none"> 1. Common NRTI, NNRTI and PI resistance mutations 2. Rationale behind standard second line regimens in Namibia 		Dr. Tadesse, Dr. Brandt
1-Mar-2016	Approach to patients failing second-line regimens	<ol style="list-style-type: none"> 1. Identify when to do resistance testing (review of clinical and viral load history) 2. Understand how to complete resistance testing request form 3. Appropriate strategies for and selection of 3rd line regimen. 	Include requirement to present cases at HIV drug resistance panel	Dr. Mdala
8-Mar-2016	Transitioning to preferred first line ART regimens	<ol style="list-style-type: none"> 1. Rationale for transition 2. Criteria to transition 3. Transition process 	case vignettes, voting	Dr. Bikinesi

DATE	DIDACTIC TOPIC (15min)	LEARNING OBJECTIVES	Notes	Didactic Presenter
15-Mar-2016	"Skin Clinic" Part 1: Skin conditions in HIV patients	<ol style="list-style-type: none"> 1. (case-based) differential diagnosis 2. (case-based) management options 	announce in advance for photographs	
22-Mar-2016	ART toxicities	<ol style="list-style-type: none"> 1. Recognize the potential toxicities with the preferred ART regimens 2. Common NNRTI side effects 3. Identify when the use of tenofovir is contraindicated 4. TIPC reporting 		Dr. Mengistu
29-Mar-2016	ART drug interactions	<ol style="list-style-type: none"> 1. Recall the metabolism of common ART medications 2. Recognize common drug-drug interactions with recommended ART agents 		Mr. Greatjoy
5-Apr-2016	QI Part 2: Performance measurement	<ol style="list-style-type: none"> 1. Understand what performance measurement is 2. Approach to performance measurement 3. Linking performance measurement to quality improvement 		Dr. Mutandi
12-Apr-2016				
19-Apr-2016	TB infection control	<ol style="list-style-type: none"> 1. Introduction of the "3Is" strategy for HIV/TB 2. TB intensive care (IC): administrative, environmental and personal protective measures; definitions and practical implementation 	clinics asked to report on their TB IC practices and challenges)	Ms. Mungunda, Ms. Indongo
26-Apr-2016	TB screening & prophylaxis in HIV	<ol style="list-style-type: none"> 1. Intensified case finding - screening for active TB. 2. IPT - evidence on effectiveness, dosage, duration and durability 		Dr. Kakubu
3-May-2016	Presentation and diagnosis of TB	<ol style="list-style-type: none"> 1. Presentation of TB in patients with and without HIV 2. Diagnosis of TB in HIV-infected and uninfected adults and children 		Dr. Ruswa
10-May-2016	Management of TB in HIV-infected individuals	<ol style="list-style-type: none"> 1. TB treatment in HIV patients 2. ART regimen selection 3. Challenges in managing TB and HIV (side effects, drug- drug interactions, IRIS) 		Dr. Kamangu
24-May-2016	HIV-HBV Co-infection	<ol style="list-style-type: none"> 1. Recognize the health effects of HBV-HIV co-infection. 2. Understand the rationale for repeating HBsAg after 6 months if initially positive 3. Discuss management of pts with HBV-HIV 		Dr. Mugala

DATE	DIDACTIC TOPIC (15min)	LEARNING OBJECTIVES	Notes	Didactic Presenter
31-May-2016	Anemia in HIV	<ol style="list-style-type: none"> 1. Presentation and evaluation of anaemia in HIV- infected patients on or off ART 2. Differential diagnosis and investigations 3. Management of anaemia 		Dr. Katijtae
June 7-2016	Voluntary Medical Male Circumcision	<ol style="list-style-type: none"> 1. Understand the evidence for decreased HIV incidence in males and females and other advantages of VMMC 2. Role of HCWs in CDCs to educate HIV-positive women to encourage VMMC in their negative partners 		Mr. Aupokolo
14-Jun-2016	Anemia in HIV	<ol style="list-style-type: none"> 1. Presentation and evaluation of anaemia in HIV- infected patients on or off ART 2. Differential diagnosis and investigations 3. Management of anaemia 		Dr. Katijtae
21-Jun-2016	STI Screening & Management	<ol style="list-style-type: none"> 1. HIV and STI interactions 2. Syndromic management guidelines 3. Cervical cancer guidance (annual testing of HIV positive women) 		Dr. Sithole
28 June- HUB TEAM OUT OF TOWN ON A MISSION				
5-Jul-2016	HIV Testing: Methods & Interpretation in Adults & Children	<ol style="list-style-type: none"> 1. New RT testing guidelines (serial testing and repeat tests) 2. Current pediatric testing guidelines 		Mr. Edington
12-Jul-2016	Challenges in HIV testing children in Namibia: HIV sero- reversion	<ol style="list-style-type: none"> 3. Seroreversion (consider as a separate topic) 		Dr. Tadesse
19-Jul-2016	QI Part 3: Identification and prioritisation of QI improvement projects	<ol style="list-style-type: none"> 1. Tools to identify QI needs and projects (root cause analysis, fishbone analysis) 2. Prioritisation matrix 		Ms. Patience
26-Jul-2016	Management of Cryptococcal Meningitis in HIV	<ol style="list-style-type: none"> 1. Understand screening and prophylaxis recommended 2. Management of cryptococcal meningitis including secondary prophylaxis 	hear from participants about practical challenges noted in their facilities	Dr. Kakubu
2-Aug-2016	Evaluation and Mgmt of Patients with TB Meningitis	<ol style="list-style-type: none"> 1. Presentation and evaluation of patients with symptoms suggestive of TB meningitis 2. Management of TB meningitis 		Dr. Gunter
9-Aug-2016	Other HIV-associated CNS Opportunistic Infections and Conditions	<ol style="list-style-type: none"> 1. Evaluation and management of patients with CNS toxoplasmosis 2. Primary CNS lymphoma and PML 3. HIV-associated neurocognitive disorders - screening and management 		Dr. Mugala

DATE	DIDACTIC TOPIC (15min)	LEARNING OBJECTIVES	Notes	Didactic Presenter
16-Aug-2016	"Skin Clinic" Part 2: Skin Conditions in HIV patients	<ol style="list-style-type: none"> 1. (case-based) differential diagnosis 2. (case-based) management options 	request photographs to be submitted by 20 January	Dr. Mgori
23-Aug-2016	Renal Disease in HIV	<ol style="list-style-type: none"> 1. Common HIV-associated renal disease including HIVAN 2. Identify routine screening recommendations (methods and frequency of monitoring) prior to and after starting TDF 3. Management of patients with chronic renal insufficiency while on ART 		Dr. Cupido
30-Aug-2016	Common long term complications in HIV	<ol style="list-style-type: none"> 1. Screening for common long-term PI and NNRTI effects 2. Diagnosis and management of long-term effects 		Dr. Katjitae
6-Sep-2016	ART Adherence Counseling	<ol style="list-style-type: none"> 1. Identify factors that influence adherence 2. Identify strategies to accurately assess adherence 3. List suggestions to improve adherence 		Mr. Natanael/ Dr. Mazibuko
13-Sep-2016	Namibia TeleECHO Clinic Pilot Evaluation/Wrap-Up	<ol style="list-style-type: none"> 1. Focus group discussions, interviews 2. Post-assessments 		Evaluation Team
20-Sep-2016	Ethics: Topic TBA	<ol style="list-style-type: none"> 1. Recognize the legal and ethical issues around disclosure of HIV status to children 2. Recognize the legal and ethical issues around disclosure of HIV status to partners 		Ms. Siseho
27-Sep-2016	Cervical Cancer Screening and Prevention	<ol style="list-style-type: none"> 1. Association of HIV and cervical cancer 2. Recommended screening guidelines (PAP and VIA) 3. Key prevention messages 	anticipating that the ECHO program will continue we have included more sessions	Dr. Emvula and Ms Buys
4-Oct-2016	Nutrition in HIV	<ol style="list-style-type: none"> 1. Recognize the nutrition requirements in PLHIV 2. Screening and management of children with malnutrition 3. NACS in adults 		Sr. Kutondokwa/ Sr. Nambambi
11-Oct-2016	Defaulter tracing: challenges, strategies, community linkages	<ol style="list-style-type: none"> 1. Identifying defaulters 		Sr.Chirodzero, Dr.Mutenda

Appendix F: Namibia Pilot Project ECHO HIV Clinical Providers Knowledge Assessment

I. Antiretrovirals & Prophylactic Antimicrobials for Adults and Adolescents with HIV

When should cotrimoxazole preventive therapy (CPT) be initiated in adults?

- a) CD4 count ≤ 200 cells/mm³ or WHO stage 3 or 4
- b) CD4 count ≤ 350 cells/mm³ or WHO stage 3 or 4
- c) CD4 count ≤ 500 cells/mm³ or WHO stage 2
- d) In all patients not on antiretroviral medications

Answer: b. CPT should be initiated when the CD4 count drops at or below 350 cells/mm³ or in those who have WHO clinical stage 3 or 4 disease. Dapsone is an alternative if the patient has grade 3 or 4 sulfa allergy or cotrimoxazole desensitization has failed and the patient has a CD4 count below 350 cells/mm³.

Reference: 2016 Guidelines Opportunistic Infection Prevention, Section 1.17.1.

Learning Objective Tested: Initiating HIV Treatment for Adults TeleECHO session, LO #1: Identify eligibility for CPT initiation, for stopping CPT, and for use in malaria endemic areas.

A 35 year old male patient whose wife is HIV-positive is newly diagnosed with HIV. His CD4+ T cell count of 450 cells/mm³ and he is noted to have oral candidiasis (thrush). Which of the following is the most appropriate statement?

- a) Defer ART until the patient's CD4 count is ≤ 200 cells/mm³
- b) Defer ART until the patient's CD4 count is ≤ 350 cells/mm³
- c) Start ART since the patient's CD4 count is ≤ 500 cells/mm³
- d) Start ART since the patient is HIV-positive.

Answer: d. ART should be initiated when diagnosed per new 'test and treat' approach as outlined in the most recent national guidelines.

Reference: 2016 Guidelines Section 1.2 and Table 1.1

Learning Objective Tested: Initiating HIV Treatment for Adults TeleECHO session, LO #2: Identify eligibility criteria and first line agents for initiation of first and second line ART for adults.

A newly diagnosed HIV-infected non-pregnant female patient presents to your clinic. She is asymptomatic and has a CD4 count of 190 cells/mm³. She reports that she is ready to start ART. Assuming all baseline investigations are normal and she has been fully counseled, which of the following options is the best therapeutic choice?

- a) Start TMP/SMX (Cotrimoxazole) & stavudine/lamivudine/lopinavir/ritonavir
- b) Start TMP/SMX (Cotrimoxazole & tenofovir/emtricitabine/efavirenz
- c) Start TMP/SMX (Cotrimoxazole) & tenofovir/zidovudine/efavirenz
- d) Start TMP/SMX (Cotrimoxazole) & zidovudine/lamivudine/abacavir

Answer: b. TMP/SMX (Cotrimoxazole) is indicated for adults with a CD4 count ≤ 350 cells/mm³ or have WHO Clinical Stage 3 or 4 disease. Tenofovir/[emtricitabine or lamivudine]/efavirenz is the preferred first line regimen, containing 2 nucleoside reverse transcriptase inhibitors and 1 non- nucleoside reverse transcriptase inhibitor. Emtricitabine is preferred for its better pharmaco-availability benefit. Currently, a regimen containing tenofovir/emtricitabine/efavirenz is available for use and is a single tablet at night regimen. Estimation of Glomerular Filtration Rate (eGFR) is not possible as serum creatinine level cannot be determined the same day. Hence, it's crucial to do spot urine protein test using qualitative/ dipsticks method. If a significant proteinuria exists, a treating nurse or doctor needs to consult with a clinical mentor right away before initiating ART.

Reference: 2014 Guideline Section 1.17.1, Sections 1.6 and 1.7, Table 1.2

Learning Objective Tested: Initiating HIV Treatment for Adults TeleECHO session, LO #1: Identify eligibility for CPT initiation, for stopping CPT, and for use in malaria endemic areas. LO #2: Identify eligibility criteria and first line agents for initiation of first and second line ART for adults.

A newly diagnosed HIV-infected patient is started on tenofovir/emtricitabine/efavirenz. Which of the following common antiretroviral-associated toxicities is the least likely to happen with this regimen?

- a) Anemia
- b) Elevated transaminases
- c) Insomnia and nightmares
- d) Rash
- e) Renal dysfunction

Answer: a. Anemia is a common toxicity of zidovudine (AZT). Tenofovir is not directly associated with anemia but can lead to progressive renal dysfunction. Efavirenz can lead to rash, insomnia and nightmares, and elevated transaminases.

Reference: 2016 Guideline Sections 1.13, 1.14

Learning Objective Tested: ART Toxicities TeleECHO session, LO#1 Recognize the potential toxicities with the preferred ARV regimens.

An 18-year old non-pregnant female HIV patient has been on her initial combination therapy with zidovudine/lamivudine/nevirapine with good clinical results. Her recent HIV viral load done four months ago was undetectable. Which of the following is the *most appropriate* recommendation for her antiretroviral (ARV) regimen?

- a) Change nevirapine to efavirenz but continue the other two ARVs
- b) Continue current ARV regimen
- c) Discontinue her ARVs as she has no evidence of an AIDS-defining illness
- d) Switch her ARV regimen to tenofovir/emtricitabine/efavirenz

Answer: d. Recommendation to transition patients to a fixed dose tenofovir based combination includes patients on zidovudine (AZT) and stavudine (d4T). The advantages of changing to TDF/FTC/EFV are twofold: (1) Adherence benefit: this regimen will give adherence benefit, as it is one pill once during the evening, and (2) Sequencing advantage: TDF is a K65R-selecting ARV and rarely selects thymidine analogue mutations (TAMs). Hence, even if the patient fails on this regimen we are almost certain that AZT will be a fully active ARV for second line. However, if we used AZT in the first line and patient fails with selection TAMs this can confer resistance to almost all NRTIs. Pregnant women on a stable regimen with an undetectable viral load should not be switched.

Reference: 2016 Guideline Section 1.9

Learning Objective Tested: Transitioning to preferred first line ARV regimens, LO#1 Identify the criteria to transition.

A 34 year-old man is newly diagnosed with HIV. He has oral thrush, seborrheic dermatitis, and a CD4 count of 150 cells/mm³. He denies any symptoms consistent with active tuberculosis. Which of the following statements is correct?

- a) Give isoniazid for prevention of tuberculosis for nine months
- b) Give isoniazid/rifampin/pyrazinamide/ethambutol to treat presumptive latent tuberculosis
- c) Order a screening chest X-ray
- d) Screen for TB symptoms at every visit but no treatment is required

Answer: a. Give isoniazid as long as he has no signs, symptoms, or physical findings of TB and there is no contraindication to prevent active TB. TB with HIV is the most frequent opportunistic infection in this part of the world and one of the major causes of death. Adults with HIV and latent TB have an estimated 10% annual risk of developing active TB disease. Adults and children older than 5 years of age who receive isoniazid for TB prevention should get pyridoxine (vitamin B6) to prevent peripheral neuropathy from isoniazid toxicity.

Reference: 2016 Guidelines Section 1.17.1, Figure 1.8

Learning Objective Tested: TB screening & prophylaxis in HIV TeleECHO, LO#2. Explain IPT.

The ARV combination of didanosine (ddI) and stavudine (d4T) is no longer recommended. Which of the following is the reason why?

- a) Antagonism between the drugs
- b) High toxicity
- c) Poor CD4 response
- d) Poor virologic suppression

Answer: b. Combination of d4T and ddI produces significant toxicity including peripheral neuropathy, pancreatitis, and lactic acidosis. Tenofovir and ddI can't be administered together because of drug interactions and poor CD4 response. The combination of AZT and d4T is not allowed as there are chemically and functionally very close and act as antagonists. NVP and EFV should not also be co-administered as they antagonize each other's antiviral activity

Reference: 2016 Guideline Section 1.9

Learning Objective Tested: Transitioning to preferred first-line ARV regimens TeleECHO, LO #1 Discuss the rationale for transition

A 38 year old male patient with HIV stable ART for the past year is seen for routine follow-up. How often is it recommended that he get an HIV viral load (VL)?

- a) Every 3 months
- b) Every 6 months
- c) Every 12 months
- d) No viral load monitoring is required

Answer: c. HIV VL should be checked 6 & 12 months after initiating ART and then every 12 months afterward. Children and adolescents should have VLs done every 6 months. If the VL at any time gets to levels beyond 1000 RNA copies/ml, one needs to provide adherence interventions and repeat the VL after three months of good adherence. One log or more drop from the pre-adherence intervention VL level shall be taken as a sign the patient is now taking the medications and also suggestive of a high likelihood that the regimen is still working.

Reference: 2016 Guideline Section 1.11

Learning Objective Tested: Initiating HIV treatment for adults, LO#3 Identify routine laboratory monitoring recommended for those on ARV.

An adult male patient who reports good adherence to ARV had a HIV viral load after six months of treatment of 12,493 RNA copies/ml. You conducted careful assessment of barriers for adherence, provided intensive adherence counseling to him and his treatment supporter for three months. You were convinced that the patient has been taking his medicines well during the last three months and repeated VLs for the second time. The current VL is 10,000 copies/mL. After making sure that poor adherence, medication interactions, malabsorption, and opportunistic infections are ruled out, which of the following is the *most appropriate* next step?

- a) Check CD4 count and HIV genotype
- b) Change his ARVs to second-line regimen
- c) Discontinue ARVs and check HIV drug resistance in 6 months
- d) Encourage adherence and recheck HIV viral load in 6 months

Answer: b) Change his ART to second-line regimen. Resistance testing is costly and not to be performed routinely although it is required for those who fail a second line regimen.

Reference: 2016 Guideline Section 3.5.3

Learning Objective Tested: ARV resistance basics II, LO#1 Identify when to do resistance testing, Initiating HIV Treatment for adults, LO#2 Identify eligibility criteria and ARV agents for initiation of first- and second-line ARV for adults, Interpretation of HIV viral load, LO#2 Recognize that a detectable HIV VL may mean that the ARV regimen is failing or that the patient has poor ARV adherence.

An HIV-infected adult patient who recently started on an ARV regimen containing efavirenz is seen with a mild rash over the trunk that spares all mucous membranes. The rash gave him some discomfort; but didn't affect his daily life. He is otherwise without any other complaint. Which of the following is the *most appropriate* next step?

- a) Check LFTs and, if abnormal, discontinue efavirenz
- b) Discontinue efavirenz and add it to the patient's allergy list
- c) Reassure the patient and continue his current regimen with close monitoring
- d) Switch efavirenz to nevirapine

Answer: c. Reassure the patient and continue his current regimen. If the rash does not resolve with antihistamine, replace efavirenz with lopinavir/ritonavir. This is possibly grade I toxicity. Reassuring the patient, monitoring him closely and, if the discomfort worsens and rash expand, one considers using an antihistamine, usually Promethazine 10mg at bedtime. If the rash worsen, one can then consider changing EFV to LPVr. Note that it is not recommended to change patients from NVP to EFV after diagnosis of EFV-induced allergic rash, as there is cross reactivity between these two medicines and NVP has a higher chance of causing rash than EFV.

Reference: 2016 Guideline Section 1.14

Learning Objective Tested: ARV Toxicities TeleECHO, LO#2 List the common NNRTI side effects and how they should be managed.

An HIV-infected female patient who recently started on an ARV regimen containing abacavir is seen with a rash, fever, nausea, malaise, and muscle aches which are felt to be due to this medicine. Which of the following is the *most appropriate* next step?

- a) Check LFTs and, if abnormal, discontinue abacavir
- b) Discontinue abacavir and don't ever re-challenge with it.
- c) Reassure the patient and continue her current ARV regimen
- d) Switch abacavir to stavudine

Answer: b. If rash is suspected to be abacavir-related, replace it with another NRTI. However, stavudine is not on the preferred NRTI list. Tenofovir or zidovudine would be preferred. Patients should not be rechallenged with abacavir if there is suspicion of hypersensitivity reaction.

Reference: 2016 Guideline Section 1.14

Learning Objective Tested: ARV Toxicities TeleECHO, LO#1 Recognize the potential toxicities with the preferred ARV regimens.

A patient has been newly diagnosed with HIV with CD4 75 cells/mm³. Which of the following is recommended?

- a) No screening is necessary unless the CD4 is < 50 cells/mm³
- b) No screening is necessary, but start all patients with a CD4 <100 on prophylaxis
- c) Order a cryptococcal blood culture
- d) Order a serum cryptococcal antigen

Answer: d. All HIV-infected patients with CD4<200 cells/mm³ should be screened with a serum cryptococcal antigen.

Reference: 2016 Guideline Section 1.11

Learning Objective Tested: Management of cryptococcal meningitis in HIV, LO#1 Describe the recommended screening and prophylaxis for cryptococcal meningitis.

Which of the following is the most accurate statement about adherence to antiretroviral (ARV) medications?

- a) Adherence only needs to be addressed when the patient begins a new regimen of ARV medication.
- b) A patient's readiness to begin ARVs has little impact on adherence.
- c) Excellent sustained adherence to ARVs prevents development of viral resistance and reduces the risk of HIV transmission to uninfected individuals.
- d) Socio-economic status and education level are good predictors of adherence.

Answer: c. Adherence must be addressed from the very beginning of ART and counseling needs to be done at every visit to ensure that the client gets the most benefit from the therapy. Adherence is the single most important determinant of response to ART. Hence, maximum weight should be given to assessing and supporting adherence. Patients need to receive continuous education on the importance of adherence to treatment and encouragement to report all potential barriers to their adherence.

Reference: 2016 Guideline Section 1.3

Learning Objective Tested: ARV adherence counseling, LO#1 Identify factors that influence adherence, LO#2 Identify strategies to accurately assess adherence, LO #3 List suggestions to improve adherence

Which of the following ARVs have anti-viral activities against Hepatitis B virus (HBV)?

- a) Abacavir
- b) Didanosine
- c) Tenofovir
- d) Zidovudine

Answer: c. tenofovir (TDF), lamivudine (3TC), and emtricitabine (FTC) have anti-HBV activities.

Reference: 2016 Guidelines section 1.19.2

Learning Objective Tested: HIV-HBV Co-infection, LO#3 Discuss the ARV selection and monitoring of patients with HBV-HIV.

Which of the following is correct about the development of acquired HIV ARV resistance?

- a) HIV replication is inefficient with low viral replication off ARVs
- b) Resistance mutations are not present when HIV viral load is undetectable
- c) Resistance mutations can accumulate over time
- d) Suboptimal ARV serum concentrations select for resistant HIV quasispecies

Answer: c. In the absence of treatment, the virus multiplies more than 10 billion copies a day and can cause errors several hundreds of thousands times a day. These errors (mutations) can, as a matter of chance, confer resistance to certain ARVs. A combination of ARVs, when taken properly, can suppress the virus to very low levels such that the virus would not mutate fast. However, when ARVs are not taken with optimal adherence, this can create selective pressure whereby some of the susceptible viruses can be killed and the resistant ones will get a conducive environment to multiply without dominance from the wild types. These will lead to accumulation of resistant viruses and can cause partial or cross-class resistance to different classes of ARVs.

Reference: Stanford HIV Drug Resistance Database. Found at: <https://hivdb.stanford.edu>

Learning Objective Tested: ARV Resistance Basics I, LO#1 Discuss the reasons why ARV resistance occurs.

If a patient failed first-line treatment with tenofovir/emtricitabine/efavirenz (TDF/FTC/EFV), the recommended second-line regimen is zidovudine/tenofovir/emtricitabine/lopinavir/ ritonavir (AZT/TDF/FTC/LPV/r). Which of the following statements does NOT correctly describe the rationale for this regimen?

- a) **M184V confers high level resistance to 3TC and FTC but makes the virus hyper- susceptible to TDF and AZT so keeping 3TC or FTC in the second-line regimen is beneficial**
- b) **K65R causes high-level resistance to TDF and ABC but prevents selection of further thymidine analogue mutations (TAMs) so keeping TDF in the second-line regimen carries some benefits.**
- c) **AZT is unlikely to be effective in the second-line regimen due to K65R that is likely to have been selected in the failed first-line regimen**
- d) **LPV/r has strong genetic barrier and is a good choice in the second-line regimen as it takes several mutations for it to lose much of its activity.**

Answer c. K65R is a signature mutation to TDF and ABC but doesn't cause resistance to AZT. Rather, maintaining this mutation by keeping TDF in second line regimens can antagonize selection of TAMs, as there is bilateral antagonism between K65R and TAMs. K65R can also cripple the virus.

Reference: Stanford HIV Drug Resistance Database. Found at: <https://hivdb.stanford.edu/hivdb/by-mutations/report/>

Learning Objective Tested: ARV Resistance Basics I, LO#1 Recognize how mutations are selected. ARV Resistance Basics II, LO#1 Recognize common resistance mutations. LO#2 discuss the rationale behind the standard second line regimens.

Which of the following statements about ARV resistance is correct?

- a) **Efavirenz has a low barrier to resistance because the M184V mutation alone leads to complete resistance the medication**
- b) **Lamivudine and emtricitabine have high genetic barriers to resistance because they require many mutations to lose their activities**
- c) **Mutant viruses usually have a lower replicative capacities than the wild type (susceptible) ones**
- d) **Resistance testing using genotypic sequencing requires an HIV viral load of at least 1 million RNA copies/mL**

Answer: c. Mutant viruses tend to pay fitness costs and would generally have lower replicative capacity. Hence, in face of optimal adherence to ARVs, resistant viruses won't multiply extremely fast. In patients with viral loads as high as 1,000,000 copies/mL; it's most likely true that the patient has not been taking the medicines. In the absence of treatment, wild viruses out-grow the resistant ones. The ordinary sequencing technique we use for identifying mutations can't detect viruses, which are less than 20% of the sampled viral population. In such cases, the genotype may likely report that the virus is susceptible to all classes of ARVs. Hence, it's better, especially in resource-constrained settings, to reinforce adherence and consider doing genotype at a later date.

Reference: Reference: Stanford HIV Drug Resistance Database. Found at: <https://hivdb.stanford.edu>

Learning Objective Tested: ARV Resistance Basics II, LO#1 Recognize common resistance mutations. Approach to patients failing second-line ARV regimens LO#1 Identify when to do resistance testing.

Which of the following statements about resistance testing is true?

- a) **Genotyping is the only available means of testing for HIV resistance.**
- b) **In a patient who failed to all ARVs and has significant resistance, it's better to stop all ARVs if there are no newer options**
- c) **Resistance mutations to NRTIs occur on the genes encoding viral reverse transcriptase enzyme**
- d) **M184V makes the virus hyper-susceptible to tenofovir, zidovudine, and abacavir**

Answer c. Phenotypic test and virtual phenotypes can also help detect resistance. In cases where there is no further ARV option to treat patients with multi-drug resistant HIV infection; keeping the failed regimen can maintain pressure on viral multiplication and hence slows the progression to AIDS stage. NRTI and NNRTI mutations occur on the gene expressing the viral reverse transcriptase enzyme. M184V re-sensitizes the virus to TDF, AZT and D4T, but it confers resistance to ABC.

Reference: Reference: Stanford HIV Drug Resistance Database. Found at: <https://hivdb.stanford.edu>

Learning Objective Tested: ARV Resistance Basics II, LO#1 Recognize common resistance mutations. Approach to patients failing second-line ARV regimens LO#1 Identify when to do resistance testing.

Which of the following statements about ARV resistance mutations is FALSE?

- a) M41L, L210W and T215Y are first pathway thymidine analogue mutations (TAMs) and have been found to cause worse resistance against NRTIs than D67N, K70R, and K219Q/E which are called second pathway TAMs
- b) M184V confers high level resistance to lamivudine and emtricitabine, but M184I does no harm to the effectiveness of these drugs
- c) K103N is signature mutation for efavirenz and confers high-level resistance to it, but it can't confer cross-resistance to etravirine
- d) Selection of A98G, Y181C/I/V, or G198A can confer some level of resistance to etravirine.

Answer b. Both M184V and M184I confer high levels of resistance to 3TC and FTC

Reference: Reference: Stanford HIV Drug Resistance Database. Found at: <https://hivdb.stanford.edu>

Learning Objective Tested: ARV Resistance Basics II, LO#1 Recognize common resistance mutations. Note: This is a detailed ARV resistance question that is beyond basic working ARV resistance knowledge.

Co-Infection (HBV, TB, STI, OI)

A 43 year old man with HIV infection is noted to have proteinuria and an elevated serum creatinine with a creatinine clearance of 45ml/min. His current CD4 count is 450 cells/mm³. He has never been on ARVs or had an opportunistic infection and is Hepatitis B surface Antigen (HBsAg) negative. Which of the following options is the most appropriate management?

- a) Avoid ARV since ARV agents cannot be given to patients with renal insufficiency
- b) Defer ARV until his creatinine is improved
- c) Start abacavir, lamivudine, and efavirenz
- d) Start cotrimoxazole & tenofovir/emtricitabine/efavirenz
- e) Start stavudine, emtricitabine, lopinavir/ritonavir

Answer: c. Fixed dose combination therapy cannot be used when the creatinine clearance is <50 mL/min as the doses of NRTIs need to be adjusted to renal doses. Tenofovir should be avoided when the creatinine clearance is <30 mL/min, unless there is HBV co-infection. Many NRTIs, including tenofovir, lamivudine, and emtricitabine, require dose adjustment in renal insufficiency. Zidovudine can be used in renal insufficiency, but can cause anemia, which is already a problem in many patients with renal disease. Abacavir and efavirenz do not require renal dose adjustment. Abacavir can cause a hypersensitivity reaction, but is uncommon in people of African descent. In the U.S., all patients are screened for HLA B*5701 and abacavir is given only those who test negative.

Reference: 2016 Guideline Sections 1.7

Learning Objective Tested: Initiating HIV Treatment for Adults TeleECHO session, LO #2: Identify eligibility criteria and first line agents for initiation of first- and second-line ART for adults. Renal Disease in HIV, LO#3. Describe management of patients with chronic renal insufficiency while on ARV.

A 35-year-old male patient presented to your clinic with a CD4 count of 785 cells/mm³ and a positive Hepatitis B surface antigen (HBsAg). He was otherwise healthy. His baseline creatinine clearance (CrCl) was 55 mL/min and urine protein was trace on urine dipstick. Which one of the following statements is NOT correct?

- a) He is eligible for ART because he has current HBV infection
- b) The preferred ART regimen for this patient is TDF/FTC/EFV
- c) The preferred regimen for this patient is AZT/3TC/EFV because the CrCl is less than 60mL/min
- d) This patient needs ALT at 2, 6, 12 and 24 months, then every 6months after that. He also needs a repeat HBsAg test after 6 months of ART

Answer c. In patients with HIV/HBV co-infection, it's recommended to give TDF as an NRTI back bone for the preferred first-line regimen and follow closely for renal function. This is because; TDF and 3TC (FTC) treat both HIV and HBV infections. N.B.: In this case, the CrCl is <60 mL/min but ≥50 so there is no need for dose adjustment. If the CrCl was <50, downward dose adjustment would be necessary. In cases where the eGFR is <10ml/min there is no TDF dosage recommendation due to lack of pharmacokinetic data. In such cases it's important to discuss with an HIV specialist before considering putting the patient on TDF or deferring it for some time.

Reference: 2016 Guideline Sections 1.19

Learning Objective Tested: HIV-HBV Co-infection, LO#3 Discuss the ARV selection and monitoring of patients with HBV-HIV.

At two weeks the patient returned for a follow-up appointment. He had no complaints, his serum ALT was 35 IU/L and he was stable on his treatment. At six months his HBsAg test turned negative. What is the most likely cause?

- a) False negative HBsAg result
- b) False positive initial HBsAg result
- c) He cleared the HBV infection spontaneously
- d) He is cured from HBV infection because of his ARV regimen

Answer. c. It's very likely that the patient has cleared the HBV infection. Up to 90% of healthy adults can clear acute HBV infection without HBV treatment. Hence, patients who tested positive for HBsAg at enrollment to HIV care may subsequently test negative, if they didn't already develop chronic HBV infection. Hence, it's recommended in the Namibian ART Guidelines to repeat the HBV test after 6 months of treatment.

Reference: 2016 Guideline Sections 1.19

Learning Objective Tested: HIV-HBV Co-infection, LO#2. Explain the rationale for repeating HBsAg after 6 months, if initially positive

A 27-year-old female patient who has been known HIV-positive for two years presented with cough, fever, night sweats, dry cough, and mild pleuritic chest pain a few days ago. The sputum direct microscopy for Acid Fast Bacilli (AFB) returned smear-positive (++) and molecular test (Xpert MTB/RIF) reported rifampin-sensitive Mycobacterium tuberculosis. She has a CD4 of 22 cells/mm³ and she has never been on ARV. Which one is the most appropriate management of her tuberculosis (TB) and HIV?

- a) Start a standard 4-drug anti-TB regimen and then start an ARV regimen 3 days later
- b) Start ARV regimen with tenofovir/emtricitabine/efavirenz prior to starting standard 4-drug anti-TB regimen
- c) This patient has a higher risk of developing IRIS after starting ART so monitor closely for possible exacerbation of symptoms.
- d) Wait to start an ARV regimen until she completes her tuberculosis treatment

Answer. c. Patients with TB and HIV should start ART as soon as possible between 2 and 8 weeks of TB treatment as long as the TB treatment is well tolerated. Patients with very low CD4 counts, such as those with CD4s less than 50 cells/mm³, should be initiated on ART earlier on after 1 week of TB treatment. As this patient has a Rifampicin-sensitive TB, we start her on the standard anti-TB regimen comprising of an intensive phase of RHZE for 2 months. TDF/FTC or 3TC/EFV are preferred regimens for adults with HIV and TB, unless there are reasons that may contraindicate the use of one of these medicines.

Reference: 2016 Guideline Sections 1.19

Learning Objective Tested: Management of TB in HIV-infected individuals, LO#1 Identify the recommended TB treatment I HIV patients, LO#2 Recognize how to select an ARV regimen in an HIV- infected patient with TB, LO#3 Recognize the challenges in managing TB and HIV including medication side effects, drug-drug interactions, and IRIS.

You saw the above patient after ten days of anti-TB treatment. She was tolerating the treatment very well. You initiated her on ARVs on that same day. She came back to clinic after two more weeks and she was doing well. At six weeks of TB treatment, you collected sputum for direct microscopy and it was still positive with 1+. Which of the following statement is correct?

- a) Drug resistance to one or more of the anti-TB medications is unlikely because this is not seen before 6 months of treatment have been completed.
- b) Drug resistant tuberculosis testing with molecular test Gene Xpert has low sensitivity when sputum direct microscopy for AFB is positive.
- c) Prolong the 4-drug intensive phase by 4 more months and repeat sputum direct microscopy for AFB. If it is still positive, order a repeat Gene Xpert test.
- d) A diagnosis of rifampin-resistant Mycobacterium tuberculosis (MTB) at 10 weeks warrants starting preparation for second-line anti-TB medicines; while collecting sputum for conventional Mycobacterium tuberculosis (MTB) culture

Answer d. Almost all sputum smear-positive TB patients should convert sputum to negative state by 6 weeks of treatment. In the background of good adherence to treatment, failure to convert sputum to negative at 6 weeks should alert to the possibility of resistance. In this case, it is recommended to continue the intensive phase of treatment for one more month and repeat sputum DM at 10 weeks. A positive smear necessitates doing a Gene Xpert test. Report of rifampin resistance dictates a presumptive diagnosis of multi-drug resistant TB. When TB bacilli are resistant to rifampicin, they are likely to be resistant to isoniazid also. In face of sputum DM-positive state, Gene Xpert testing is found to be highly sensitive with sensitivity of close to 100%. But when the DM is negative, the sensitivity of Gene Xpert testing drops to 60%.

Reference: 2016 Guideline Sections 1.19, 2012 Guidelines for the Management of TB Chapter 3

Learning Objective Tested: Management of TB in HIV-infected individuals, LO#3 Recognize the challenges in managing TB and HIV including medication side effects, drug-drug interactions, and IRIS. Drug resistance.

Which of the following is correct about *Mycobacterium tuberculosis* (TB) infection control measures:

- a) Administrative measures are first-line measures to prevent inhalation of TB bacilli that are already in the environment.
- b) Environmental measures ensure prevention of the release of TB bacilli into the environment.
- c) Use of personal protective equipment (PPE) helps to prevent inhalation of TB bacilli that are already in the environment.
- d) Use of ultraviolet (UV) light is an example of an administrative measure for TB prevention

Answer c. Use of PPE helps to prevent inhalation of TB bacilli that are already in the environment. Administrative measures are first-line measures to ensure preventing the release of TB bacilli into the environment. Environmental measures remove bacilli, which are already in the environment. Use of UV light is an example of an environmental measure.

Reference: 2016 Guideline Sections 1.19, 2012 Guidelines for the Management of TB Chapter 9

Learning Objective Tested: TB Infection Control TeleECHO, LO#1. Recognize the 3Is strategy for HIV/TB, LO#2. Correctly identify TB infection control.

A 35-year old woman with newly diagnosed WHO HIV Stage 3 disease due to active pulmonary tuberculosis, started TB treatment. Subsequently, she started ART after two weeks of TB treatment, at which time most of her initial symptoms resolved. Two weeks after starting ART, she presents to your clinic with worsening of fever, night sweats, cough, and chest pain. Which of the following is the most likely cause for her symptoms?

- a) Drug-resistant tuberculosis
- b) HIV drug resistance
- c) Immune reconstitution inflammatory syndrome (IRIS)
- d) Kaposi sarcoma pneumonia

Answer: c. Clinical worsening after initial improvement on therapy is due to IRIS. IRIS to TB disease is the commonest one that is experienced by most patients in the sub-Saharan Africa. It usually resolves without the need to withhold ART. In rare cases where it gets more severe and life threatening, one can consider providing steroids to suppress inflammation. One may consider suspending ART in rare cases of significantly raised intra-cranial pressure when fear of brainstem herniation is significant. Also drug-resistant TB does not present so early after 2 weeks of resolving TB symptoms.

Reference: 2016 Guideline Sections 1.18, 2012 Guidelines for the Management of TB Chapter 3

Learning Objective Tested: Management of TB in HIV-infected individuals, LO#3 Recognize the challenges in managing TB and HIV including medication side effects, drug-drug interactions, and IRIS.

Which of the following statements is correct about sexually transmitted infections (STIs) and HIV?

- a. Conventional STIs and HIV infection share similar risk factors
- b. Effective management of STIs does not reduce HIV infection
- c. HIV does not influence the clinical features of STIs
- d. STIs do not increase the risk of HIV transmission

Answer: a. Conventional STIs and HIV infection share similar risk factors. STIs could increase vulnerability to HIV infection. The clinical features of STI can be influenced by co-infection with HIV.

Reference: 2016 Guideline Section 1.1, 4.3.4

Learning Objective Tested: STI screening & management, LO#1 Describe how STI can increase transmission of HIV, LO#2 Recognize STI syndromic management guidelines, LO#3 Identify important risk reduction messages.

Which of the following statements about sexually transmitted infection (STI) syndromic management is TRUE?

- a. Requires multiple visits to clinic to adequately treat STIs
- b. Syndromic diagnosis is the most expensive approach to reducing the spread of STIs.
- c. Uses flow charts that enable providers to identify causes of a given syndrome
- d. Usually misses mixed infections because it is not highly sensitive

Answer: c. STI syndromic management uses flow charts that enable service providers to identify causes of a given syndrome.

Reference: 2016 Guideline Section 1.8.2

Learning Objective Tested: STI screening & management, LO#2 Recognize STI syndromic management guidelines.

Which sexually-acquired infection is associated with cervical cancer?

- a. Gonorrhea
- b. Herpes simplex Virus type 2
- c. Human Papillomavirus Types 16 and 18
- d. Syphilis

Answer: c. Human Papillomavirus Types 16 and 18 is associated with cervical cancer.

Reference: Reference: 2016 Guideline Section 1.8.2

Learning Objective Tested: STI screening & management

A 54 year old male adult patient who was diagnosed with HIV when he was admitted with symptomatic cryptococcal meningitis is now on a stable ART regimen and has completed inpatient amphotericin B and 800 mg fluconazole daily antifungal therapy for cryptococcal meningitis. He continued 400mg of fluconazole for 8 more weeks and is now stable. He is starting on 200mgs daily fluconazole for a secondary prophylaxis. At what time is it safe to discontinue secondary fluconazole prophylaxis?

- a) After two consecutive CD4 counts are >200 cells/mm³ at least 6 months apart
- b) After 12 months of prophylactic-dose fluconazole
- c) Once the cryptococcal serum antigen is undetectable for 6 months
- d) Once the HIV viral load is undetectable

Answer: a. After 2 consecutive CD4 counts are >200 cells/mm³ at least 6 months apart. Note that there is no need for routine CD4 monitoring for most patients. However, such patients require six monthly CD4 monitoring until fluconazole is stopped.

Reference: 2064 Guideline Section 1.11.1, Table 1.5

Learning Objective Tested: Management of cryptococcal meningitis in HIV, LO#2 Identify the antifungal management of cryptococcal meningitis including secondary prophylaxis.

II. HIV Prevention (circumcision, PEP)

Which of the following is NOT a biological reason for the protective effect of voluntary medical male circumcision (VMMC) against HIV?

- a) The inner foreskin is much less keratinized than other genital mucosa making its immune cell targets unusually susceptible to HIV infection
- b) The highly vascularized foreskin mucosa, which is prone to tearing or bleeding during intercourse, facilitates HIV infection in uncircumcised men
- c) Circumcision reduces the area of the penile shaft where most HIV entry occurs
- d) The inner foreskin ulcerative STIs, like HSV-2 and syphilis, are more prevalent in uncircumcised men and facilitate HIV infection

Answer: c. Circumcision removes the foreskin, not the penile shaft.

Reference: A framework for VMMC, WHO 2016.

Learning Objective Tested: Voluntary Medical Male Circumcision TeleECHO LO#1 Describe how the incidence of HIV is reduced in both males and females by VMMC.

Which of the following statements about male circumcision and women is TRUE?

- a) Male circumcision decreases the risk of all STIs in men and their female partners.
- b) Male circumcision increases risk-taking sexual behavior with female partners causing an increase in HIV incidence in women in the long term
- c) Male circumcision increases the risk of HPV infections in female partners
- d) Male circumcision indirectly reduces the risk of HIV in female partners

Answer: d. Male circumcision indirectly reduces the risk of HIV in female partners.

Reference: A framework for VMMC, WHO 2016.

Learning Objective Tested: Voluntary Medical Male Circumcision TeleECHO LO#1 Describe how the incidence of HIV is reduced in both males and females by VMMC.

A 16 year old female victim of sexual assault by a male stranger presents to your clinic within 72 hours of the event. In addition to offering her voluntary HIV, STI, Hepatitis B surface antibody, and pregnancy testing and emergency contraception, which of the following options is the most appropriate next step?

- a) Give her a single dose of tenofovir/emtricitabine for HIV post-exposure prophylaxis (PEP) and have her return in 3 months for another HIV screening test
- b) Have her return to clinic in 3 days to review her HIV screening results and offer HIV post-exposure prophylaxis if her baseline is negative
- c) Inform her that there is no risk to her sexual partners in the next 3 months if her baseline HIV screen is negative
- d) Start HIV post-exposure prophylaxis with tenofovir/emtricitabine/efavirenz and a return appointment to the clinic in 3 days to get her HIV screening results

Answer: d. Start HIV post-exposure prophylaxis with tenofovir/emtricitabine/efavirenz and a return appointment to the clinic in 3 days to get her HIV screening results. Voluntary testing for HIV, STIs including syphilis, Hepatitis B, and pregnancy is offered to all victims of rape. Additional laboratory tests include ALT and creatinine clearance for appropriate ARV selection and monitoring of liver and renal functions. PEP should be offered if she presents within 72 hours of the exposure. The efficacy of PEP in preventing HIV in rape is unknown. Common side effects of PEP regimen should be explained and PEP discontinued if the victim's HIV antibody test is positive. HIV testing should be done at 6 weeks, 12 weeks, and 6 months to monitor for HIV seroconversion. HIV-positive women should be referred to the ART clinic for management of their HIV infection. Emergency contraception should be offered, as well as Hepatitis B Immunoglobulin and Hepatitis B vaccination, if initially seronegative. If any woman becomes pregnant as a result of the rape, she should be counseled about the option of pregnancy termination.

Reference: 2016 Guideline Section 6.2

Learning Objective Tested: Post-Exposure Prophylaxis TeleECHO, LO#3. Describe the recommended work-up and timing for PEP.

One of the doctors in your clinic requests HIV post-exposure prophylaxis (PEP) after a deep needle-stick injury from a source patient whose HIV status is unknown and who refuses HIV testing. In addition to doing wound care and drawing baseline labs including HIV antibody, Hepatitis B surface antigen, and Hepatitis B surface antibody, which of the following is the most appropriate next step?

- a) Delay PEP until the doctor's HIV antibody status is confirmed negative to avoid unnecessarily exposing him/her to the side effects of ARVs
- b) Start 3-ARV HIV PEP immediately, but discontinue if baseline HIV antibody is negative at the 3 day follow-up appointment
- c) Start 3-drug HIV PEP immediately and continue for 28 day course, if the baseline HIV antibody is negative at the 3 day follow-up appointment
- d) Start HIV PEP with lopinavir/ritonavir twice a day for 28 days

Answer: c. Deep needle stick injury carries a high risk of transmission and prompt treatment with an expanded PEP ARVs regimen (1-2 hours preferred) is recommended; those who present after 72 hours should not be exposed unnecessarily to ARVs since it is probably not effective after this much time has elapsed. It's anticipated that the effectiveness of ARVs for PEP will be significantly reduced during the 24-72 hour post-exposure period. Draw baseline tests to help monitor side effects to ARVs and to determine baseline hepatitis B antibody status. It's also important to vaccinate the HCW for HBV, if tested HBV-negative and/or susceptible (no immunity against HBV).

Reference: 2016 Namibia Guidelines Section 6.1

Learning Objective Tested: Post-Exposure Prophylaxis TeleECHO, LO#2 Identify potent high-risk occupational exposures. LO#3 Describe the recommended work-up and timing for PEP.

In the management of an HIV-infected male and his HIV-negative female partner who are trying to conceive through unprotected sex, which of the following statements is the most appropriate recommendation?

- a) The HIV-infected partner should be on ARVs with a dropping viral load prior to attempted conception.
- b) The couple should be advised to have unprotected intercourse only between days 1-7 of the menstrual cycle.
- c) The female partner should be confirmed HIV antibody-negative within the last 3 months, have a normal creatinine clearance, and be prescribed pre-exposure prophylaxis (PrEP) daily for 1 week prior to and 4 weeks after the period of exposure.
- d) Serodiscordant couples should be advised to never have unprotected sex since the risk to the seronegative partner is high and having a baby is not worth this risk.

Answer: c. The female partner should be confirmed HIV antibody-negative within the last 3 months, have a normal creatinine clearance, and be prescribed pre-exposure prophylaxis (PrEP) daily for 1 week prior to and 4 weeks after the period of exposure. We need to support couples to have safer conception, not to advise against it completely. Reducing the viral load to very low levels, giving PrEP to the HIV-negative woman and restricting days of unprotected intercourse to those most likely to result in conception reduces risk of transmission of HIV, offering the greatest protection for the HIV-negative partner. In Namibia, we recommend giving PrEP to the HIV-negative female partner. If the female is positive and the male is negative, we recommend artificial insemination of the female partner, once the HIV-positive female has a suppressed VL (to minimize risk to the infant).

Reference: 2016 Guidelines Reproductive Considerations, Section 2.8

Learning Objectives Tested: Safe conception in the context of HIV including Family Planning, LO#2 Identify the safe conception guidelines for HIV-concordant and discordant couples.

III. Pregnant Women/PMTCT

A 22 year-old 14-week pregnant woman is diagnosed with HIV at her first antenatal clinic visit during routine screening. She has no complaints and is staged as WHO clinical stage I. Trace proteinuria is seen on spot urine dipstick. Which of the following options below is the most appropriate next step?

- a) No ART is necessary until CD4 results is made available, since the patient has WHO clinical stage 1 disease
- b) Start fixed-dose tenofovir/emtricitabine/efavirenz to initiate lifelong treatment for the mother and decrease the risk of transmission to the infant
- c) Start zidovudine/lamivudine and lopinavir/ritonavir to initiate lifelong treatment for the mother and decrease the risk of HIV transmission to the infant
- d) Wait to start antiretroviral treatment ART until the third trimester since HIV transmission to the infant occurs at the time of delivery

Answer: b. For HIV-positive pregnant women, like any PLHIV, ART is initiated regardless of clinical stage or CD4 count on the same day a pregnant woman is diagnosed with HIV. Provide comprehensive care to mothers living with HIV and prevent transmission to their infants during delivery and breastfeeding period. The ART provided also benefits the mother for her own health and prevents mother-to-child transmission of HIV during possible future pregnancies.

Reference: 2016 Guideline Section 2.1

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#1 Explain the recommended HIV management during pregnancy

To ensure optimal adherence to ARVs, which of the following is required at the time of ARV prescription in a pregnant woman with HIV?

- a) Counseling on the importance of adherence to ARVs and follow-up care and potential ARV side effects
- b) Her male partner's agreement to dispense her ARVs daily throughout pregnancy
- c) Mandatory follow-up with community support services
- d) Patient's ability to describe the mechanism of action of the ARVs medications

Answer: a. Counseling and referral to support services is important for this population.

Reference: 2016 Guidelines PMTCT General Considerations, Section 2.1

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#1 Explain the recommended HIV management during pregnancy. ART Adherence Counseling TeleECHO LO#3 List suggestions to improve adherence.

In addition to prescribing ARVs for this pregnant woman, which of the following health screenings is also recommended at baseline?

- a) Cryptococcal serum antigen
- b) HIV genotype resistance testing
- c) HIV viral load
- d) Partner HIV screening

Answer: d. Partner referral for HIV testing and counseling is very important as (1) there is a possibility that the male partner could still be HIV-uninfected, (2) risk reduction counseling needs to be provided for both to avoid re-infection and (3) the pregnancy shall be supported.

Reference: 2016 Guidelines PMTCT General Considerations, Section 2.1

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#1 Explain the recommended HIV management during pregnancy

A pregnant woman with HIV is on ARVs and currently has an undetectable viral load. Which of the following statements should NOT be included in your discussion with the mother about further risk reduction of HIV transmission to her infant?

- a) **Avoid breastfeeding as the risk of transmission to the infant is high from breastfeeding even if mother's HIV viral load is undetectable**
- b) **Continue ARVs throughout the pregnancy and at least until breastfeeding is stopped**
- c) **Give the infant nevirapine oral prophylaxis from birth to at least 6 weeks, depending on breastfeeding status and mother HIV viral suppression**
- d) **Present early in labor to avoid prolonged rupture of membranes > 4 hours**

Answer: a. Breastfeeding can be allowed in mother's whose HIV VL is undetectable, particularly when safe alternatives are not available. Delivery at a hospital to avoid risk factors for HIV transmission during labor is advisable. Nevirapine prophylaxis should be given for at least 6 weeks if the infant is born in a health facility or presents within 72 hours of birth. This is to minimize the risk of infection from the exposure during labor.

If the infant presents more than 72 hours after birth and if the mother is not breastfeeding and intends not to breastfeed at all, no nevirapine prophylaxis should be given. Nevirapine should be continued for more than 6 weeks in all infants who are breastfeeding, at whatever time they present to the health facility until 4 weeks after the mother's viral load is <20 or 4 weeks after breastfeeding stops.

Reference: 2016 Guidelines Management of ARVs in Pregnancy, Section 2.3

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#1 Explain the recommended HIV management during pregnancy. LO#2 Describe the steps to reduce the perinatal transmission of HIV during labor, delivery, and breastfeeding, LO#3 Identify the treatment and monitoring recommendations for HIV-exposed infants.

In addition to assessment of the duration of HIV infection and the current viral load and CD4 count, obtaining a history of prior prevention of mother-to-child transmission (PMTCT) is also recommended in HIV-positive pregnant women. Which of the following correctly explains the rationale?

- a) **ARVs in pregnancy can be dangerous if given more than twice previously**
- b) **If she was previously given a stavudine containing regimen with good virologic response, she should be started on that regimen again**
- c) **Prior nevirapine (NVP) can affect how well a woman will respond to a first-line ARV regimen**

Answer: c. Previous use of NVP can affect how well a woman will respond to a triple drug regimen. If she has received previous PMTCT with single dose NVP, her ART regimen should include lopinavir/ritonavir (LPV/r) and no non-nucleoside reverse transcriptase inhibitors (NNRTI).

Reference: 2016 Guideline Management of ARVs in Pregnancy, Section 2.3

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#1 Explain the recommended HIV management during pregnancy. ARV Resistance Basics 1, LO#2 Recognize how mutations are selected.

A pregnant woman arrives to the delivery ward in early labour. She has tested HIV-negative more than 6 months ago. What is the *most appropriate* next step?

- a) **Admit her to the labour ward as usual and congratulate her on her HIV-negative status**
- b) **Offer her repeat HIV testing to evaluate if she may have become HIV-infected since her last test**
- c) **Start the woman on an ARV regimen immediately**
- d) **Test the infant for HIV as soon as it is born**

Answer: b. Pregnant women often remain sexually active or could have been in the window period during the last HIV test and should be screened again to ensure that all HIV-positive women are initiated on ART. Repeat testing is furthermore important, as women who sero-converted during pregnancy and/or labor and delivery have higher risk of passing the virus to their babies. If found HIV-positive, she should start ART immediately and the infant should receive the usual NVP prophylaxis.

Reference: 2016 Guidelines General Considerations, Section 2.1

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#2 Describe the steps to reduce the perinatal transmission of HIV during labor, delivery, and breastfeeding

An HIV-positive woman who was on AZT prophylaxis during her pregnancy brings her breastfeeding 6 month old child to the clinic for a refill of NVP syrup. What is the most appropriate next step?

- a) Decrease the NVP dose to 3ml (30 mg) daily
- b) Encourage the mother to come in if she gets pregnant again so she can restart zidovudine (AZT) prophylaxis
- c) Switch the child to zidovudine (AZT) prophylaxis
- d) Weigh the child to ensure that the child is growing normally and assess developmental milestones

Answer: d. The baby's growth and development should be monitored closely and nutritional assessment shall also be done since malnutrition is a major contributor to mortality among HIV- exposed infants. Indeed, development may lag as a result of malnutrition or HIV infection itself. Women presenting who had previously been on AZT prophylaxis (Option A) or a first-line ART regimen (Option B+) should be initiated on ART if they are still breastfeeding. Even if she does not want lifelong treatment for herself, she shall be adequately counseled on the benefits of lifelong ART for preventing transmission of HIV to the baby and for her own health. The infant should take NVP until 4 weeks after maternal viral load is reduced to < 20 copies/mL or 4 weeks after breastfeeding has stopped, whichever occurs first. Adjust the dose of NVP according to age (doses increase as baby's gain weight).

Reference: 2016 Guidelines, Management of ARVs in Pregnancy, Section 2.5

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#3 Identify the treatment and monitoring recommendations for HIV-exposed infants.

An HIV-positive woman on ART comes to the clinic with her breastfeeding baby for her ART refills 6-8 weeks after delivery. What actions should be taken by the health care worker pertaining the HIV-exposed infant?

- a) Collect Dried Blood Spots (DBS) for HIV DNA PCR
- b) Evaluate the infant for any sign of OIs, malnutrition, assess vaccination status of the child, and commence cotrimoxazole
- c) Assess adherence and possible toxicity to NVP, refill NVP for PMTCT, and give one month follow-up
- d) All of the above

Answer: d. At the 6-8 weeks visit of the mother-baby pair, it is important that the DBS samples be collected and sent for HIV DNA PCR, comprehensive clinical evaluation be done to assess for infant feeding, malnutrition, possible signs of OIs, cotrimoxazole prophylaxis should be started, and vaccination status should be assessed. Moreover, adherence to and possible toxicities to NVP should be assessed and also appropriate doses of NVP should be dispensed that are sufficient until the next visit.

Reference: 2016 Guidelines, Early Infant Diagnosis, Section 3.2.1

Learning Objective Tested: PMTCT Option B+ TeleECHO LO#3 Identify the treatment and monitoring recommendations for HIV-exposed infants.

HIV-positive pregnant women with active untreated tuberculosis

- a) are less likely to deliver low birth weight infants
- b) are more likely to transmit HIV to their infants
- c) should defer anti-tuberculosis treatment until after the first trimester
- d) should start a nevirapine-containing ART regimen

Answer: b. TB is one of the opportunistic infections (OIs) that has been shown to increase MTCT and can be easily screened for during pregnancy and appropriate TB treatment initiated.

Reference: 2016 Guidelines Tuberculosis, Section 2.6.1

Learning Objective Tested: no specific learning objective from guidelines

IV. HIV Diagnosis and ARVs in Children & Adolescents

Which of the following statements are accurate about starting treatment of HIV in children <15 years old?

- a) A CD4 test should be done prior to starting ARVs to document immunologic status but not routinely repeated once the child is on ARVs
- b) ARVs should be initiated in all HIV infected children under 15 years old
- c) Initiation of ARVs should be delayed until the child reaches clinical WHO Stage 3 or experiences delayed growth or development
- d) Once children start ARVs, it is no longer important to determine their clinical stage

Answer: b. Clinical staging and immunologic status are no longer used as criteria for starting ART in children and adolescents under 15 years old; all HIV-positive children should be initiated on ART. However, it is important to note the CD4 at the start of treatment and to monitor disease progression by determining the clinical staging and subsequent CD4-staging of HIV in children.

Reference: 2016 Guidelines. Natural course of HIV disease in Children, Section 3.1

Learning Objective Tested: HIV Treatment for Children TeleECHO LO#1 Describe the eligibility criteria for first- and second-line ARVs LO#3 Identify the recommended monitoring of physical and cognitive development and nutritional status.

At what age and weight may children start using tenofovir-based ARV regimens?

- a) 5 years old and 25 kg
- b) 10 years old and 35 kg
- c) 13 years old and 45 kg
- d) 18 years old and 65 kg

Answer: b. Adult dosing of tenofovir (TDF) + emtricitabine (FTC) or lamivudine (3TC) should be started when a child reaches 10 years of age and weighs at least 35 kg.

Reference: 2016 Guidelines, Recommended ART Regimens, Section 1.7

Learning Objective Tested: HIV Treatment for Children TeleECHO LO#1 Describe the eligibility criteria for first- and second-line ARVs.

Which of the following is the recommended screening test for early infant diagnosis (EID) of HIV at 6 weeks of age?

- a) CD4 count from whole blood
- b) HIV DNA PCR
- c) HIV ELISA antibody
- d) Viral load

Answer: b. HIV DNA PCR from whole blood or dried blood spot (DBS) is used EID. The first PCR should be done at 6-weeks of age whenever feasible. An infant with a negative PCR test at 6 weeks, regardless of breastfeeding status, should be tested with a rapid test (RT) at 9 months to detect HIV antibodies.

Reference: 2016 Guidelines, Early Infant Diagnosis, Section 3.2

Learning Objective Tested: HIV Testing: Methods & Interpretation in Adults & Children, LO#2 Identify the current pediatric HIV testing guidelines.

A 3 year old child with documented HIV infection is eligible for initiation of ART. In selecting the preferred first-line treatment for this child, what factor is NOT taken into account?

- a) Age and weight
- b) Co-morbidities
- c) Mother's viral load
- d) Prior NVP exposure

Answer: c. The mother's viral load is not directly connected to the child's disease progression and regimen selection should be based on age, weight, prior NVP exposure for PMTCT, and co- morbidities (such as TB/HIV).

Reference: 2016 Guidelines, Natural Course of HIV Disease in Children, Section 3.1, Diagnosis of HIV Infection in Children, Section 3.2

Learning Objective Tested: HIV Treatment for Children TeleECHO LO#1 Describe the eligibility criteria for first- and second-line ARVs.

A 6 month old exclusively breastfed baby born to a 29 year old HIV-infected mother presents to the clinic for a first visit. She herself started ART one year ago and her most recent VL was <20copies/mL. You counsel the mother about testing the baby for HIV and she agrees to a dried blood spot (DBS) for HIV DNA PCR. You give mother a follow up appointment for the baby and prescribe the following medication(s)

- a. cotrimoxazole
- b. multivitamins
- c. cotrimoxazole and multivitamins
- d. none

Answer: c. Cotrimoxazole protects the infant from several different opportunistic infections as well as from bacterial infections and should be continued unless all HIV exposure (breastfeeding) has ended and the infant is determined to be HIV-negative. Multivitamins should be started to provide essential vitamins not provided by breastfeeding alone. If an infant is confirmed HIV-positive, follow the guidelines for continuing prophylaxis. If the mother was not on ART herself, she should start ART because she is still breastfeeding and the infant should be given nevirapine prophylaxis.

Reference: 2016 Guidelines, Cotrimoxazole Preventive Treatment Section 3.3.1, Figure 3.1

Learning Objective Tested: HIV Treatment for Children

The baby above returns at 7 months old and still exclusively breastfeeding. The baby's HIV DNA PCR test result from the last visit is negative and you record the result in the chart and the child's passport. You then perform the following

- a. infant feeding counseling to encourage complementary foods
- b. refill the prescription for cotrimoxazole and multivitamins
- c. give a follow up appointment in 2 months for clinical evaluation and HIV antibody test
- d. all of the above

Answer: d. All of the above. Encourage complementary foods and prescribe multivitamins to enhance nutrition and give cotrimoxazole to prevent opportunistic infections. A rapid HIV antibody test or HIV ELISA is recommended for babies 9-17 months of age.

Reference: 2016 Guidelines, Diagnosis of HIV Infection in Children, Section 3.2.1, Figure 3.2

Learning Objective Tested: HIV Treatment for Children

The baby returns at 9 months of age and the rapid HIV test (RT) is positive. Besides recording the result in the chart and the passport, giving post-test counseling, documenting the same in the lab log, and continuation of previously-given cotrimoxazole and multivitamins, you

- a) Collect DBS for HIV DNA PCR
- b) Perform baseline blood work
- c) Ask the mother if she has other children or family members who should also be tested for HIV
- d) a and c

Answer: d. For HIV-exposed infants, the HIV RT can rule out but cannot rule in HIV infection in infants and children younger than 18 months of age, as circulating maternal antibodies can be detected by the HIV RT. Hence, in cases where the RT is positive at 9 months we need to do HIV DNA PCR that will be diagnostic for HIV infection at this age. In infants who tested positive with HIV RT at nine months, you do not need to start ART or draw baseline blood workups. However, you collect the DBS for HIV DNA PCR and wait for the result. If the infant is very sick with signs suggestive of opportunistic infections, consult with clinical mentors. Moreover, it is important to take the opportunity to find out if there are siblings who may also be HIV-positive and untreated. The risk of mortality in HIV-infected infants and children is very high and ART initiation should be undertaken as quickly as HIV infection is confirmed to prevent high mortality from untreated HIV in infants.

Reference: 2016 Guidelines, Criteria for Diagnosis or Exclusion of HIV, Section 3.2.3, Figure 3.2

Learning Objective Tested: HIV Treatment for Children

A 2 year old child with a CD4 count of 180 cells/mm³ (CD4 13%), a fever, cough, and no weight gain in 12 months presents to your clinic. The mother reports the child's good adherence to ART, no vomiting or diarrhea, and the last viral load one month ago was < 20 copies/mL. What is the most likely cause?

- a. Adverse drug-drug interactions
- b. Incorrect storage of medications
- c. Intercurrent opportunistic infection such as TB
- d. Non-adherence to ART
- e. Poor absorption of ART medications

Answer: c. With an undetectable viral load, the child is adhering and doing well with the ART regimen, so the answer should be looked for in other infections such as TB, which is one of the major causes of HIV-related mortality.

Reference: 2016 Guidelines, TB Screening and TB-IPT for Children, Section 3.3.2

The child above is diagnosed with active tuberculosis and is on an ART regimen that contains LPV/r. Which of the following is the most appropriate consideration in the child's management?

- a) **Change ART regimen to didanosine, stavudine, and lamivudine and then start TB treatment 2 weeks later**
- b) **Start a TB treatment regimen that excludes rifampicin, because LPV/r can never be co-administered with rifampicin**
- c) **Start the child on the standard anti-TB treatment and add ritonavir syrup to standard lopinavir/ritonavir to the level that the dose of ritonavir equals the dose of lopinavir**
- d) **Stop ART until tuberculosis treatment has been completed**

Answer: c. Lopinavir "super boosted/pharmaco-augmented" with ritonavir results in a therapeutic level of lopinavir in children on rifampin-based TB regimens.

Reference: 2016 Guidelines, ART Regimens for Children with TB being Treated with Rifampicin-based Regimens, Section 3.7.2

Learning Objective Tested: HIV Treatment for Children TeleECHO LO#2 Identify 1st and 2nd line ARVs for children with TB/HIV co-infection.

Which of the following statements correctly describes the benefits of HIV disclosure to a child?

- a) **Increases emotional difficulties in the child**
- b) **Improves adherence to medication**
- c) **Causes increased psychological distress to caregivers**
- d) **Should never be done by the parent/caregiver**

Answer: b. Evidence exists that adherence to medication is improved following HIV disclosure, and also that distress is decreased, particularly if disclosure is done in a planned and appropriate way. The decision as to who should disclose to the child is one to be made ultimately by the primary caregiver/parents and respected by the health care workers (HCWs). Some caregivers prefer to have the HCW disclose (in their presence), some prefer to themselves disclose in the presence of the HCW, and others prefer to disclose at home after being prepared by HCWs.

Reference: 2016 Guidelines, Section 3.10.3

Learning Objective Tested: HIV Disclosure to Children & Transitioning to Adult Care, LO#1 Discuss strategies for age appropriate HIV disclosure to children.

The HIV disclosure process should?

- a) **generally start when a child reaches 12 years old**
- b) **only start when the child is put on ART**
- c) **generally start by the time a child is 7 years old**
- d) **be delayed until the child is sexually active**

Answer: c. Partial disclosure is targeted to start when a child reaches 6 years old. The aim is that by the time the child turns 10 years full disclosure is achieved. It is important to disclose HIV status to all children in the target age range, even if they are not yet on ART. With the new HIV guidelines, however, all children are eligible for ART irrespective of CD4 or clinical stage, so it is likely that the need to disclose to children not on ART will be minimal.

Reference: 2016 Guidelines, Section 3.10.3

Learning Objective Tested: HIV Disclosure to Children & Transitioning to Adult Care, LO#1 Discuss strategies for age appropriate HIV disclosure to children.

Partial disclosure to a child means:

- a) **Telling some family members about a child's HIV status but not others**
- b) **Explaining to a child that the medicines he is taking are for another condition that does not carry the same stigma as HIV**
- c) **Letting a child overhear others mentioning his/her HIV-positive status**
- d) **Telling the truth to a child in an age-appropriate manner**

Answer: d. Partial disclosure to young children means telling them the truth about the disease process in ways that they will understand. Using an allegory about the interaction of “bad guys” (HIV) and soldiers (CD4), HCWs and caregivers can openly discuss how the medicines work and the importance of adherence. Some caregivers explain the need for medication as treatment for another condition such as TB, however the child eventually starts to question why his TB treatment is for so long, and once they do learn that they are HIV-infected, they can be angry at having been “lied to”. This is why “b” is not the correct answer.

Reference: 2016 Guidelines, Section 3.10.3

Learning Objective Tested: HIV Disclosure to Children & Transitioning to Adult Care, LO#1 Discuss strategies for age appropriate HIV disclosure to children.

In the management of a 13 year old boy with HIV in your clinic, his transition plan to the adult ART clinic should include which of the following options?

- a) **Confirm his understanding of the HIV diagnosis and treatment and provide counselling and support to assist him throughout transition process**
- b) **Inform him that condoms are not necessary with sexual activity as long as he is on ART**
- c) **Wait until he transitions to the adult clinic before disclosing his HIV status to him**
- d) **Wait until he transitions to adult clinic before giving him independence on medication administration**

Answer: a. An adolescent whose HIV status has not been disclosed can have severe negative reactions when learning it. Carefully question the boy to see what he understands about why he is taking medicine and his disease and how the best to support him. Ensure that adequate support is available through counselling, support groups and/or teen clubs to help with this difficult transition. Ensure that he is adhering to his medications since many patients this age rebel against taking their medications despite an excellent history of adherence during childhood.

Reference: Adolescents – Special Concerns, Section 4.1

Learning Objective Tested: HIV Disclosure to Children & Transitioning to Adult Care, LO#2 Identify adolescent-friendly health services, LO#3 Identify the milestones that should be reached prior to transitioning adolescents to adult care.

IV. Routine Health Maintenance (Cancer Screening)

A 30 year old HIV-positive woman, has had a Pap smear at your clinic and her smear result is negative. How often do you advise her to come back for other smears assuming that they are all normal?

- a) **Every 6 months**
- b) **Every year**
- c) **Every 3 years**
- d) **Every 5 years**

Answer: b

V. Quality Management (QM)

Which of the following is not essential component of the HealthQUAL Quality Management (QM) Model?

- a) **Establishing QM structure**
- b) **Conducting routine performance measurement to inform quality improvement needs and priorities**
- c) **Designing, implementing, monitoring and evaluating Quality Improvement Projects**
- d) **None of the above**

Answer d. all of these are essential components of the HealthQUAL QM model.

Which of the following is true regarding Quality Assurance and Quality Improvement?

- a) **Both quality assurance and improvement require team approach**
- b) **Quality improvement assesses compliance to standards or guidelines**
- c) **Quality assurance and quality improvement are practically the same**
- d) **Performance measurement can help identify QI needs**

Answer: d. One of the most important advantages of performance measurement is to inform levels of service quality. In situations where performance is low, teams can sit together and carry out root cause analysis to diagnose the main causes of the problem and generate change strategies that will be tested and scaled up if they bring about real improvement. QA assesses compliance to standards or guidelines. Both QI and QA would work best in a team approach.

A PDSA cycle is a tool used to accelerate quality improvement interventions and has the following components/steps:

- a) Personnel, Data, Surveillance, Attitudes
- b) Policy, Development, Service, Agreements
- c) Plan, Do, Study, and Act
- d) Punishment, Discipline, Solutions, Attentiveness

Answer c, PDSA is a cycle that has the Plan-Do-Study-Act steps

A Cause-and-Effect Diagram is a tool used in quality improvement to map variables that may influence a problem, outcome, or effect and is also known with which of the following names:

- a) Ishikawa diagram
- b) Pareto chart
- c) Fish bone diagram
- d) A and C

Answer d. Fish-bone diagram is also called cause and effect diagram or Ishikawa diagram. It helps to identify many possible causes for an effect or problem. It can be used to structure a brainstorming session. It immediately sorts ideas into useful categories.

Which one of the following is True for sampling in the patient care performance measurement process?

- a) Sampling is a waste of time. All patient charts should be reviewed to ensure accuracy of performance data collected.
- b) Sampling is a methodology used in quality management to obtain a representative sample of patient numbers for chart abstraction and performance measurement
- c) Samples for QA purposes should in general be huge in numbers because the primary purpose of sampling for QA is establish statistical correlations and ensure generalizability
- d) Sampling is NOT required for facilities with very huge numbers of patients

Answer b. Sampling is a methodology used in quality management to obtain a representative sample of patient numbers for chart abstraction and performance measurement

Appendix G: Unmatched pre- and post-test knowledge assessment with total participant responses (# correct and # not answered), by question

Knowledge Question	Pre-test total N= 155		Post-test total N= 86	
	n (%) Correct	n (%) Q not answered (regarded as incorrect)	n (%) Correct	n (%) Q not answered (regarded as incorrect)
Section I. ARVs & Prophylactic Antimicrobials for Adults and Adolescents Living with HIV				
1. A 35 year old male patient whose wife is HIV positive is newly diagnosed with HIV. His CD4+ T cell count of 450 cells/ mm ³ and he is noted to have persistent oral candidiasis (thrush). Which of the following is the most appropriate statement	109 (70.3%)	1 (0.6%)	67 (77.9%)	3 (3.5%)
2. An 18-year old non-pregnant female HIV patient has been on her initial combination therapy with zidovudine/ lamivudine/nevirapine with good clinical results. Her recent HIV viral load done four months ago was undetectable. She has no complaints including cough, weight loss, night sweats or fever. She has no enlarged lymph node on physical evaluation. She completed TB treatment 5 years ago. Which of the following is the most appropriate recommendation for her antiretroviral (ARV) regimen and her general health?	65 (41.9%)	3 (1.9%)	56 (65.1%)	2 (2.3%)
3. A 38 year old male patient with HIV on stable ART for the past year is seen for routine follow-up. How often is it recommended that he get a HIV viral load?	83 (53.5%)	1 (0.6%)	60 (69.8%)	2 (2.3%)
4. An adult male patient who reports good adherence to his ART had a HIV viral load after six months of first line treatment of 12,493 RNA copies/ml (log 4.10). You conducted careful assessment of barriers for adherence, provided intensive adherence counseling to him and his treatment supporter for three months. You were convinced that the patient has been taking his medicines well during the last three months and repeated VLs for the second time. The current viral load is 10,000 copies/mL (log 4). After making sure that poor adherence, medication interactions, malabsorption, and opportunistic infections are ruled out, which of the following is the most appropriate next step?	68 (43.9%)	7 (4.5%)	45 (52.3%)	4 (4.7%)
5. A patient has been newly diagnosed with HIV with CD4 75 cells/mm ³ . Which of the following is recommended?	79 (51%)	8 (5.2%)	63 (73.3%)	5 (5.8%)
6. Which of the following is the most accurate statement about adherence to antiretroviral medications?	135 (87.1%)	4 (2.6%)	79 (91.9%)	3 (3.5%)
7. Which of the following statements about resistance testing is true?	51 (32.9%)	8 (5.2%)	12 (14%)	9 (10.5%)
8. A 35-year-old male patient presented to your clinic with a CD4 count of 785 cells/mm ³ and a positive Hepatitis B surface antigen (HBsAg). He was otherwise healthy. His baseline creatinine clearance (CrCl) was 55ml/min and urine protein was trace on urine dipstick. Which one of the following statements is NOT correct?	65 (41.9%)	7 (4.5%)	44 (51.2%)	5 (5.8%)

Section II. Co-Infection				
9. A 27-year-old female patient who has been known HIV positive for two years presented with fever, night sweats, dry cough and mild pleuritic chest pain a few days ago. The sputum direct microscopy for Acid Fast Bacilli returned smear positive (++) and molecular test (Xpert? MTB/RIF) reported rifampin-sensitive Mycobacterium TB. She has a CD4 of 22 cells/mm ³ and she has never been on ART. Which one is the most appropriate management of her TB and HIV?	7 (4.5%)	2 (1.3%)	4 (4.7%)	3 (3.5%)
10. Which of the following statements is correct about STIs and HIV?	122 (78.7%)	2 (1.3%)	69 (80.2%)	2 (2.3%)
11. A 54 year old male adult patient who was diagnosed with HIV when he was admitted with symptomatic cryptococcal meningitis is now on a stable ART regimen and has completed inpatient amphotericin B and 800 mg fluconazole daily antifungal therapy for cryptococcal meningitis. He continued 400mg of fluconazole for 8 more weeks and is now stable. He is starting on 200mgs daily fluconazole for a secondary prophylaxis. At what time is it safe to discontinue secondary fluconazole prophylaxis?	65 (41.9%)	6 (3.9%)	50 (58.1%)	5 (5.8%)
Section III. HIV Prevention				
12. Of the following possible biological reasons for the protective effect of voluntary medical male circumcision against HIV is NOT correct?	34 (21.9%)	6 (3.9%)	25 (29.1%)	6 (7.0%)
13. A 16 year old female victim of sexual assault by a male stranger presents to your clinic within 72 hours of the event. In addition to offering her voluntary HIV, sexually transmitted infections, Hepatitis B surface antibody and pregnancy testing and emergency contraception, which of the following options is the most appropriate next step?	100 (64.5%)	3 (1.9%)	70 (81.4%)	4 (4.7%)
14. One of the doctors in your clinic requests HIV post-exposure prophylaxis after a deep needle-stick injury from a source patient whose HIV status is unknown and who refuses HIV testing. In addition to doing wound care and drawing baseline labs including HIV antibody, Hepatitis B surface antigen, and Hepatitis B surface antibody, which of the following is the most appropriate next step?	100 (64.5%)	4 (2.6%)	70 (81.4%)	2 (2.3%)
Section IV. Prevention of Mother-to-Child Transmission of HIV				
15. A 22 year-old 14-week pregnant woman is diagnosed with HIV at her first antenatal clinic visit during routine screening. She has no complaints and is staged as WHO clinical stage 1. Trace proteinuria is seen on spot urine dipstick. Which of the following options below is the most appropriate next step?	128 (82.6%)	4 (2.6%)	76 (88.4%)	2 (2.3%)
16. A pregnant woman arrives to the delivery ward in early labor. She has tested HIV-negative more than 6 months ago. What is the most appropriate next step?	150 (96.8%)	2 (1.3%)	80 (93%)	3 (3.5%)
17. In the management of an HIV-infected male and his HIV-negative female partner who are trying to conceive through unprotected sex, which of the following statements is the most appropriate recommendation?	80 (51.6%)	6 (3.9%)	52 (60.5%)	2 (2.3%)

Section V. HIV Diagnosis and ARVs in Children & Adolescents				
18. At what age and weight may children start using tenofovir-based ARV regimens?	90 (58.1%)	13 (8.4%)	61 (70.9%)	3 (3.5%)
19. A 6 week old exclusively breastfed baby that born to a 29 year old HIV-infected mother presented to your clinic for a first visit. The infant has been on NVP since birth. The mother herself started ART one year ago and a VL done 2 months ago was <40copies/ml. You counsel the mother about testing the baby for HIV and she agrees to a dried blood spot (DBS) for HIV DNA PCR. You give mother a follow up appointment for the baby and prescribe the following medication(s)	30 (19.4%)	7 (4.5%)	27 (31.4%)	1 (1.2%)
20. The same baby is brought to clinic at 9 months of age, still breastfeeding, and the rapid HIV test is positive. Besides recording the result in the chart and the passport, giving post-test counseling and documenting the same in the lab log, and continuation of any previously-given medicine, you ...	27 (17.4%)	6 (3.9%)	14 (16.3%)	2 (2.3%)
21. An HIV-infected child is diagnosed with active TB and is on an ART regimen that contains LPV/r. Which of the following describes the most appropriate further management?	86 (55.5%)	14 (9.0%)	64 (74.4%)	2 (2.3%)
22. Which of the following statements correctly describes the benefits of HIV disclosure to a child?	141 (91%)	7 (4.5%)	81 (94.2%)	3 (3.5%)
23. The HIV Disclosure process should . . .	101 (65.2%)	6 (3.9%)	71 (82.6%)	2 (2.3%)
Section VI. Quality Management				
24. Which of the following is not essential component of the HealthQUAL Quality Management Model?	71 (45.8%)	11 (7.1%)	52 (60.5%)	6 (7.0%)
25. A PDSA cycle is a tool used to accelerate quality improvement interventions and has the following components/steps:	62 (40%)	10 (6.5%)	56 (65.1%)	4 (4.7%)

Appendix H: Provider Baseline Survey

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

What is this survey?

This is an anonymous survey we are asking all health care workers participating in the Namibia ECHO Project to complete. The survey is part of a larger effort to understand whether ECHO is a useful model for providing training and technical support to health care workers at health care facilities in Namibia. The results of the survey will help us to understand the benefits and challenges of the model so it can be improved in the future. Your answering is voluntary (your choice). If you do not want to do this survey, it will not affect your job, now or in the future.

This is the baseline survey. You will be asked to complete a follow-up survey in the future after you have participated in the ECHO Project. This survey should take less than 30 minutes to complete.

What are the possible risks and benefits?

You will be asked to give at most 30 minutes of your time and you can choose to stop at any time even if the survey is not complete. You will not put your name on the survey, so any information you give us will be anonymous. The only people who will have access to your anonymous survey will be the members of the project team and they will not share individual results with anyone else for any reason. We will present the results of the overall evaluation back to the clinic team after the evaluation is completed. No individual survey responses that may identify you or anyone at this clinic will be shared.

There will be no direct benefit to you from completing this survey. However, the information that you provide may help improve the quality of services offered by HIV outpatient clinics in Namibia.

If you have any further questions about this survey or your participation in this study, please contact either of the following individuals: ENTER INFO HERE

Please answer the following questions about yourself.

- 1. Year of birth:
- 2. Gender: 1.☐ Male 2.☐ Female
- 3. ECHO ID Number :
- 4. Region: _____ District: _____
- 5. Are you working in an HIV Outpatient Clinic?
[] Yes
[] No
- 6. Where is the clinic situated?

[] Intermediate hospital
[] District hospital
[] Health Center
[] Other: _____
- 7. What kind of professional qualification do you have? (tick all that apply)

[] Doctor
[] Pharmacist
[] Pharmacist’s assistant
[] Nurse
[] Bachelor in Public Health
[] Other: _____

8. Where did you get your HIV education (tick all that apply)
- ☐ Medical or nursing university
 - ☐ In-service training courses
 - ☐ Distance learning courses, e.g., University of Washington (UW) HIV Management course, UW Principles of STD/HIV course
 - ☐ On-line courses
 - ☐ HIV clinical mentor
 - ☐ Other: _____
9. How many years of experience do you have taking care of HIV patients? (round to nearest whole number)
- _____
10. On average, how many HIV patients do you take care of per week? _____

Please answer the following IT-related questions.

11. Do you have a personal computer/laptop?
- ☐ Yes, computer
 - ☐ Yes, laptop
 - ☐ No
12. Do you have a smart phone or tablet?
- ☐ Yes
 - ☐ No
13. At your clinic, do you have the following facilities (tick all available equipment):
- ☐ Computer
 - ☐ Webcam
 - ☐ Microphone
 - ☐ Computer speakers
 - ☐ Internet connection
 - ☐ Projector
14. How would you rate your computer literacy?
- ☐ Never used a computer before
 - ☐ Beginner or new computer user
 - ☐ Average user
 - ☐ Above average user
 - ☐ Advanced user
15. Do you check your email regularly?
- ☐ Yes
 - ☐ No
16. Have you ever participated in an on-line or distance learning course?
- ☐ Yes
 - ☐ No

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

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
17. When I need clinical support or assistance I have timely access to an HIV expert					
18. I have an opportunity to share clinical experience with my colleagues on a regular basis					

Please answer the following questions regarding Continuing Professional Development (CPD) Credits

19. In the last 12 months, what are the ways you obtained your CPD training/credits? Check all that apply

- ☐ Training in my facility
- ☐ Attended live training courses/lectures in my region but outside of my facility
- ☐ Traveled outside of my region for live training courses / lectures
- ☐ On-line self-study
- ☐ On-line live training course
- ☐ Not applicable

20. In the last 12 months, what course topics of HIV training have you attended? Tick all that apply

(Note: The list below will include dates of course that was offered in past 12 months)

- ☐ HIV counseling and testing (HCT)
- ☐ ART ☐ IMAI
- ☐ NIMART ☐ Cervical cancer screening
- ☐ OI ☐ Nutrition
- ☐ TB ☐ NACS
- ☐ MDR TB ☐ HIV disclosure to children
- ☐ PMTCT ☐ MAC
- ☐ EID ☐ RT
- ☐ Pediatric HIV ☐ TOT
- ☐ Adolescent HIV ☐ PMIS
- ☐ ePMS ☐ Other _____

21. Approximately how may CPD credits have you earned thus far in 2015? _____

22. I have access to HIV CPD to fulfill my annual requirement.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

23. What are the barriers to obtaining HIV CPD? Tick all that apply

- ☐ Absence from clinic requiring coverage by other health care worker colleagues
- ☐ Not enough sponsored courses offered
- ☐ Personal cost of the course
- ☐ Personal cost of travel or accommodation
- ☐ Lost wages
- ☐ I am not informed about courses or lectures that I could attend
- ☐ Cannot easily leave home for the required periods for personal reasons
- ☐ Other _____

Please rate your competence in each area of HIV care and treatment according to the following scale:

- 1 = none or no skill at all
- 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

24. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections (OIs) for adults and adolescents	1	2	3	4	5	6	7
25. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections in children	1	2	3	4	5	6	7
26. Ability to determine eligibility for ART in adults, adolescents, and children	1	2	3	4	5	6	7
27. Ability to counsel pregnant women for ART (PMTCT)	1	2	3	4	5	6	7
28. Ability to provide and interpret early infant diagnosis and management of infants perinatally exposed to HIV	1	2	3	4	5	6	7
29. Ability to prescribe first-line ARV regimens for all patients	1	2	3	4	5	6	7
30. Ability to recognize and manage side effects of ARV medicines for all patients	1	2	3	4	5	6	7
31. Ability to diagnose and manage treatment failure in adults and adolescents, including prescribing 2nd-line regimens	1	2	3	4	5	6	7

32. Ability to diagnose and manage treatment failure in children, including prescribing 2nd-line regimens	1	2	3	4	5	6	7
33. Ability to interpret the results of viral load testing for all patients	1	2	3	4	5	6	7
34. Ability to manage tuberculosis co-infection in HIV-infected adults	1	2	3	4	5	6	7
35. Ability to manage tuberculosis co-infection in HIV-infected children	1	2	3	4	5	6	7
36. Ability to counsel discordant couples in birth control, STIs, and conception issues	1	2	3	4	5	6	7
37. Ability to guide caregivers through the HIV disclosure process leading to successful HIV status disclosure to children	1	2	3	4	5	6	7
38. Ability to counsel adolescents in their transition from pediatric to adult care and treatment	1	2	3	4	5	6	7
39. Ability to serve as the HIV expert in your district/region	1	2	3	4	5	6	7

40. Overall, are you satisfied with your job?

- ☐ Not satisfied at all
☐ Not satisfied
☐ Somewhat satisfied
☐ Satisfied
☐ Very satisfied

Please answer the following questions related to quality improvement (QI) activities

41. Is your clinic participating in any quality improvement activities?

- ☐ Yes
☐ No

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

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
42. When I need support with implementing QI projects I have timely access to a QI coach					
43. I have an opportunity to share QI successes with my colleagues on a regular basis					

Please rate your competence in each area of Quality Improvement according to the following scale:

- 1 = none or no skill at all
 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

44. Ability to measure quality in your clinic (performance measure)	1	2	3	4	5	6	7
45. Ability to understand performance measurement results	1	2	3	4	5	6	7
46. Ability to determine the cause of a gap in quality (determine the root cause of a quality problem)	1	2	3	4	5	6	7
47. Ability to design a plan to improve a quality problem	1	2	3	4	5	6	7
48. Ability to implement and monitor a QI plan	1	2	3	4	5	6	7
49. Ability to make change and improve the overall quality of care in your clinic	1	2	3	4	5	6	7
50. Ability to coach others to improve quality	1	2	3	4	5	6	7
51. Ability to serve as a QI expert in your district/region	1	2	3	4	5	6	7

52. How confident are you that you can help to improve the quality of services in your facility?

- ☐ Very confident
☐ Confident
☐ Somewhat confident
☐ Not very confident
☐ Not confident at all

Appendix I: Provider Follow-Up Survey

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

What is this survey?

This is an anonymous survey we are asking all mentors participating in the Namibia Project ECHO to complete. The survey is part of a larger effort to understand whether Project ECHO is a useful model for providing training and technical support to health care workers at health care clinics in Namibia. The results of the survey will help us to understand the benefits and challenges of the model so it can be improved in the future. Your answering is voluntary (your choice). If you do not want to do this survey, it will not affect your job, now or in the future.

This is the follow-up survey. You have probably already completed a baseline survey prior participating as a mentor or coach in the Project ECHO. This survey should take less than 30 minutes to complete.

What are the possible risks and benefits?

You will be asked to give at most 30 minutes of your time and you can choose to stop at any time even if the survey is not complete. You will not put your name on the survey, so any information you give us will be anonymous. The only people who will have access to your anonymous survey will be the members of the project team and they will not share individual results with anyone else for any reason. We will present the results of the overall evaluation back to the clinic team after the evaluation is completed. No individual survey responses that may identify you or anyone at this clinic will be shared.

There will be no direct benefit to you from completing this survey. However, the information that you provide may help improve the quality of services offered by HIV outpatient clinics in Namibia.

If you have any further questions about this survey or your participation in this study, please contact either of the following individuals: ENTER INFO HERE

Please enter your ECHO project ID number:

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

	Date	Session Topic	Joined?	Presented a case?
2.1			<input type="checkbox"/>	<input type="checkbox"/>
2.2			<input type="checkbox"/>	<input type="checkbox"/>
2.3			<input type="checkbox"/>	<input type="checkbox"/>
2.4			<input type="checkbox"/>	<input type="checkbox"/>
2.5			<input type="checkbox"/>	<input type="checkbox"/>
2.6			<input type="checkbox"/>	<input type="checkbox"/>
2.7			<input type="checkbox"/>	<input type="checkbox"/>
2.8			<input type="checkbox"/>	<input type="checkbox"/>
2.9			<input type="checkbox"/>	<input type="checkbox"/>
2.10			<input type="checkbox"/>	<input type="checkbox"/>
2.11			<input type="checkbox"/>	<input type="checkbox"/>
2.12			<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
3. When I need clinical support or assistance, I have timely access to an HIV expert in my region					
4. I have opportunities to share clinical experience with my colleagues on a regular basis					
5. Project ECHO has reduced my professional isolation					
6. My participation in the TeleECHO sessions has enhanced my professional satisfaction					
7. Access to the TeleECHO sessions has improved the quality of care I provide to the patients at my clinic					
8. Access to HIV specialist expertise and consultation is a major area of need for me and my clinic					
9. The presentations during the TeleECHO sessions provide me with useful up-to-date knowledge					
10. 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					
11. ECHO is a useful tool for improving the sharing of information among HIV providers					
12. ECHO is a useful tool for national experts to provide technical assistance in HIV care and treatment					
13. I would like to join Project ECHO programs for other diseases, if the program existed					
14. After the pilot project is completed, I do not want to join any more TeleECHO sessions					
15. TeleECHO sessions were not always easy to access from my clinic					

Please answer the following questions regarding Continuing Professional Development (CPD) Credits

In the last 12 months, what are the ways you obtained your CPD training/credits? Check all that apply

- ☐ Training in my facility
- ☐ Attended live training courses / lectures in my region but outside of my facility
- ☐ Traveled outside of my region for live training courses / lectures
- ☐ On-line self-study
- ☐ On-line live training course
- ☐ TeleECHO sessions
- ☐ Not applicable

16. In the last 12 months, what course topics of HIV training have you attended? Tick all that apply (Note:

The list below will include dates of course that was offered in past 12 months)

- ☐ HIV counseling and testing (HCT)
☐ ART ☐ IMAI
☐ NIMART ☐ Cervical cancer screening
☐ OI ☐ Nutrition
☐ TB ☐ NACS
☐ MDR TB ☐ HIV disclosure to children
☐ PMTCT ☐ MAC
☐ EID ☐ RT
☐ Pediatric HIV ☐ TOT
☐ Adolescent HIV ☐ PMIS
☐ ePMS ☐ Other _____

17. Approximately how may CPD credits have you earned from TeleECHO sessions? _____

18. I have access to HIV CPD to fulfill my annual requirement.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

19. Project ECHO has improved my access to earn CPD credits.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

20. What are the barriers to obtaining HIV CPD? Tick all that apply

- ☐ Absence from clinic requiring coverage by other HCW colleagues
☐ Not enough sponsored courses offered
☐ Personal cost of the course
☐ Personal cost of travel or accommodation
☐ Lost wages
☐ I am not informed about courses or lectures that I could attend
☐ Cannot easily leave home for the required periods for personal reasons
☐ Other _____

Please rate your competence in each area of HIV care and treatment according to the following scale:

- 1 = none or no skill at all
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

22. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections (OIs) for adults and adolescents	1	2	3	4	5	6	7
23. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections in children	1	2	3	4	5	6	7
24. Ability to determine eligibility for ART in adults, adolescents, and Children	1	2	3	4	5	6	7
25. Ability to counsel pregnant women for ART (PMTCT)	1	2	3	4	5	6	7
26. Ability to provide and interpret early infant diagnosis and management of infants perinatally-exposed to HIV	1	2	3	4	5	6	7

27. Ability to prescribe first-line ARV regimens for all patients	1	2	3	4	5	6	7
28. Ability to recognize and manage side effects of ARV drugs for all patients	1	2	3	4	5	6	7
29. Ability to diagnose and manage treatment failure in adults and adolescents, including prescribing 2nd line regimens	1	2	3	4	5	6	7
30. Ability to diagnose and manage treatment failure in children, including prescribing 2nd line regimens	1	2	3	4	5	6	7
31. Ability to interpret the results of viral load testing for all patients	1	2	3	4	5	6	7
32. Ability to manage tuberculosis co-infection in HIV-infected adults	1	2	3	4	5	6	7
33. Ability to manage tuberculosis co-infection in HIV-infected children	1	2	3	4	5	6	7
34. Ability to counsel discordant couples in birth control, STIs, and conception issues	1	2	3	4	5	6	7
35. Ability to guide caregivers through the HIV disclosure process leading to successful HIV status disclosure to children	1	2	3	4	5	6	7
36. Ability to counsel adolescents in their transition from pediatric to adult care and treatment	1	2	3	4	5	6	7
37. Ability to serve as the HIV expert in your district/province	1	2	3	4	5	6	7

38. Overall, are you satisfied with your job?

- ☐ Not satisfied at all
☐ Not satisfied
☐ Somewhat satisfied
☐ Satisfied
☐ Very satisfied

Please answer the following questions related to quality improvement (QI) activities

39. Is your clinic participating in any quality improvement activities?

- ☐ Yes
☐ No

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

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
40. When I need support with implementing QI projects I have timely access to a QI coach in my region					
41. I have an opportunity to network and share QI successes with my colleagues on a regular basis					

Please rate your competence in each area of Quality Improvement (QI) according to the following scale:							
1 = none or no skill at all							
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							
42. Ability to measure quality in your clinic (performance measurement)	1	2	3	4	5	6	7
43. Ability to understand performance measurement results	1	2	3	4	5	6	7
44. Ability to determine the cause of a gap in quality (determine the root cause of a quality problem)	1	2	3	4	5	6	7
45. Ability to design a plan to improve a quality problem	1	2	3	4	5	6	7
46. Ability to implement and monitor a QI plan	1	2	3	4	5	6	7
47. Ability to make change and improve the overall quality of your clinic	1	2	3	4	5	6	7
48. Ability to coach others to improve quality.	1	2	3	4	5	6	7
49. Ability to serve as a QI expert in your district/province	1	2	3	4	5	6	7

50. How confident are you that you can help to improve the quality of services in your outpatient clinic?

- ☐ Very confident
☐ Confident
☐ Somewhat confident
☐ Not very confident
☐ Not confident at all

51. Did you participate in any Project ECHO QI sessions?

- ☐ Yes
☐ No ---- **SKIP TO QUESTION # 59**

52. How would you rate the quality of the QI sessions?

- ☐ Very poor quality
☐ Poor quality
☐ Average
☐ Good quality
☐ Very good quality

53. Were the QI sessions useful for your clinic?

- ☐ Not useful at all
☐ Not useful
☐ Somewhat useful
☐ Useful
☐ Very useful

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
54. Project ECHO has improved my access to a QI coach					
55. Project ECHO has improved the quality of care in my clinic					
56. Project ECHO has improved my motivation to do QI activities at my clinic					
57. Project ECHO is a useful tool for sharing QI success stories among clinics and providers					

<p align="center">General evaluation on the Project ECHO Please contribute your opinions to improve the program.</p>	
58. How did you find out about the Project ECHO?	<input type="checkbox"/> Because my region was chosen to participate <input type="checkbox"/> Introduction from training courses and conferences <input type="checkbox"/> Introduction from colleagues/friends <input type="checkbox"/> Other (specify):
59. How practical were the session topics to your work?	<input type="checkbox"/> Not practical at all <input type="checkbox"/> Not practical <input type="checkbox"/> Somewhat practical <input type="checkbox"/> Practical <input type="checkbox"/> Very practical
60. Which device did you most often use to participate in the Project ECHO?	<input type="checkbox"/> Personal computer/laptop <input type="checkbox"/> Clinic/hospital computer <input type="checkbox"/> Smartphone <input type="checkbox"/> Tablet <input type="checkbox"/> Other: specify_____
61. How do you generally evaluate the technical quality (internet access, sound, and picture) of the sessions?	<input type="checkbox"/> Very Weak <input type="checkbox"/> Weak <input type="checkbox"/> Average <input type="checkbox"/> Good <input type="checkbox"/> Very Good
62. Do you think the project should be continued?	<input type="checkbox"/> Yes <input type="checkbox"/> No
63. Which segment of the sessions do you like most?	<input type="checkbox"/> Case conference/Case presentations <input type="checkbox"/> Seminar/Lecture <input type="checkbox"/> Quality improvement <input type="checkbox"/> All
64. What do you think about the length of each session?	<input type="checkbox"/> Too long <input type="checkbox"/> Just enough <input type="checkbox"/> Too short
65. Would you like other topics presented in additional sessions?	<input type="checkbox"/> Yes <input type="checkbox"/> No
66. If yes, what topics do you think are necessary for your clinical practice?	Specify:
67. If yes, what time of day in the week is the most appropriate?	Specify: day, morning or afternoon?
68. If yes, how much time is the most appropriate?	Specify (how many hours?)
69. Do you think other specialists from other specialties need to be invited? If yes, which specialty?	Specify:
70. Other opinions:	

Appendix J: Survey Questions for ECHO Providers, Mentors and/ or Clinical Administrators

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

- 1. ECHO ID number
- 2. Gender: 1. Male 2. Female
- 3. Age:
 - [] 18-25
 - [] 26-35
 - [] 36-45
 - [] 46-55
 - [] >55
- 4. What kind of professional qualification do you have? (tick all that apply)
 - [] Doctor
 - [] Pharmacist
 - [] Pharmacist’s assistant
 - [] Nurse
 - [] Bachelor in Public Health
 - [] Other: _____
- 5. How many years of experience do you have taking care of HIV patients? (round to nearest whole number)

- 6. Where is your HIV clinic situated?
 - [] Intermediate hospital
 - [] District hospital
 - [] Health Center
 - [] Other: _____
- 7. Region: _____
District: _____
- 8. On average, how many HIV patients do you provide care for per week? _____

Survey Questions

- 1. Clinic staff have blocked out time during clinic hours to participate in teleECHO sessions. Please describe how the clinic, its staff and its patients have accommodated this adjustment.
 - a) What could the Namibia Project ECHO team have done to better prepare your site for participation in ECHO?
 - b) Which times of the day would work better for a Project ECHO session in this facility?
- 2. 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.
- 3. 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?
- 4. 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 CPD credits through teleECHO clinic sessions at your site?

Appendix K: TeleECHO FGD Consent Form

Introduction

The Namibia Project ECHO Consortium is led by the Ministry of Health and Social Services in partnership with the Centers for Disease Control (CDC) Namibia, CDC Atlanta, Elizabeth Glaser Pediatric AIDS Foundation and the University of New Mexico and University of Washington in the United States. The Namibia Project ECHO Consortium 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 focus group because you regularly attend TeleECHO sessions.

What will happen if I decide to participate?

If you agree to participate, you will attend a 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 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. You will receive a clinical text, journal, or DVD in compensation for your time.

What are the risks or side effects of being in this focus group?

There are minimal risks of discomfort when answering questions and possible loss of privacy and confidentiality associated with participating in a focus group. There is no way to protect privacy from other participants in the focus group, but everyone participating will be asked to maintain confidentiality. Discussions about sensitive personal information will be discouraged. Participants will be scheduled so that no person in the focus group reports professionally to any other.

What are the benefits to being in this focus group?

By participating in a focus group, you will be helping to determine the practical impact of the TeleECHO sessions which may be shared with other sites who are also interested in joining ECHO.

How will my information be kept confidential?

There is no way to protect privacy from other participants in the focus group, but everyone participating will be asked to maintain confidentiality. Focus group conversations 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 until they are destroyed at study completion.

Information obtained from focus groups is used to inform program improvements and will be de-identified. Your name will not be used in any published reports about this evaluation. You may keep a copy of this consent form.

Can I stop being in the focus group 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 focus group without affecting your future participation in Project ECHO®. Your employment or post assignment will not be affected by your decision to participate or not participate in this focus group.

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

If you have any questions, concerns or complaints at any time, you can contact Tadesse Teferi, MD. MPH will be glad to answer them. If you would like to speak with someone other than the Project ECHO Team, you may call CDC HSR.

CONSENT

Your participation in this focus group is a sign of your implicit consent to participate in this evaluation of the Pilot Project ECHO in Namibia.

Appendix L: TeleECHO Interview Consent

Introduction

The Namibia Project ECHO Consortium is led by the Ministry of Health and Social Services in partnership with the Centers for Disease Control (CDC) Namibia, CDC Atlanta, Elizabeth Glaser Pediatric AIDS Foundation and the University of New Mexico and University of Washington in the United States. The Namibia Project ECHO Consortium 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 a 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. You will be offered a clinical text, journal, or DVD in compensation for your time.

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?

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 until they are destroyed at study completion. Information obtained from interviews is used to inform program improvements and will be de-identified. Your name will not be used in any published reports about this evaluation. You may keep a copy of this consent form.

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®. 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, concerns or complaints at any time, Tadesse Teferi, MD. MPH will be glad to answer them. If you would like to speak with someone other than the Project ECHO Team, you may call CDC HSR.

CONSENT

Your participation in this interview is a sign of your implicit consent to participate in this evaluation of the Pilot Project ECHO in Namibia.

Appendix M: Informed Consent for Confidential Surveys and Questionnaires for Participating Providers Pilot Project ECHO in Namibia

What is this about?

The Namibia Project ECHO® Consortium is led by the Ministry of Health and Social Services (MoHSS) in partnership with the Centers for Disease Control (CDC) Namibia, CDC Atlanta, Elizabeth Glaser Pediatric AIDS Foundation and the University of New Mexico and University of Washington 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 knowledge questionnaires and surveys that ask for your feedback. You are being asked to participate in this evaluation because you are a mentor, provider, or administrator at a site that is participating in the pilot project.

What will happen if I participate?

If you participate, you will be asked to complete questionnaires and surveys about TeleECHO® sessions. You may be asked to complete a set of questionnaires at the beginning of the pilot, before the first TeleECHO session. You may be asked to complete surveys again at the end of the pilot program. The questionnaire and surveys will help us know how much you have learned from the TeleECHO sessions, your opinions of the TeleECHO sessions, and ways to improve the TeleECHO sessions. The set of surveys will take about 45 minutes 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 questionnaires or surveys. If you do not want to do a questionnaire or survey, it will not affect your job, now or in the future.

How will my information be kept private?

To protect your privacy, you will be assigned a unique number that will be link your responses 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 Namibia Project ECHO® location, with access limited to Project ECHO® staff. The responses are securely stored as data that is sec encrypted and protected with passwords on secure servers. Data will be grouped together before being reported and will not reveal the identity of participants. All data will be kept in a locked file in the locked office of Project ECHO staff and/or secured database on password-protected MoHSS and CDC servers until the study results are analyzed and results completed (approximately five years). The data will then be destroyed.

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 Namibia. If published, results will be presented in summary form only.

If you have any questions about this project, Tadesse Teferi, MD. MPH will be glad to answer them. If you prefer to speak with someone other than the Project ECHO team, you may call the CDC HSR Office.

Thank you for your consideration. Your participation in these questionnaires and surveys is your implicit consent that you understand that you are participating in an evaluation of the Pilot Project ECHO in Namibia and are willing to do so.

Notes

[illegible]



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