

IMPACT OF HIV PROJECT ECHO (EXTENTIONS FOR COMMUNITY HEALTH  
OUTCOMES) IN KAZAKHSTAN

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## **ABSTRACT**

Janell Wright: Impact of HIV Project ECHO (Extensions for Community Health Outcomes) in  
Kazakhstan  
(Under the direction of Sandra Greene)

In 2016, Kazakh Medical University for Continuous Education (KazMUCE) in collaboration with Columbia University and the US CDC, conducted a pilot program to replicate Project ECHO, a weekly innovative, virtual mentoring and training CME platform for healthcare workers. A 10-month HIV case-based curriculum was developed and implemented by KazMUCE, which served as a Training Center for the for 24 HIV treatment facilities located throughout the country. An evaluation was developed aimed at exploring the value of Project ECHO as a CME model in Kazakhstan using the desired outcomes from each level in Moore's Expanded CME Evaluation Framework. The study objective was to evaluate the relationship between Project ECHO and capacity-building among clinicians for providing high-quality care for people living with HIV in Kazakhstan. Methods included conducting and analyzing pre- and post- knowledge assessments, self- efficacy, and satisfaction surveys among all participants, as well as conducting nine in-depth interviews and five focus group discussions among participants.

There was over 90% participation in all sessions from 97 participants across all 24 HIV treatment sites in Kazakhstan. The pre- and post-knowledge assessment showed that 75% (n=73) of participants increased their score from the baseline. The surveys showed an increase of 28% in self-efficacy and an increase of 19% in job satisfaction. In the focus groups and interviews participants shared that they appreciated being involved in a community of practice and having

evidence-based concepts reinforced through the real-time practical case presentations and short didactic sessions. Providers also mentioned that the case-based learning provided a unique opportunity for providers to gain information to apply in their service delivery. Reports from respondents suggest that providers improved their performance, specifically the quality of prescribing effective treatment, managing side effects of the treatment as well as complications associated with HIV infection. As a result, providers shared that their patients' outcomes have improved.

The high degree of site participation, individual attendance, and support for the program among healthcare workers suggests that Project ECHO is a feasible model of CME in Kazakhstan, which could be expanded to other specialties and medical cadres.

This work is dedicated to the healthcare workers in Kazakhstan who have devoted their lives to caring and treating people living with HIV and their families in Kazakhstan. You are public health heroes and I will always be inspired by your dedication and resilience.

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## **LIST OF ABBREVIATIONS**

ADS	Associate Director for Science (at CDC)
ART	Antiretroviral Therapy
CDC	Centers for Disease Control and Prevention
CHW	Community Health Workers
CME	Continuing Medical Education
ECHO	Extension for Community Healthcare Outcomes
EECA	Eastern Europe and Central Asia
FG	Focus Group
HCV	Hepatitis C Virus
HCW	Health Care Worker
HIV	Human Immunodeficiency Virus
ICAP	International Center for AIDS Care and Treatment Program
IDI	In-Depth Interviews
KazMUCE	Kazakh Medical University for Continuous Education
KazNMU	Kazakh National Medical University
MOH	Ministry of Health
MOHSD	Ministry of Health and Social Development
PCP	Primary Care Physician
PEPFAR	President's Emergency Plan for AIDS Relief
PLHIV	People Living with HIV
PMTCT	Prevention of Mother to Child Transmission

PWID	People Who Inject Drugs
QI	Quality Improvement
RAC	Republican AIDS Center
SEV	Scientific Ethics Verification (at CDC)
SME	Subject Matter Experts
TB	Tuberculosis
UNM	University of New Mexico
VL	Viral Load

## **CHAPTER 1: INTRODUCTION**

### **HIV Burden of Disease in Kazakhstan**

The region of Eastern Europe and Central Asia (EECA) is one of the few regions in the world where the HIV epidemic is still on the rise.<sup>1</sup> Currently, countries in Central Asia, including Kazakhstan, face concentrated HIV epidemics; the most common mode of transmission is sharing infected syringes and needles among people who inject drugs (PWID). The HIV prevalence among PWID is 9.3%.<sup>2</sup> Late HIV diagnosis, delayed initiation of patients on HIV/AIDS antiretroviral therapy (ART), and low adherence to treatment contribute to the continuous spread of the infection and high mortality among people living with HIV (PLHIV). In June 2014, the U.S. Global AIDS Coordinator, Dr. Deborah Birx, announced that the United States program to respond to the worldwide AIDS epidemic, the President's Emergency Plan for AIDS Relief (PEPFAR), would be committed to aggressive scale-up of adult and pediatric ART across PEPFAR-supported countries in an effort to reach epidemic control.<sup>1</sup> This was following the 2014 UNAIDS (the Joint United Nations Programme on HIV/AIDS) announcement of a new "90-90-90" strategy for controlling the HIV epidemic worldwide. This strategy calls for 90% of estimated PLHIV to be diagnosed, 90% of diagnosed PLHIV to be treated with ART, and 90% of PLHIV on ART to be virally suppressed.<sup>3</sup>

Kazakhstan receives funding and support from PEPFAR. In Kazakhstan there are 26,000 estimated PLHIV.<sup>4</sup> As of January 2017, 20,841 were diagnosed in the country. Although Kazakhstan is estimated to have diagnosed about 80% of PLHIV nationally, only 55% (11,482) of diagnosed PLHIV are on ART.<sup>2</sup> Only 55% of PLHIV on ART have documented viral load

(VL) suppression.<sup>2</sup> In order to implement the 90-90-90 strategy based on the estimated PLHIV in Kazakhstan, the health system will need to cover 21,060 PLHIV with ART. Therefore, they will need to continue serving 11,482 patients plus initiate 9,578 additional patients on ART. In the short-term the government of Kazakhstan announced that they will procure ART for a total of 14,740 patients by the end of 2018, and by 2020 the government plans to procure ART to cover 90% of registered cases. To reach this goal in Kazakhstan there will need to be significant investment in building the capacity of the health care system to absorb more patients on ART and maintain quality treatment for those currently on treatment.

### **Human Resources and Policy Environment**

In 2011-2012 an assessment of HIV clinical services in Kazakhstan described the policies and regulations that drive the current structure of the HIV services.<sup>5</sup> This assessment explained that HIV treatment services are provided through a network of 24 specialized local facilities – oblast (provincial) and city AIDS Centers which are both coordinated centrally by the Republican AIDS Center (RAC) in Almaty, Kazakhstan. The RAC is a regulating entity that gathers and analyzes data and sets policies. Therefore, the RAC has a national mandate to coordinate HIV surveillance, prevention, care, and treatment activities across the country including setting the standards for the workforce in each facility. The oblast, which is equivalent to a U.S. state, and city AIDS Centers offer HIV testing, prevention interventions, and care and treatment services for PLHIV. Primary health care facilities and other specialized medical facilities refer PLHIV to AIDS Centers. In some situations, they collect blood samples for HIV testing to be conducted at AIDS Centers. However, all treatment initiation and case management is done at the AIDS Centers.<sup>5</sup>

The clinical department of a city or oblast AIDS Center usually consists of the head of



the department, two clinicians, and three nurses.<sup>5</sup> For AIDS Centers that have a high volume of patients, such as those in the cities of Karaganda and Almaty, there may be additional clinicians and nurses. During this assessment of clinical services it was noted that most providers at the AIDS Center completed postgraduate training in HIV management either at the Kazakh National Medical University or Almaty State Institute of Postgraduate Medical Education.<sup>5</sup> However, clinicians reported challenges in providing proper clinical management of PLHIV.<sup>5</sup> One of the reasons for this is that the training focuses on transferring theoretical knowledge and does not target the building of critical clinical decision-making skills or include sufficient time for case studies and discussion of clinical examples.<sup>5</sup> The consequences of limited levels of knowledge and skills among clinicians applying national guidelines to their case management resulted in low enrollment of identified PLHIV into treatment; a lack of ART adherence support by clinical staff; low patient retention rates; limited patient follow-up due to an ineffective patient data management system; low levels of tuberculosis (TB) screening among PLHIV due to a lack of coordination among service providers; and inadequate prescription of cotrimoxazole and isoniazid preventive therapies.<sup>5</sup>

Based upon the identified gaps in coverage and quality of services conducted during the clinical assessments, the Republican AIDS Center, with technical assistance and financial support from the U.S. Centers for Disease Control and Prevention (CDC), identified a small number of HIV care and treatment service delivery facilities to pilot an on-site mentoring and training program for clinical staff using a standard of care (SOC) checklist. A group of local HIV clinical experts were identified to conduct quarterly mentoring visits and in-service trainings to build the capacity of the clinical staff and improve the quality of HIV case management. For these health care workers, this outside clinical mentorship and in-service training has become an

essential form of building competencies, reinforcing skills, and ensuring that they have the knowledge and confidence to deliver high quality ART services. These programs are supported through PEPFAR donor funds, as the clinical assessment noted that there is limited number of staff at the clinical department funded by the Republican AIDS Center to conduct regular monitoring visits and provide sufficient technical support to city and oblast AIDS center in PLHIV case management.<sup>5</sup> In 2015, UNAIDS advocated among stakeholders to assist in building the capacity of healthcare workers to meet the need of doubling of treatment. At the same time, in 2015 PEPFAR revised its strategy to concentrate resources for on-site mentoring support to facilities in two oblasts in Kazakhstan in order to demonstrate a model of how to reach the 90-90-90 UNAIDS goal in a given area. Therefore, the on-site mentoring and in-service training was limited to only two oblasts. Unfortunately, the RAC has been unable to replicate the donor supported on-site program in other oblasts with funding from the national budget.

Given the providers' limited capacity to manage HIV cases,<sup>5</sup> the urgency to scale up treatment to provide services, and limited funds to provide on-site mentoring and in-service training, CDC partnered with ICAP at Columbia University and the Kazakh Medical University for Continuous Education (KazMUCE), to implement a new continuing medical education initiative called Project ECHO (Extension for Community Healthcare Outcomes) to reach more providers across the country.

### **Project ECHO Intervention**

Dr. Sanjeev Arora started Project ECHO in 2003 at the University of New Mexico (UNM) to assist primary care physicians (PCP) in treating people living with Hepatitis C instead of referring the patients to specialists. Since 2003 the Project ECHO model has been replicated across the world in building capacity of healthcare workers (HCW) in different disease areas. As

of August 2017 Project ECHO has been replicated in 23 countries on six continents including Argentina, Australia, Brazil, Canada, Cote d'Ivoire, Ecuador, Egypt, Georgia, India, Kenya, Mexico, Namibia, Tanzania, Uganda, the UK, Uruguay, and Vietnam.<sup>6</sup> The basis of the intervention is using a virtual platform to conduct mentoring and training where the expert specialists sit at a "hub" site and teams or individuals sit at "spoke" sites in their clinical facilities.<sup>7</sup>

Project ECHO is aimed at increasing knowledge, skills, and confidence of HCWs who lack expertise to treat or manage complex diseases and where there are large distances for referrals from HCWs to specialists.<sup>8</sup> Beyond the traditional learning model, Project ECHO is designed to maximize adult learning and facilitate communities of practice. Dr. Bruce Struminger, Associate Director of ECHO, wrote:

"Virtual communities of practice, such as those that use the Project ECHO model, go beyond virtual classrooms by developing knowledge networks that promote real-time, multidirectional learning and teaching, with a strong emphasis on peer-to-peer sharing and learning. Knowledge delivery and mentoring are combined with opportunities for live discussion and problem solving in situations where meeting in person is impractical and cost-prohibitive."<sup>6</sup>

### **Theoretical Basis for Project ECHO**

The theoretical basis of the learning process in Project ECHO incorporates three theories of learning<sup>10</sup>: Social Cognitive Theory,<sup>11</sup> Situated Learning Theory,<sup>12</sup> and Community of Practice Theory.<sup>13</sup>

- *Social Cognitive Theory* describes three key factors that increase a person's confidence to change their behavior: 1) personal belief that acting upon the new information will outweigh the costs of continuing with the status quo or doing nothing; 2) self-efficacy to implement and perform the new action; and 3) direct positive reinforcement after engaging in the new action from those in influential positions.<sup>14</sup> During Project ECHO,

the clinical mentor and the hub team are influencing the learners at the spoke sites by (1) providing new information about how they can improve patient outcomes (didactic sessions); (2) providing concrete examples of how a provider can implement the information (case presentations); (3) and reinforcing the information through positive feedback from the hub team (who are seen as the top experts in HIV in Kazakhstan) both during the sessions and with follow-up emails that include additional resources and materials.

- *Situated Learning Theory* suggests that learning in the context of collaboration and social interaction contributes to the success of the learning process.<sup>12</sup> If providers perceive themselves as part of a community of peers this creates a learning benefit above what other traditional trainings or one-on-one mentoring provide. Project ECHO differs from self-guided online or virtual education programs by maximizing ongoing interaction with peers and experts, using the virtual platform to connect people where everyone is learning together and at the same time.
- Finally, the *Communities of Practice Theory* suggests that the benefit from shared knowledge can lead to higher productivity.<sup>13</sup> This theory builds on the situated learning theory that social interaction and collaboration enhance the learning process by the participation in a community of learners who are building the same technical knowledge and skills. The Project ECHO model by design is a continuous mentoring program which encourages collaborative learning and coaching not only from experts but also peer-to-peer feedback and interaction.

## **Components and Model of Project ECHO**

The ECHO clinic session is about one hour long every week and starts with introductions of all participants at the hub and at the spokes on video and/or phone. The learning session starts with a case presentation, followed by a brief 15-20-minute didactic presentation on an aspect of the disease management, and ends with another case presentation. De-identified cases to be presented are submitted by participants in advance of the ECHO clinic in a standard case template. The participant who submits the case presents it based on the information provided in the template. The clinical mentor solicits clarifying questions from participants, and then from participants at the hub. The clinical mentor also solicits recommendations and suggestions from participants and provides final recommendations, which are summarized and later sent to the presenters electronically. Participant who are interested in obtaining no-cost continuing medical education (CME) credits register online at the start of the clinic and then complete a brief electronic questionnaire at the end of the ECHO clinic.<sup>15</sup>

The model uses three learning components to develop clinical skills to care for patients: mentoring and coaching from expert specialists, learning from peer-to-peer interaction, and short didactic trainings from expert specialists.<sup>16</sup> The success of the model of Project ECHO is built around three levels of outreach at the clinical level through the participating providers. The first level of outreach is to improve the treatment to the index patient whose case is presented during the ECHO session. The second level is for providers to apply the knowledge gained through the case presentation to other patients in their care. The third level is for the provider through interaction with other colleagues to spread the applied knowledge to the patient care of the whole clinic.<sup>17</sup> This learning loop creates deep knowledge, increased skills, and improved self-

efficacy.<sup>18</sup> It is meant to enhance the knowledge of the primary care providers, permit patients to continue receiving care from their primary providers, and reduce the need for referrals.<sup>19</sup>

Given the success that Project ECHO has achieved, I hypothesized that this model of continuing medical education through virtual training and mentoring would lead to increased HIV clinical management knowledge and improved quality of clinical services, as well as enhanced competency in HIV case management.

### **Description of the Implementation of the Pilot Intervention**

The first phase of HIV Project ECHO took place from September 2016 to June 2017. This first phase also served as a pilot to evaluate the impact of the initiative in Kazakhstan. Participants were recruited and selected to participate in the pilot and evaluation of Project ECHO from all 24 treatment facilities in Kazakhstan (23 city and provincial AIDS Centers and the Mother and Child Health Center in Shymkent).

Prior to launching Project ECHO in the summer of 2016, a working group from Kazakhstan traveled to the ECHO Institute in New Mexico to participate in the immersion training and sign partnership agreements with UNM. Based on this experience the working group also developed the implementation plan and evaluation for the pilot phase. They also conducted a public press briefing and launch of the initiative at KazMUCE to gain the support and backing of major stakeholders, including the Ministry of Health.

The implementation team included the director of KazMUCE, Dr. Raushan Issayeva; the Project ECHO clinical coordinator, Dr. Zhanna Zeypedenovna Trumova; and an information technology (IT) and administrator to support the telesessions, Mr. Almas Meirmanov; staff from CDC and ICAP. KazMUCE engaged faculties from KazMUCE, KazNMU, RAC, and ICAP to facilitate clinical sessions, case studies, and consultations. A teaming agreement developed by

KazMUCE was signed between KazMUCE, ICAP, and RAC to establish a non-binding partnership for supporting Project ECHO.

The curriculum was developed based on a needs assessment conducted by the clinical coordinator as she recruited participants into Project ECHO. The curriculum included nine modules, covering 38 topics (see Figure 1). The curriculum was approved and accredited by the Kazakhstan Ministry of Education, allowing KazMUCE to distribute CME credits to the participants upon completion of 90% of the sessions. The sessions were designed based on the approved curriculum and lasted 60 minutes. A short didactic session was presented for each topic by the clinical coordinator or a guest specialist. Participants were pre-selected to present a case from their treatment facility pertaining to the topic. The curriculum built in a few sessions where case presentations outside of its parameters were introduced to allow for the discussion of pressing cases. At the end of each session, the session's presentations, patient recommendations from the experts, and links to educational literature/modern publications were sent to participants via email.

Starting in Sept 2016 there were two ECHO sessions on Thursdays back-to-back with approximately 50 participants in each session. A clinical coordinator facilitated all of the sessions and over the course of the 9-month implementation period invited 16 experts in 12 different specialties to participate in relevant sessions.

**Figure 1. Kazakhstan HIV Project ECHO curriculum modules Sept 2016- June 2017.**

**Module 1: HIV and Evidence-Based Medicine; one session.**

**Module 2: HIV. HIV-Associated (secondary) Conditions; seven sessions.**

**Module 3: Illnesses, Not Related to HIV; five sessions.**

**Module 4: Antiretroviral Therapy; five sessions.**

**Module 5: HIV in Children; five sessions.**

**Module 6: Prevention of Mother-to-Child Transmission of HIV (PMTCT); five sessions.**

**Module 7: Infection Control. Biosafety of Patients and Health Professionals in Health Care Facilities; three sessions.**

The clinical coordinator, Dr. Zhanna Zeypedenovna Trumova, is also the head of the Evidenced-Based Medicine Center at KazMUCE and is accredited as an independent expert of the Republic of Kazakhstan on infectious diseases. She has a medical degree from the Aktobe State Medical Institute and did her clinical residency at the Academy of Medical Sciences in USSR. She worked as a clinician for twenty years and then became the Chief of the Clinical Department at the Republican AIDS Center for ten years. Since 2013 she has served as the clinical expert on HIV at KazMUCE. During her tenure at the Republican AIDS Center she became widely known and respected among HIV providers in Kazakhstan.

### **Study Objective and Aims**

**Objective:** To evaluate the relationship between Project ECHO and capacity-building among clinicians for providing high-quality PLHIV care in Kazakhstan.



**Aim 1:** To examine the attitudes and practices of HIV providers toward participating in Project ECHO.

**Aim 2:** To evaluate changes in participating providers' HIV knowledge, self-assessed professional satisfaction, and self-efficacy to provide essential components of HIV clinical care.

**Aim 3:** To explore the degree to which participants integrated knowledge and skills gained while participating in Project ECHO into their clinical practice to benefit PLHIV patients.

### **Guiding Conceptual Framework**

Project ECHO is a continuing medical education (CME) model.<sup>9</sup> The underlying hypothesis of CME is that physicians must commit to continuous learning in order to provide the best possible care for their patients.<sup>20</sup> The guiding theoretical and practical basis for studying Project ECHO as a method of capacity-building through CME is the Expanded Outcomes Framework for Planning and Assessing CME put forward by Dr. Donald E. Moore and his team at Vanderbilt University.<sup>20</sup> The Expanded CME Framework builds upon the original framework for outcomes assessment that was proposed by Dr. Moore in 2003 and includes seven levels of potential CME outcomes. The framework was designed to propose a comprehensive way of planning and assessing continuing medical education. The focus is on achieving desired outcomes, including improved physician performance and better health outcomes. Table 1 provides a description by Moore of each outcome level.

This framework guided the approach and organization for the literature review, the methodology, and the results for this research. Through studying each level of Moore's CME Framework, I attempted to address the aims of the research to understand how the components of Project ECHO interact to produce the desired outcomes of continuing medical education. This

framework suggests that there are many levels to CME and the desired outcomes can be measured together or independently. Also, Moore and his team suggest that ideally a CME program would be planned based on all levels in this comprehensive framework. They recognize, however, that not all CME programs can or have been planned in such a comprehensive way but still can be assessed using desired outcomes of any level. This research assessed Levels 1-6.

**Table 1. Expanded outcomes framework for planning and assessing CME programs**

**(adapted from Moore).<sup>20</sup>**

<b>Expanded CME Framework Levels</b>	<b>Description</b>
Participation Level 1	The number of physicians and others who participated in the CME activity
Satisfaction Level 2	The degree to which the expectations of the participants about the setting and delivery of the CME activity were met
Learning: Declarative Knowledge Level 3A	The degree to which participants state what the CME activity intended them to know
Learning: Procedural Knowledge Level 3B	The degree to which participants state how to do what the CME activity intended them to know how to do
Competence Level 4	The degree to which participants show in an educational setting how to do what the CME activity intended them to be able to do
Performance Level 5	The degree to which participants do what the CME activity intended them to be able to do in practice
Patient Health Level 6	The degree to which the health status of patients improves due to changes in the practice behavior of participants
Community Health Level 7	The degree to which the health status of a community of patients changes in the practice behavior of participants

## **CHAPTER 2: LITERATURE REVIEW**

Since its inception in 2003, Project ECHO has been replicated all over the world to address capacity-building of providers for various diseases or conditions. The objective of this systematic literature review is to examine the existing evidence of Project ECHO effectiveness. I have organized the literature based on Moore's Expanded CME Framework seven levels of CME outcomes: Participation, Satisfaction, Learning (declarative and procedural knowledge), Competence, Performance, Patient Health, Community Health.

### **Methods**

I conducted a systematic literature review of peer reviewed journal articles using PubMed, Global Health (ephost) and Scopus. Since Project ECHO is a specific intervention with strict replication criteria I used the following search term: "Project ECHO" OR "Extensions for Community Health Outcomes." I searched the English language literature from January 2003-December 2017 since the initial pilot of Project ECHO was launched in 2003.<sup>21</sup> Additional studies were identified through reference lists of previously found studies or articles related to Project ECHO.

The inclusion criteria were as follows:

- 1) Articles describing the replication process of Project ECHO and/or the feasibility of the replication in any given context
- 2) Evaluations of Project ECHO impact including the original Project ECHO in the University of New Mexico and any replications of Project ECHO
- 3) Articles reporting results from an empirical study

The exclusion criteria were as follows:

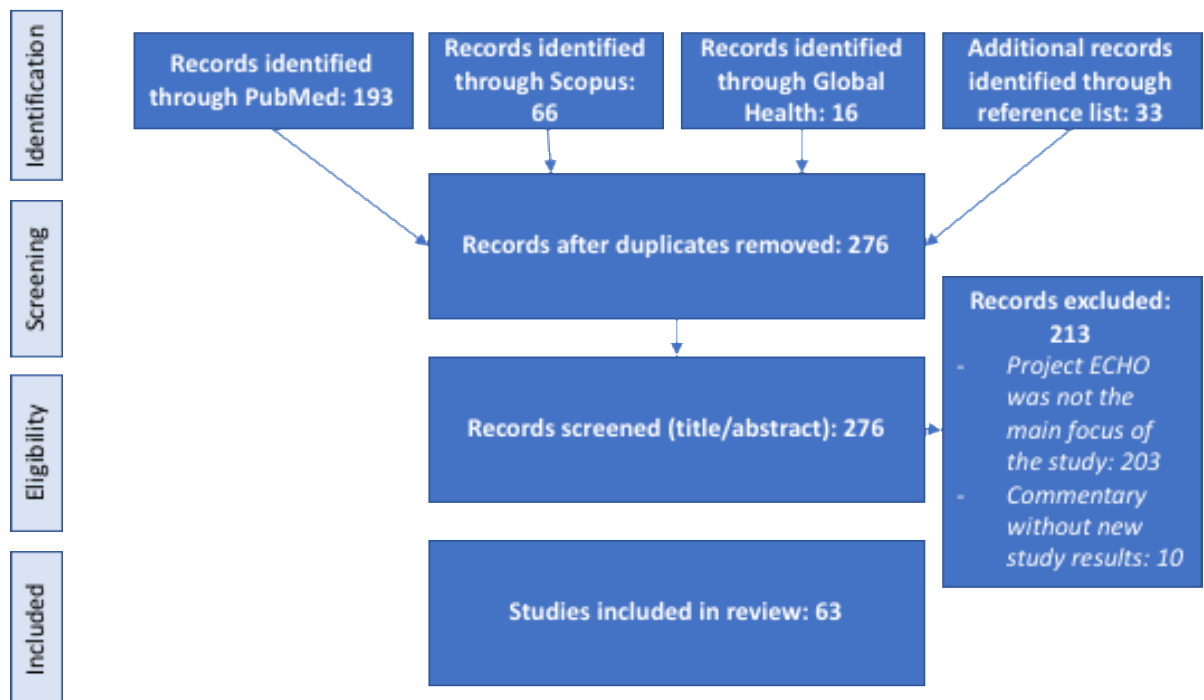
- 1) Project ECHO was not the main focus of the study

### ***Data extraction and classification***

This literature review followed the guidelines for conducting a systematic literature review.<sup>22</sup> The PRISMA diagram is found in Figure 2. Using the search terms, I found 275 abstracts that referenced Project ECHO in three web-based databases. Using bibliographies from other articles referencing Project ECHO I was able to include 33 more studies for a total of 307. I imported all of the articles into Mendelay reference manager. I ran a deduplication process through the reference manager, leaving a total of 276 records to review. I reviewed the titles and abstracts of 276 records for relevance and to determine if they met the selection criteria. A total of 63 records met the inclusion criteria and were included for a full-text review. I used a data extraction Excel table to document descriptive information as well as make notes of any of the outcomes described in Moore's Expanded CME Framework.

**Figure 2. Literature review process diagram on project ECHO feasibility and impact.**

## Results

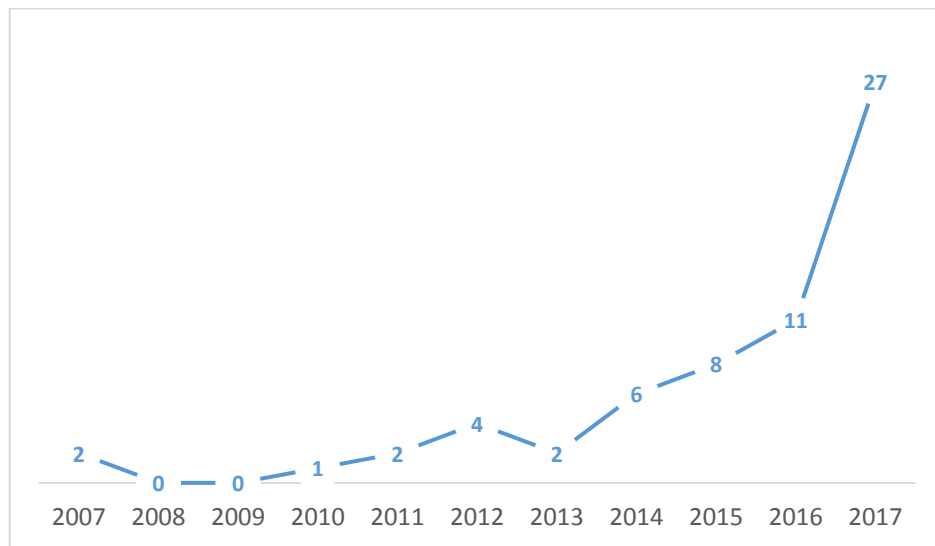


I reviewed 63 articles for this literature review. The general description and overview of the literature is summarized first, followed by a description of the outcomes using Moore’s Expanded CME Framework. I also included the methodology used in the literature to evaluate Project ECHO.

Dr. Sanjeev Arora started Project ECHO at the University of New Mexico in 2003.<sup>21</sup> The first two articles describing the intervention at the University of New Mexico were published in 2007. Between 2010-2011, Dr. Arora published three additional articles describing the outcomes of Project ECHO, including impact on patient outcomes. Six articles were published between 2012-2013, including the first article documenting the replication process and outcomes in other locations and disease areas. Between 2014-2015, 16 articles were published, with an additional

11 published in 2016. In 2017, 27 articles were published as Project ECHO replication models around the world became more established. Figure 3 illustrates the exponential growth in the literature base, especially in 2017.

**Figure 3. Number of publications by year.**



The literature contained evaluations of Project ECHO clinics in North America, including New Mexico, Utah, Arizona, Pacific Northwest, Missouri, Massachusetts, Michigan, and Ontario. Also, the literature covers Project ECHO clinics that span the US through Indian Health Services, Veterans Affairs (VA) and the Military Health Service. Three articles evaluated Project ECHO outside of North America: Northern Ireland, Argentina and India<sup>18,23,24</sup>. Similar to the other evaluations of Project ECHO in North America, they described limited health provider resources and scarcity of treatment facilities in rural areas as an impetus for starting Project ECHO.<sup>18,23,24</sup>

Project ECHO started as a telementoring and training for primary care physicians (PCP) involved in treating Hepatitis C. Fifteen articles explain the implementation of Hepatitis Project ECHO.<sup>7,9,10,25–36</sup> Six articles compare Project ECHO replication models across multiple diseases or conditions primarily at the VA or UNM.<sup>17,37–41</sup> Eight articles discussed treating chronic pain

as the population in the United States is seeking increased treatment of pain with narcotics.<sup>42–49</sup> Five articles examined the program for addiction in the context of increased substance abuse in the United States.<sup>5,2730</sup> Three articles described the Bone Health teleECHO at UNM.<sup>53–55</sup> Three articles described Project ECHO for diabetes type II in the United States as obesity and sedentary lifestyle increases.<sup>56–58</sup> Five articles evaluated how Project ECHO has been replicated to assist providers with care and treatment for geriatric patients to improve mental health<sup>59–61</sup> or as they transition from surgery to care.<sup>62,63</sup> The following Project ECHO clinics for other diseases or conditions were described by one or two articles in the context of either complex case management or increases in prevalence of the condition or disease: complex care for low income patients,<sup>64,65</sup> women’s health,<sup>66</sup> palliative care,<sup>24,67</sup> HIV,<sup>68</sup> multiple sclerosis,<sup>69</sup> hypertension,<sup>19</sup> autism,<sup>70</sup> antipsychotic use,<sup>71</sup> transgender health,<sup>72</sup> tobacco cessation,<sup>73</sup> antimicrobial stewardship,<sup>74</sup> behavioral health,<sup>75,76</sup> public health,<sup>39</sup> and Zika.<sup>77</sup>

Of the literature reviewed, 42 evaluation studies included participation (Level 1); 22 explored participant satisfaction with the program (Level 2); 19 described the learning outcomes of participants (Level 3); 18 examined competence, which included perceived self-efficacy and professional satisfaction (Level 4); 16 evaluated performance of participants as a result of participation in ECHO (Level 5); 10 assessed patient outcomes (Level 6); and 1 discussed community health outcomes (Level 7). Some studies addressed more than one level of desired outcomes.

### *Participation (Level 1)*

Forty-two studies evaluated the number of participants and frequency of attendance. Many studies included participants’ locations and medical specialty or profession. There was no description of an ideal number of participants per session but on average the number of

participants averaged about 20-45 with variation in participation for every session. The main method used for data collection was participation logs from the electronic iECHO tool, which collects statistics on each ECHO session.

### *Satisfaction (Level 2)*

Twenty-two articles described participant satisfaction with their involvement in Project ECHO. All articles reported a high participant satisfaction with the sessions and/or the design of Project ECHO.<sup>10,17,18,27,29,33,38,44,46–48,51,52,61,63,66,69,70,75,76,78,79</sup> The main method of collecting participant satisfaction results was through administering surveys after six months and up to two years from the start of implementation of the Project ECHO.<sup>10,17,18,27,29,44,51,52,66,70,78,79</sup> Qualitative data from interviews or focus groups was another method of obtaining information about participants' satisfaction with the program.<sup>33,38,46–48,61,69</sup>

Providers reported several factors that led to their satisfaction with participating in Project ECHO. One factor was having access to a multidisciplinary team or expert panel who could provide comprehensive and expert advice.<sup>18,33,43,61</sup> However, one study noted that providers were frustrated when they received too many opinions from the multidisciplinary team during the sessions.<sup>65</sup> Other factors expressed by participants which contributed to their satisfaction with Project ECHO included improving participants' expertise,<sup>33,46,48</sup> increased networks and community of practice,<sup>47,48</sup> and receiving continuing medical education.<sup>50,65,70</sup> In the New Mexico model, if network clinicians manage 20 Hepatitis C patients through a year of antiviral therapy and demonstrate competence they can be eligible for certification of the Hepatitis C treatment expertise, which was a motivation for participation in Project ECHO.<sup>7</sup>

One study by Kristina M. Cordasco described the importance of focusing ECHO on one condition or disease for the success of the program.<sup>66</sup> Veteran's Health Affairs set up an ECHO



program to train providers on women's health because there was a lack of knowledge on how to treat female patients. They conducted 18 interviews with PCP participants over the span of two years starting the month of the initiation of the intervention. Some of the interviewees reported finding the ECHO sessions helpful with the case presentation and through the interviews a common theme emerged: how they had used a session to assist with another case.<sup>66</sup> However, in the study they also received feedback that while participants increased their knowledge, the range of topics was too broad and it was difficult to implement the recommendations.<sup>66</sup>

A study by Susan Kellie described how one ECHO project used the platform for distance learning for disseminating information about antimicrobial stewardship.<sup>74</sup> While presenting cases during the session is a trademark of the ECHO model, this ECHO program was instead designed to teach new information and maximize the peer-to-peer interaction by having robust conversations about how each hospital or center implements antimicrobial stewardship. This deviation from the model still resulted in high satisfaction among the participants.<sup>74</sup>

In a study conducted by Elisa Fisher, which evaluated Project ECHO to improve geriatric mental health care, her team conducted interviews with participants.<sup>61</sup> The study found that access to experts and a professional support community fostered the most satisfaction for Project ECHO, especially among rural clinicians in smaller cities. Participating clinicians who already had access to experts at larger teaching or urban hospitals reported less satisfaction.<sup>61</sup>

Participants noted the main factor contributing to dissatisfaction with Project ECHO was loss of productivity during the sessions; therefore, providers reported lack of time or protected time to participate.<sup>26,28,33,44,65</sup> One study describing the implementation of Project ECHO in the Pacific Northwest stated how the hub addressed this issue. The hub staff advocated for providers' participation by explaining to the site management how participation in Project ECHO

provides free CMEs and also enhances provider self-efficacy.<sup>65</sup> Additionally, a study from the UNM also described how the hub provides monetary reimbursement to providers as an incentive for taking the time to prepare and present a case during a session.<sup>26</sup>

There is a chance for selection bias among these results since participation in Project ECHO is voluntary and participants who completed the surveys presumably had an interest in Project ECHO before joining.

#### *Knowledge (Level 3)*

Nineteen studies focused on evaluating knowledge gained during Project ECHO. Thirteen studies assessed participants' self-reported impact on knowledge after participating in Project ECHO using post-session surveys, focus groups or interviews.<sup>10,33,37,38,43,46–48,61,66,68,69,75</sup> Also, six studies assessed impact on knowledge by using a multiple choice test before participation in Project ECHO and after a set number of sessions, usually after six months to a year of participation.<sup>9,19,50,52,76,80</sup> All studies reported moderate to high levels of knowledge improvement.

#### *Competence (Level 4)*

Eighteen studies evaluated competence, focused mostly on changes in provider self-efficacy (or self-confidence) and job satisfaction as a result of participating in Project ECHO. Sixteen studies evaluated self-efficacy through post-intervention surveys, open-ended questions or interviews.<sup>9,10,19,33,37,46,47,50,52,55,56,61,68–70,81</sup> Three studies included a specific post-intervention survey to measure change in provider satisfaction in implementing knowledge gained during Project ECHO.<sup>10,52,70</sup> The results found that there were moderate to significant increases in all of these categories, even when barriers were noted, although one study observed that the results on self-efficacy were not statistically significant.<sup>19</sup>

In an evaluation of the UNM Project ECHO Pain, researchers used focus groups conducted by video teleconference and included nine questions on five topics conducted by the ECHO Pain evaluation staff and the medical director. Of the 14 clinicians who participated in ECHO Pain for one year or longer, nine clinicians agreed to join a focus group. The results showed that the participants were motivated to continue participating because they felt less isolated and they felt encouragement from the hub team, which gave them confidence in their work.<sup>82</sup>

In a study by Micah Mazurek, which assessed ECHO participants' outcomes on managing autism, self-efficacy was evaluated using self-reported questionnaires at baseline and then after the study period.<sup>70</sup> Participants reported the degree to which they felt confident to provide care in a specific area using a six-point Likert Scale and the study found that confidence levels improved significantly.

#### *Performance (Level 5)*

Sixteen studies assessed Project ECHO's impact on participants' performance. Six studies conducted post-intervention or post-session surveys to measure self-reported changes in service delivery performance.<sup>9,28,44,63,66,70,74,75</sup>. Six studies reviewed patient-level data to assess changes in provider service delivery as a result of participating in Project ECHO.<sup>15,45,46,50,61,63,71</sup> One study conducted focus groups<sup>43</sup> and one study conducted interviews<sup>66</sup> to explore how providers applied their gained knowledge to their practice.

The ECHO Autism study by Mazurek assessed practice behavior using a before and after self-reported questionnaire. Participants were asked to indicate if they had administered a standardized checklist during screening and used specific resources developed by the Autism Treatment Network.<sup>70</sup>

A study by Joanna Katzman used focus groups to study performance outcomes of the Project ECHO Pain.<sup>43</sup> Participants described how they applied concepts from Project ECHO to treat patients and help them get off narcotics. Additionally, the providers mentioned they had changed their attitude toward the patients, learned how to talk with patients, and used the information gained during the sessions for serving their other patients.<sup>43</sup>

A study by Elisa Fisher evaluating Project ECHO in a geriatric mental health care setting analyzed data on health care utilization and costs before and after the implementation of Project ECHO at the spoke sites. The researchers followed patients of participating spoke sites and found they had fewer ER visits for issues related to mental health than in previous years. The results showed there was a 24% reduction in costs associated with emergency room use. The other metrics had a downward trend but were not found to be statistically significant.<sup>61</sup>

Miriam Komaromy conducted a study in which her team administered post-session surveys linked to receiving CME credits. The surveys had open-ended questions for participants to discuss whether the information would be useful in caring for their own patients and if so, in what way. Of the responses from 299 post-session surveys, 77% stated that the case discussion influenced their patient care plan.<sup>75</sup>

#### *Patient Outcomes (Level 6)*

Ten studies assessed patient outcomes as a result of their providers participating in Project ECHO. Two studies looked at changes in patient triage with the patient outcome being improved access to care. In a study by Ruth Dublin examining ECHO Ontario Chronic Pain and Opioid Stewardship, researchers used surveys and focus groups to evaluate patient triage.<sup>51</sup> In Ontario, where the wait to see a specialist is sometimes years, participants reported that through Project ECHO patients could be triaged by PCPs and those that needed additional support were

fast-tracked to appropriate care.<sup>51</sup> This improved the access to care for patients. In another study on the implementation of Project ECHO in the Veteran's Health Care (VHC) by Tahan, about half of the SCAN-ECHO consultations resulted in patients receiving their treatment from their local PCP instead of being referred to specialist, also improving the access to acute treatment.<sup>44</sup> The remaining half were referred to the VHA Medical Center when the treatment involved equipment or services not available through their PCP.<sup>83</sup>

Eight studies reviewed patient-level data to assess impact on patient outcomes and all demonstrated improvements to patients' health outcomes.<sup>25,27,32,58,59,61,62,71</sup> In the first article published on patient outcomes, Dr. Sanjeev Aurora from the University of New Mexico led a prospective cohort patient chart review comparing Hepatitis C treatment outcomes (viral suppression) from the mentoring spoke sites with the hub sites and found that there was equal success in patient outcomes.<sup>25</sup> The study showed that 58.2% of the patients at the ECHO spoke sites had a sustained viral load suppression response, and 57.5% of patients at the UNM HCV clinic had a sustained viral load suppression response, which was almost the same rate.<sup>25</sup> Dr. Stephen Gordon led a prospective matched-cohort study in a nursing home context, demonstrating that the intervention sites had a significant decrease in using physical restraints and a significant decrease in residents receiving antipsychotic medications compared to the control group.<sup>60</sup>

In a study by Angela Catic evaluating the Project ECHO-AGE, participants self-reported during interviews that the recommendations of the ECHO team were completely or partially followed in 39 out of 44 cases; using medical records, researchers found that 74% clinically improved versus 20% when recommendations were not followed.<sup>59</sup> Also, hospitalization was less common among patients for whom the recommendations were followed and there was lower

mortality in the 29 cases in whom improvement was reported.<sup>59</sup> In a study by Watts evaluating Project ECHO for diabetes, researchers used retrospective chart review and found that the glycemic control improved in all of the patients who were treated by participating PCPs compared to the overall improvement of glycemic control; this development does not appear to be the result of some system-wide improvement from other interventions.<sup>58</sup>

In a CDC report, Kiren Mitruka examined the patient outcomes on Project ECHO Hep C in Arizona and Utah using clinical data. The study determined that 46% of HCV-infected patients reached by teleECHO clinics received treatment, a proportion that was more than twice that observed in another CDC report for patients receiving Hepatitis treatment (14%-22%).<sup>27</sup>

#### *Community Health Outcomes (Level 7)*

One study evaluated the impact of Project ECHO participation on community health.<sup>50</sup> In New Mexico the state legislature mandated CME for providers administering opioids to manage pain. A Project ECHO was designed to fulfill this requirement. The six courses were attended by a cumulative 1,090 participants.

A study by Joanna Katzman examined the results of this Project ECHO.<sup>50</sup> The study reviewed state-wide data on prescription patterns before and after the implementation of Project ECHO; where there had been a five-year increase in the prescribing of opioid medications before ECHO, afterward there was a positive downward trend in the quality of opioid medications prescribed. This study also mentioned several other confounding variables that could have led to the change in trends, including media attention to providers overprescribing and providers being sanctioned by the Medical Board for excessive opioid prescribing.<sup>50</sup>

## **Discussion**

The literature describes how Project ECHO has been replicated mainly in North America to train and mentor providers in the care of a chronic disease or condition. The literature is also multiplying each year as Project ECHO is replicated and implemented in more contexts. My organization and analysis of the studies examined different levels of outcomes of Project ECHO as a CME in the context of Moore's Expanded CME Framework. Most of the literature includes evaluating the outcomes of Moore's first six levels and only one examining level 7: Community Health Outcomes.

The studies employed many different methodologies, both qualitative and quantitative, for collecting evaluation results. Most of the studies used a combination of post-session surveys, focus groups, interviews and patient-level data to analyze the desired outcomes in the Expanded CME Framework. Multiple methods used in the literature to capture desired outcomes will be used in the methods for this research.

Of the literature evaluating Project ECHO, there is a limited number of articles highlighting Project ECHO replication in a developing country context and there is only one article dedicated to the description and implementation of an HIV Project ECHO. The purpose of this research is to use the methods and findings from the literature to guide the evaluation of the impact of HIV Project ECHO on providers and patients in Kazakhstan.

## **Limitations**

The main limitation in the literature was selection bias and small sample sizes, since Project ECHO is a voluntary program and providers who are naturally drawn to technology and/or innovative methods of learning would be drawn to participate in Project ECHO. Also, participation in the surveys, focus groups, and interviews were voluntary and largely

uncompensated. While some evaluations were able to capture a large number of respondents, many had a smaller respondent size pool.

Many of the studies noted the lack of comparison groups as a limitation, especially among the studies that evaluated participants' changes in knowledge. While these studies employed pre- and post-test results to measure changes in participants' knowledge, these changes could also be attributed to other training programs or professional development activities.

One limitation of using Moore's Framework was the assessment of Level 4: Competence. Moore's Framework describes "Competence" as evaluating the degree to which participants can demonstrate in an educational setting how to do what the CME activity intended them to be able to do.<sup>20</sup> In many trainings, especially for medical professions, a practicum is included with supervision from a professor or instructor to ensure that providers can perform the intended task. Since Project ECHO is a virtual training program with up to 50 participants in a session, it is difficult for all of the providers in the large setting to demonstrate their knowledge. There were no studies evaluating participants' demonstrated knowledge within Project ECHO sessions other than peer-to-peer discussions of cases or follow-up from cases. Therefore, the studies that captured competency focused mainly on self-reported changes in confidence to implement and apply the knowledge gained.

Finally, the lack of literature to describe the community outcomes limits this literature review. I cannot make a concrete conclusion about whether Project ECHO had an impact on this final desired outcome from Moore's Framework.



## CHAPTER 3: METHODOLOGY AND STUDY DESIGN

### Study Design

The study design employed a multiple method approach to evaluate the three aims for this research. Each aim was addressed through assessing one or more of the levels of desired outcomes in Moore's Expanded CME Framework. While Moore outlines seven levels of desired outcomes, the scope of this study assesses Levels 1-6 using quantitative and qualitative methodology applied from the literature review (see Table 2).

**Table 2. Summary of research measurement outcomes and data collection methods.**

<b>Aim</b>	<b>Desired Outcome Measurement Based on Expanded CME Framework</b>	<b>Data Collection Method</b>	<b>Measurement Collection Tool</b>
1. To examine the attitudes and practices of HIV providers toward participating in Project ECHO	Level 1: Participation	iECHO attendance records and CME credits	iECHO
	Level 2: Satisfaction	Focus groups: perceptions of participants	Interview guide developed by KazMUCE & ICAP
		In-depth interviews: perceptions of participants	Interview guide developed by PI
2. To evaluate changes in participating providers' self-assessed professional satisfaction, HIV knowledge, and self-	Level 3A: Declarative knowledge	Pre- and post-knowledge assessments	Assessments developed by KazMUCE & ICAP
	Level 3B: Procedural knowledge		

efficacy to provide essential components of HIV clinical care	Level 4: Competence	Post-intervention self-assessed self-efficacy and professional satisfaction survey	Surveys developed by KazMUCE & ICAP
		Focus groups: self-reported knowledge gained, self-report of competence, intention to change	Interview guide developed by KazMUCE & ICAP
		In-depth interviews: self-reported knowledge gained, self-report of competence, intention to change	Interview guide developed by PI
3. To explore the degree to which participants have integrated knowledge and skills gained while participating in Project ECHO into their clinical practice to benefit PLHIV patients	Level 5: Performance	Focus groups: self-report of performance of applied knowledge and patient outcomes	Interview guide developed by KazMUCE & ICAP
	Level 6: Patient Outcomes	In-depth interviews: self-report of performance of applied knowledge and patient outcomes	Interview guide developed by PI

## Approach

In order to address the first aim, I analyzed the desired outcomes from Level 1: Participation and Level 2: Satisfaction in Moore's Expanded CME Framework. Participation was evaluated by recording the number of providers who participated in Project ECHO and how many CME credits were received. Providers' satisfaction with Project ECHO was evaluated through their opinions expressed during semi-structured, in-depth interviews and focus groups. Since the goal of Project ECHO is to build the capacity of as many providers as possible, it was essential to maximize participation by making the sessions user-friendly and assessable. I sought

to understand from the provider's perspective what were the motivating factors and barriers for participation in Project ECHO.

In order to address the second aim, I analyzed the desired outcomes from Level 3: Knowledge and Level 4: Competence in Moore's Expanded CME Framework. Changes in providers' knowledge were evaluated by analyzing pre-and post-knowledge assessments as well as analyzing focus group and interview responses for statements about what Project ECHO intended them to know and how to do what Project ECHO intended. Changes in providers' competence were evaluated through analyzing a post-intervention survey focused on self-efficacy and job satisfaction. Also, opinions expressed by participants during in-depth interviews and focus groups were analyzed to understand the providers' perceived changes in confidence levels to apply their knowledge gained by participating in Project ECHO. By evaluating the changes in provider knowledge and competency through focus groups and in-depth interviews, I sought to demonstrate whether Project ECHO was useful in increasing knowledge of HIV clinical case management and how it changed providers' confidence and competence. The perceived benefit to the provider of participating in a training program is essential to on-going participation.

To achieve Aim 3, I analyzed reports from the respondents in the focus groups and in-depth interviews on how knowledge gained through participation in Project ECHO has had an impact on service delivery and patient outcomes. The information collected during these interviews included providers' perceptions on the applicability of the information provided during the case presentations and didactic presentations, how the peer-to-peer discussions facilitated their knowledge and skills building, and their experience with presenting a case and getting advice from their colleagues and the expert hub mentors. The interviews also explored

specific cases (de-identified) where providers were able to apply their knowledge to improve service delivery. It is important to demonstrate to decision makers not only that Project ECHO has benefited providers but that there has been an impact on improved service delivery.

### **Sample Size and Inclusion Criteria**

The pilot of Project ECHO started in September 2016 and physicians from HIV service delivery sites were invited to attend. All 24 treatment facilities in Kazakhstan became participating spokes (23 AIDS Centers and the specialized Mother and Child HIV clinic in Shymkent- see appendix A for complete list of sites). Table 3 describes the inclusion criteria for the final sample sizes included in this study. There was a total of 106 participants who joined Project ECHO during the course of the pilot and agreed to participate in the evaluation. A total of 103 took the pre-assessment and 100 took the post- assessment. Only 97 took both the pre-assessment and the post-assessment, therefore only 97 participants' scores were included in the final analysis. The surveys were retrospective and both base-line and post-intervention surveys could be completed at the same time. 101 participants agreed to take the surveys.

**Table 3. Summary of inclusion criteria and sample size.**

<b>Method</b>	<b>Inclusion Criteria</b>	<b>Sample Size</b>
Attendance records	All participants	106 participants
Pre- and post-knowledge assessments	Providers who participated in the pre-knowledge assessments	97 participants
Self-assessed self-efficacy survey and professional satisfaction survey	Providers who participated in at least 30 ECHO sessions	101 participants
Focus groups	Providers who participated in at least 30 ECHO sessions	5 FG with total of 30 respondents
In-depth interviews	Providers from different sites who participated in at least 30 sessions and who presented at least one case	9 respondents

### **Data Collection**

Data collection for the evaluation of Project ECHO was conducted in stages. KazMUCE and ICAP collected process data, including attendance records and CME credits, as part of routine program monitoring from Sept 2016-June 2017. KazMUCE and ICAP administered the pre-knowledge assessment in Sept 2016 before the implementation of Project ECHO as part of a program evaluation. They administered the pre- and post- knowledge assessment, self-efficacy, and professional satisfaction surveys in June 2017 at the end of the first year of Project ECHO, also as part of a program evaluation. ICAP study staff conducted five focus groups in July 2017 among 30 participants. I conducted in-depth interviews with nine participants in November 2017 as part of this dissertation research.

### ***Process Data***

During the first year of implementation, Project ECHO staff evaluated the participation in Project ECHO (Level 1). The process records provided data on who registered to participate versus who actually participated, how many didactic sessions and patients' cases were presented, and how the ECHO sessions were staffed. Project ECHO contains a software application, "iECHO," a web-based partner relations management tool that is used to track data for ECHO sessions and activities. It also provides reporting functions for ECHO session performance and provides online resources to ECHO partners.

A project administrator for the Project ECHO team was responsible for routinely entering data into iECHO and documenting a complete record of ECHO session performance. 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 was completed by either a verbal or electronic roll call during the session. Information was entered and stored in the iECHO application. The data stored in iECHO was protected with 128 AES bit encryption, Secured Socket Layer (SSL) encryption and required secure user logins and passwords.

Additionally, KazMUCE provided CME credits to all participants who participated in at least 90% of the 38 sessions. A summary report of the process data was provided to me including the number of total participants, the percentage of sessions attended by the participants, CMEs credited and participants' specialties.

### ***Multiple Choice Knowledge Assessment***

The multiple choice knowledge assessment was developed by KazMUCE based on the core competencies and scope of practice for HIV clinical providers. The assessment covered HIV competency areas derived from the national HIV Treatment Guidelines and covered in the

curriculum for ECHO sessions. The curriculum topics were identified through a rapid needs assessment conducted with providers at the pilot sites, as well as suggestions from 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), central nervous system (CNS) toxoplasmosis, cryptococcal meningitis, etc., and HIV-TB co-infection; interpretation of viral load results; first and second-line ART regimens; antiretroviral toxicities; ART drug-drug interactions; ART 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 ART and Quality Management.

### ***Self-Efficacy Survey and Professional Satisfaction Survey***

Two additional surveys were administered among ECHO participants. A survey measuring self-efficacy centered on providers' perceptions of their own skills and level of expertise in serving as a clinician. Participants selected their level of competency from a Likert Scale of very low to excellent. The project participants were asked to assess their own competence in management of patients with HIV before and after participation in Project ECHO, based on 24 characteristics, including:

- Counseling patients on ART initiation
- Assessment of a patient's condition, selection of drugs for ART for different patient groups, therapy initiation, monitoring, and change of ART regimens
- Supporting patients to adhere to ART
- Prevention of mother-to-child HIV transmission

- Prevention, diagnosis, and treatment of opportunistic infections and co-morbidities
- Management of non-communicable diseases, including hypertension, dyslipidemia, diabetes mellitus, renal disease, and malignant tumors in PLHIV
- Pre-exposure and post-exposure prophylaxis

Another survey included an assessment of providers' level of job satisfaction. Again, the project participants were asked to assess their own professional satisfaction before and after participation in Project ECHO using a Likert Scale from "totally disagree" to "fully agree" with the following statements:

- I feel professional isolation at my workplace.
- I can easily take a personal rapport with my colleagues.
- I can easily turn to clinicians if I need to get professional feedback or help from them.
- I can easily access resources for professional development (improve knowledge).
- When I need help or support from clinicians, I can get in touch with an HIV expert in appropriate time.
- I have the opportunity to regularly share my clinical experience with colleagues.
- I am generally satisfied with my work.
- I am sure that I can improve the quality of health services delivery in my facility.

### ***Focus Groups and In-Depth Interviews with ECHO Clinic Participants***

The ICAP Project ECHO evaluation team conducted five focus groups with 30 total participants and I interviewed nine Project ECHO participants. Respondents from the focus groups and the interviews represented 15 out of 24 treatment facilities in Kazakhstan. Appendix



E and Appendix F provide a description of the respondents in the in-depth interviews and focus groups, respectively.

The transcripts of the focus groups and interviews were de-identified, transcribed in Russian and translated into English. The English transcripts were provided to me in Word documents by a professional translation company in Kazakhstan familiar with the translation of public health documents and used by many public health organizations to do written translation. The translations were reviewed by CDC or ICAP staff familiar with the English and Russian terminology and who had participated in the focus groups or interviews to ensure the fidelity of the translation to the spirit of what was said in Russian. Russian and English translated transcripts were provided to me for review and analysis. I also have a working knowledge of Russian, specifically with public health terminology. I was also able to reference the Russian transcripts when there was a confusing translation to better understand the spirit of the quote. Finally, I cross-referenced any confusing quotes with notes I had taken during the interviews.

The focus group questions probed into participants' perspectives on session usefulness and how they selected patient cases to present in an ECHO session, including identification of quality gaps in patient care. Respondents also included self-reported changes in knowledge, competence, and performance (see Appendix D).

The in-depth interviews were conducted to gain insight about how Project ECHO impacted provider performance and patient outcomes as a result of provider participation and to solicit responses regarding providers' opinions and perceptions on the desired outcomes of Levels 1-6 of Moore's Expanded CME Framework. The in-depth interview guide (Appendix C) was developed specifically for this research.

Interviewees were approached to participate based on the following criteria: they had participated in at least 30 out of 38 sessions of their group of Project ECHO and they had presented at least one case. They were then categorized by facility and one was randomly selected from each facility. I included the criteria of having presented at least one case so that I could ask questions about their presenting experience, since that is a major component of Project ECHO. I also wanted perspectives from participants at different facilities to understand the impact of Project ECHO in different settings. Once the participants were identified as meeting the criteria, they were approached by email for participation in the in-depth interview. There were ten participants who met the criteria and all ten agreed to participate. One interviewee was unable to complete the interview due to competing work demands at the time of the interview. The remaining nine participants were able to complete the full interviews. The interviews were scheduled for a time convenient for each provider and were conducted using the Project ECHO virtual platform, Zoom. Before each interview, the interviewee was sent the informed consent form (Appendix C) to explain the purpose and the procedures of the study. Those who agreed to participate provided verbal consent (described in the next section) and completed the interview.

The data collection team for the in-depth interviews was comprised of two interviewers, the CDC Associate Director and the principal investigator (me). The CDC Associate Director conducted the interview in Russian. A professional Russian-English translator provided simultaneous translation for me during each session. The Russian Zoom video session was recorded, transcribed, and translated into English and presented to me in a Word document.

### **Informed Consent**

Informed consent was sought from all participants before the start of the focus group discussions and in-depth interviews. The study participants were advised of the purpose of the

study and received details of the relevant study procedures and of procedures to protect their confidentiality. A copy of the consent form for the in-depth interviews (Appendix D) was sent to the participants via email. Prior to recording, participants were instructed not to use any identifiable patient information. Participants were informed that they could withdraw from participation at any time without giving an explanation. Participants also agreed to have Zoom video session recording during the focus groups and the in-depth interviews. The protocol for conducting the study, as well as the consent form, was approved by the Ethics Committee of the Ministry of Health, Kazakhstan and CDC Associate Director of Science.

## **Data Analysis**

### ***Participant Assessments and Surveys***

I used descriptive statistics to analyze the results of the pre- and post-knowledge assessments and surveys. I compared the mean number of questions answered correctly in the pre- and post-knowledge assessments to analyze the overall increase or decrease of knowledge of the group. I also did a pairwise analysis to analyze the individual increase or decrease of knowledge. To analyze the survey results I compared the mean score from the participants' recall of their baseline status and their post-intervention status.

### ***Focus Groups and Interviews***

Transcripts from the focus groups and in-depth interviews were analyzed using template analysis. This method provides a systematic technique for categorizing qualitative data.<sup>84</sup>

Template analysis was chosen because it allows a priori code to develop initial major themes; in this case the seven levels of desired outcomes in Moore's Expanded CME Framework. Template analysis provides the flexibility to modify codes as themes emerge while applying the major themes to the data.<sup>84</sup>

The transcripts from both the focus groups and in-depth interviews were formatted in Word documents. The data were then grouped under the priori codes and then further grouped into meaningful patterns and/or themes in which the data were labeled for certain words or content. Themes were identified, interpreted, and developed into emergent codes. Under each a priori code there were 2-4 emergent codes that were included as subthemes. A second coder verified the coding of both priori codes and emerging codes for three of the nine interviews. After identifying themes and patterns, the data were organized and displayed according to the desired outcomes of the expanded framework as a narrative in order to facilitate the organization of the results.

#### ***Data Security, Storage and Data Management of All Project ECHO Evaluation Records***

The data collected during the first year of implementation from provider assessments, focus groups, interviews, and surveys were not sensitive enough to cause safety concerns to either patients or providers. The project does not involve the collection of any identifying patient information or personal health information. Therefore, risks regarding data security and breach of confidentiality were minimal.

Appropriate security measures were taken to ensure the security and confidentiality of respondent data. Paper surveys were scanned digitally and stored electronically, separately from de-identified data (i.e., stripped of regional names and personal identifying information) on a secure ICAP network drive. Paper copies of respondent data, including consent forms and responses to verbal questionnaires, were kept in a locked ICAP office, accessible only to Project ECHO evaluation staff. Online survey data were saved on ICAP servers and transferred electronically only after de-identification. Secure logins and password administration were required to access the data.

Data from paper forms entered into a de-identified electronic database resided on password-protected, secure ICAP servers. ICAP shared a copy of all electronic data with me to facilitate analysis of the data. External hard drive back-ups are kept in a locked cabinet in the ICAP office.

All completed screening forms, digital recording, and field notes are kept in a locked cabinet at the ICAP office. All electronic data were saved on password-protected computers. Access to paper forms and electronic files were restricted to study investigators. Paper forms and electronic files will be stored for up to two years after data collection and will then be destroyed.

### ***Potential Risks***

As with all studies involving participant-specific data, there was a slight risk of loss of privacy for study participants. In order to minimize this, all study staff and translators signed a confidentiality agreement.

## CHAPTER 4: RESULTS

The results address the key finding in response to the three aims of this dissertation.

Quantitative results and qualitative results will be presented as they address each aim. A concept table (Table 4) was used to organize the results from the focus groups and the in-depth interviews and outline the priori themes from the Expanded CME Framework and the emerging themes. Quotations used in this section were taken directly from the focus groups and interviews and are attributed anonymously to the person (or organization they represent) in the narrative. To avoid pronouns that would disclose the gender, name of a person, or specific organizational entity, pronouns and personal nouns have been substituted with “s/he”, “they,” “their” or “them” to help ensure anonymity.

**Table 4. Summary of qualitative emerging primary themes based on research aims and Moore’s expanded CME framework.**

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**Aim 1: To examine the attitudes and practices of HIV providers toward participating in Project ECHO**

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**Framework Concept: Satisfaction**

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- |                         |   |
|-------------------------|---|
| <i>Emerging Themes:</i> | <ul style="list-style-type: none"><li>○ Satisfaction with the virtual platform of Project ECHO</li><li>○ Satisfaction with the knowledge gained during Project ECHO</li><li>○ Satisfaction with the community of practice</li><li>○ Challenges with participation</li></ul> |
|-------------------------|---|
- 

**Aim 2: To evaluate changes in participating providers’ self-assessed professional satisfaction, HIV knowledge, and self-efficacy to provide essential components of HIV clinical care**

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**Framework Concept: Knowledge**

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- Emerging Themes:*
- Increased learning of antiretroviral therapy (ART)
  - Increased learning on coinfections, comorbidities, and HIV-related complications
  - Increased knowledge of managing HIV among special populations
  - Diffusion of knowledge
- 

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**Framework Concept: Competence**

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- Emerging Themes*
- Increased competence to apply case-based learning
  - Increased confidence to prescribe ART
- 

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**Aim 3:** To explore the degree to which participants integrated knowledge and skills gained while participating in Project ECHO into their clinical practice to benefit PLHIV patients

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**Framework Concept: Performance**

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- Emerging Themes*
- Applied recommendations and learning
  - Improved analysis and diagnostics
  - Improved prescribing of effective ART regimens
  - Improved ability to manage ART side effects, comorbidities, and HIV-related complications
  - Barriers to applying recommendations and learning
- 

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**Framework Concept: Patient's Health**

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- Emerging Themes*
- General health improvements
  - Adherence to ART and reduced viral load
  - Reduction of comorbidities and coinfections
- 

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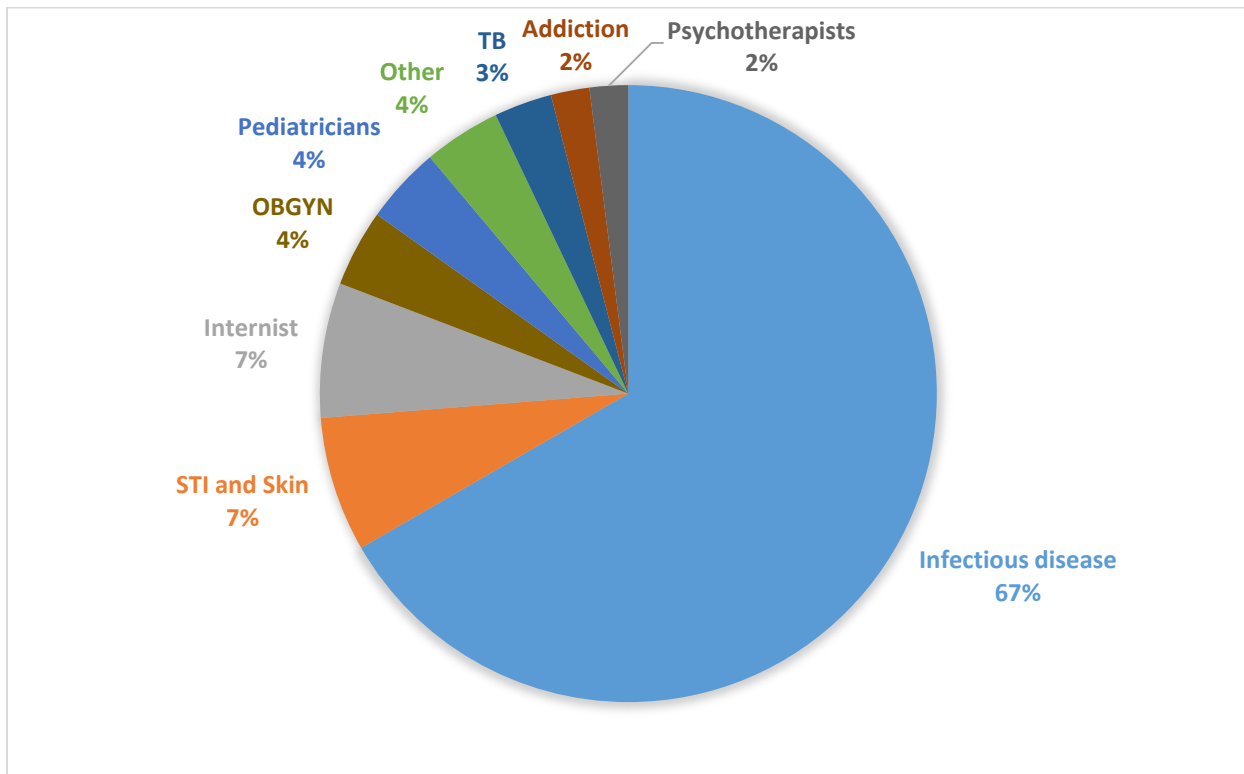
**Aim 1: To examine the attitudes and practices of HIV providers toward participating in Project ECHO**

In order to examine the attitudes and practices of HIV providers toward participating in Project ECHO, I assessed Level 1: Participation and Level 2: Satisfaction in Moore's Expanded CME Framework.

### ***Level 1: Participation Results***

As previously indicated, all 24 treatment facilities participated as spoke sites. All participants were physicians and worked at one of the HIV treatment facility spoke sites. For the pilot of Project ECHO, two groups were formed to include approximately 50 doctors in each group. The two groups conducted separate sessions that were carried out on the same topic on the same day. There were 38 sessions for each group for a total of 76 sessions during the pilot of Project ECHO. Upon completion of Project ECHO, 101 participants attended at least 30 out of 38 sessions and received state recognized certificates on completion of 54 hours of professional development training (KazMUCE). Figure 4 illustrates the breakdown of participants' specialties; the infectious disease specialty had the highest degree of participation.

**Figure 4. Project ECHO participants' specialty (N = 106).**





## ***Level 2: Satisfaction Results***

The respondents expressed positive views and opinions of their participation in Project ECHO. They also shared some challenges with participation.

### ***Satisfaction with the Virtual Platform of Project ECHO***

Respondents stated that they appreciated the format of Project ECHO. Specifically, they appreciated that the sessions were conducted at a convenient time during their work day and there was no travel associated with the training, allowing them to stay with their families. One respondent said, “We did not need to travel anywhere; we all were in one place and it was very convenient to have such a wonderful on-the-job training while staying with your family – kids and husband – and receiving this valuable and useful knowledge that we need.”

Unlike other in-person trainings or seminars, several respondents emphasized, “The fact that we did not have to interfere with people's work in terms of business trips or some kind of long specialization helped us unbelievably. In other words, in the process of work it took an hour a week, but we got this great clinical experience.”

Respondents noted that the virtual platform allowed them to participate in the sessions even when they were away. One respondent said, “What I really liked is that when I was on a business trip I did not miss out [on] anything, since I connected to the sessions via my cell phone.” Along with this, participants were satisfied that Project ECHO is “on-the job training” and “free of charge.”

Participants were very satisfied that Project ECHO also allowed for a virtual sharing of materials and resources. The resources were emailed to participants after the sessions. Many commented that they have developed a mini-library at their clinics with the materials and refer to them often while treating their patients. A respondent described the value of receiving the

materials: “The available records and slides are repeatedly analyzed, there are links to these literature data, and we even have some kind of a mini-library now.” Respondents were positive about having access to the didactic sessions, case presentations, recommendations, and the literature associated with the topics and one respondent mentioned, “These materials are from the latest contemporary sources. We need them in our daily routine work with our patients.”

Others said they share the resources with their colleagues when discussing and treating patients. They also allow providers who are unable to attend the sessions to review the materials presented during the sessions. A respondent pointed out that “these sessions satisfied our needs. We also liked so much that after the session all materials were emailed to us because sometimes there was no sound and we have to make sure that nothing was missed out.”

Another indication of participants’ satisfaction in the project was that providers who did not initially sign up to participate in the pilot phase of Project ECHO began attending the sessions throughout the year. One respondent shared, “I know that even doctors who did not participate in the ‘ECHO’ project came to listen, if they had free time, because this is a very great experience, very big experience. I did not force them; I did not call them. They just came and listened.” One respondent noted that s/he was proud to participate in a new training initiative and said:

“Such training, as we believe in our service, gave us a chance to be a flagship and be trained in the first line unlike other services. This is why we feel proud that representatives of the Medical University, who visited us, were surprised that our service is a beneficiary of such training of which they were unaware. We are proud of our service that we participated in such training system.”

#### *Satisfaction with the Knowledge Gained During Project ECHO*

Respondents shared that they were satisfied with Project ECHO because of the knowledge that they gained throughout the sessions. They were specifically pleased with the

practical knowledge they gained. A respondent specifically mentioned why s/he wanted to participate: “The main purpose for me was to obtain more additional knowledge, because we are usually guided by the protocols or clinical guidelines, which are purely theoretical. Whereas here we received deeper additional knowledge.” Another respondent further mentioned, “All didactic material provided to us, along with the consultations, gave us a full scope of knowledge, it provided us with the answers to our questions, shared experience with us on patient treatment, on diagnostics, patient examination.” They were able to use the knowledge and put it into practice immediately. Also, they mentioned that over the course of several months they were able to get a comprehensive understanding of the complexity of treating PLHIV.

Respondents commented that the topics were interesting, relevant, and useful in their work, which is why they continued to participate in the sessions. Many respondents mentioned that the most interesting topics covered diagnosis and ART schemes. One respondent answered which topics were most helpful by saying, “In terms of diagnosis, in terms of treatment, during selection of drugs, we always had difficulties, and now, thanks to the ‘ECHO’ project we don’t.” Other topics that were of particular interest to respondents were: oncology, maternal and child health, comorbidities, social and psychological challenges among PLHIV, tuberculosis hypertension, and cardiovascular diseases. Several highlighted the complexity of managing PLHIV and one respondent said, “The fact of working in [an] AIDS Center with HIV-infected patients was one of the driving forces, since HIV-medicine is a complicated science that requires constant and continuous training and education. This factor was pushing us to participate in ECHO, as any information on the topic is very useful.”

Along with the didactic sessions, a unique aspect of Project ECHO is the discussion of real patient cases. This was noted among respondents as a very helpful and useful component of

the training program. A respondent described their experience this way: “During an ordinary seminar we have to listen to a presentation or report and maybe have a discussion. Whereas here it was real life, you see, there was a concrete patient whose case the doctors and other specialists discussed. There was a practical live example in every session.”

Some of the respondents noted that they come from other specialties besides infectious disease. These sessions helped broaden their understanding of the treatment of HIV as it relates to their specialty. An OBGYN shared, “As an obstetrician-gynecologist I particularly liked the section during which we were discussing pregnant women, contraception methods...because this topic is closer to me and I was sharing this information with my colleagues, obstetrician-gynecologists.”

Another unique aspect of Project ECHO described by respondents was the live discussion. One respondent shared, “The culture of our discussions also mattered, since I assume we made some treatment mistakes, maybe we had some doubts, but we received recommendations in a very cultured manner.” S/he went on to say, “Initially, of course, we were shy but then we got used that recommendations will be provided and treatment plans will be approved in a very painless, so to speak, way...it is also a very important aspect.” Many respondents noted that they were pleased to obtain knowledge through receiving real-time recommendations on their cases or answers to their questions and perceived them to be very helpful. One administrator added:

“As an administrator, I would like to tell that instructions received on every case really enrich our specialists, you know. There were many cases that we presented and our colleagues and specialists from other regions informally told us that they were not only very interesting for them as specialists but also enriching, since they used in their practice and treatment strategies all these methodological materials and studied cases.”

Respondents also mentioned their satisfaction in Project ECHO's enhancement of their general professional development. One respondent described their experience like this: "With this project, I personally began for instance to think more about some things, because unfortunately the medical activity often requires time for some administrative actions, that's why it's a very big support for us in terms of treatment." One respondent who mentioned working over 20 years with PLHIV mentioned, "Last year [before Project ECHO] I was somewhat more self-confident, I think. Because I rated my level a little lower. After 1.5 years of participating [in Project ECHO], I realized that I do not know much. I do it for myself, and so I actually realized that we do not know very much just yet."

Many respondents also commented that Project ECHO was a means of overall professional development among colleagues, which was a benefit to their clinic. One respondent noted:

"You know, 'ECHO' project helped us incredibly. When the project started, last year, we just had a change in staff. Several new doctors arrived and two doctors were fully trained there, that is from the very beginning to the very end. Our dermatologist has been trained, i.e., she works as a dermatologist and most often she sees patients of her specialty, but we now use her services much more. She specialized in infectious diseases and immediately took 'ECHO' project, in other words, she received her clinical experience in analyzing situations. So now she helps us much more and better and we make use of it."

#### *Satisfaction with the Community of Practice*

The HIV Project ECHO in Kazakhstan provides a platform for HIV providers to interact with a topic expert in HIV every week, with the clinical coordinator, with other experts in other fields related to HIV, and with each other. This community of practice was noted among most respondents as one of the main factors in their satisfaction with Project ECHO.

In every interview and most focus groups, respondents were extremely satisfied with having access to the clinical coordinator, Dr. Zhanna Zeypedenovna Trumuva, on a regular basis. Respondents noted that her facilitation of the sessions and her expertise was a significant

influence on their satisfaction with Project ECHO. Dr. Zhanna also invited many experts to present, facilitate case presentation discussions, and answer questions related to their specialties. As referenced previously, some oblasts in Kazakhstan have limited specialist physicians or specialist professors. Respondents mentioned that being able to interact with top specialists in Kazakhstan was extremely useful and helpful. Specifically, one respondent mentioned, “As for diagnosis, on-line consultations by specialists helped us very much since a specialist does not always come across a HIV-infected patient.” S/he further added, “Without work experience with our patients, it is difficult for us to find a specialist who will be competent namely in the problem of HIV infection.” Another respondent shared how access to specialists was particularly useful: “We learned from others, for example, when others presented their cases, clinical cases, we learned from those, because we do not have professors and consultants. We are far away, in the west.”

Many respondents noted that they benefited from being able to interact with each other during the sessions, as well as with experts and the clinical coordinator. They valued the lessons learned during the case presentations from their colleagues across Kazakhstan, as several respondents noted that they have similar patients. They also valued having a wider network of HIV providers to consult with outside of their proximate clinical team and one respondent shared, “We are so grateful that we can communicate with colleagues in this way, share knowledge, share experiences and discuss. This helps us to reveal some of our own shortcomings and to evaluate our work.”

Several respondents mentioned that they enjoy the interaction because they do not feel so isolated, especially among those who work in a small AIDS Center. One respondent mentioned, “because, in fact, we have only one AIDS center in each region and there are few physicians who

work with HIV infection. This project gave us the opportunity to communicate between each other, analyze serious and unclear patients, clinically serious patients.” However, even those who work in larger AIDS Centers mentioned they enjoyed communicating with other providers across Kazakhstan. One respondent said, “Well, I feel that I am not alone. For example, my problem is not just my problem, I can get consultations, so now I am more confident and daily work has become easier. I can consult, call, analyze or present my case. I can get a professional answer.”

In general, respondents were satisfied with their participation in Project ECHO and during the focus groups respondents continually asked when the next phase of Project ECHO would start again.

### *Challenges with Participation*

Respondents noted two specific challenges with participation in Project ECHO. The program is run solely on virtual technology; therefore, the success of the sessions rises and falls with internet connections and the participants’ ability to use the Zoom technology on their computers. Respondents commented that sometimes the internet would fail, the sound would go out or they were unable to connect for other reasons due to technical issues with their computers and/or electricity. However, most respondents noted that this challenge was not very disruptive and was infrequent.

Another challenge noted by respondents was that because sessions were during work hours there were often patients waiting to be treated. A respondent shared, “I believe that the only obstacle was that all doctors are in the lecture during working hours. Whereas our patients are waiting for us...Patients are left alone unattended.” Sometimes it was difficult to get away from the clinic in order to participate in the sessions. Again, most respondents mentioned that

this was not prohibitive to their participation because they learned how to schedule patients to be treated at a different time or by another provider.

**Aim 2: To evaluate changes in participating providers' self-assessed professional satisfaction, HIV knowledge, and self-efficacy to provide essential components of HIV clinical care**

In order to address Aim 2, I assessed Level 3: Knowledge and Level 4: Competence in Moore's Expanded CME Framework.

***Level 3: Knowledge***

A total of 97 participants completed the pre- and post-knowledge assessments. The mean percentages of correct answers for the pre-and post-knowledge assessment were 62% and 84%, respectively. A pairwise analysis showed that 75% (n=73) of participants increased their score from the pre-knowledge assessment to the post-knowledge assessment (Table 5).

**Table 5. Pre- and post-knowledge assessment score results.**

<b>Participants' Scores</b>	<b>N of Participants</b>	<b>% of Total Participants</b>
Increased*	73	75%
Stayed the Same	12	12%
Decreased **	12	12%
* Average 31%		
** Average 14%		

Overwhelmingly, respondents from the focus groups and in-depth interviews mentioned that they improved their knowledge of managing HIV. Many also noted that through participating they realized they had gaps in their knowledge and that Project ECHO helped them fill those gaps by refreshing their knowledge or presenting new knowledge.



### *Increased Knowledge of Antiretroviral Therapy (ART)*

Respondents were asked to respond to questions about the most valuable knowledge they acquired during the course of Project ECHO. Almost all respondents stated that what they learned about ART was the most valuable. Particularly, one mentioned, “Antiretroviral therapy, as well as treatment, were mostly affected. As to approaches, we began differentiating them, knowing the outcomes and what to be expected from this or that patient, with the effect of this or that medication.” Another respondent added, “You know, the issue of drug interactions I would say [is the most valuable]. Drug interactions are very relevant today as the drugs come with a narrowed safety profile. We try to select an exact drug that is most needed, from the available in stock, for each patient. And from what we may expect.” Also, many respondents appreciated learning how to manage the side effects of current ART regimens in their patients. They also learned about new ART regimens, which are more effective and have reduced side effects, and one respondent said, “We learned a lot about new drugs. I really want to see these drugs, we are really looking forward to having them, because we already have patients who have long-term side effects of therapy.”

### *Increased Learning on Coinfections, Comorbidities, and HIV-Related Complications*

After learning about ART, respondents valued learning about the diagnostics and treatment of coinfections, comorbidities, and HIV-related complications, specifically noncommunicable diseases. One response summarized many respondents in both focus groups and interviews about a particular helpful module: “Almaty region presented and analyzed a case with oncopathology, and according to the law of paired cases, we had a similar case. Therefore, based on their experience, we already had some skills and recommendations that we could use.”

After oncology, respondents mentioned that they valued the knowledge gained about cardiovascular disease, diabetes, and kidney diseases. While respondents mostly valued learning about comorbidities, some respondents mentioned learning about coinfections and particularly noted sessions on TB and herpes, which gave them new and important knowledge.

#### *Increased Knowledge of Managing HIV Among Special Populations*

Respondents also mentioned that they valued the knowledge gained about managing HIV among special populations, particularly pregnant women, children, and the aging population:

“We studied cases with pregnant women and children. For us, for me it was a great experience because previously I was not working with pregnant women and do not know how to consult or treat them. Zhanna Zeipedenovna explained everything: how to deliver a baby, how to check, how to treat, and what laboratory tests should be conducted.” Respondents also mentioned gaining valuable information about managing the drug interactions with methadone and ART.

One respondent mentioned:

“Last year there was a session on addiction medicine, PWID, treatment with methadone, methadone program. This was new for me because we thought we would have a program for the introduction of methadone, but we did not study that one. Exactly then there was a session with a drug abuse therapist..., that's when we completely analyzed the methadone program. That was new for me... What was valuable to me is how to treat ART and what drugs to be used against the background of methadone.”

#### *Diffusion of Knowledge*

Another central topic that was raised during the focus groups and interviews was about the diffusion of knowledge. While I will further detail how respondents applied their knowledge in the section on performance, it is worth mentioning here that many respondents reported that they discussed the knowledge they learned with their colleagues, other providers in clinics, and even, in one case, with epidemiologists. One respondent mentioned how their clinic has used knowledge gained during Project ECHO, saying, “We learned to discuss. For a doctor such an

experience is valuable - to teach how to discuss...doctors learned to report clearly and competently even during discussions among themselves, for instance: ‘There is a patient with such and such values and the problem is so and so. So, what should we do?’” Another respondent mentioned, “I managed to accumulate a lot of experience, heard examples of different clinical cases. I was sharing received knowledge with my colleagues who did not participate in the sessions.” One respondent added an important story of how their ability to share knowledge increased their credibility among their peers:

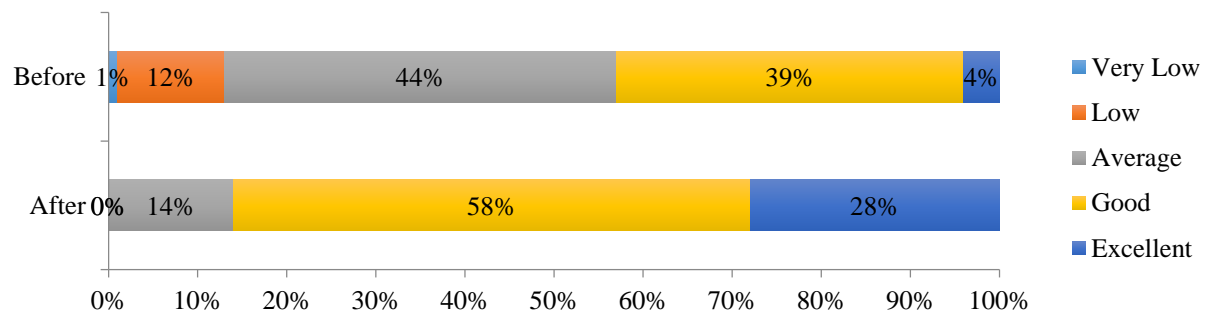
“Right before the day when we were about to go to the medical network, during the session ‘Bloodborne infections,’ Zhanna Zeypedevna gave us the latest recommendations from the latest sources, and we immediately took it on board and went to the medical network with newest recommendations from the very latest sources, and began to teach our healthcare workers how to prevent it. It was right on the point; this session was really necessary. It gave me such a vivid impression that I can still remember how the attitude of epidemiologists changed. They wrote that we began to give new recommendations, as we said: ‘Just yesterday we received the latest data and sources, today we bring these new recommendations to you.’ We need more new knowledge like that. We surely long for it.”

#### ***Level 4: Competence Results***

Results from the self-efficacy survey showed that participants’ confidence in their ability to manage HIV as a result of participation in Project ECHO increased. Of the 101 respondents, 87 (86%) assessed their competence after the project as excellent or good compared to 43 (43%) before the project (Figure 5).

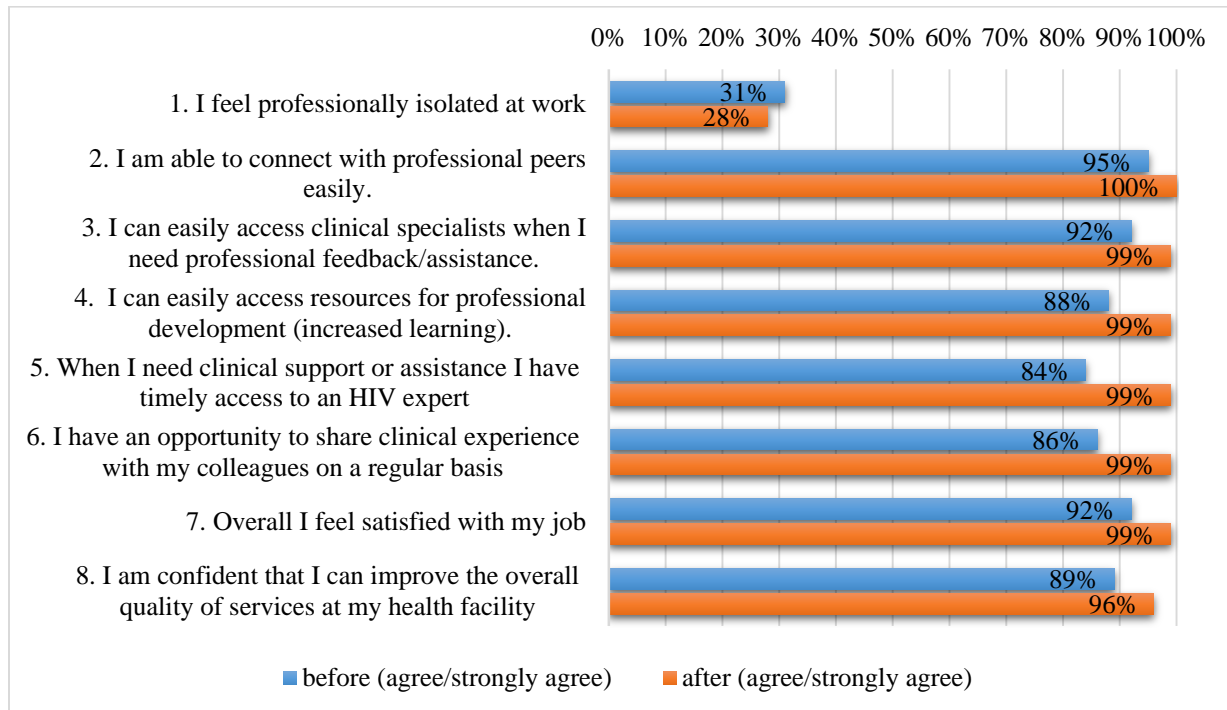
Specifically, the level of participants' self-efficacy increased in relation to HIV counseling and delivery of different services to PLHIV, such as assessment of patient health condition, determination of examination scope, choice of drugs, and use and application of a standard package of health care services for PLHIV of all ages.

**Figure 5. Results of retrospective survey of participants' self-efficacy before and after Project ECHO (N = 101).**



Overall, professional satisfaction, availability of resources for professional development, and opportunities for experience sharing with other specialty health care providers improved (Figure 6). Of 101 respondents, 96 (95%) reported improved professional satisfaction after completing the entire training course. The same percentage (95%) agreed that Project ECHO provided an opportunity to access resources for professional development. Almost two-thirds of the participants (73%) agreed that participation in the project allowed them to reduce their sense of professional isolation and 94% felt that it helped establish closer ties with their colleagues. There was a reduced number of providers, from 31% to 28%, who felt some professional isolation. At the same time, the percentage of providers with knowledge of where to request expert assistance has increased from 84% to 100% (Figure 6).

**Figure 6. Results of retrospective survey of participants' professional satisfaction (N = 101).**



### *Increased Competence to Apply Case-Based Learning*

Respondents noted in the focus groups and in-depth interviews that they themselves became more competent through their participation in Project ECHO and many reported that they noticed their colleagues also became more competent. Descriptions from respondents noted that participants took time after the ECHO sessions to discuss their own patients who were similar cases to the ones they discussed on Project ECHO. Project ECHO is uniquely designed to provide an opportunity for participants to demonstrate their competence through discussions about practical cases in each session. Participants are encouraged to apply their experience and knowledge gained to provide their opinions and advice during the sessions. Many respondents shared how they took this one step further by not only discussing cases during the sessions but also discussing how cases could be applied to their patients after the session was over. One respondent shared, “You know that all our specialists, namely physicians, psychologists,

infectious disease specialists, nurses got together in one room and discussed the case presented during the session from the point of view of its applicability to our patient.” Another respondent added the experience from their treatment facility about how they discussed the knowledge gained during the sessions:

“I was watching two doctors in our session when they were discussing cases, not in the air but between the two of them. They were telling how they were treating a similar patient and suggested to try a different method. I was simply an onlooker and after each session they discussed how to apply learned materials to their patients. They introduced some changes and corrections in the course of their discussion; that is the best evidence of our sessions’ practical value.”

#### *Increased Confidence to Prescribe ART*

Respondents mostly mentioned that they became more competent and confident in prescribing ART. One respondent said, “I can assure you that thanks to the ‘ECHO’ project our doctors became more competent and began to prescribe the treatment scheme more correctly.” Notably, they reported that their increased confidence led to improved patient relationships and trust, especially around prescribing ART. One respondent shared, “When they come to see us or we come to them we see straight away what the side effects are, and they probably see confidence in our eyes, confidence in our words when we say that this is a rash, which is an expected reaction and that this is how it goes. In fact, it feels like we get more trust from patients.”

#### **Aim 3: To explore the degree to which participants have integrated and applied knowledge and skills gained while participating in Project ECHO into their clinical practice to benefit PLHIV patients**

In order to examine Aim 3 I assessed Level 5: Performance and Level 6: Health Outcomes in Moore’s Expanded CME Framework.

## ***Level 5: Performance Results***

### ***Applied Recommendations and Learning***

Most respondents in the focus groups and in-depth interviews noted that they received knowledge from didactic sessions and recommendations from case presentations that they were able to apply in their practice immediately. One of the unique aspects of Project ECHO is that the community of providers participate in discussing patient cases from around Kazakhstan. The idea is that providers will apply the recommendations to their own patients. Notably, many respondents shared that they applied in their own treatment the recommendations from case presentations which were presented from other oblast AIDS Centers. One respondent described the usefulness of case-based learning to change their performance: “In general, clinical case studies were presented by each oblast. I personally received a lot of new knowledge from those cases that I immediately applied to my patients. I either adjusted treatment or corrected diagnostics.”

Respondents also mentioned that they often refer to the resources and materials to guide their treatment for their patients. One respondent explained how they incorporated the resources into their clinical service delivery:

“Well, in general, thanks to ‘ECHO’... we discussed and analyzed many of the issues, and even when there were complicated cases, we recalled: ‘Remember we had it analyzed on “ECHO” and Zhanna Zeypedenovna said this and that.’ As soon as we encountered a similar pathology at the center, with a similar problem, we would open our old presentations, look through them and make right decisions for the patients.”

### ***Improved Analysis and Diagnostics***

Respondents mentioned that, as a result of participating in Project ECHO, they started to implement what they learned by “working step-by-step,” “working more thoroughly and in more detail,” and “thinking about all aspects.” They noted that their level of analysis has increased to include a more holistic approach to screening patients for comorbidities, coinfections, and other

complications. For example, one respondent mentioned, “We even began to take into account the social aspect of his life, you know. Perhaps, before we did not think about the quality of life, the way he will live with this, but then we started to consider details more complex and systematized.”

Along with improved patient screening analysis, respondents shared that they improved their diagnostic abilities, as well. One respondent explained, “Before the treatment scheme is replaced or therapy is started there is a big stage of diagnosis. That is, at first we perform diagnosis, we exclude all the comorbidities, diagnose the comorbidities, and then start the therapy scheme.”

#### *Improved Prescribing of Effective ART Regimens*

Respondents shared specific experiences where they improved their ability to prescribe more effective regimens of ART and manage the side effects of ART. Respondents also discussed how they started prescribing ART more confidently. One respondent said, “Basically, earlier we took patients in therapy with caution as new drugs were coming out and we were administering them with caution, but now we are confidently changing the treatment scheme, selecting treatment schemes more correctly.” They also mentioned that after receiving recommendations they would discuss how those could be incorporated to switch ART regimens for their patients. One respondent specifically recalled how they changed schemes for the patients: “There are many examples when we changed schemes, switched to Truvada plus Aluvia, Kivexa plus Aluvia and similar medication. We switched to Atripla, the newest drug. Now, for 2018, I plan that we will have new drugs, new schemes like Durnovir and Durotagravir. I planned a certain number of people and I think they will use it.”



### *Improved Ability to Manage and Monitor ART Side Effects, Comorbidities, and HIV-Related Complications*

Respondents also mentioned that they improved their ability to manage the side effects of the ART and they changed their treatment regimens based on their understanding and knowledge of the side effects of the ART. One respondent described how they applied knowledge from Project ECHO in clinical practice: “Sometimes it happened before that we administered Truvada and Tenofovir to children. When I learned that Truvada leads to osteoporosis, especially in teenagers, and I personally never knew about it before, it was an important lesson for me. This is why we stopped administering it in pediatric cases.”

Respondents mentioned that they improved their management of comorbidities, coinfections, and other HIV-related complications as a result of applying the knowledge they gained during Project ECHO. One respondent shared, “[There is] this woman with diabetes and kidney pathology. We have adjusted her treatment with respect to comorbidities. We contact her consultant doctors who manage her and this way we correct her treatment of comorbidities, hypertension, and diabetes mellitus.” Another respondent mentioned that they improved their management of patients, saying, “Even the virological and immunological monitoring became better, in my opinion, with the implementation of recommendations concerning this patient.”

One respondent shared how they collaborated with other medical institutions to provide better treatment for HIV related complications: “Since we could run only a blood test at our place and that's it, we started working in tandem with those patients and not just by ourselves, also engaging and involving the medical network. I think that was generally right on our part, we felt more competent.”

Respondents also shared their experiences with improving their relationship with their patients. One respondent described their experience using the information from Project ECHO to enhance prevention of HIV among their patients:

“Do you want to know how we worked earlier? We got brochures regarding preventive measures of diabetes, preventive maintenance of hypertension. To tell you the truth, nobody touched these brochures for years. But starting from last year we have been explaining these brochures to patients, putting it in their hands. We tell them that while using medications they need to monitor their condition, i.e., take prevention measures of atherosclerosis, go see cardiologist, get prescription. We tell them that especially in the presence of HIV infection diabetes may appear or progress. All the knowledge we have we use now, and the brochures do not just lie there anymore.”

### *Barriers to Applying Recommendations and Knowledge*

While respondents shared many experiences of how they were able to translate recommendations into improved service delivery, many also shared the barriers to implementing recommendations. Notably, respondents mentioned that the lack of access to recommended ART or diagnostics were the biggest barriers to changing their approaches to their service delivery. One respondent shared, “We have another patient with pathology, with combined pathology of kidneys, diabetes mellitus, and hypertension. We are trying to correct her scheme, but there is a little problem in replacing the scheme since we do not have a drug. So we are waiting for January to get new drugs and we will switch this patient to a new therapy scheme.”

Some respondents shared that despite their efforts, patients still did not comply with their recommendations or they were still non-adherent to their treatment. One respondent shared their experience with a patient who did not want to get a test: “We presented him in summer, around August, probably. We were given recommendations on the matter, as to dermatovenerology. All in all, we did our best...But he was very hard to [connect] with, he did not want to go see a dermatovenerologist, although he had a positive IFA for syphilis, but he flatly refused to be

examined for syphilis at that time.” Another respondent shared about a non-adherent patient despite their efforts to convince the patient to take her medication:

“Well, I think the results depend on the patient. She is a thoughtful person, but as long as we work with her and manage her, she constantly skips the drugs intake. She's not committed, not at all. We can't get her commitment any way. She says that she is afraid to take medication all the time, even though we work with her husband on commitment as well. We still can't make her absolutely committed to the treatment”

### ***Level 6: Patients' Health***

#### *General Health Improvements*

Many respondents shared how their patients' health improved as a result of implementing the recommendations. Many noted overall that “there were positive changes” and that “they definitely improved.” One respondent summarized many responses by saying, “It improved the quality of their life and the effectiveness of therapy in each and every case.” Another respondent added, “At the moment this patient is on therapy for the second year, her clinical condition is stable, in general everything is fine.” Another respondent shared how patients being able to return to work, “All in all I can say that the patient is safe now... he lives, leads an active way of life, in other words, all this symptomatology has almost stopped. Well, the dynamics are positive. He became a normal adequate person, so to say, and he continues the therapy.”

#### *Adherence to ART and Reduced Viral Load*

A main health outcome that was shared by respondents was improved adherence to ART and the overall reduction of viral load among patients. One respondent noted that more patients were being retained on treatment, “Effectiveness and retained patients were the ultimate goal. We now actually see this picture.” Another respondent described how patients have been stabilized on treatment as a result of the recommendations provided during Project ECHO: “The patient was on Efavirenz and we were recommended Aluvia, a protease inhibitor. We switched her to a new scheme and the woman feels very well, the tolerance is good, there are no side

effects...I had to take personal risk each time when I administered Abacavir. Everything went fine and children started recovering.” Another respondent shared that they saw an increased CD4 count and undetectable viral load: “And as of today the CD count increased up to 450. The viral load is not detectable any more. Hence we may say that the patient's condition is quite satisfactory.”

### *Reduction of Comorbidities and Coinfections*

A few respondents recalled how the recommendations given to them during Project ECHO helped them to manage comorbidities and coinfections. They were able to see the improved health outcomes in their patients as a result. One respondent said, “The most important is an example of pneumocystis pneumonia and then toxoplasmosis that we encountered for the first time. Our patients were in the hospital, in our central hospital, during their cases presentation. We followed expert recommendations based on presented data and achieved a very good result. The patients significantly improved. They continue their therapy and show a good dynamic.”

Level 7 in Moore’s Expanded Framework is community health, defined as the degree to which health status of community of patients changes because of practice behavior of CME participants. While this research did not specifically probe for responses or inputs into Level 7 of the Framework, there were two outstanding stories from respondents on how participation in Project ECHO improved overall health in their clinic. A respondent from a rural clinic in western Kazakhstan, where there are limited resources, mentioned that there were no deaths this year as compared with four last year:

“In comparison with last year, we have no mortality this year, no one has died from HIV infection. We think that the ‘ECHO’ project helps us, that we treat correctly and choose the right drugs. We did not have mortality caused by AIDS [last year], but, for example, patient died of cirrhosis, there was mortality due to tuberculosis and there was one

suicide. Overall, I would not say that we had no mortality on the background of HIV infection. This year there is no mortality at all, no serious patients. On the background of ART therapy, I think we can continue to treat.”

Another respondent noted how their community of PLHIV has benefited from Project

ECHO as the overall patients on ART increased significantly over the course of the year:

“Basically, earlier we took patients in therapy with caution as new drugs were coming out and we were administering them with caution, but now we are confidently changing the treatment scheme, selecting treatment schemes more correctly. Even our director noticed that earlier we did not have more than 500 patients under therapy while having over 1,000 patients in total. Around 1,000 patients out of them needed therapy, but we still were cautious. But there also was a little viral load which could wait as it was low. So, we put it on hold. Now, on the other hand, we are confident. We know that therapy improves the quality of life, it has already been proven. Wherever we go in the medical networks, wherever we speak, everywhere we say that therapy is prescribed as preventive care. So, we put it all into practice, we see that this gives a good effect. Surely now we have about 800 patients on therapy.”

## **CHAPTER 5: DISCUSSION**

The HIV epidemic continues to rise in Kazakhstan while treatment coverage for PLHIV remains low. In 2017, the MOH in Kazakhstan approved new clinical guidelines based on WHO recommendations, which included a new treatment protocol to treat all PLHIV with ART. Many of the providers were trained in an era where ART was prescribed when the CD4 count of a patient fell below 350. The concept of starting treatment for all PLHIV despite the CD4 count is new for many providers. Therefore, there is a need to build capacity among providers at the treatment facilities in order to scale up treatment across the country. Given the resource constraints and the vast geographical distance between facilities, a Project ECHO pilot was introduced in 2016 in Kazakhstan. The objective of the pilot was to virtually connect a large number of providers in a community of practice to provide accessible, low-cost, quality training and mentoring in HIV care and treatment. The Project ECHO model not only allows for dissemination of the new treatment guidelines but also encourages practical implementation of the new guidelines which is reinforced in every session throughout the year. The aims of the research seek to generate an understanding of the relationship of implementing Project ECHO and the overall impact on capacity-building among HIV providers in Kazakhstan.

The published literature on Project ECHO has highlighted its implementation mostly in developed or resource-rich areas. Additionally, there is only one published article specifically evaluating the implementation of an HIV Project ECHO. This research in this dissertation contributes to the literature by exploring the results of the implementation of Project ECHO as a continuing medical education model in a resource-limited setting, specifically addressing HIV.

For each aim of the research I used Moore's Expanded CME Evaluation Framework to examine different levels of desired outcomes of continuing medical education.

The results demonstrated that there was an extraordinary 97% participation rate during the pilot. In Kazakhstan providers are required to acquire CME credits annually in order to continue practicing. Traditionally, providers have had to travel to another city to receive training, taking them away from their patients. Also, this often includes a cost to either the provider or the treatment facility. The Ministry of Education accredited the curriculum for Project ECHO and designed the pilot so that participants would receive their annual CME credits at the end of the pilot if they participated in 90% of the sessions throughout the nine-month period of time. Project ECHO is free of charge for participants and for the treatment facility. This aspect was reported as a great incentive both from the providers and the administrators of the treatment facilities, which possibly contributed to the high level of participation.

Respondents also perceived that participation in Project ECHO positively influenced their service delivery and their patients. Similar to previously published studies which described participants' satisfaction with having access to expert advice and recommendations during Project ECHO, the respondents in Kazakhstan described their positive experiences with receiving expert advice from the clinical coordinator and from guest experts and specialists. This research highlighted that a critical component of participant satisfaction with ECHO and motivation for continuing to participate was the facilitation from the clinical coordinator. Many respondents mentioned how much they respected and valued Dr. Zhanna's contribution to ECHO. Other studies have also shown that a key factor of success or failure of a Project ECHO clinic is the clinical coordinator's ability to facilitate the sessions. It is unclear if the participants would have been so positive and satisfied with their experience in Project ECHO in Kazakhstan

under the facilitation of another clinical coordinator. Therefore, it will be important for Dr. Zhanna to train other facilitators to maintain successful implementation of Project ECHO.

The model of Project ECHO allows for a community of practice to form, which is discussed throughout the literature as an important component. Along with having access to experts and the clinical coordinator, the participants from Kazakhstan also valued the knowledge gained through connections with their peers. They specifically mentioned that they were comforted to know that others across the country were facing similar challenges and they enjoyed the real-time discussions to address common issues.

Similar to other studies, this research evaluated changes in knowledge, self-efficacy, and professional satisfaction through assessments and surveys and found similar increases among participants. However, unlike most studies, this research sought to further understand participants' opinions and perceptions in these three areas by conducting interviews and focus groups. This resulted in a deeper understanding of the knowledge that the participants found valuable and to what degree they felt confident to implement the knowledge. Notably, the prominent responses from respondents were about their increase in knowledge about ART schemes and their increased confidence in prescribing ART to all of their PLHIV patients. A main objective for starting Project ECHO was to disseminate best practices for the treatment of HIV. This research suggests that the implementation of Project ECHO resulted in increased knowledge, self-efficacy, and professional satisfaction among participants.

In the literature, changes in provider performance have been studied mostly by conducting self-reported surveys among providers or reviewing patient charts for indications that providers have changed service delivery. Also, changes in patient outcomes as a result of their providers participating in Project ECHO have been studied through reviewing patient-level data.



This research sought to explore how providers in Kazakhstan perceived their own ability to implement knowledge and how it changed their patients' outcomes. Providers in the study, despite some limitations with implementing the recommendations, reported that they made changes in their overall service delivery, suggesting that the knowledge gained was being applied not just to cases that were presented and discussed, but across their clinic. Providers mentioned that they improved their problem solving and analytical skills during Project ECHO by expanding their knowledge base. It is critical for physicians to be able to provide the best care possible, even in places that lack diagnostics and have limited ART. Providers report seeing improved patient outcomes, specifically reduced viral loads, and reduced complications due to coinfections, comorbidities, and side effects of ART. This suggests that the Project ECHO model in Kazakhstan can be effective in impacting patient health. The results of this portion of the research can be used as formative research to inform a broader patient-level study in Kazakhstan to fully capture the changes in patient outcomes.

While this research did not intend to explore the impact on community health, it was important to capture a few respondents' accounts about the overall health outcomes at their clinic and the potential that Project ECHO has to impact the HIV epidemic in Kazakhstan. With the country's goal to increase the number of patients on ART in a short amount of time, it was encouraging to hear that one treatment facility had increased the number of patients on ART from less than 500 to 800 (out of 1,000 eligible patients) in one year. This increase was a result of the provider gaining confidence through Project ECHO. This demonstrates that treatment facilities potentially can absorb an increase in patients if continually encouraged through Project ECHO. However, there were also respondents who mentioned that some of the recommendations were not applicable because their clinic did not have the access to ART, tests or the diagnostics

recommended by the experts. As new ART become available in treatment facilities currently limited by the ART stock, it will be important to monitor whether the participants are willing and able to prescribe the ART to more patients.

In conclusion, the evaluation of implementing Project ECHO through the Expanded CME Framework showed positive outcomes in Kazakhstan. Further research reviewing patient and community health data could contribute to determining the impact on health outcomes among individual patients and the impact on controlling the HIV epidemic in Kazakhstan.

### **Limitations**

The current study describes the results of an initial pilot of the HIV Project ECHO. The data presented in this research fulfil the purpose of addressing the aims of this dissertation. Yet the results should be evaluated in light of a few important limitations.

One limitation is the use of self-reported data. Providing negative information may present a clinic or a provider's ability in an unfavorable light, leading the respondents to over-represent successful accounts of their experience with Project ECHO. Thus, social desirability bias should be considered in the responses in the focus groups and interviews. Furthermore, the surveys for self-efficacy and professional satisfaction were measured at the end of the pilot. Questions asked about past events or perceptions are subject to recall biased and should be regarded with less confidence.

Another limitation is the possibility that other trainings or programs influenced providers' increase in knowledge and self-efficacy throughout the course of the nine-month pilot. Specifically, PEPFAR and the Global Fund provide funding for on-site HIV care and treatment trainings in four treatment facilities. The Republican AIDS Center holds one or two off-site trainings or conferences for providers in Almaty each year. While not all providers attend,

usually a representative from many of the treatment facilities attends. Therefore, it was important to solicit opinions and perceptions from participants about how they gained and applied knowledge from Project ECHO to better understand the relationship between increased knowledge and self-efficacy and the role that Project ECHO played in this desired outcome.

Another limitation of this research is the lack of a direct measure of practice or patient outcomes. Additionally, patient-level data was not collected and therefore provider performance and health outcomes are self-reported by participants. Most previous studies evaluating provider performance and health outcomes as a result of participation in Project ECHO reviewed patient-level data from charts or from insurance claims. Measuring definite changes of service delivery and patient outcomes should include direct review of patient charts, which was beyond the scope of this project. However, the studies which reviewed patient-level data did so only after several years of implementing Project ECHO. For example, at UNM Dr. Arora started Project ECHO for Hepatitis C in 2003. It was not until 2011 that he published the first patient outcomes research. Since the HIV Project ECHO in Kazakhstan has only been implemented in its pilot phase, it was determined that qualitative, formative research could uncover changing trends in provider performance and health outcomes. This information will guide further research to review patient-level data to determine Project ECHO's impact on health outcomes of PLHIV patients.

The scope of this research did not include a cost-effectiveness analysis. Certainly, cost is a critical component for an institution or other entity to consider before starting Project ECHO. The main cost associated with initial set-up of ECHO was purchasing equipment and securing a reliable internet connection for the treatment facilities. Once the sites had the technology established, the running costs of Project ECHO were limited to the cost of remunerating the ECHO session administrator and clinical coordinator. A cost-effectiveness study by Thilo Rattay

in 2017 found that Project ECHO is a “cost effective way to find and treat patients with HCV infection at scale using existing primary care providers but the high budgetary costs suggest that incremental rollout of ECHO may be best.” A cost analysis in a resource limited setting would contribute to the advocacy of replicating Project ECHO for other diseases or conditions in Kazakhstan.

Finally, given my role as part of the team that helped implement Project ECHO as a pilot, and now as a researcher, I am a participant observer. While this perspective may lead to some level of bias, the use of quantitative and qualitative data sought to evaluate the research aims using different methodology so as to minimize this bias.

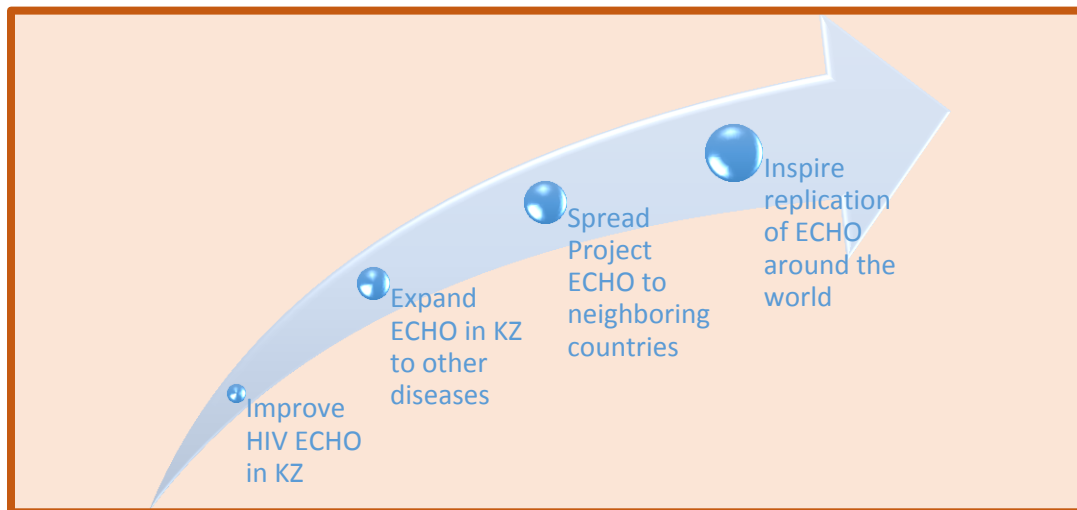
## **CHAPTER 6: PLAN FOR CHANGE**

The primary intended product of this research is to evaluate the relationship between Project ECHO and capacity-building among clinicians for providing high-quality PLHIV care in Kazakhstan. The findings from the research suggest that the platform of Project ECHO is an accepted and feasible model of continuing medical education for HIV treatment and has the great potential to be an effective model for continuing medical education to reach healthcare workers with best practices and the most current medical guidelines for improved patient outcomes for other diseases or conditions.

The goal at UNM is for Project ECHO to touch the lives of one billion people by 2025. In keeping with the themes and values of ECHO, the purpose of this Plan for Change is to influence the quality and reach of Project ECHO in Kazakhstan and to provide recommendations to the ECHO Institute on providing enhanced support to partners in developing countries desiring to replicate the project.

The Plan for Change follows four recommendations, outlined in Figure 7, to implement Project ECHO as a platform for continuing medical education.

**Figure 7. Plan for change four-part recommendation.**



### **Ministry of Health in Kazakhstan**

Due to the expanse of Kazakhstan and the limited training options for healthcare workers, the MOH should maximize the current excellent technology infrastructure and readiness of the nation to reform CME to train and mentor healthcare workers using the ECHO platform.

Project ECHO has momentum in Kazakhstan to continue and the findings from this research can inspire the implementation of three recommendations. Table 6 outlines the recommendations and the suggested actions to be taken for each recommendation by KazMUCE, Ministry of Health, and the Principal Investigator (PI) of this research (me).

**Table 6. Plan for change recommendations for Kazakhstan.**

<b>Recommendation</b>	<b>KazMUCE</b>	<b>Ministry of Health</b>	<b>Principal Investigator</b>
1. Improve the quality of the HIV Project ECHO in Kazakhstan	Collaborate with PI and other stakeholders to incorporate suggested improvements into HIV Project ECHO	Support KazMUCE to address the areas of improvement and continue to provide support to address barriers to the implementation of recommendations, such as a shortage of diagnostic tests and ART availability	Provide a briefer to KazMUCE on gaps and challenges identified during the research, specifically for HIV Project ECHO
2. Develop a vision and implementation plan for incorporating Project ECHO into the continuing medical education for other diseases/ conditions	Lead the effort with stakeholders to develop an ECHO Center to host more ECHO clinics and incorporate into appropriate CME models	Identify disease/conditions where providers have gaps in knowledge and training and identify national funding to sustain an ECHO Center	Provide suggestions in a briefer to KazMUCE on the key components of a successful ECHO implementation based on the findings from this research to incorporate into building the Center
3 Lead and inspire other neighboring post-Soviet countries to adopt Project ECHO into their continuing medical education	Present Project ECHO at regional conferences, publish results of Project ECHO in Russian journals, develop a network among institutes to share experiences of implementing Project ECHO	Support and promote KazMUCE efforts to share experiences with sister institutes across the region	Assist KazMUCE to develop briefers, publications, and other advocacy tools for spreading the results of Project ECHO in Kazakhstan

## **Recommendation 1: Quality Improvement for Continuing the HIV Project ECHO**

The Quality Improvement model of “Plan, Do, Study, Act” outlines a framework for increasing the effectiveness for projects and programs. We have completed the first three steps and now it is time to “act.” The HIV Project ECHO in Kazakhstan evaluation results show that Project ECHO improved the performance of HIV providers and ultimately improved patient outcomes. However, there were findings discovered during the research which could be addressed to improve the implementation. The PI will provide the findings to KazMUCE in a report.

One of the challenges that providers face is the lack of retention among patients. While respondents reported improved retention due to patients being on better regimens and managing side effects, only one respondent mentioned learning about the psychosocial support or mental health for patients struggling with adherence. HIV Project ECHO leaders should consider including psychosocial support as a major topic for future ECHO sessions and including a psychologist in each session.

One of the main reported reasons for providers joining Project ECHO was the facilitation and access to the clinical coordinator. UNM stresses the importance of having a good facilitator and expert for a clinical coordinator. The leaders of Project ECHO should consider training other clinical coordinators to take on facilitation role so that the project will continue to be impactful if the current clinical coordinator leaves the project.

The evidence generated from this evaluation contributes important information policy makers need in order to consider including Project ECHO in health education reform and health training budgets. The HIV Project ECHO should be sustained by the national training budget by 2019, as funding from PEPFAR is planned to reduce. Further research on cost, cost-



effectiveness, and quantitative health outcomes would provide additional support for the advocacy of Project ECHO in Kazakhstan.

## **Recommendation 2: Develop a Vision and Implementation Plan for Incorporating Project ECHO into the CME for Other Diseases/Conditions**

The government of Kazakhstan is undergoing a seven-sector reform, including health reform. The window of opportunity is open to explore innovative solutions to the nation's challenges. Since the HIV Project ECHO has been found to be an effective model for CME in Kazakhstan, the MOH should support KazMUCE to expand the model to include other disease categories.

One of the main concerns in Kazakhstan is the growth of chronic, non-infectious illnesses and thus the increased need for capacity-building among clinicians to manage the care of patients with these illnesses. Another concern is that as the MOH discusses plans to decentralize specialized services there will be a growing need to train and mentor primary care physicians. There are common barriers to care, including treating complex and chronic diseases, shortage of healthcare providers, and/or a lack of knowledge among the providers. One of the most unique aspects of Project ECHO is the ability to involve large numbers of healthcare workers in many different settings across large distances.

KazMUCE is an entity of the MOH that can provide post-graduate training to healthcare workers in Kazakhstan. In the first year of implementation the informal feedback from participants, experts, and the clinical coordinator spurred the rector of the institute to consider spreading the model to five priority diseases/conditions in Kazakhstan. The rector at KazMUCE, Dr. Rauchan, has been a champion of Project ECHO from the beginning. In May 2017, a team from Kazakhstan including Dr. Raushan, Dr. Zhanna, and two CDC representatives (of which I

was one) went to the ECHO Institute to gain further understanding about creating an ECHO center in Kazakhstan. In the following months, KazMUCE prepared a university-to-university partnership agreement with UNM to continue collaborating on the development of an ECHO center in Kazakhstan.

During the planning phase, it will be important ensure that the policies and financial and human resources are in place to sustain the implementation of institutionalizing Project ECHO in Kazakhstan and that it is considered part of the culture of continuing medical education. As mentioned previously, a cost analysis of start-up costs as well as sustainability costs will provide important information for the implementation of Project ECHO. KazMUCE can generate these cost reports and possibly work with their faculty to generate a cost analysis within the current context of CME in Kazakhstan.

The MOH should empower the rector of KazMUCE to work with stakeholders to build a working group in order to develop a plan for implementing Project ECHO as a platform for continuing medical education for other diseases. This can include representatives and top decision makers from the TB institute, chronic care, epidemiology, hospital sector, etc. There is the possibility of developing an ECHO Center to host several ECHO clinics much like the model used at UNM or University of Washington. In this model, KazMUCE would guide departments and/or other institutes through a needs assessment and mapping of existing resources to start Project ECHOs for different diseases or conditions. The PI will provide the results of the evaluation regarding the facilitators and factors of successful implementation to decision makers within the MOH and working group. Some of the key factors for successful implementation are: recruiting a dynamic and knowledgeable clinical coordinator, including experts/specialists, developing relevant and interesting curriculum, designing the ECHO sessions to encourage

physicians to participate in a community of practice around case-based learning, and building a library of resources. This will be in the format of a report/briefer or a working group meeting during summer 2018. It will include feedback and suggestions from stakeholders over the course of spring 2018.

The working group can use their own networks to recruit and inspire participants, experts, and clinical coordinators to join a Project ECHO. They also can develop a plan to advocate for resources to the MOH, Ministry of Education and Ministry of Finance. The participants of the working group have the unique perspective to identify obstacles preventing the start-up of Project ECHO, especially if they interfere with changing models for continuing medical education. Some of the siloed disease sectors may need to allow some flexibility to become part of the ECHO Center at KazMUCE.

The development of the ECHO Center could be a short-term win, as well as launching a few more Project ECHOs within the first two years. These successes could further motivate the MOH to provide support for Project ECHO and include the model in reforming post-graduate medical education. Continuing to expand Project ECHO to build the capacity of healthcare workers around many different disease and conditions could lead to the further development of using the platform for responding to outbreaks or other emergencies.

### **Recommendation 3: Lead and Inspire Other Neighboring Post-Soviet Countries to Adopt Project ECHO Into Their Continuing Medical Education**

The countries in Central Asia often look to Kazakhstan to lead progress in many sectors, including health. There is a window of opportunity for Kazakhstan to inspire and share their HIV Project ECHO experiences with neighboring post-Soviet countries that have similar health structures, language, and HIV epidemics, including Russia and Ukraine. According to the

UNAIDS 2016 Gap Report, Eastern Europe and Central Asia is the only region in the world where HIV is continuing to rise rapidly.<sup>1</sup> Infections in Russia account for more than 80% of the new infections in the region and those in the Ukraine account for about 10% of new infections.<sup>1</sup>

Post-Soviet countries face similar health system and human resource capacity constraints since they originated from the same system. Both Russia and Ukraine have the challenge of vast land mass with limited capacity to address the growing epidemic of HIV and treatment needs. The evidence generated by this research can demonstrate the success in reaching large numbers of providers with quality training and mentoring within a post-Soviet system. The lessons learned in Kazakhstan should inspire the implementation in these countries where the governments have more resources to employ innovative models and have the IT infrastructure Project ECHO requires.

Additionally, other post-Soviet countries, such as neighboring Uzbekistan, would have the infrastructure to support Project ECHO. They have a centralized system that supports the post-graduate school in providing continuing medical education where a hub could be located. They also have an extreme suspicion of trainings that are not fully vetted by the MOH and often the President's office. Constantly gaining approval to conduct trainings becomes laborious; however, over a virtual platform the MOH can easily monitor the trainings while continuing to train and mentor large groups of healthcare workers.

Project ECHO leaders in Kazakhstan can share or present their experiences during regional meetings and conferences as well as publish their results in Russian language journals and demonstrate the feasibility and utility of Project ECHO in a post-Soviet healthcare setting. The PI will assist KazMUCE with the content needed to demonstrate the successes of Project ECHO in Kazakhstan so they can submit abstracts to regional conferences, develop

presentations, and potentially publish in Russian journals. The PI also will encourage the networking of institutes around Central Asia to collaborate with the KazMUCE on the implementation of Project ECHO in different countries.

### **ECHO Institute at University of New Mexico**

The ECHO Institute has physically hosted thousands of organizations from across the US and the world to help them replicate Project ECHO in their respective locations. The results of this research show that Project ECHO can be an effective CME platform in resource-limited countries. It highlights the factors that contribute to participant satisfaction and why they participate. It also highlights the benefits for patients. Using the findings from this and other research, the ECHO Institute at UNM can consider focusing targeted investments in inspiring the replication of this type of CME model around the world. The ECHO Institute has applied for a \$50 million grant from a consortium of donors, including Gates Foundation, to provide support for current or future ECHO partners in low and middle countries. This funding would allow ECHO Institute to develop a plan for further sharing the model of Project ECHO around the world. The benefit of this grant would be that the ECHO Institute would focus the funding on building strong partnerships and building the capacity at universities, institutes or other entities to deliver high quality CME within the national disease priorities. Therefore, countries would be able to decide which diseases or conditions to focus on and it would not be prescriptive by the donor or UNM. Table 7 summarizes the recommendation for the ECHO Institute and the suggested actions to be taken by the ECHO Institute and the PI in implementation.

**Table 7. Plan for change recommendations for ECHO Institute.**

<b>Recommendation</b>	<b>ECHO Institute</b>	<b>Principal Investigator</b>
4. Inspire replication around the world	Develop Global Technical Assistance Unit to enhance the reach to partner with universities and institutes around the world and to international donors and NGOs	Provide the ECHO Institute with results from the research and prepare a draft plan for partnering with international entities

#### **Recommendation 4: Inspire Replication Around the World**

In a 2017 article, Dr. Arora outlined how Project ECHO has evolved over the last 15 years as a continuing medical education model: “An important next step for ECHO is to adapt to the changing cultures, norms, languages, and disease patterns, and socioeconomic conditions that exist around the world. The explosive demand for ECHO replication has created an imperative to best use resources and technology to provide adequate technical assistance.”<sup>40</sup> Another leader at UNM said, “Virtual communities of practice like Project ECHO facilitate use of scarce health-care resources to promote continual learning and collaboration, breaking the distance barrier that blocks timely access to medical and public health knowledge and expertise in many parts of the world. As characterized within the Sustainable Development Goals, the magnitude and complexity of efforts to reduce preventable morbidity and mortality require continued focus on adapting innovative strategies for learning collaboration and telementoring to new settings and new challenges. To achieve healthy lives and wellbeing for all, the right knowledge must get to the right place at the right time for those who need it most.”<sup>6</sup>

One of the challenges with starting new initiatives is the limitation on financial resources. The UNM team has been steadfast in spreading the ECHO movement free of charge but they have not moved into providing their own funds as a donor to start Project ECHOs around the US or the world. In the US organizations typically receive funding from grants or their own

universities to fund Project ECHO. Around the world Project ECHO has begun being adopted by universities and institutes with their own resources, such as in the United Kingdom, Argentina, India, and Canada. Developing countries continue to rely on donors from resource-rich countries such as the US and countries in Europe to assist them with human and financial resources to respond to specific diseases and sometimes support their health system. For example, Project ECHO in Kazakhstan was supported by PEPFAR funds. Donors often support capacity-building and training efforts at universities and institutes in developing countries as a way of building the infrastructure of the health system.

The ECHO Institute could consider forming a Global Unit at the Institute with additional staffing to reach more global partners. The Global Unit can develop strategies for achieving successful Project ECHOs based on the emerging research and best practices from teams who have already implemented ECHO in developing countries with complex and/or limited health systems. The PI has an established relationship with the senior leadership at the ECHO Institute and will provide initial research findings and recommendations to the team and offer to continue to collaborate on developing a Global Unit.

The Global Unit can focus on diversifying their reach by collaborating with two specific audiences: 1) national institutes and universities in developed countries, which focus on CME and 2) donors working in resource-limited countries, which focus on workforce development and capacity-building. Currently, the ECHO Institute invites groups who are prepared to implement a specific Project ECHO to UNM for training in implementation. The Global Unit can build the capacity of ECHO Superhubs in locations around the world. These Superhubs are designed to provide replication trainings similar to the ECHO Institute. Providing more proximate training

and more language options could motivate additional universities and institutes to join and consider replication in their location.

The Global Unit also can plan for a one- or two-year intensive move toward forming overarching partnerships with major donor organizations such as CDC, USAID, HRSA, WHO, UNICEF, Gates Foundation, Clinton Foundation, Global Fund, Aus AID, and other international non-government organizations or non-profit organizations who are interested in capacity-building. This could include hosting conferences or meetings where donors and implementing partners can come to UNM to understand how to contribute and initiate the ECHO movement in the context where they work. The ECHO Institute can communicate the feasibility and the acceptability of implementation in different contexts in order to set the organizations up for success. Representatives from those organizations would look for opportunities to implement Project ECHO and also be part of a collaborative movement toward building capacity around the world. This collaboration would seek to maximize resources among organizations and allow coordination and innovation. The Global Unit also should look for opportunities to present at international development and humanitarian conferences around the world. Additionally, they can target specific donors by having one-on-one meetings with influential decision makers within the donor organization.

Through many venues, the UNM Global Unit can assist the donor organizations to identify potential barriers and anticipate working within different health structures. They can promote networking by partnering new organizations with those that have already implemented Project ECHO to share experiences and motivate collaboration. They also can assist organizations with materials and messages to help advocate with decision makers in the different countries.



The Global Unit can highlight short-term wins that would continue to inspire organizations to move forward with the implementation of Project ECHO. These wins might include highlighting more global partnerships and/or assisting with dissemination of preliminary participation data around the world, as iECHO would allow for the consolidation of this type of data. They also can facilitate and partner with organizations to publish evaluation results to contribute to the international literature. Additionally, they could highlight innovative approaches in adapting Project ECHO to respond to disease outbreaks that cross borders and humanitarian health needs in fragile states. As an example, the United States Department of Health and Human Services adapted Project ECHO to build physician networks and utilize the multidirectional information exchange as part of the Zika response in 2016 and 2017. In an epidemic of a relatively rare disease that crosses international borders, Project ECHO allows for information and knowledge sharing to be disseminated immediately. The multidirectional information exchange is important, as it encourages generation of new knowledge and providers to share their observations and experiences with one another. The sessions also can serve to collect real-time data on emerging trends.<sup>77</sup>

As Project ECHO engages with implementation around the world through existing mechanisms at national universities and donor organizations, they will be able to expand their reach while maintaining the intention and values of the ECHO Institute.

### **Limitations and Barriers**

Any replication of Project ECHO is reliant on good technology infrastructure, which could be a main barrier against its implementation in developing countries. Also, Project ECHO does not address all capacity-building and workforce development needs. It is one tool or model that can be used as part of a comprehensive workforce development plan to mentor and train

healthcare workers. It also cannot be used in every situation, especially where there is limited access to medicines, diagnostic tests or other supplies needed to address a disease or condition. Furthermore, the implementation will require organizations to collaborate and siloed or traditional approaches to continuing medical education will need to be open to being paired with this nontraditional approach.

## **Conclusion**

In conclusion, this ambitious proposal of recommendations seeks to integrate the results of the dissertation research into an action plan. The desired result of implementing this plan would be for Project ECHO to play a critical role in building capacity among healthcare workers to control the HIV epidemic, especially in Kazakhstan and other post-Soviet countries where the epidemic is on the rise. This plan could also contribute to Dr. Arora's vision of touching one billion lives with the hope that public health around the world will improve as healthcare workers are trained and mentored.

## APPENDIX A: HIV TREATMENT FACILITIES IDENTIFIED FOR PROJECT ECHO

COUNTRY	Facility
Kazakhstan	1. East-Kazakhstan Oblast AIDS Center
Kazakhstan	2. Semey City AIDS Center
Kazakhstan	3. Pavlodar Oblast AIDS Center
Kazakhstan	4. Branch of Pavlodar Oblast AIDS Center in Aksu
Kazakhstan	5. Branch of Pavlodar Oblast AIDS Center in Ekibastuz
Kazakhstan	6. Astana City AIDS Center
Kazakhstan	7. Karaganda Oblast AIDS Center
Kazakhstan	8. Branch of Karaganda Oblast AIDS Center in Temirtau
Kazakhstan	9. Branch of Karaganda Oblast AIDS Center in Zhezkazgan
Kazakhstan	10. Branch of Karaganda Oblast AIDS Center in Balkhash
Kazakhstan	11. North-Kazakhstan Oblast AIDS Center
Kazakhstan	12. Almaty Oblast AIDS Center
Kazakhstan	13. Branch in Taldykorgan
Kazakhstan	14. Almaty City AIDS Center
Kazakhstan	15. Mangistau Oblast AIDS Center
Kazakhstan	16. Atyrau Oblast AIDS Center
Kazakhstan	17. South-Kazakhstan Oblast AIDS Center
Kazakhstan	18. Kostanay Oblast AIDS Center
Kazakhstan	19. Akmola Oblast AIDS Center
Kazakhstan	20. Aktobe Oblast AIDS Center
Kazakhstan	21. West-Kazakhstan Oblast AIDS Center
Kazakhstan	22. Zhambyl Oblast AIDS Center
Kazakhstan	23. Kyzylorda Oblast AIDS Center
Kazakhstan	24. Mother and Child Center in Shymkent

## APPENDIX B: INTERVIEW GUIDE FOR IN-DEPTH INTERVIEW

<b><i>Date</i></b>	/__//__//__//__//__//__(dd/mm/yy)
<b><i>Interviewer initials</i></b>	
<b><i>Start Time</i></b>	/__//__/: __//__(hour/min)
<b><i>End Time</i></b>	/__//__/: __//__(hour/min)

**Ask all questions.** If the participant has addressed a question spontaneously before it is asked, the question should be prefaced with reference to the earlier discussion. Questions may be rephrased to facilitate the flow of conversation and for clarity.

**Probes** are follow-up questions to be used as needed to initiate discussion or elicit further contributions. If probing is not necessary to initiate discussion or elicit further contributions, probes should not be asked. Probes in this guide are listed below the main questions and are italicized.

**Global probes** can be used any time at the facilitator's discretion to generate more complete answers or further reflection:

*Please say more about that.*

*Please give me an example of that.*

*Tell me more about your thinking about that.*

*What led up to that?*

*What happened after that?*

*I think I understand you to be saying (paraphrase participant's statement. Is that what you meant, or have I misunderstood?)*

*Because of the limited time and number of issues to cover, there may be times when the interviewer may move the discussion to the next question.*

*The focus of Project ECHO in Kazakhstan during the first year of implementation was to bring a community of physicians together using the Zoom platform to learn from cases, didactic sessions, and discussions. There were 4 major themes during the ECHO sessions:*

- 1) General, evidence-based, and up-to-date information about HIV*
- 2) Treatment of HIV using different ART regimens and focusing on an individual approach to each patient*
- 3) Treatment and/or management of co-morbidities such as HIV and kidney disease*
- 4) Treatment and/or management of opportunistic diseases*

## Background

---

*We'd like to begin with some general questions about your training, your practice, and your medical community:*

- Can you tell us how long you have been treating patients?
- What is the HIV patient case load at your facility and how many HIV patients do you see daily?
- What are the greatest challenges you have faced in treating HIV patients?

## Case Presentation

---

*We would like to ask a few questions about your experience as a participant in Project ECHO:*

- How many cases did you present?

- How did you implement the feedback and recommendations from your peers or clinical mentor after your case presentation?
  - Tell us about any changes in patient outcomes that you saw or observed in your patient after implementing the recommendations.
  - What were some of the considerations for changing your patient care from the recommendations from peers or experts?
- Have you contacted the clinical mentor outside of the ECHO sessions for advice on case management for other patients?
  - Were you able to implement the recommendations? What were the outcomes?

Changes related to Project ECHO participation

---

*I'd like to ask a few more questions about your experience providing treatment for HIV patients both before and after you participated in Project ECHO*

- What new knowledge and skills learned during your participation in Project ECHO would you say have been the most valuable?
  - Could you give an example of a time when you were able to apply this knowledge in your practice?
- How are you able to apply concepts and feedback presented by other participants during other case presentations to patients with similar problems in your own practice?
  - Can you describe an example of a case, which you did not present directly, where Project ECHO impacted your treatment plan?

- Can you describe any changes in patient outcomes you noticed after implementing these treatments?
- How, if at all, has your participation in Project ECHO impacted your treatment for HIV patients with co-morbidities and/or opportunistic infections?
- Can you describe any changes in treatment or procedures you have noticed among other providers in your practice since Project ECHO was implemented?
- How has your confidence in your ability to provide care for patients with HIV changed after your participation in Project ECHO?
  - Are there specific areas in which you think Project ECHO had the most influence on your confidence in your ability to provide effective care? (Probe: for example, around your ability to diagnose, screen, or prescribe treatment effectively?)
- Do you have any other examples of ways that your participation in Project ECHO influenced how you manage the treatment of HIV patients?

## **CLOSING**

That is the end of the discussion.

Thank you so much for sharing your thoughts with us.

Do you have any questions, or is there anything that you would like to add before we end?

If you have further thoughts about any of the issues we discussed today, please call *[INSERT NUMBER WHERE INTERVIEWER CAN BE CONTACTED]*

*END RECORDING HERE*

*TO BE COMPLETED BY THE MODERATOR:*

*Please note your impressions about the session, its main themes and the comments and reactions of participants*

INTERVIEW WAS: \_\_\_\_ ROUTINE \_\_\_\_ NOT ROUTINE

IF NOT ROUTINE, WHY:

ANY ADVERSE REACTIONS IN THE INTERVIEW: \_\_\_\_ YES \_\_\_\_ NO

IF YES, SPECIFY:

OTHER OBSERVATIONS/COMMENTS:

*TO BE COMPLETED BY THE NOTETAKER:*

*Please note your impressions about the session, its main themes and the comments and reactions of participants*

INTERVIEW WAS: \_\_\_\_ ROUTINE \_\_\_\_ NOT ROUTINE

IF NOT ROUTINE, WHY:

ANY ADVERSE REACTIONS IN THE INTERVIEW: \_\_\_\_ YES \_\_\_\_ NO

IF YES, SPECIFY:

OTHER OBSERVATIONS/COMMENTS:



## **APPENDIX C: CONSENT FORM FOR IN-DEPTH INTERVIEWS**

### **Study Purpose**

This research is supported by the University of North Carolina at Chapel Hill and involves the Centers for Disease Control and Prevention (CDC). What we learn from this survey will help us make suggestions for how to improve Project ECHO in Kazakhstan.

Janell Wright, the principal investigator on this study, is a DrPH student in the School of Public Health. In addition, she is an employee at the CDC, the site where this research is being conducted. Ms. Wright is doing this research in her role as a student. Results will only be shared with the organization at the same time as they are made publicly available.

A review of these arrangements was conducted at UNC-Chapel Hill. They concluded that the possible benefit to the person(s) listed above is not likely to affect your safety or the scientific quality of the study. If you would like more information, please ask the researchers listed on the first page of this form.

### **Procedures**

We would like you to participate in an interview. You are being asked to participate today because you have ideas and opinions that can help us understand how Project ECHO has changed clinical practice.

If you agree to be in this study, the following will happen:

1. You will participate in an individual in-depth interview. The discussion will take about 30-45 minutes and will be led by a trained study coordinator.
2. We will ask participants about the following issues relating to Project ECHO:
  - a. What you have learned as a result of Project ECHO
  - b. How you have applied your knowledge in clinical practice
  - c. How your clinical case management of HIV patients has changed

3. During the interview, we will take notes on paper and the study coordinator will audio-tape the discussion so that we can listen to it again later while writing our report.
4. We will not ask for your name or any other information that might identify you or connect you to what you said during the interview.
5. At the end of the study, the notes and tape recordings from the individual interview will be kept in a locked and secure place for up to two years, after which they will be destroyed.

**Risks or Discomforts**

Your name will not be asked for or written down at any point in this study. No one on the staff will tell anyone else that you were in the study, and there will not be a written list of people who attended.

**Benefits**

There is no direct benefit to you for participating in this activity, but the information you give us may help us to improve Project ECHO and help us describe how Project ECHO may be useful to expand as a capacity-building component for other diseases.

**Confidentiality**

All responses will be confidential. We will code your interview with a letter and number to help us keep track of our notes from the interview. We might use some of the quotes in the final report but there will be no link to your name at any time. The interview notes and audio recordings will be kept in a locked and secure place for up to two years and during that time the study team will have access to this information. All study staff will be required to sign confidentiality agreements.

**Compensation**

There is no compensation incentive for your involvement in this study.

## **Voluntary Participation**

Your participation is voluntary. You are free to choose not to be in the study. If you choose not to be in the study, there is no penalty. If you decide to be in the study, you are free to stop at any time. You do not have to give us a reason for stopping. You do not need to talk about anything that is asked or discussed during the interview if you do not want to.

## **Verbal Consent**

Interviewer asks: Do you have any questions at this time about participating in the Individual In-Depth Interview?

*Answer the participant's questions about the interview before proceeding to the next question.*

Interviewer says: You have read and/or had read to you the explanation of this study, you have been given a copy of this form, a chance to ask questions and have them answered to your satisfaction and you know that you can refuse to participate. I am now going to ask for your consent to do this interview.

If you agree to participate, please read the following statement:

“I freely agree to participate in this interview.”

Date: \_\_\_\_\_ Initials of Interviewer: \_\_\_\_\_ to confirm affirmative verbal consent

I have explained to the participant the study purpose and procedures and we have discussed all the risks that are involved. I have answered questions that the participant had to the best of my ability.

Date: \_\_\_\_\_ Signature of interviewer: \_\_\_\_\_

## APPENDIX D: INTERVIEW GUIDE FOR FOCUS GROUPS IN KAZAKHSTAN

<b><i>Date</i></b>	/__//__//__//__//__//__(dd/mm/yy)
<b><i>Interviewer initials</i></b>	
<b><i>Start Time</i></b>	/__//__/: __//__(hour/min)
<b><i>End Time</i></b>	/__//__/: __//__(hour/min)
<b><i>Name of electronic file in ZOOM</i></b>	

**Ask all questions.** If the participant has addressed a question spontaneously before it is asked, the question should be prefaced with reference to the earlier discussion. Questions may be rephrased to facilitate the flow of conversation and for clarity.

**Probes** are follow-up questions to be used as needed to initiate discussion or elicit further contributions. If probing is not necessary to initiate discussion or elicit further contributions, probes should not be asked. Probes in this guide are listed below the main questions and are italicized.

**Global probes** can be used any time at the facilitator's discretion to generate more complete answers or further reflection:

*Please say more about that.*

*Please give me an example of that.*

*Tell me more about your thinking about that.*

*What led up to that?*

*What happened after that?*

*I think I understand you to be saying (paraphrase participant's statement. Is that what you meant, or have I misunderstood?)*

Hello, my name is XX. I am working with ICAP at Columbia University on an evaluation of Project ECHO. Thank you for agreeing to be interviewed today. We would like to get your opinion on project ECHO and your recommendations on how to improve project ECHO in Kazakhstan and Kyrgyzstan.

In this interview there are no right or wrong answers; your thoughts, opinions, and experiences in your own words are what is important. While we ask that you speak candidly, you do not have to answer questions you do not feel comfortable discussing.

I will be asking most of the questions today. [Co-facilitator] may ask some follow-up questions, and will be taking notes to go along with the recording. As we go through the interview, please let me know if there any questions you would rather not answer or if you need a break.

1. What do you think of project ECHO?
  - a. In your opinion, what are the facilitators that help providers to participate in ECHO sessions?
  - b. What are the barriers that have hindered providers' participation in ECHO sessions? *Probe: was it easy to connect from your site to teleECHO session?*  
*What did you use to connect – cell phone, laptop computer, phone?*

- c. What could be done to overcome those barriers?
- 2. Please think about the short didactics included in the weekly HIV ECHO clinic sessions.
  - a. How well do the didactic sessions address the needs of the providers?
  - b. What or how can the didactic sessions be improved?
- 3. Please think about the case-scenario presentations that are facilitated by clinicians in participating health facilities.
  - a. How well do the discussions and recommendations on the HIV-related cases presented address the needs of the providers?
  - b. What could be improved upon during the case presentation discussions?
- 4. Are the sessions held at a time that is convenient for providers to attend? If not, what do you think is the best time to offer these sessions?
  - a. How often should sessions be held to ensure maximum participation?
  - b. What are your thoughts on the duration of the ECHO sessions? Is the time allocated adequate for the learning objectives?
- 5. How does project ECHO help providers to improve the quality of patient care?
  - a. To what degree are providers able to apply concepts presented during the project ECHO HIV clinic sessions to patients with similar problems in their clinic?
  - b. What could have been done better to help them apply the concepts presented to their patients?

6. How is project ECHO helping them acquire Continuing Education credits (CPD points)?
  - a. Has project ECHO improved access to earning required CPD credits?
  - b. What is your opinion on the number of CPD credits given for attending ECHO sessions? Please comment on whether they were adequate or insufficient and why.
7. Much of medicine involves a team of health care providers in the care of patients.
  - a. What helps providers share the information with others in your teams? What are the barriers for sharing information with others in their team?
  - b. Do you think all health care providers at your clinic should participate in the ECHO sessions?
  - c. What, in your opinion, would facilitate participation of all health care providers in your clinic in the ECHO sessions?
8. As a facilitator, what do you see as advantages of ECHO sessions vs. workshops?
  - a. What do you see as disadvantages of ECHO sessions vs. workshops?
9. Can you comment on how the ZOOM technology has functioned so far? *Probe for internet, speakers, screens, and utility.*
  - a. What have been some of the barriers you have faced as a facilitator of TeleECHO sessions? What could have been done to overcome these barriers?
10. Overall, do you think the project should be continued? Why or why not? *Probe for HIV and/or other topics?*



## **CLOSING**

Those are all the questions that we have. Are there other things that you believe are important to discuss about project ECHO?

Thank you for your time and your suggestions.

## APPENDIX E: CHARACTERISTICS OF IN-DEPTH INTERVIEW RESPONDENTS

<b>№</b>	<b>Facility</b>	<b># patients treated per provider per month</b>	<b>Years working with PLHIV</b>
1	Karaganda Oblast AIDS center	200	>20 years
2	Republican AIDS Center	500	10 years
3	Pavlodar Oblast AIDS Center	200	20 years
4	Astana City AIDS Center	280	13 years
5	Almaty City AIDS Center	450-500	6 years
6	Shymkent, Mother and Child Center	200	11 years
7	Karaganda Oblast AIDS center	300-350	14 years
8	West-Kazakhstan AIDS Center	200	13 years
9	Atyrau Oblast AIDS Center	200	15 years

## APPENDIX F: CHARACTERISTICS OF RESPONDENTS FROM FOCUS GROUPS

№	Facility	# of sessions attended	%
1	Shymkent, Mother and Child Center	36	95%
2	Shymkent, Mother and Child Center	32	84%
3	Shymkent, Mother and Child Center	30	79%
4	Aktobe AIDS Center	36	95%
5	Aktobe AIDS Center	35	92%
6	Aktobe AIDS Center	34	89%
7	East-Kazakhstan Center	36	95%
8	East-Kazakhstan AIDS Center	33	87%
9	East-Kazakhstan AIDS Center	30	79%
10	West-Kazakhstan AIDS Center	37	97%
11	West-Kazakhstan AIDS Center	33	87%
12	Astana City AIDS Center	36	95%
13	Almaty City AIDS Center	37	97%
14	Almaty City AIDS Center	36	95%
15	Almaty City AIDS Center	35	92%
16	Almaty Oblast AISD Center	36	95%
17	Almaty Oblast AISD Center	32	84%
18	Karaganda Oblast AIDS center	35	92%

19	Karaganda Oblast AIDS center	32	84%
20	Karaganda Oblast AIDS center	37	97%
21	Karaganda Oblast AIDS center	37	97%
22	Kostanai AIDS Center	38	100%
23	Kyzyl-Orda AIDS Center	38	100%
24	Kyzyl-Orda AIDS Center	38	100%
25	Mangystau AIDS Center	37	97%
26	Pavlodar Oblast AIDS Center	34	89%
27	Pavlodar Oblast AIDS Center	35	92%
28	Atyrau Oblast AIDS Center	35	92%
29	Zhambyl Oblast AIDS Center	37	97%
30	South-Kazakhstan Oblast AIDS Center	37	97%
31	South-Kazakhstan Oblast AIDS Center	33	87%
32	South-Kazakhstan Oblast AIDS Center	32	84%

## APPENDIX G: LIST OF TERMS AND DEFINITIONS

ECHO Institute	Refers to Project ECHO’s legal entity, faculty, and staff as well as headquarters and physical location at UNMHSC in Albuquerque, NM.
ECHO Model	Developed as a platform for both healthcare service delivery and research in 2003. The ECHO model is based on four core pillars: 1. use technology to leverage scarce resources, 2. sharing “best practices” to reduce disparities, 3. Case-based learning to master complexity, and 4. a web-based database to monitor outcomes. The ECHO model develops knowledge and capacity among community clinicians through ongoing mentoring and education.
Hub Site	Regional center where multidisciplinary team of subject matter experts for an ECHO clinic is located.
iECHO	Project ECHO’s web-based partner relations management tool that is used to manage ECHO clinics, collect data on ECHO clinic participation, and provide online resources to partners.
Spoke Site	Community partner site at which an individual or a team of learners is located and connects to hub via ECHO clinics.
ECHO Clinic	Term used to describe regularly scheduled videoconferencing sessions which include subject matter experts and learners who use the ECHO model, didactic presentations, and case-based learning to create learning loops. ECHO clinics are a core feature of the ECHO model.

ECHO Clinic Coordinator	Someone who is responsible for the administrative and organizational component of an ECHO clinic and also provides guidance information to ECHO clinic participants and ECHO clinic guest speakers.
Zoom	Teleconferencing software used for ECHO clinics.

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