PEDIATRIC ONCOLOGY

Using Virtual Learning to Build Pediatric Palliative Care Capacity in South Asia: Experiences of Implementing a Teleteaching and Mentorship Program (Project ECHO)

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abstract

Palliative care is an important component of pediatric cancer treatment that provides holistic support for children and their families. In low- and middle-income countries, where 98% of the children needing palliative care reside, access to palliative care services is often very limited. Training opportunities for healthcare professionals are essential to improve access to palliative care in these settings. Virtual learning, which brings training and mentorship directly to learners, can improve access to educational opportunities for staff in resource-limited settings. In this report, we describe a novel and evolving model of building pediatric palliative care (PPC) capacity in South Asia. We describe the design, implementation, challenges, and subsequent modifications of our program, as well as the impact of the program for participants and for PPC service delivery in South Asia. Our teleteaching and mentoring program (Project ECHO) [Extension for Community Healthcare Outcomes] consisted of biweekly videoconference sessions with didactic teaching and case-based discussions. The program focused on engaging participants in meaningful learning by focusing on opportunities for participant interaction through teachings and case discussions. Participants identified the program as particularly beneficial for improving their knowledge and confidence in managing seriously ill children. Project ECHO is a novel model of building PPC capacity that is suitable for resource-limited settings. Key modifications to the Project ECHO model include a course-specific leadership team, developing learning plans to address the specific learning needs of participants, focusing on ensuring learner participation during sessions, and using social media and electronic resources to create opportunities for further learning outside of ECHO sessions. These adaptations may improve the efficacy of Project ECHO and others using virtual learning programs in resource-limited settings.

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INTRODUCTION

There is a significant global need for children's palliative care, with an estimated 21 million children needing palliative care annually.[1] Developing palliative care programs in resource-limited settings is a global priority since 98% of the children requiring palliative care reside in low- and middle-income countries (LMICs).[2,3]

A lack of education about palliative care among healthcare providers is a significant barrier to improving palliative care availability.[4,5] Healthcare providers may lack knowledge of how to assess and treat pain and other symptoms, and a recent survey of physicians providing cancer care in Bangladesh found that the majority of physicians were unaware of the potential therapeutic benefits of morphine for pain management and did not feel adequately trained to prescribe morphine for this indication.[6]

Online education has been suggested as an effective strategy for disseminating specialized training in LMICs, and a recent review of teleteaching for health professionals concluded that educational outcomes were as good as traditional in-person teaching methods.[7] Using virtual training can also address the challenges of staff needing to take time off and to travel to attend education programs.[4,8,9]

Project ECHO [Extension for Community Healthcare Outcomes] is an online technology-enabled capacity building model that focuses on improving community-level healthcare providers' knowledge and skills through teaching and mentorship.[10] In Project ECHO, multipoint videoconferencing is used to connect local healthcare providers with specialists at a hub site (Fig 1). ECHO sessions are conducted at regular intervals (eg, weekly or biweekly) and follow a structured format of didactic teaching and case presentation and discussion.

Despite the proposed benefits of online learning in medical education, there can be significant challenges when implementing e-learning. A recent review of the topic, focused on resource-limited settings, identified the lack of face-to-face interaction as a significant challenge to engaging in interactive discussion, which is critical for learning.[11] Additionally, the authors noted that virtual learning programs should be modified to be

ASSOCIATED CONTENT

Appendix

Data Supplement

Author affiliations and support information (if applicable) appear at the end of this article.

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CONTEXT

Key Objective

How can we develop an effective virtual pediatric palliative care (PPC) capacity building program suitable for resource-limited settings using the Project ECHO model?

Knowledge Generated

Project ECHO can be modified to include a leadership team with an in-depth understanding of the local healthcare situation and learning needs of participants, training for course facilitators on specific techniques that increase learner participation, and using familiar social media channels and electronic resources to support participants to engage in further learning outside of ECHO sessions. This capacity building program is highly valued by participants and supports the development of new PPC programs in the region.

Relevance

Using an adapted Project ECHO education model is a valuable capacity building strategy that supports healthcare providers to develop new knowledge and skills and mentors them to develop new PPC programs in resource-limited settings.

culturally relevant and to fit with healthcare realities of a particular country.[11]

SETTING AND POPULATION

A recent study estimating the global need for pediatric palliative care (PPC) projected that 4.25 million children in India need palliative care at any one time, including 1.63 million who require specialized palliative care.[1] Almost 80% of the children with cancer in high-income countries are cured; however, in LMICs, difficulties accessing diagnostic facilities and curative cancer treatment lead to survival rates that may be as much as four-fold lower.[12,13]

Palliative Care in India

India has a universal publicly funded healthcare system that is provided by the central and state governments. Government hospitals provide essential treatments for free or at minimal charge; however, the government system is underfinanced and lacks adequate staff and resources to address the needs of the vast number of patients seeking medical care.[14] The availability of palliative care also varies widely across India, with 19 of 36 states having no known palliative care activity.[14] The state of Kerala has particularly well-developed palliative care services, which account for 90% of palliative care programs within the country despite having only 3% of the Indian population.[15,16] Outside of Kerala, the majority of palliative care services are supported by nongovernmental organizations and are located within urban areas, leading to significant gaps for the majority of the population who reside in rural areas.[16,17] Even in urban areas, most palliative care services are focused on adult patients, with very few dedicated pediatric programs;

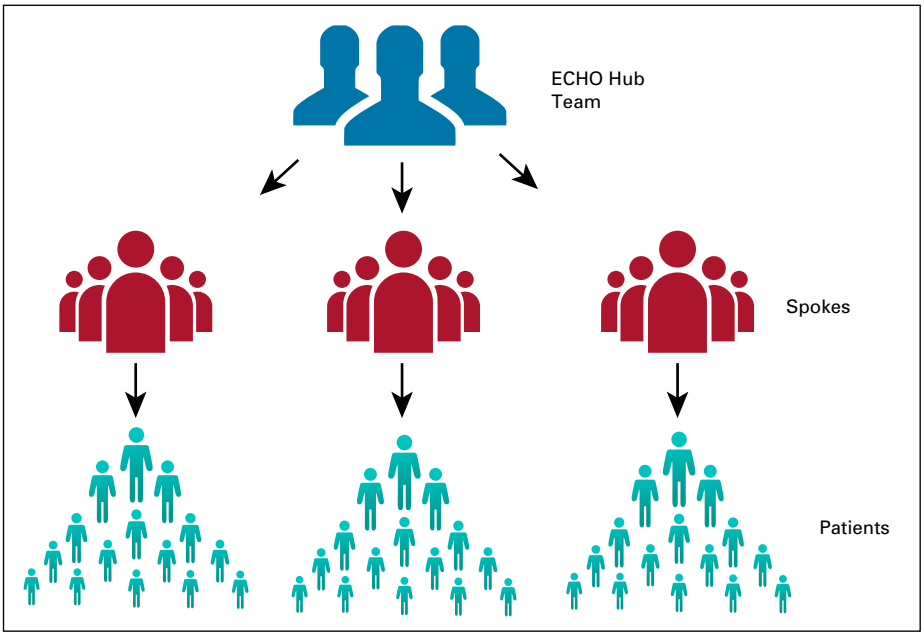

FIG 1. Hub and spoke model of Project ECHO (Extension for Community Healthcare Outcomes).

outside of Kerala, we are aware of only four pediatric-focused programs: Hyderabad, Mumbai, Delhi, and Pune.[14]

Palliative Care Education in India

In recent years, several formal palliative care training programs for physicians and nurses have been developed, but none are focused on pediatrics.[16] Palliative care training has also not been systematically incorporated into undergraduate training programs for physicians or other health professionals.

A recent study of pediatric postgraduate trainee physicians in South India found that 77% were uncomfortable discussing palliative care with families, yet most of those surveyed (87%) were very interested to improve their knowledge and skills in this area.[18] Providing specialized training for primary care practitioners, nurses, and other professionals in rural settings has been identified as a priority to improve access to palliative care in India.[15,16] Given its vast geographical area and largely rural population, technology-enabled learning provides a simple and economical solution for improving access to PPC education in India. Results from a recent survey study of Indian palliative care clinicians also identify high levels of interest in online training, suggesting that this form of intervention would be well-received.[19]

In this report, we describe the design, implementation, and impact of a new and evolving model of capacity building in PPC through an education program based on the Project ECHO model (ECHO PPC). We discuss the key steps in program development as well as our adaptations of the Project ECHO model to address the specific features healthcare professionals in India and in South Asia more broadly. Our experiences can guide other groups seeking to develop palliative care programs for health professionals in resource-limited settings.

DEVELOPING AND IMPLEMENTING ECHO PPC

We selected the Project ECHO model that is specifically designed to reach healthcare workers in remote and underserviced areas, locations where many children needing palliative care in India reside. Our program was developed jointly by a local palliative care society (Pain Relief and Palliative Care Society, Hyderabad, India) and a nongovernmental organization (Two Worlds Cancer Collaboration, Vancouver, Canada), through the existing partnership providing palliative care education and clinical support in Hyderabad, India.

The initial focus of ECHO PPC was to build the capacity of healthcare professionals in India to provide PPC, and over time, our geographical scope has expanded to all of South Asia. Since PPC requires a multidisciplinary team approach, we invite physicians, nurses, psychologists, pharmacists, physiotherapists, social workers, and counsellors to participate in ECHO PPC programs.

Over the past 2.5 years, we have conducted a series of ECHO PPC courses, tailored to the needs of various groups of target learners. Table 1 lists the completed and upcoming courses. Topics for selected courses are shown in Appendix Table A1. We tracked the development of new PPC services in South Asia through our network of participants and professional networks.

For assessment of the program's impact, we invited learners from the first ECHO PPC program by e-mail to participate in an online survey to explore their experiences with the program. Demographic and professional practice characteristics of study participants were collected. This study was approved by the Children's Hospital of Eastern Ontario's ethics board, approval number 17/201X. Written informed consent was obtained from all study participants.

Key Steps and Modifications

During development and evolution of these courses, we developed a number of innovations and adaptations to Project ECHO, which are highlighted in Table 2.

Preparation Phase

Leadership and administrative support teams. The core leadership team includes experienced palliative care physicians and other experts from India and Canada. We also include physician trainees, initially as observers on the leadership team, with a gradual transition into leadership roles as their skills increase. For each individual course, course-specific leaders are added to the core leadership team. These members are generally leaders or key stakeholders representing the target learners for a particular course.

We complimented the original mandatory training for new Project ECHO sites from Project ECHO (India) with additional mentoring from established Project ECHO leaders specific to palliative care from the Trivandrum Institute of Palliative Sciences–Pallium India and Hospice UK.

The program coordinator facilitates administration of the program by sending reminder and summary messages (via e-mail and WhatsApp) to participants and speakers, maintaining an online resource library (on Google Drive), and uploading session recordings to a video-sharing website for participants to access.

We developed a checklist (Table 3) of the leadership and administrative roles for each ECHO PPC session. This checklist is reviewed during the weekly preparation meeting, helping to ensure that leadership, administrative, and technical staff are aware of the specific roles and responsibilities for a particular week, which is particularly relevant given that the leadership team is often spread across several continents.

Technical considerations. ECHO India provided on-site technical support with program launch and continues to provide support remotely. An information technology technician is employed to facilitate technical management

TABLE 1. ECHO PPC Courses

Series Name	Description	Target Learners[a]	Number of Sessions[b]	Dates	Leadership Team Members
PPC	Comprehensive overview of PPC, including physical and psychosocial concerns communication	Healthcare providers caring for children with life-limiting conditions	24	April 2018-February 2019 (biweekly)	Core team only
PPC 2.0	Comprehensive overview of PPC, including pediatric life-limiting conditions, physical and psychosocial concerns communication	Palliative medicine residents in India	27	April 2019-July 2020 (biweekly)	Faculty leaders from residency training sites
COVID-palliative care ECHO	Issues related to providing palliative care in COVID-19 pandemic	Palliative care providers in India	9	April-May 2020 (weekly)	Indian national leaders and international experts
Introductory PPC for Nepal	Holistic introduction to PPC	Pediatric and palliative care clinicians in Nepal	10	June-August 2020 (weekly)	National pediatric and palliative care leaders from Nepal and international experts
Intermediate PPC for Nepal	Physical and emotional symptom concerns, in further detail than introductory series	Pediatric and palliative care clinicians in Nepal	10	December 2020 (weekly)	National pediatric and palliative care leaders from Nepal and international experts
Introductory palliative care for humanitarian settings	Introductory-level palliative care humanitarian health settings	Health workers in Rohingya refugee camps, Bangladesh	7	Batch 1: September-October 2020 (twice per week). Batch 2: December-January 2020 (weekly)	Clinical leaders of Rohingya palliative care response and international humanitarian palliative care experts

Abbreviation: ECHO, Extension for Community Healthcare Outcomes; PPC, pediatric palliative care.

[a]Target learners are those for whom the course is developed; however, courses are generally open to all interested clinicians who report that the sessions also meet their learning needs.

[b]Details of the topics of each series are included in Appendix Table A1.

of each session at the hub site. A stable high-speed Internet connection, backup power supply, and appropriate audio-visual equipment are needed to ensure smooth and reliable hosting from the main site, whereas participants can easily join from anywhere with a computer or mobile device. We use Zoom as the videoconferencing platform for our sessions, and our information technology technician hosts videoconferencing practice sessions for participants and speakers to minimize technical problems during sessions.

Determining program goals and curriculum design. The leadership team identifies target learners and their specific learning needs through discussions and an online survey to assess learning needs prior to starting the course (an example of this survey is included in the Data Supplement). Topics that are frequently of high interest to participants are shown in Table 4.

Participant identification and recruitment. Recruitment strategies are adapted to the specific course and may include social media, e-mail, telephone, word of mouth, and advertisements on websites and social media sites of relevant local or national professional organizations, academic institutions, and healthcare facilities, such as Pallium India, the Indian Association of Palliative Care, the International Children's Palliative Care Network, and eHospice.

Implementation

Session format. The main components of each session are described in Table 5. A case presentation template is used to provide a simple and standardized format to facilitate clear case presentations from participants (Appendix Table A2). During each session, a clinical expert provides a short didactic lecture. The expert may be a member of the leadership team or an external expert depending on the subject.

Facilitator. The facilitator (a member of the leadership team) welcomes participants and introduces each component of the session, ensuring that the session flows smoothly, minimizing pauses between sections of the session. The facilitator pays particular attention to encouraging participation, using questions directed at specific participants and comments that guide the flow of the discussion toward key teaching points. Two large screens at the hub site to visualize of all participants simultaneously, which allows the session facilitator to observe participants' expressions and encourage greater learner engagement. We have developed a facilitator training program to provide structured guidance for new facilitators.

Chat feature. Participants are also encouraged to use the chat feature in Zoom as an additional way of interacting.

TABLE 2. Key Innovations and Adaptation of Project ECHO Model

Original Project ECHO Step	Modification	Rationale
Form core leadership team with subject matter expertise	Include local, regional, and international experts in leadership team	Increase participant interest in program by providing latest knowledge as well as specific adaptions to local context
	Include physician trainees in leadership team, with gradual transition into leadership roles	Facilitates capacity building in leadership roles as trainees develop skills to lead Project ECHO independently in their future career
	Include key stakeholders from target learner group in leadership team	Improves core leadership team's understanding of learners and builds the capacity of course-specific leaders to run Project ECHO independently in future
	Establish leadership team roles using session checklist (Table 4)	Ensures that team members are aware of their roles and responsibilities for each session
Immersion training for new Project ECHO hub sites	Seek mentorship from established Project ECHO programs on palliative care	Allows sharing of knowledge and experiences, challenges, and possible solutions relevant to Project ECHO in LMICs and palliative care
Program coordinator supports administrative aspects	Maintain an online resource library on Google Drive	Improves resource and knowledge dissemination to participants
	Use social medial channels familiar to participants	
Technological support from ECHO India	Ensure stable high-speed Internet connection and backup power supply	Ensures smooth and reliable hosting and avoids technical problems that cause learners to lose interest
	Have a backup computer and an audiovisual setup during each session at hub site	
Physical setup for ECHO	Ensure large seating area at hub site	Ensures adequate space for visiting learners to participate and allows for physical distancing for COVID-19 pandemic
	Air-conditioned room	Ceiling fans generate too much background noise
Use appropriate videoconferencing platform	Host introductory sessions on videoconferencing etiquette and how to use Zoom prior to each course for participants and any new speakers	Minimizes participant interruptions because of technical problems during teaching sessions
Develop program learning objectives and define target learners	Use online (mobile-friendly) survey to assess participants' learning needs prior to starting the course	Ensures course matches participants' interests and learning needs
Recruit participants	Partner with local or national professional organizations, universities, and hospitals to increase awareness of the course.	Increases recruitment of participants who are interested and could benefit from the course, particularly because such networks may be more limited in resource-limited settings
	Use social media, e-mail, telephone, word of mouth, and advertisements on websites or social media sites of relevant professional groups.	
Ask participants to present clinical cases for discussion	A case presenter uses a prescribed template incorporating key components of palliative care approach	Ensures cases are presented in a clear format, particularly since participants may not be experienced in succinct case presentations
	A faculty member provides feedback and suggestions to presenter prior to presentation	
Multiple cases may be presented in a single ECHO session	Only one case presentation per ECHO session	Ensures that adequate time is allotted for discussion of case and encourages learners to participate in discussion
Experts provide didactic teaching	External experts are given information about local resources and relevant medication availability prior to their session	Ensures content of expert's teaching is relevant to local resources and medications that are available
Encourage participation from all learners	Facilitator training program to enhance the role of the facilitator in encouraging participation	Encourages active learning by participants particularly since participants may be hesitant to participate without encouragement
	Use chat feature to encourage participation	Provide lower stakes option for participants who are hesitant to participate verbally
Learning through didactic teaching and case discussion during ECHO sessions	Provide additional learning resources for asynchronous learning, including learning points, sessions recordings, curated database of additional PPC resources, and social media channels for discussion	Provide opportunities for further learning outside of the ECHO PPC session, which complements the sessions.
	Use online examinations and written assignments to improve knowledge and skill retention	
Leadership team debriefs after each session	During debriefing, the leadership team considers the need for modifications to the session schedule and content to ensure that the learning goals are reached	Ensures learning is relevant to participants and meeting their learning needs
Assess participants' experiences of Project ECHO	Use social media to recruit participants for pre- and post-ECHO surveys	Improve response rates as many participants rarely use e-mail or are more comfortable with social media.

Abbreviations: ECHO, Extension for Community Healthcare Outcomes; LMICs, low- and middle-income countries; PPC, pediatric palliative care.

TABLE 3. Weekly Preparation Role Checklist and Role Description

Item	Item Description
Session date	—
Session title	—
Host	Shares his/her screen and advances slides during the session. Typically, the program coordinator fills this role.
Backup host	Functions as a backup for the host in case the host has Internet connection problems or other technical issues.
Facilitator	Moderates session, introduces speakers, and engages and calls upon participants for input during discussion.
Backup facilitator	Acts as a backup for facilitator in case of Internet or other technical issues.
Writer of key learning points	Learners take turns completing this task. A roster for this role is made at the beginning of the course.
Faculty for review of key learning points	One leadership team member is assigned to review learning points before these are shared with participants.
Chat moderator	One leadership team member reads and responds to all comments and questions in the chat. The facilitator may call upon the chat moderator to read key questions or comments from the chat for important learning points.
Speaker	An expert who provides didactic session, may be a member of the leadership team or an external expert, depending on the session's subject.
Local context speaker (optional)	A local leader or participant may be invited to share context specific to the local situation (eg, discuss local availability of opioids).
Case presenter	Learners take turns completing this task. A roster for this role is made at the beginning of the course.
Timekeeper	A leadership team member is introduced in this role at the beginning of the session and will give speakers a 1-minute warning before their time is up.
Debrief leader	The leadership team member who leads the debrief meeting after the session.

Comments and questions in the chat may be read aloud by the facilitator. A member of the leadership team is assigned to moderate the chat each week and respond to questions that may not be answered verbally during the session. We find that the chat discussion often complements the audio discussion and that there is often no time to discuss all the issues raised by participants. There may also be questions in the chat that are not relevant to the larger group of learners or not relevant to the session's topic, which can instead be answered individually by the chat moderator.

Learning materials. Participants can access a variety of learning materials outside of ECHO PPC sessions, which are shared via e-mail and social media. Social media channels are developed to allow participants to ask questions and interact with the new material outside of the sessions.

TABLE 4. Palliative Care Topics of Highest Interest to Participants Prior to Starting ECHO Program

Pain assessment in children
Pain management in children
Opioid use in children
Identifying and managing depression and anxiety in children
Palliative sedation
Communication with children
Breaking bad news to parents and children

Abbreviation: ECHO, Extension for Community Healthcare Outcomes.

Program Evaluation

Debriefing. The leadership team conducts a short debrief immediately following each session to discuss progress toward the desired learning outcomes, and the team may make modifications to the session schedule and content on the basis of their discussion, continuously allowing improvements of the course to ensure it meets the learning needs of participants.

Survey of participants. At the end of each course, we conduct an online survey of participants about program satisfaction; the barriers and enablers of participation; and their knowledge, skills, and self-efficacy in palliative care. Although a full discussion of the results of this evaluation is beyond the scope of this article, Table 6 shows a summary of responses from participants from the first ECHO PPC course. These participants describe the main benefits of participation as learning more about PPC, learning from the experience of other participants, and hearing about palliative care practices in different countries. Additionally, participants noted the benefit of an opportunity to learn and discuss relevant topics and how this increased their own motivation to continuing learning about PPC and their awareness of their own learning needs. We found that survey response rates were low when sent by e-mail; after the first course, we have modified our recruitment strategy to use social media.

The main factors that facilitated participation include convenient session timing and duration, ease of accessing the sessions online, and reminder e-mails. The most significant obstacles of participation included Internet

TABLE 5. Key Sections of a Typical ECHO Pediatric Palliative Care Session

Section	Duration[a]	Description	Purpose
Introduction	5-10 min	Facilitator welcomes participants	Build group cohesion and develop an online learning community
Didactic presentation	20-30 min	The speaker is introduced and leads a didactic teaching session	Provide participants with new knowledge and skills about a particular topic
Discussion	10-15 min	Participants are invited to discuss the topic and ask the speaker questions (verbally or written in chat feature)	Clarification of the new material presented
		The facilitator leads group in discussion around the potential local challenges to implementation of treatments discussed by the speaker	Participants are encouraged to apply knowledge to their own clinical practice setting, share their experiences, and reflect on the new knowledge presented
Case presentation	10 min	One participant presents a clinical case (case does not include any personal health information) using a structured template	Provide participants with an opportunity to discuss issues that are relevant to their own clinical practice and apply new knowledge and skills
		The presenter identifies two to three key questions from the case for discussion	
Case discussion	10-15 min	Participants discuss the key questions from the case	Participants share experiences and practical solutions to problems relevant to their clinical practice
		The facilitator stimulates discussion by asking questions or asking participants to share relevant experience	Encourage deeper learning among participants
		The facilitator encourages verbal questions but offers participants the option to write questions or comments in the chat window	Link learning to the local context
Summary and conclusion	5 min	The facilitator summarizes the key learning points of the session	Provide participants with a content summary to increase retention
Postsession	Electronically (e-mail, file-sharing sites, and social media)	The program coordinator shares key learning points, relevant clinical resources (articles, book chapters, and guidelines), and the video recording with participants	Provide additional reinforcement of learning
			Provide resources for participants to learn more about the topic
			Participants can review any sessions that they were not able to attend.

Abbreviation: ECHO, Extension for Community Healthcare Outcomes.
[a]Duration varies depending on the length of the session (60, 75, or 90 minutes).

connection problems and busy work schedules. Participants were very motivated to attend further training, and all stated that they would recommend ECHO PPC to others.

Service delivery impact. We are aware of the development of fifteen new services, including ten community-based palliative care services that are able to support children in India[8] and Bangladesh[2] and five hospital-based PPC services (one in India and four in Bangladesh), since 2018. Although the implementation of these services is not fully attributable to ECHO PPC, it is notable to consider that ECHO PPC may have supported the development of these services, particularly since healthcare providers from 11 of these programs have participated in ECHO PPC.

DISCUSSION

We have described our experiences developing, adapting, implementing, and evaluating a novel capacity building program for PPC. ECHO PPC consists of regular (weekly or biweekly) virtual training sessions, incorporating didactic teaching from international experts and clinical case discussions. Our model of capacity building incorporates key principles from health professionals' education into its design and implementation, including focusing on participants' self-identified gaps in knowledge, providing opportunities for problem-oriented learning, and creating a supportive learning community.[20,21]

Our flexible and adaptive leadership structure includes a core leadership team and course-specific leaders and stakeholders. Previous e-learning courses have identified the importance of ensuring that all partners understand the local healthcare and educational systems of trainees.[22] This structure allows our core leadership team to gain an in-depth understanding of the local medical culture and healthcare situation from the course-specific leaders.

Having a defined mission statement has been identified as an important step for health professional training programs.[23] In our setting, we found that ensuring a unified

TABLE 6. Initial ECHO Program on PPC Participant Experience (N = 18)

Characteristics	No.	%
Participant characteristics		
Professional role		
Medical officer	10	55.6
Consultant physician	4	22.2
Pharmacist	2	11.1
Nurse	1	5.5
Project coordinator	1	5.5
Years in clinical practice		
< 5	5	27.8
5-9	8	44.4
10 or more	4	22.2
Missing data	1	5.5
Primary focus of clinical work		
Adult and PPC	7	38.9
Adult palliative care	5	27.8
PPC	2	11.1
Pediatric oncology	1	5.5
Pediatrics	1	5.5
Pain medicine or anesthesia	1	5.5
Missing data	1	5.5
Number of children needing palliative care being managed by my team, (monthly)		
< 11	9	50.0
11-25	1	5.5
26-50	3	16.7
> 50	5	27.8
Participants' use of ECHO PPC learning resources		
I watched recorded ECHO PPC sessions		
Always	3	16.7
Often	4	22.2
Sometimes	9	50.0
Never	2	11.1
I read key learning points shared after the session		
Always	8	44.4
Often	6	33.3
Sometimes	4	22.2
I downloaded materials from ECHO PPC Google Drive		
Yes	11	61.1
No	7	38.8
Participants' experiences and evaluation of ECHO PPC		
Participants who agreed with the following statements		
The didactic portion provided high-quality teaching	17	94.4
There were ample opportunities to ask questions or make comments during the sessions	17	94.4
I was able to speak when I wanted to contribute to the discussion	17	94.4
The cases presented were relevant to my own clinical practice	17	94.4

(Continued on following page)

TABLE 6. Initial ECHO Program on PPC Participant Experience (N = 18) (Continued)

Characteristics	No.	%
During discussions, facilitators encouraged participation from all who were attending, n = 17	16	94.4
The speakers and other experts participating had relevant experience	18	100.0
The structure and organization of ECHO PPC facilitated my learning	18	100.0
ECHO sessions provided exposure to multiple relevant perspectives	18	100.0
Facilitators made ECHO PPC a welcoming environment, n = 17	17	100.0
I will attend future ECHO programs on PPC, n = 17	17	100.0
I will recommend future ECHO programs on PPC to others, n = 17	17	100.0

Abbreviation: ECHO, Extension for Community Healthcare Outcomes; PPC, pediatric palliative care.

course vision required a series of discussions between core and course-specific leadership team members to develop a common shared understanding and vision for the course. The program goals then guide the development of a learning plan to meet the educational needs of the particular learners, with weekly leadership team debriefing meetings to address newly identified learning gaps, which often become more apparent as the course progresses.

Understanding the practice characteristics and baseline knowledge of program participants has been identified as important to ensuring that training is at an appropriate level and allows training to build on participants' prior knowledge and skills.[23] We developed a brief survey for new participants to learn about their professional and clinical practice characteristics. The survey data as well as participant feedback from previous ECHO PPC courses and the experiences of the leadership team inform the selection of didactic teaching topics for each course.

Incorporating case-based learning is an important aspect of the Project ECHO model since active learning and peer discussion are associated with improved learning outcomes.[24] However, in a virtual environment, interactivity requires additional efforts since nonverbal speaking cues are often not visible to participants.[11,20,24] We describe how the facilitator plays a key role in creating a supportive and encouraging learning environment in the virtual context. Facilitators use specific strategies to ensure that learners feel safe and comfortable and to minimize traditional healthcare hierarchies.[20] These strategies include welcoming participants by name, understanding participants' clinical roles, and calling on specific participants to share their expertise and experiences. Facilitators may also invite participants to read aloud their comments or questions from the chat. Our preliminary survey findings suggest that this format provides a safe and welcoming environment for participants and encourages them to feel comfortable speaking.

An additional aspect of a supportive learning community is the availability of learning resources in a time and form that is convenient for participation. We found that participants frequently used ECHO PPC resources after the live sessions, with the majority watching session recordings (89%), reading key learning points (100%), and downloading database resources (61%). These findings suggest that learning from Project ECHO can be enhanced by expanding the learning environment beyond the individual Zoom sessions, which has not been discussed in previous descriptions or reviews of other Project ECHO programs.[25] Since most learners in LMICs are using mobile devices (not computers) to access social media, it is important that electronic resources are suitably formatted for mobile devices.[26]

We used pre- and post-ECHO assessments of participants' knowledge, skills, and attitudes about palliative care to assess the impacts of ECHO PPC, which has been described in previous Project ECHO programs.[25] There are limited data regarding the evaluation of Project ECHO outside of high-income countries, and we found that low survey response rates posed a particular challenge that may be particularly relevant in resource-limited settings. We initially used e-mail for survey distribution but found that distributing invitations and reminders via social media platforms has improved response rates.

In conclusion, Project ECHO is a novel model of building PPC capacity that is suitable for resource-limited settings. Key modifications to the Project ECHO model include a course-specific leadership team and a curriculum that addresses the specific cultural and healthcare system realities of each group of learners. The learning experience was further enriched by the use of facilitators to enhance learner participation during sessions and social media and electronic resources to create opportunities for further learning outside of ECHO sessions. These adaptations may improve the efficacy of Project ECHO and others using virtual learning programs in resource-limited settings.

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Administrative support: Vineela Rapelli
Provision of study materials or patients: Gayatri Palat
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Accountable for all aspects of the work: All authors

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians (Open Payments).

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APPENDIX

TABLE A1. Schedule of Sessions for Completed ECHO PPC Courses

PPC

Session No.	Topic
1	Introduction and identifying children needing PPC
2	Assessing pain and other symptoms in children
3	Opioids in children and WHO pain ladder
4	Communication: breaking bad news to parents
5	Opioid rotation, titration, and routes of administration
6	Communication with children: challenges and what they do understand
7	Use of opioids in children with noncancer diagnoses
8	Management of dyspnea-oxygen and morphine and more
9	Supporting siblings in palliative care
10	Importance of play therapy
11	Supporting the withdrawn child
12	Identifying and managing delirium in children
13	Grief and bereavement in children
14	Palliative sedation in pediatrics
15	Helping the anxious child
16	Talking to children about death and serious illness
17	Building relationships with children and families
18	Fluids and feeding at end of life
19	Treating pain and irritability in nonverbal children
20	Cerebral palsy—management in palliative care
21	Supporting adolescents with life-limiting conditions
22	Perinatal palliative care
23	Legacy and memory-making activities
24	Management of involuntary movements

PPC 2.0

Session No.	Topic
1	What is PPC and which conditions need PPC
2	Unique considerations of pediatric symptom management
3	Developmental stages and milestones in pediatrics
4	Pain assessment in children
5	Using opioids in children, focus on noncancer diagnoses
6	Procedural pain management
7	Pain in nonverbal children
8	Pain treatments: methadone and beyond opioids
9	Play therapy
10	Talking to children about serious illness and death
11	Dyspnea in children
12	Anorexia and fluids in children at EOL
13	Spasticity and dystonia
14	Siblings
15	Legacy and memory-making
16	Perinatal palliative care
17	Cerebral palsy in resource-limited settings, how can palliative care help, common symptoms and concerns
18	Specific concerns of adolescents with life-limiting conditions
19	Neuro-irritability and agitation
20	Anxious or withdrawn child
21	Delirium in children
22	Ethics and withdrawal of life-sustaining treatment
23	End-of-life care, locations of end-of-life care
24	Grief and bereavement in children
25	Sickle cell disease, role of palliative care in resource-limited settings
26	Neurological and neurodegenerative conditions
27	Setting up a PPC program

COVID-Palliative Care ECHO

Session No.	Topic
1	Redesigning existing PC services in COVID pandemic
2	Optimizing our use of virtual care for home-based palliative care
3	Staying safe in health interactions and health environment for palliative care providers—a rapid review of evidence
4	Specific mental health challenges in palliative care during COVID pandemic
5	Leveraging our expertise in palliative care to respond to the COVID-19 pandemic (symptom control guidelines and more)
6	Effects of COVID pandemic on children, their emotional needs and roles
7	Understanding clinical features and symptoms of COVID
8	Exploring equitable care in COVID pandemic times
9	Voices of COVID—patients' and clinicians' perspectives

Introductory PPC for Nepal

Session No.	Topic
1	Welcome and introduction to course and teaching methods and assignments
2	Introduction to PPC (it's not just end-of-life care), oncology and beyond; what does a palliative care program look like
3	PPC in nononcology conditions and various settings (ICU, NICU, home, hospice, and hospital)
4	Team-based PPC, including human resource needs in PC, education of healthcare providers, creating a common language to enhance understanding of prognosis with fragility or instability
5	Opioids and pain management in children and infants, local opioid availability and regulations
6	Role of psychosocial professionals, family, and community (including volunteers) in palliative care
7	Supporting children who have serious illnesses and with grief and bereavement
8	Importance of play and other supportive therapies for seriously ill children
9	Symptoms other than pain (nausea or vomiting, dyspnea, bleeding, and constipation)
10	Group presentations of their assignments with plans for how to improve PPC in Nepal

Abbreviation: ECHO, Extension for Community Healthcare Outcomes; EOL, end of life; ICU, intensive care unit; NICU, neonatal intensive care unit; PC, palliative care; PPC, pediatric palliative care.

TABLE A2. Template for Case Presentation (Each Item Is Presented on a Separate Slide)

Slide Heading
1. Patient details (age, sex, and diagnosis)
2. Brief summary of treatment related to life-limiting condition
3. Past medical history (if relevant)
4. Pain and symptoms, including relevant treatments
5. Psychosocial and family concerns and structure
6. Spiritual concerns
7. Communication (between family and healthcare teams and between family members)
8. Collaboration and partnerships with other healthcare teams or organizations
9. Summary of case
10. Key questions that case presenter would like to discuss

