RESEARCH ARTICLE

Taylor & Francis

OPEN ACCESS OPEN ACCESS

Facilitators and barriers to implementing the Project ECHO model: perspectives of 8 ECHO implementation teams

M. Kathryn Allison ^(b,b), Cari A. Bogulski^{b,c}, Hannah C. McCoy^b, Rosario Silva^b, Corey J. Hayes^{b,c,d}, Jennifer A. Andersen^{e,f,g} and Hari Eswaran^{b,e}

^aDepartment of Health Behavior and Health Education, Fay W. Boozman College of Public Health, University of Arkansas for Medical Sciences, Little Rock, AR, USA; ^bInstitute for Digital Health and Innovation, University of Arkansas for Medical Sciences, Little Rock, AR, USA; ^cDepartment of Biomedical Informatics, College of Medicine, University of Arkansas for Medical Sciences, Little Rock, AR, USA; ^dDivision of Pharmaceutical Evaluation and Policy, Department of Pharmacy Practice, College of Pharmacy, University of Arkansas for Medical Sciences, Little Rock, AR, USA; ^eDepartment of Obstetrics and Gynecology, College of Medicine, University of Arkansas for Medical Sciences, Little Rock, AR, USA; ^eDepartment of Community Health Innovation, University of Arkansas for Medical Sciences, Springdale, AR, USA; ^gDepartment of Internal Medicine, College of Medicine, University of Arkansas for Medical Sciences, Little Rock, AR, USA;

ABSTRACT

Background: Project ECHO has emerged as a leading telementoring modality for continuing medical education, particularly for providers practicing in rural and underserved areas with limited access to specialty care. The efficacy and utility of the ECHO model in healthcare training is well documented, though there is less literature focused on the determinants of ECHO implementation.

Objective: This study aims to assess facilitators and barriers to implementing the ECHO model. **Methods:** We conducted virtual focus groups with eight Project ECHO implementation teams (n = 29 individuals) across the United States. Guided by the Consolidated Framework for Implementation Research (CFIR), focus groups explored experiences implementing the ECHO model and assessed facilitators and barriers to program uptake, delivery, and sustainability.

Results: Qualitative analysis revealed implementation determinants across CFIR levels. Participants recognized the advantage of ECHO's virtual, learner-centric, case-based learning approach compared to other continuing medical education modalities. Participants recommended recruiting subject matter expert presenters with skills as educators and understanding of the ECHO model. Because of Project ECHO's emphasis on case-based learning, participants highlighted the importance of balancing didactics with case presentations and discussion. Scheduling and finding time to participate was reported as a challenge for provider engagement, though most participants suggested that the length, frequency of sessions, and number of participants can be tailored for each program to accommodate needs. Providing CME credit and setting expectations for attendance and case presentation were said to improve provider engagement. Support and mentorship from the ECHO Institute was described as a facilitator in planning for ECHO implementation and delivery. Funding was reported as a barrier to sustainability.

Conclusion: By addressing barriers prior to implementing the ECHO model, future ECHOs can be tailored to leverage program resources, maximize attendance, expand reach, and ultimately improve outcomes.

Introduction

Healthcare workforce shortages and lack of specialized healthcare are significant problems in rural areas of the United States (U.S.) [1–3]. These shortages can result in a lack of adequate mentors for novice healthcare providers [4]. Telementoring, or technology-enabled mentoring, capitalizes on recent advancements in telecommunication technology to deliver education, provide support, and share best practices to build capacity for specialized healthcare practice in rural and underserved areas [5]. A number of telementoring and virtual learning

community models have been developed to facilitate the dissemination of best practices across long distances, including Project ECHO, individual tele-consultations, and asynchronous learning such as webinars, podcasts, online curricula, and virtual community learning clubs.

Project ECHO

Project ECHO (Extension for Community Healthcare Outcomes) is a telementoring model of continuing medical education and care

CONTACT M. Kathryn Allison 🔊 kallison@uams.edu 🗈 Department of Health Behavior and Health Education, Fay W. Boozman College of Public Health, University of Arkansas for Medical Sciences, 4301 W. Markham, Slot #820, Little Rock 72205, AR, USA

© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

ARTICLE HISTORY

Received 18 October 2024 Revised 3 February 2025 Accepted 24 February 2025

KEYWORDS

Project ECHO; implementation; telementoring; virtual learning models; qualitative research

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (http://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

management that uses video-conferencing technology to train, advise, and support clinicians to improve access to specialty treatment in rural and underserved areas. Since its development by Dr. Sanjeev Arora at the University of New Mexico Health Sciences Center in 2003, the ECHO model has reached over 5,814,000 attendees of 6,800 programs in 208 countries and areas [6,7]. The 'all teach, all learn' ECHO model has four guiding principles: amplification using technology to leverage scarce resources, sharing best practices to reduce health disparities, using case-based learning to master complexity, and using data to monitor outcomes and increase impact [6].

This guided practice model uses a 'hub and spoke' knowledge-sharing method, where expert teams at ECHO 'hubs' lead virtual trainings and case consultations with community clinicians. More than 1,000 ECHO Hubs have launched since 2003. Organizations can become an ECHO Hub by attending a 'Partner Launch Training,' which involves a two and a half day virtual training that provides access to online resources to assist with ECHO program launch and operation, trains participants to run ECHO sessions, and shares information about ongoing ECHO-related opportunities. Historically, the ECHO Institute based at the University of New Mexico has centrally managed the training and licensing of all organizations newly implementing the ECHO model; however, an experienced ECHO partner can now become an ECHO 'Superhub' to help train and support organizations that want to launch their own ECHO programs or Hubs. Authorized ECHO Superhubs host Partner Launch Trainings, provide mentoring and assistance to new programs to ensure fidelity to the ECHO model, and share resources and tools [6].

More than 600 peer-reviewed articles [7] have been published demonstrating ECHO's efficacy as a virtual learning model for supporting clinicians in treating various conditions. Many studies have documented the value of the ECHO model in improving healthcare providers' knowledge and self-efficacy for managing several health conditions [8–12]. However, systematic and scoping reviews of peer-reviewed studies of Project ECHO reveal that few studies report patientand community-level health outcomes [13–15]. Arora et al. (2007) was the first to report improved patientlevel outcomes and increased access to care for people living in underserved areas following their providers' participation in a Project ECHO [16]. Zhou et al.'s 2016 systematic review identified 39 peer-reviewed articles on Project ECHO programs' impact on patient-level outcomes and cost-effectiveness [14], and their preliminary findings demonstrated evidence that ECHO programs have an impact on patient-level outcomes and cost savings [14]. A more recent scoping review by Osei-Twum et al. (2022) identified 15 peerreviewed studies describing patient or community outcomes of Project ECHO programs [15]. Of these, only one study [17] reported community-level outcomes.

Implementation science

Although there is extensive literature demonstrating the efficacy and utility of Project ECHO as a healthcare workforce training model, much of the published literature describes the effectiveness outcomes of Project ECHO, as opposed to the implementation outcomes; even fewer articles describe the challenges and barriers to implementing the ECHO model at the Hub, Network, or Superhub levels. Implementation Science, or the scientific study of methods and strategies to facilitate the uptake of evidence-based practice into regular use by practitioners and policymakers [18], provides frameworks for investigating the determinants of implementation as a means to identify implementation facilitators and barriers to inform future implementation strategies.

Prior studies of ECHO implementation

Prior studies have identified providers' barriers to participating in ECHO, including a qualitative study by Agley et al. (2021) [19]. Their study, which involved interviews and focus groups with five ECHO programs, revealed that the duration of each ECHO session and scheduling issues were the main barriers to participation. In 2022, Moss et al. published results from an international e-Delphi study focused on identifying indicators that could be used to inform quality monitoring and assess the implementation of Project ECHO globally [20]. Moss et al.'s final framework specifies 54 distinct indicators of implementation success across four domains (spoke participant engagement, ECHO hub or teleECHO Network design and operation, ECHO hub team engagement, and local impact) that can be used to guide ongoing quality improvement and program outcomes evaluation. In February 2023, Larson et al. disseminated an implementation frequency asked questions (FAQs) guide titled, 'Project ECHO Implementation: Guidance from the Field,' based on findings from a project funded by the Robert Wood Johnson Foundation [21]. Their project involved interviews with 160 individuals from 34 ECHO hubs and 62 ECHO programs in the U.S. and Canada, as well as feedback from 25 ECHO Implementation Fellows [21]. The FAQs respond to questions about (1) organizing ECHO hubs, (2) funding ECHO hubs and programs, (3) recruiting and engaging ECHO participants, (4) recruiting and engaging ECHO subject matter experts, (5) working with ECHO partners and champions, (6) designing ECHO programs, (7) recruiting and presenting ECHO cases, and (8) assessing ECHO programs and monitoring program outcomes. This comprehensive implementation FAQs document details practical advice for planning, implementing, and sustaining ECHO hubs and programs. Larson et al.'s implementation FAQ guide provides valuable insights and recommendations from ECHO implementers and participants. The current study confirms and adds to this literature by providing an in-depth, qualitative study focused on implementation facilitators and barriers experienced by ECHO implementation teams, guided by an established implementation determinants framework, and reporting the most commonly identified determinants, in a peer-reviewed study.

The current study

Despite literature documenting the effectiveness of Project ECHO as a virtual learning model and Larson et al.'s recently disseminated implementation FAQs document, fewer publications describe the implementation determinants and strategies to support implementation of the ECHO model. Recognizing this gap, we conducted a qualitative study to identify common implementation facilitators and barriers experienced by ECHO implementation teams. This study was guided by the Consolidated Framework for Implementation Research (CFIR) commonly framework [22], а used in Implementation Science to identify factors that often influence implementation outcomes across multiple levels.

Methods

Researcher positionality statement

In the spirit of self-reflexivity, we acknowledge our standpoint as researchers with no experience implementing Project ECHO. The research team consists of researchers with backgrounds in public health, behavioral health, qualitative research, digital health research, and implementation science. All study authors contributed to the interpretation of the findings and implications of the study. We acknowledge that our positionality likely influenced this project to some extent, including our interpretation of the data. The authors made efforts to acknowledge and bracket existing assumptions in reflexive notes during data collection and analysis.

Sampling and recruitment

Between May and September 2023, the research team conducted a series of eight virtual focus groups with Project ECHO implementation teams across the U.S. ECHO teams were recruited via email using contact information of corresponding authors of recent peer-reviewed articles about Project ECHO, as well as contact information of organizations that receive federal funding to implement Project ECHO and ECHO-like programs. Overall, the researchers used non-probability, convenience sampling but could still garner perspectives from a sample diverse in geographic location and length of experience implementing the ECHO model. Following a brief recruitment video call via Zoom describing the goals and methods of the study, a recruitment email was sent to nine ECHO implementation teams who had received federal funding to implement virtual learning community models like Project ECHO; of these teams, four agreed to participate. We then sent recruitment flyers via email to six additional U.S.based ECHO programs, followed by a reminder email; of these teams, four agreed to participate. Upon completion of analysis of the eighth focus group data, it was agreed upon by the research team that no new constructs were being identified as implementation factors, and therefore, it was decided that data saturation had been reached and data collection would conclude. A total of 29 individuals (average 3.6 individuals per focus group, range: 2-6) participated in the eight focus groups. As members of Project ECHO implementation teams, participants had a range of experience implementing ECHO, with roles such as: project directors; program managers, coordinators, and specialists; faculty experts and facilitators; clinical advisors; and project evaluators and quality improvement leads. The University of Arkansas for Medical Sciences Institutional Review Board reviewed the study methods and determined they were not human subjects research (#275310).

Data collection

Data collection consisted of a one-time focus group conducted virtually via Zoom. The research team developed a semi-structured interview guide informed by the CFIR framework [22]. The guide consisted of 34 questions exploring implementation influences across the five CFIR domains: inner setting, outer setting, characteristics of the individuals involved, innovation characteristics, and the implementation process. ECHO programs such as ECHO Ontario Mental Health (ECHO-ONMH) have used CFIR to guide creation of ECHO implementation readiness tools and implementation guidelines [23]. In the current study, all participants received a description of the purpose of the focus group, were reminded that participation was voluntary and confidential, and provided verbal consent to participate. No participation incentives were provided. Focus groups were audio recorded and transcribed verbatim by a transcription service. Focus groups lasted an average of 62 minutes (range 53–92 minutes).

Data analysis

Transcripts were uploaded into the qualitative data management and analysis software, MAXQDA. Three researchers analyzed the text data using qualitative content analysis. First, three researchers read through all focus group transcripts to familiarize themselves with the data and check the transcripts for accuracy. Then, two researchers coded two focus group transcripts together using CFIR constructs as an initial codebook for deductive coding, then inductively coded with descriptive summaries and subcodes. Subcodes were created in an iterative process of discussion and refinement. Once intercoder agreement was reached on approximately 25% of the data, two researchers independently coded and reviewed the remaining data. Coding discrepancies were discussed by the research team and resolved through consensus or by the third researcher.

Results

Results presented below describe reported facilitators and barriers to implementing the ECHO model across the five CFIR domains. CFIR constructs are italicized, and additional exemplary quotations can be found in Table 1.

Innovation characteristics

Participants described the advantage of the ECHO model for training healthcare professionals over other learning models like lecture series and course curricula, including the advantage of the model being delivered virtually that allows for it to be taught and attended from any location. Many participants acknowledged that Zoom and other virtual communication platforms are now widely utilized by healthcare professionals, and participants need little technical instruction to participate in ECHO sessions. They also spoke of the advantage of building communities of practice through ECHO. One participant said, 'I think the benefit of a lot of our ECHOs - which a lot of them are nationally-based or some of them regionallybased - but it connects clinicians with other people really trying to improve their own - their skill set, too, to work together to collaborate with one another. Versus a webinar, you don't really have that community, and whereas the learning collaborative is more about building community within one's clinic, rather than going outside of your clinic.' The cost-effectiveness of ECHO's virtual

learning community model was seen as a facilitator, given that ECHO learners and facilitators do not need to travel to attend ECHO sessions, participate in groups discussions, or receive peer mentoring. The interactive nature of the model and the inclusion of case presentations with feedback were also advantages. One participant said, 'It's a space where participation is encouraged and applauded, and that keeps people engaged.'

Although some participants said that they are taught the importance of maintaining 'fidelity to the approach,' participants also noted that the model can be *adapted* to accommodate the needs of a program, including number of participants, length of sessions, and frequency of sessions. For example, one program described changing the session structure, including eliminating participant introductions at the beginning of each session, when the number of participants increased significantly. Another participant said, 'They actually recommend two hours every week. Um, we just couldn't afford to set aside two hours.' So, we said, 'We'll start it with an hour. If we need two hours, we can always expand it, but we're gonna start with one hour every week.' They went on to say, 'We've stuck with the hour-long ECHO. We've never expanded it to the two-hour ECHO. We don't do a didactic session every week like [the ECHO Institute] model is. If you look at their Project ECHO sessions, they've got probably 20 people in the room. We probably have 5. And so, trying to come up with a 15-minute presentation every single week is just not feasible.'

Additionally, ECHO content can be adapted during implementation to respond to emerging evidence, best practices, and guidelines. One participant described ECHO as 'a method of being able to – for [our program] at least – help disseminate information and best practices to our members. It allows us the flexibility to move through different topics as we hear of educational needs among our members.' Some participants also said that ECHO is a model that has been expanded beyond healthcare settings to reach other types of professionals, including those working in schools, courts, and juvenile justice. One participant said, 'The ECHO model is a tried-andtrue, flexible, adaptable model that can be transferred to different audiences.'

Participants had mixed perceptions of the *complexity* of the ECHO model. Reflecting on ECHO as a learning model, one participant said, 'It just clicks. It makes sense, as a way to get information.' However, others described the model as more complex, with one participant saying, 'It's more complicated than you think. It sounds like a simple model, but it really is a lot more complicated than you'd imagine in terms of finding a group of participants and partners and figuring out

Table 1. Factors	influencing implement.	ation of the ECHO Model.	
CFIR Domain	CFIR Construct	Description	Exemplary quotation
Innovation Characteristics	Relative advantage	Advantage of a virtual model with interactive, case-based learning	"Some of the things that have been super engaging is discussing cases or case discussions People will always want to talk about the practical experience: trying to find creative ways and strategies to incorporate practical examples, having one of the program participants identify a unique case from their practice and discuss that practice, to talk about some of the challenges and barriers and addressing some of the priority health concerns, and then having people chime in to ask questions and offer advice and feedback.
	Cost	Cost-effectiveness of virtual learning community model	The thing about ECHO is that because it's all online and it's cost-effective in that we're not spending money for travel or all the core tenets of what ECHO is, that you leverage technology to address where there're scarce resources. so it's cost-effective in that way.
	Adaptability	Adaptable to accommodate the needs of the program and audience	It depends on what are the goals of having ECHO at your institution, or within your division. That's one of the beauties of the ECHO model that I think is really powerful, is that it's a principle-based model. You can implement those principles as a single unit doing one topic, and you can implement those principles as a massive multi-site academic medical center, trying to impact a whole region, if you want to. I think that's one of the reasons I think it's caught file, is because, while the principles remain, they are adartable in most settings.
	Complexity	Complexity of identifying cases and preparing presenters during the ECHO program	You really have to be careful about selecting faculty. The temptation with an ECHO is to go straight to academia and choose people who are seasoned educators or have a lot of experience giving lectures or things like that, but the ECHO model is fundamentally different. So, you have to make sure that you really work with your faculty so that they understand the model and so that they take advantage of that. New faculty will often err on the side of having really long lectures because they really want to get a lot of stuff nor faculty so will often the understand the model and so that they really want to get that. New faculty will often err on the side of having really long lectures because they really want to get a lot of stuff in and really cram it in, and then that-that's a webinar. That's not ECHO. So, I think faculty training is really important as well.
	Design quality and packaging	Managing expectations, marketing to the audience, mutual learning, and balancing didactics and case-based learning	This is not a traditional consultative model. It's not you come to me, and I bestow my brilliance on you. You are an expert, and I maybe have some additional things to offer or-or a different perspective to offer, but I'm gonna recognize – as we're thinking through a case – I'm gonna recognize that you're an expert, and you're doing good work.
Inner Setting	Structural Characteristics	Dedicated staff with clear roles and responsibilities	You've just got to have an engaged team. You have got to have a team that's meeting often, that works well with each other, and everybody's roles and responsibilities are well-defined and that you hold yourself accountable. I am not an ECHO expert, but I'm just speaking just from my two years of being here, working with [this team], that we work very well together. We meet often and we understand each other's roles and responsibilities. I think that needs to be established early. I think when you have neonle that work well forether you!
	Implementation climate	Incentivizing participation with CME credit; Using participant feedback for quality improvement	That's a big deal for some people. That's why they're there is they're there for the CME'
	Readiness for implementation	Having access to video conferencing software and faculty with content expertise	'Not all specialty care providers are like [staff person's name] that have an understanding of what is happening out there in the wild in primary care, with their area of specialty. It's not just enough to have a physician champion or clinician champion. It's really helpful if they have some grounding in what makes sense out in primary care – especially outside of the academic medical center – because that primary care provider's not necessarily gonna need to know the deep physiology of a medication, but they need to know drug-drug interaction, for example. Having people who are not just excellent clinicians, but also great teachers, is really important in the implementation, but especially in the sustainability of it.'

(Continued)

Table 1. (Contin	iued).		
CFIR Domain	CFIR Construct	Description	Exemplary quotation
Outer Setting	Needs and resources of those served by the organization	Addressing the educational and technological needs of ECHO participants	From what I have learned about the work that's been done from the team, the relationships are just so key. So, putting in that initial effort and time to build relationships [with sites]. Oftentimes, you know, with a big component of that being really listening and trying to understand and meet the needs of the sites that you're working with. And then, as problems come up along the way, which inevitably they do, you do back to those relationships dc and can really work to solve things to order there with vour sites.
	Cosmopolitanism	Leveraging professional connections to identify faculty presenters and using Project ECHO as a mechanism to develop professional networks	Our particular procession in a lot of different ways. One lorganization, I believe, they had heard about us from word-of-mouth. One lorganization] approached us and then they wanted to bring in the local university to strengthen their partnership together. One partnership branched and led to another. We do also sometimes just approach new organizations in order – that we feel like are mission aligned, introduce ourselves. I'd say it is a lot of word of mouth right now. We do, of course, have an entire team that for uses more on development and wave that rectours can learn about us'
	External policies and incentives	Grant funding to support ECHO programming	A big part offs in which is always thinking bout how we can keep great ECHOs funded If it was not being funded under the umbrella of [Federal] funding, then we would be year-to-year – and we have been year-to-year on it and contract-to-contract – and so that's part of the reason why [the Hub] was initially created was that because of the – such high reliance on contracts and grants. Without having a centralized group like us, other groups are very vulnerable. When the grant ends, the team and the learning inst fall anart.
Characteristics of Individuals	Knowledge and Beliefs about the Innovation	Presenters with understanding of the ECHO model, content expertise, and skilled in virtual communication	It is a different thing from teaching a med student or a resident in clinic or in the hospital. It's different than when you're working with colleagues who are out practicing. There are a lot of providers who are good at making that jump, because they're used to having those phone calls with those providers. Providers are also good learners. They're listening. They're listening and they're taking it in, and they're modifying their didactics, or modifying how communicate.'
Implementation Process	Planning	Planning for implementation, including developing partnerships, setting expectations, scheduling, planning curricula content, and support from the ECHO Institute	One thing that we vergotten into the habit of too, is asking our faculty members to provide backup cases just so we have them in case we need them because obviously, the goal is to get participants to submit cases, but we also need a certain amount of prep time. If the clock is really ticking and I still don't have a case, I don't want it to be the day before a session and have to ask faculty member for a case. We've been asking them to have them at here at the ready. It us in case we need them."
	Engaging	Presenters that are engaging, balance didactics and discussion, respected in the field	Having a good facilitator is very important. It has to be somebody who has a lot of experience in the field, who is respected, and people know that this person has a lot of credibility, but also, somebody who has an ability to speak well and to be able to redirect conversations and keep the sessions moving and not make them super boring, right? Like, "Oh, again, we are having this ECHO?" Just making them really vibrant and exciting and making wibrant and exciting and making the rederbody's feeling included, right? We're not just having them monologuing for an hour and then – of course, we're learning a lot from this person, but the idea is also to exchange experiences and to learn from each other. It's a balance."
	Reflecting and evaluating	Quality improvement using learner feedback	For me, one of the Jessons that I learned was how can we communicate back with our program managers and our faculty and medical directors what people are saying that they need and making sure that for those people who want more practical examples, who want to learn about X, Y, and Z. My role in that is really just understanding the importance of the feedback that we're getting from the program participants. That's something that I have done differently Making those changes in real time. That way people feel heard.

*CFIR = Consolidated Framework for Implementation Research.

how to implement it in a way that really stays with your focus.' Some said the ongoing need to identify cases and prepare ECHO participants for their case presentation created the need for ongoing coordination and backup cases. One participant stressed the importance of training faculty presenters on the ECHO model so that they understand the importance of preserving time for discussion and case-based learning.

Participants described the importance of how each ECHO program is *designed*, *packaged*, *and presented* to each audience. One participant said it is important to 'make sure that, whatever you're designing, that you're managing expectations, and you're marketing to your audience. ... Then being clear about what they can expect from participation.' Others described the importance of balancing didactic presentations and case presentations. One said, 'Try to increase the dialogue back and forth because ... the model itself is designed to be a 10- to 15-minute didactic presentations.' The emphasis on mutual learning and recognizing the participant as an expert was described as a facilitator of implementation.

Inner setting

The *structural characteristics* – including size, staffing structures, and scope of practice - of organizations implementing the ECHO model were described as implementation factors. Some spoke of the importance of having protected time for staff or having staff dedicated to coordinating ECHO programs. One participant said, 'One thing that I think is really helpful is having a program specialist assigned to each individual ECHO. I think it makes it a lot more personal for participants.' Many participants spoke of the importance of having well-defined roles and responsibilities for ECHO implementation teams. One participant said, 'It comes back to the roles and responsibility and things running smoothly. People need to know what their role is, and that that's their person, or that's part of their job - dedicated roles.' Access to resources, such as video conferencing software and faculty with content expertise, was described as a key implementation factor in a program's readiness to implement the ECHO model.

The *implementation climate* of organizations was identified as an implementation factor, which included elements such as organizational incentives and reward, goals and feedback, and the relative priority of implementing Project ECHO. Continuing Medical Education (CME) credit for ECHO participation was described as an important *incentive or reward*. One participant said, 'If we're going to try to engage these people in our ECHOs, we know one of the biggest incentives is, "Am I gonna get credit for this?" ... So, expanding the credit options available.'

One participant said, 'One of the benefits we have with being a larger organization - we can offer these things where a smaller organization might need to partner with somebody to offer CE [continuing education] or CME or anything. Our accreditation department will work with us and tell us what we need to do to be able to add [CE for another profession].' In some cases, participation in ECHO sessions satisfies other professional requirements. For example, one participant said, 'We have a good number of [healthcare providers] that participate. And the only real reason they're participating is they need CME, and it's free. And they don't have to go anywhere, pay for an expensive hotel or flight or, you know, course presentation. It also fulfills the requirement that the medical board has of having, uh, I think it's one or two hours of opioid prescribing CME, every year. And so, that's a requirement that's fulfilled by participating in Project ECHO.' Related to goals and feedback, many teams highlighted the importance of receiving real-time ECHO participant feedback and incorporating that feedback into program improvements. This feedback is gathered through various channels, such as post-ECHO evaluations, individual session feedback, and direct interactions between participants and members of the ECHO implementation team.

Outer setting

Understanding and addressing the needs of those served by the organization was identified as a key factor in successful implementation. This includes ensuring that ECHO topics align with the educational needs of the audience, addressing any technological challenges faced by ECHO participants, and scheduling ECHO sessions at times that are most convenient for the audience. One participant noted that 'there's a balance in how you select [ECHO] topics and how much the general medical community can fit ECHO into their day. They have to be excited and really interested and committed to the ECHO as well.' Again, this demonstrates that topics must align with the needs of the audience. Multiple participants mentioned provider time to attend ECHOs and scheduling as an ongoing issue, one saying, 'I think primary care availability is a big one - and scheduling. Some ways around that are by doing that 7:00 to 8:00 a.m. timeframe. The lunchtime can help, or sometimes later in the day, but that's really challenging because people are moving on with their life after work, so being conscientious about the scheduling.'

A key element of Project ECHO is leveraging the expertise of specialists to provide telementoring to providers in rural and underserved areas and developing professional networks (*cosmopolitanism*). In other words, the ECHO model serves as

a mechanism for facilitating professional networks and communities of practice. Participants described leveraging their professional 'relationships and connections' to identify faculty presenters and ECHO participants. One participant described identifying presenters 'either through relationships or just through our network, and then inviting people to participate.' Some spoke of the importance of building strong relationships with partner institutions, including sharing program outcomes.

Many participants acknowledged the role of grant funding (external policies and incentives) in supporting ECHO programs, given the costs of program staff time and compensation for faculty presenters. Some programs compensate participants for participating in ECHO through small grants to their organization. However, the continuation of some ECHO programs is vulnerable to the potential end of grant funding. One participant said, 'On a systems side, a big challenge is if you look across our funding, much of our funding is year-to-year. We don't have many multi-year grants and contracts, and so as a leader, a big part of my job is always thinking about how we can keep great ECHOs funded.' Because of this, some programs created centralized networks to support multiple ECHO programs within one organization or Hub.

Characteristics of individuals involved with implementation

Participants described characteristics of individuals involved with implementation, particularly those involved with ECHO session delivery. Many said that the presenters must be skilled educators in addition to subject matter experts; presenters must also be comfortable educating providers. One participant said, 'It is a different thing from teaching a med student or a resident in clinic or in the hospital. It's different than when you're working with colleagues who are out practicing.' They went on to say, 'There are a lot of providers who are good at making that jump, because they're used to having those phone calls with those providers. Providers are also good learners. They're listening. They're listening and they're taking it in, and they're modifying their didactics, or modifying how they communicate.' Some also said that presenters should be knowledgeable of the ECHO model.

Implementation process

In *planning* for a new ECHO program, participants described the importance of developing partnerships and collaborations to identify key stakeholders, potential ECHO learners, and potential presenters. One participant said, 'You can't do this in a vacuum. You've got to have partners, and you really have to

lay the groundwork for identifying who those partners are and have a plan for recruitment. ... Our advice is always to really work on building a foundation, and I always say the most important components are enthusiasm at both ends, right? The faculty lead, but also your partners.'

Many spoke of the importance of setting expectations for participants early in the ECHO program, including attendance requirements and expectations to present cases. Some programs said that they saw an increase in attendance when they set an attendance requirement. One program offered a stipend to improve regular attendance. Identifying a regular day and time for ECHO sessions that fit in the learners' busy schedules was said to be a significant barrier. ECHO sessions being scheduled at a regular time was said to be a challenge for clinicians who may not be able to make the regular time work for their clinical schedule. Because of this, some participants said that clinics and healthcare organizations need to make ECHO participation a priority for their clinicians and protect time for them to participate. Although some acknowledged that moving the time around might help to improve attendance for learners who cannot attend at the regular time, most programs held sessions at the same time each week and found this to be logistically more feasible.

Participants described many forces driving the selection of ECHO focus topics, including provider educational needs or interests, referral backlogs, patient population needs, spoke site leadership, faculty presenters, and funding. Participants also described the challenge of planning for each session of an ECHO program, including the didactic content. One participant described these challenges, saying, 'Making sure that you're staying on top of the curriculum and that you've got speakers lined up for the next several months,' and went on to say, 'Getting those [cases] submitted and setting up case forms to try to minimize the [participant] burden.' Some programs encounter difficulties in obtaining participantsubmitted cases or receiving cases with sufficient lead time for CME approval. To address this issue, certain programs request their faculty to prepare backup cases. However, some recommend regular contact with participants leading up to their planned case presentation to ensure they are prepared to present.

Some programs previously provided one-on-one technical training for providers on how to utilize Zoom. However, most participants said that training is no longer needed because Zoom is now used regularly by providers. Some programs ask case presenters to log in to sessions a few minutes early to ensure they know how to unmute, share their screen, and/or utilize other features of the teleconferencing platform.

Support from the ECHO Institute was often described as a key facilitator in planning for the

implementation of the ECHO model. Valuable resources provided by the ECHO Institute include monthly seminars by the founder, Dr. Arora, tools and information on the ECHO Institute website, and collaborative consultation on how to grow and sustain ECHO programs, Hubs, and Superhubs. Most focus group participants referenced the initial Partner Launch Training they received from the ECHO Institute – training that is also now available through Superhubs. Still, many said that they also received 'on-the-job' training by observing team members with ECHO experience or by attending other ECHO programs' sessions. One said, 'What helped me step in when I need to step in is to watch other facilitators, to join other ECHOs.'

Focus group participants described strategies for engaging ECHO learners, including embedding knowledge checks or quizzes and using Zoom polls during sessions, using the participant chat, providing online tools and materials to learn more or to share with colleagues, and asking learners to use their webcams. However, some said that it may not be realistic for clinicians to turn on their webcams, depending on the setting in which they are in.

Participants described the need to recruit presenters who listen to learners, respond to their educational needs, and are willing to learn themselves. 'There's bidirectional learning about what is really needed to help patients, which I think is really helpful and really useful.' Some participants said it is important to train presenters on using the ECHO format and how to engage participants virtually so that ECHO sessions stay on track and balance didactics and discussion.

Many participants acknowledged the importance of reflecting and evaluating their programs, including collecting data for continuous quality improvement. One participant said, 'Initially, [feedback] is applied to the content of the course. But then, the idea overall is to just help people feel really confident in making improvements in the work that they provide within the clinic in all areas. That's been really exciting to see.' Some said it can be challenging to get participants to complete feedback surveys. One participant said, 'It's important to have enough time to do evaluation at the end.' Some programs have implemented a learning collaborative focusing on quality improvement. One participant said, 'We've also shared stories from our partners, like our partners at [organization] who do a diabetes ECHO, showing savings - cost savings. They've looked at Medicaid claims of all of the patients seen by ECHO-trained providers, compared to the patients of providers not participating in ECHO. They've seen savings, in terms of reduced hospitalizations, healthcare costs. I think sharing these stories that our partners are telling, as well, has been really impactful.'

Discussion

Project ECHO has emerged as a leading telementoring modality for CME, particularly for providers practicing in rural and underserved areas with limited access to specialty care. By linking primary care providers and others with specialists at academic health centers who provide telementoring, the ECHO model enables local providers to treat patients with complex conditions [24]. Through focus groups with eight ECHO implementation teams, our study identified determinants of ECHO implementation and delivery as a means to share information and practical advice for those planning new ECHO programs. Exemplary quotations provide a rich description of facilitators and barriers experience by ECHO implementation teams. By focusing on describing the implementation determinants most commonly reported by the ECHO implementation teams and providing direct quotes from these teams, this study adds to prior work that describes case studies of ECHO implementation and outlines guidance for ECHO program implementation [21] by focusing on assessing implementation facilitators and barriers, guided by an established implementation determinants framework, and reporting the most commonly identified determinants.

Our participants perceived that virtual attendance, case-based learning, mentorship, and ongoing discussion of the ECHO format make it advantageous over other CME modalities. Our participants also highlighted the importance of balancing didactic content with case discussions, given that case-based learning is central to the ECHO model. Learner centricity is a core focus of the ECHO model. Our participants said that identifying topics that align with the educational needs of the audience facilitated ECHO implementation. The opportunity for real-time discussion and tailored feedback during case-based learning sets the ECHO model apart from other models of CME. ECHO programs are also able to adapt the length, number, and timing of sessions to meet the needs of attendees and the content, which can address known barriers to participation in ECHO, such as time and scheduling [19]. Because using virtual communication platforms like Zoom became common practice for healthcare professionals during the COVID-19 pandemic, ECHO programs no longer need to provide one-on-one technical support for new ECHO learners. Instead, staff can be available before or during ECHO sessions to respond to learners' technical concerns, but generally focus on other aspects of the program coordination.

Consistent with existing literature demonstrating that offering CME credit increases resident and faculty attendance of conferences [25], our study found that offering CME credit facilitated ongoing provider participation in ECHO sessions. Larson et al.'s implementation FAQs also found that offering CME was commonly used as a strategy to attract participants and encourage ongoing engagement in an ECHO program [21]. According to Arora et al. (2017), the ECHO model is consistent with best practice recommendations for CME [24].

Our participants highlighted the importance of continuous quality improvement and using participant feedback to improve implementation. Moss et al. international e-Delphi study focused on identifying indicators that could be used to inform quality monitoring and program outcomes evaluation across four domains, including spoke participant engagement, ECHO Hub or teleECHO Network design and operation, ECHO Hub team engagement, and local impact [20]. Our focus group participants were particularly interested in program evaluation to measure local impact – the improvement in workforce development and capacity – as well as continuous quality improvement measures to assess and increase spoke participant and hub team engagement.

Funding was described as the main threat to ECHO program sustainability, given that many programs are grant funded. Coordinating multiple ECHO programs was said to improve sustainability and support staff longer term, given that it is more likely that the programs are supported by multiple funding sources. Larson et al.'s implementation FAQs guide also recommend diversification as a funding strategy, as well as suggested finding partners with secure funding or sharing program costs [21]. Recently, Moss et al. (2024) published findings from an online survey distributed to all ECHO hub organizations globally, revealing that ECHO implementation teams that liaised more regularly with ECHO Superhub mentors went on to launch a greater number of ECHO Networks that were sustained over the longer period [26]. Similarly, our participants spoke of the key role of ongoing mentorship and resources of the ECHO Institute in facilitating planning for ECHO launch and sustainment.

Strengths and limitations

One of the notable strengths of our study was the inclusion of individuals from eight different ECHO programs, all with varying levels of experience with implementing the ECHO model in other areas of the country. We did not systematically assess characteristics of the participants' organizations as part of this focus group study, such as length operating as an ECHO program or specific audiences reached by ECHO programs, and we recognize this as a limitation in the interpretation of study fundings. Another limitation of the study was the convenience sampling strategy used for participant recruitment. Given that participants were recruited based on personal contact with the research team and based on current ECHO programs, some bias could be present in the participant pool and the perspectives shared. For example, having current funding to implement Project ECHO could have biased results related to the influence of funding on implementation. Also, the perspective of ECHO learners, as well as the perspectives of additional faculty presenters, may have identified different or additional implementation barriers.

Conclusions

The ECHO model is a leading modality for continuing medical education and telementoring in healthcare. This study highlights implementation factors, including facilitators and barriers, to inform future ECHO implementation efforts. By addressing barriers prior to implementing the ECHO model, future ECHO programs can be tailored to leverage program resources, maximize attendance, expand reach, and ultimately improve outcomes.

Acknowledgments

We would like to thank our participants for their contribution to this study.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The work was supported by the Health Resources and Services Administration [U3GRH4001]; National Center for Advancing Translational Sciences [K12TR004924].

Disclosures

This project was supported by the Office for the Advancement of Telehealth (OAT), Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services (HHS) under grant number U3GRH4001. The information and conclusions in this manuscript are those of the authors and do not represent the views of OAT, HRSA, or HHS. Drs. M. Kathryn Allison and Jennifer A. Andersen are supported by the Translational Research Institute, KL2 TR003108, through the National Center for Advancing Translational Sciences (NCATS) of the National Institutes of Health (NIH). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

ORCID

M. Kathryn Allison (b) http://orcid.org/0000-0001-6178-0352

References

- Douthit N, Kiv S, Dwolatzky T, et al. Exposing some important barriers to health care access in the rural USA. Public Health. 2015;129(6):611–620. doi: 10. 1016/J.PUHE.2015.04.001
- [2] MacDowell M, Glasser M, Fitts M, et al. A national view of rural health workforce issues in the USA. Rural Remote Health. 2010;10(3):1531. doi: 10.22605/ rrh1531
- [3] Weinhold I, Gurtner S. Understanding shortages of sufficient health care in rural areas. Health Policy (New York). 2014;118(2):201–214. doi: 10.1016/J. HEALTHPOL.2014.07.018
- [4] Chong JY, Ching AH, Renganathan Y, et al. Enhancing mentoring experiences through e-mentoring: a systematic scoping review of e-mentoring programs between 2000 and 2017. Adv Health Sci Educ Theory Pract. 2020;25 (1):195–226. doi: 10.1007/S10459-019-09883-8
- [5] National Rural Telementoring Training Center. [cited 2024 May 29]. Available from: https://ruraltelementoring.org/
- [6] Project ECHO. [cited 2024 May 29]. Available from: https://projectecho.unm.edu/
- [7] Project ECHO Publications Dashboard. [cited 2025 Jan 30]. Available from: https://redi.metaecho.com/ superset/dashboard/ProjectECHOPublications/
- [8] Arora S, Kalishman S, Thornton K, et al. Expanding access to hepatitis C virus treatment-extension for community healthcare outcomes (ECHO) project: disruptive innovation in specialty care. Hepatology. 2010;52(3):1124–1133. doi: 10.1002/HEP.23802
- [9] Marciano S, Haddad L, Plazzotta F, et al. Implementation of the ECHO[®] telementoring model for the treatment of patients with hepatitis C. J Med Virol. 2017;89(4):660–664. doi: 10.1002/JMV.24668
- [10] Giachetto G, Casuriaga AL, Santoro A, et al. Extension for community healthcare outcomes Uruguay: a new strategy to promote best primary care practice for autism. Glob Pediatr Health. 2019;6:6. doi: 10.1177/ 2333794X19833734
- [11] Hostutler CA, Valleru J, Maciejewski HM, et al. Improving Pediatrician's behavioral health competencies through the project ECHO teleconsultation Model. Clin Pediatr (Phila). 2020;59(12):1049–1057. doi: 10.1177/0009922820927018
- [12] Lewiecki EM, Rochelle R, Bouchonville MF, et al. Leveraging scarce resources with bone health TeleECHO to improve the care of osteoporosis. J Endocr Soc. 2017;1 (12):1428–1434. doi: 10.1210/JS.2017-00361
- McBain RK, Sousa JL, Rose AJ, et al. Impact of project ECHO models of medical tele-education: a systematic review. J Gen Intern Med. 2019;34(12):2842–2857. doi: 10.1007/s11606-019-05291-1
- [14] Zhou C, Crawford A, Serhal E, et al. The impact of project ECHO on participant and patient outcomes: a systematic review. Academic Med. 2016;91 (10):1439–1461. doi: 10.1097/ACM.000000000001328

- [15] Osei-Twum JA, Wiles B, Killackey T, et al. Impact of project ECHO on patient and community health outcomes: a scoping review. Acad Med. 2022;97 (9):1393–1402. doi: 10.1097/ACM.000000000004749
- [16] Arora S, Thornton K, Jenkusky SM, et al. Project ECHO: linking university specialists with rural and prison-based clinicians to improve care for people with chronic hepatitis C in New Mexico. Public Health Rep. 2007;2(2_suppl):74–77. doi: 10.1177/ 00333549071220S214
- [17] Rattay T, Dumont IP, Heinzow HS, et al. Costeffectiveness of access expansion to treatment of hepatitis C virus infection through primary care providers. Gastroenterology. 2017;153(6):1531–1543.e2. doi: 10. 1053/J.GASTRO.2017.10.016
- [18] What is implementation science? | implementation science at UW. [cited 2024 May 29]. Available from: https://impsciuw.org/implementation-science/learn/ implementation-science-overview/
- [19] Agley J, Delong J, Janota A, et al. Reflections on project ECHO: qualitative findings from five different ECHO programs. Med Educ Online. 2021;26(1). doi: 10.1080/10872981.2021.1936435
- [20] Moss P, Hartley N, Newcomb D, et al. Measuring the success of a project ECHO implementation: results from an International e-Delphi study. Global Implementation Res Appl. 2022;2(3):179–194. doi: 10.1007/S43477-022-00050-7
- [21] Larson RS, Dodsworth-Rugani K, Dearing J. PROJECT ECHO implementation: guidance from the field frequently asked questions study sites, ECHO program topics, and implementation fellows. Available from: https://www.researchgate.net/publication/369550690
- [22] Damschroder LJ, Aron DC, Keith RE, et al. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Sci. 2009;4 (1):50. doi: 10.1186/1748-5908-4-50
- [23] Serhal E, Arena A, Sockalingam S, et al. Adapting the consolidated framework for implementation research to create organizational readiness and implementation tools for project ECHO. J Contin Educ Health Prof. 2018;38 (2):145–151. doi: 10.1097/CEH.000000000000195
- [24] Arora S, Kalishman SG, Thornton KA, et al. Project ECHO: a telementoring network Model for continuing professional development. J Contin Educ Health Prof. 2017;37 (4):239–244. doi: 10.1097/CEH.000000000000172
- [25] Lefebvre CW, Hiestand B, Bond MC, et al. Increasing faculty attendance at emergency medicine resident conferences: does CME credit make a difference? J Grad Med Educ. 2013;5(1):41. doi: 10.4300/JGME-D-12-00030.1
- [26] Moss P, Hartley N, Russell T. Project ECHO^{*}: a global cross-sectional examination of implementation success. BMC Health Serv Res. 2024;24(1):1–21. doi: 10. 1186/s12913-024-10920-5