Original Article

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Online palliative care education and mentorship in Nepal: Project ECHO – a novel approach to improving knowledge and self-efficacy among interprofessional health-care providers

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Abstract

Background. Palliative care access in Nepal is severely limited, with few health-care providers having training and skills to pain management and other key aspects of palliative care. Online education suggests an innovation to increase access to training and mentoring, which addresses common learning barriers in low- and middle-income countries. Project ECHO (Extensions for Community Health Care Outcomes) is a model of online education which supports communities of practices (COPs) and mentoring through online teaching and case discussions. The use of online education and Project ECHO in Nepal has not been described or evaluated.

Setting. An online course, consisting of 14 synchronous weekly palliative care training sessions was designed and delivered, using the Project ECHO format. Course participants included health-care professionals from a variety of disciplines and practice settings in Nepal.

Objectives. The goal of this study was to evaluate the impact of a virtual palliative care training program in Nepal on knowledge and attitudes of participants.

Methods. Pre- and post-course surveys assessed participants' knowledge, comfort, and attitudes toward palliative care and evaluated program acceptability and barriers to learning.

Results. Forty-two clinicians, including nurses (52%) and physicians (48%), participated in program surveys. Participants reported significant improvements in their knowledge and attitudes toward core palliative care domains. Most participants identified the program as a supportive COP, where they were able to share and learn from faculty and other participants.

Conclusion. Project ECHO is a model of online education which can successfully be implemented in Nepal, enhancing local palliative care capacity. Bringing together palliative care local and international clinical experts and teachers supports learning for participants through COP. Encouraging active participation from participants and ensuring that teaching addresses availability and practicality of treatments in the local health-care context addresses key barriers of online education.

Significance of results. This study describes a model of structured virtual learning program, which can be implemented in settings with limited access to palliative care to increase knowledge and attitudes toward palliative care. The program equips health-care providers to better address serious health-related suffering, improving the quality of life for patients and their caregivers. The program demonstrates a model of training which can be replicated to support health-care providers in rural and remote settings.

Introduction

Palliative care focusses on managing pain and other symptoms for individuals with serious illnesses. Worldwide there is a significant need for palliative care, with more than 56 million individuals needing palliative care annually, 80% of whom live in low- and middle-income countries (LMICs), such as Nepal, where access to palliative care is extremely limited (Worldwide Hospice Palliative Care Alliance 2020). In Nepal, there are few health facilities providing palliative care, with most services concentrated in the Kathmandu Valley (Clark et al. 2020; Gautam and Adhikari 2021). Since 2009, morphine has been manufactured in Nepal and is available
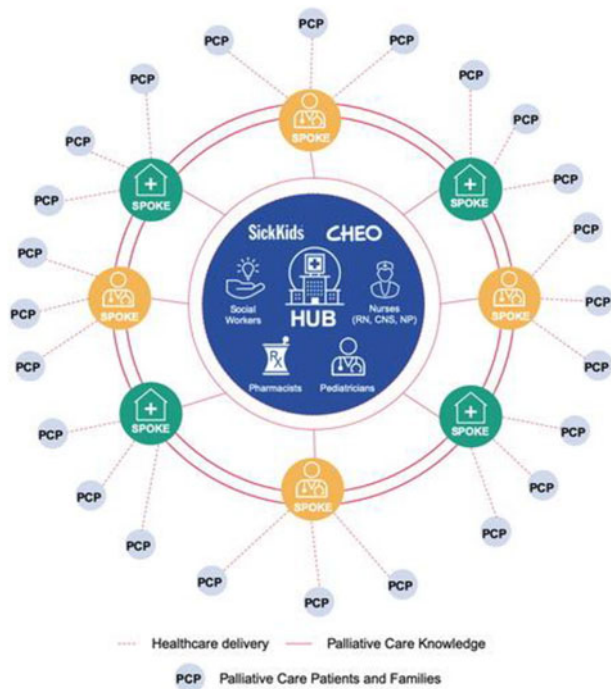
Figure 1. Hub-and-spoke design (Image credit ECHO Ontario, used with permission) (Lalloo et al. 2021, 3).

in both oral (syrup, immediate and sustained release tablets) and intravenous formulations (Gautam and Adhikari 2021; Munday et al. 2018).

Limited knowledge and training in palliative care among health-care professionals (HCP) has been identified as a major barrier to increasing the availability of palliative care in LMICs including Nepal (Donkor et al. 2018; Gautam and Adhikari 2021). Although medical schools in Nepal have started to implement palliative care into undergraduate education, a recent study among medical students study found limited knowledge about palliative care (Pandey et al. 2015). Palliative care has not been systematically incorporated into UG or PG training for HCP in other disciplines, such as nursing and psychology (Gautam and Adhikari 2021). Opportunities for continuing professional development (CPD) in palliative care are limited, and if available, training is generally delivered in urban centers which makes it challenging for staff from rural areas to attend (Hannon et al. 2016; Saini and Bhatnagar 2016).

Online learning has increasingly been reported as innovative solution to improve the availability of palliative care education in LMICs. Online education offers particular benefits, since it can reduce financial and travel barriers for HCP, and allow specialists to connect directly with HCP in rural and remote areas for training and mentorship (Frehywot et al. 2013; Salins 2020). Project ECHO (Extensions for Community Health Care Outcomes) is novel model of online education which was developed to train and support community-level health-care providers by connecting them with subject-matter experts during regular (weekly, biweekly, or monthly) teaching and case discussion sessions by videoconferencing (Arora et al. 2017). ECHO employs a "hub-and-spoke" design where experts at a "hub" health facility are connected with participants or "spokes" (Fig. 1).

The "hub" team generally includes specialist clinicians, while "spoke" sites are generally health-care providers working outside

of tertiary centers, who join ECHO to learn and receive support from specialists for particular patient population (Usher et al. 2022). In Nepal where access to specialist palliative care clinicians is extremely limited, ECHO suggests a model which can reach health-care providers who may not otherwise be able to access palliative care training and mentorship (Sutcliffe et al. 2021). Furthermore, ECHO allows palliative care specialists, from outside of Nepal to participate in the learning and mentoring which can further enhance the learning program (Arora et al. 2017). ECHO emphasizes active learning through case discussions and sharing experiences, which may also support learning for participants, since they are encouraged to consider how to apply the new knowledge and skills to their specific clinical practice and cultural milieu. Considering how to adapt palliative care practices to the local clinical situation is particularly relevant in palliative care, since health care for individuals with serious illness and death is particularly influenced by sociocultural factors (Varon et al. 2021).

Despite the potential benefits of online education and the ECHO model, there are several important challenges to implementing virtual learning in resource limited settings. First, a lack of face-to-face interaction can limit active interaction between participants which is important for learning (Frehywot et al. 2013). Second, education and training materials need to be adapted to the local health-care environment and health-care resources available (Frehywot et al. 2013; Kiss-Lane et al. 2019). Third, addressing technological and language barriers for participants are key considerations which have been identified as barriers for participants in a previous ECHO program in India (Doherty et al. 2021a). Previous studies have described the importance of interactive activities and enabling interactions between learners when providing online learning and with Project ECHO specifically (Doherty et al. 2021b; Scott et al. 2017).

Several PC CPD programs using the ECHO model have been reported in the literature, including a program on pediatric palliative care in India and on humanitarian palliative care in Bangladesh, both of these programs included interdisciplinary HCP (Doherty et al. 2022, 2021b). The ECHO program in India identified key adaptions to modify the program to the needs of health-care providers in South Asia. ECHO participants in Bangladesh reported that the program improved their knowledge, comfort, and attitudes toward palliative care (Doherty et al. 2022). Several recent studies have described using online education for UG medical training in Nepal during COVID-19; however, the use of online CPD education in Nepal has not been reported (Nepal et al. 2020; Subedi et al. 2022). Developing and evaluating online palliative care education for HCP in Nepal is an important topic which warrants further study.

The aims of this study are to evaluate the impact of an ECHO program to provide CPD training on palliative care for interdisciplinary clinicians in Nepal, assessing program acceptability and changes in learners' self-reported knowledge, comfort, attitudes, and practice change through pre- and post-ECHO surveys. Evaluating the impact of ECHO programs will support further refinements and modifications to ECHO for CPD.

Methods

Learning program description

The ECHO program developed through an existing partnership between clinicians and educators in Nepal and Canada

Table 1. Weekly session topics of palliative care ECHO in Nepal

1	Introduction to the Palliative Care ECHO Course Introduction of Participants and Faculty
2	Introduction to Palliative Care and the Palliative Care Situation in Nepal
3	Pain Management Including Opioids
4	Whole Patient Assessment
5	Respiratory Problems in Palliative Care
6	Communication in Palliative Care
7	Gastrointestinal Problems in Palliative Care
8	Nursing Roles in Palliative Care
9	Depression, Anxiety, Delirium and Suffering
10	Non-cancer Illness in Palliative Care
11	Nutrition, Hydration, Food and Fluids
12	Last Days and Hours
13	Grief and Bereavement
14	Ethical Issues in Palliative Care

(Brown et al. 2007; Sutcliffe et al. 2021). A series of collaborative discussions with key stakeholders was conducted, leading to the formation of a leadership team of palliative care experts and educators from Nepal and Canada. The leadership included palliative care nurses, doctors, and a pharmacist, supported by a program coordinator for administrative and logistical support.

Learning needs assessment and course content

During the planning phase, an online needs assessment survey of potential ECHO participants was done to understand learning needs. The survey was distributed by email and social media to individuals interested in palliative care training and included questions about the format of training (preferences for timing and duration of sessions) and specific topics of interest. The leadership team also met with potential participants and other palliative care clinicians in Nepal to further explore topics and course design. The leadership team had experience with in-person palliative care education in Nepal and was thus well connected to potential ECHO learners. Several team members had participated in previous pediatric palliative care ECHO programs (Doherty et al. 2021b; Lynch-Godrei et al. 2021). Teaching topics were determined through group consensus by the leadership team, with consideration of survey results, stakeholder feedback, expert opinions, and a review of the relevant literature. Table 1 shows the topics which were included.

Program recruitment

The course was advertised to potential participants by email, word of mouth, telephone, and social media chat groups, through team members' established networks. All interested HCP were invited to participate and there was no course fee. Potential participants were provided with information regarding the ECHO, including the timing of sessions and the technological requirements to join (laptop, tablet, or smartphone and stable high-speed internet connection).

Program structure

The ECHO program consisted of 12 weekly 1-hour online sessions conducted between January and April 2022 using Zoom Videoconferencing Software. An information technology specialist attended each session to support rapid troubleshooting of technical issues. Each session included a didactic presentation (20–30 minutes), from a palliative care expert (local or international). For international speakers, a Nepali physician provided a summary of the specific adaptations of the topic to the local health-care situation. Didactic teaching was followed by questions from participants (10 minutes) and case presentation by a participant with subsequent case discussion (20–30 minutes).

Sessions were facilitated by the leadership team, after facilitation training which emphasized key practices to encourage interaction and sharing by participants. Participants who registered and attended all course sessions received a course certificate. Participants received weekly emails following each session which included a summary of the session's key learning points, the didactic presentation slides, and a link to the session video recording. Participants were invited to join a social media chat group on WhatsApp for the duration of the course, where participants and faculty interacted between sessions.

Study recruitment

All learners who register for ECHO were invited to participate in this study, which included surveys at the time of program registration ("pre") and at the end of the ECHO program ("post"). Survey recruitment was done by email and social media.

Survey development

Surveys were develop based on team members' previous experiences evaluating ECHO programs on palliative care in South Asia and a review of the relevant literature. The surveys were intended to explore participants' knowledge of palliative care as well as their attitudes toward key topics and their comfort in delivering key elements of palliative care. There were specific survey questions for each teaching topic. Survey questions also addressed course satisfaction, barriers and enablers of program participation, and clinical practice change as well as exploring participants' use of the learning materials, including recordings, presentation slides, and additional reading materials. Demographic data collected included health profession, area of practice/specialty, years of experience, and contact with seriously ill patients in clinical practice. The wording of questions was reviewed and modified based on feedback from HCP in Nepal to ensure that the wording reflected local palliative care concepts.

Participants' knowledge of specific items included the stem question "for my scope of practice, I have an appropriate level of knowledge about …" In the self-efficacy domain, there were 15 questions with the stem "within my scope of practice, I am confident in my ability to …" Studies of ECHO programs report that participants may initially overestimate their level of knowledge and comfort before the ECHO program, and this study asked participants to re-rate their baseline abilities during follow up surveys and these adjusted baseline responses were subsequently used in the analysis. Survey questions included responses as multiple choice, free text, and using a 7-point Likert scales with response options ranging from [1] "strongly agree" to [7] "strongly disagree" (Data Supplement S1).

Table 2. Topics of interest to participants

Select the topics of most interest to you (participants could select up to 5 topics)	
Pain management	82%
Talking to patients about serious illness and death	62%
End-of-life care	62%
Supporting patients with anxiety and grief	54%
Communication of bad news	51%
Feeding and fluids – discontinuing at the end of life	46%
Opioids – rotation, switching, availability	46%
Neurological symptom management	41%
Compassionate extubation and discontinuing life-sustaining medical treatments	41%
Introduction to palliative care	38%

Statistical analysis

Data were analyzed using Microsoft Excel to obtain descriptive statistics. Mann–Whitney U-tests were performed to evaluate differences between knowledge, comfort, and attitude scores of survey participants before and after participating in the ECHO program. An a priori statistical significance was set to $p = 0.05$. Likert scales were reverse coded to improve clarity of results in presentation. Effect size was calculated using Cohen's d, with an effect size 0.8 or more suggesting a large effect. Likert scales were reverse coded to improve clarity of results in presentation.

Results

Program characteristics

There were 14 educational sessions, with a total of 44 ECHO participants who registered and attended at least one ECHO session, along with 13 faculty members. The needs assessment survey identified pain management, talking patients about serious illness and death, and end-of-life care as topics of most interest to participants (Table 2).

Participant characteristics

Forty-two ECHO learners participated in this study, including 22 nurses (19 staff nurses, 2 nursing students, and 1 nursing lecturer) and 20 physicians (17 staff physicians and 3 residents). Most participants were from urban areas ($n = 38$, 90%), and most were working in a government hospital ($n = 29$, 69%). A smaller number of participants were working in a hospice setting ($n = 10$, 24%) or a university hospital ($n = 3$, 7%). There was a wide variety of specialty areas represented among participants, with the largest numbers coming from oncology (38%), general practice (24%), and other internal medicine subspecialties (19%). There were 6 participants who reported that palliative care was the focus of their clinical work (14%). Most participants were in the first 5 years of clinical practice (67%). Further demographic details of participants are shown in Table 3.

Table 3. Characteristics of participants for project ECHO on palliative care in Nepal ($n = 42$)

	n	%
Profession		
Nurse	19	45
Physician	17	40
Resident physicians	3	7
Nursing student	2	5
Nursing lecturer	1	2
Primary practice setting		
Government hospital	29	69
Hospice	10	24
College/University hospital	3	7
Primary focus of professional work[a]		
Oncology (radiation or medical)	16	38
General practice	10	24
Other subspecialties of internal medicine	8	19
Nephrology	1	
Endocrinology & Obesity	1	
General internal medicine	1	
Unspecified	5	
Palliative care	6	14
Intensive care	2	5
Anesthesia or Pain medicine	2	5
Clinical education	2	5
Emergency medicine	1	2
Pediatrics	1	2
Other	1	2
Missing data	1	2
Years in clinical practice		
<1	3	7
1–5	25	60
6–10	9	21
11–15	2	5
>15	2	5
Missing data	1	2
Average (SD)	5.54 (4.77)	
Highest level of education completed		
Undergraduate	25	69

(Continued)

Table 3. (*Continued.*)

Highest level of education completed		
Masters or PhD	10	24
Postgraduate training or specialization	7	7
Number of palliative care patients managed monthly		
0	8	19
1–10	18	43
11–25	7	17
26–50	4	10
>50	3	7
Missing data	9	21

[a]Multiple responses permitted.

Palliative care knowledge, comfort, and attitudes

The pre-program responses from participants indicated areas where participants rated their knowledge or comfort as low, as indicated by responses of "strongly disagree," "disagree," and "somewhat disagree." These areas included providing end-of-life care ($n = 10$, 26%), breaking bad news ($n = 7$, 18%), and managing anxiety and depression ($n = 6$, 16%). Areas where participants more frequently indicated low levels of comfort were in discussing the transition from a curative to a palliative approach with patients/families ($n = 8$, 21%), discussing palliative care with other health-care providers ($n = 8$, 21%), and providing bereavement care to family members ($n = 8$, 21%). Participants' attitudes related to palliative care included 12 (31%) participants who disagreed with the following statement "withholding or stopping NG tube feeding in a patient with advanced cancer who is in the terminal phase of life and who is no longer able to eat may be good care," including strongly disagree", "disagree," and "somewhat disagree" responses.

Comparisons of participant knowledge (6 areas) and comfort (12 areas) found statistically significant improvements in knowledge and comfort in all areas, as shown in Table 4. At the end of the ECHO program, participant attitudes toward palliative care improved in all 8 areas evaluated, with significant improvements in 6 of 8 areas evaluated. Subgroup analyses with duration of professional experience and profession did not show any significant differences in knowledge, comfort, or attitudes. Table 4 shows further details of the attitudes measured and the changes before and after participation.

Despite completing the program almost one-third of participants felt that they needed more formal teaching/training (32%) or clinical training (29%) to be able to provide palliative care. Additional barriers to practice change included a lack of time ($n = 6$, 21%) and lack of palliative care training among team members ($n = 6$, 21%). Only 2 participants indicated that medications discussed during ECHO were unavailable in their setting.

Program acceptability and satisfaction

Upon completion of the ECHO program, most participants (93%) felt the program had become a supportive COP and was an effective way to learn (89%). Most participants would recommend this program to colleagues (89%) and noted that participating in this program was a valuable experience (89%). Participants felt comfortable participating in ECHO discussions (68%) and using video conferencing (86%), with 89% agreeing that faculty were supportive and approachable.

Further details of participants' experiences with the program are shown in Table 5. The most frequent barriers to participating in the ECHO program included at lack of time ($n = 20$, 71%) and technical issues ($n = 11$, 39%).

Learning resources

Seventeen participants (60%) accessed learning resources from the shared online folder for the course; however, 25% of participants were unaware of this resource. Three quarters ($n = 21$) of participants reported that they reviewed the key learning points for each session some or most of the time. Video recordings were most commonly (71%) reviewed by participants after they had missed a session, and 18% of participants used video recordings to teach colleagues or learners who were not participating in the ECHO.

Discussion

This study describes an online education and mentorship program in palliative care, which used the Project ECHO model to train health-care providers. The study identifies improvements in learners' knowledge, comfort, and attitudes toward palliative care from program participation. Most participants were highly satisfied with the program, noting that faculty provided a supportive learning environment; however, the majority felt that they would benefit from further clinical training to be able to provide palliative care.

Online learning

Online learning has been suggested as an important tool to address HCP shortages in LMICs, and increasing access to palliative care training in these settings is particularly important (Yennurajalingam et al. 2019). Despite the proposed benefits, online learning has not been widely implemented in LMIC (Barteit et al. 2019; Karim et al. 2021) Project ECHO is a method of online learning which may be particularly effective, as several previous studies have demonstrated improvements in HCP knowledge, skills, and attitudes from participation in PC ECHO programs in India, Bangladesh, and Ireland (Doherty et al. 2022; Lynch-Godrei et al. 2021; Usher et al. 2022). The present study's findings of improved comfort and attitudes toward palliative care among a diverse group of nurses and physicians in Nepal supports the previous findings; suggesting that Project ECHO is an effective learning model for training HCP in diverse settings in LMICs.

Moore's Expanded Continuing Medical Education (CME) Framework (Table 6) describes a hierarchy of learning outcomes from participation (Level 1) to HCP knowledge (Level 3a), and patient and community health (Levels 6 and 7). Previous ECHO programs, in the fields of chronic liver disease in the USA, have described improvements in patient-level outcomes (Glass et al. 2017; Moore et al. 2009; Su et al. 2018). Evaluation of patient- and community-level outcomes in palliative care can be particularly challenging due to the burden of serious illness for patients and family caregivers, and no previous programs have reported on patient-level outcomes for ECHO programs in this field. Future studies should consider assessing patient level outcomes in relation to PC ECHO programs. Given that study participants identified the need for more clinical training to be able to deliver palliative care, evaluation of learning outcomes at higher levels of Moore's

Table 4. Changes in Likert scale scores of participants' knowledge, self-rated confidence, comfort, and attitudes about palliative care at baseline and the end of ECHO program (*n* = 27–29 for each individual question, full data set available on request). Item response options ranged from strongly disagree (1) to strongly agree (7)

Knowledge				
For my scope of practice, I have/had an appropriate level of knowledge about..	Mean, Pre-	Mean, Post-	M-W *U*-test* P value	Effect size**
Medical conditions appropriate for palliative care	5.07	6.21	<0.001	1.20
How to introduce palliative care to families	4.77	6.19	<0.001	1.55
Managing pain in patients with a serious illness	5.21	6.18	<0.001	1.11
Managing nausea and vomiting	5.29	6.25	<0.001	1.17
Breaking bad news to patients and their families	5.04	6.14	<0.001	1.25
Managing end-of-life care	4.89	6.07	<0.001	1.43
Confidence				
Within my scope of practice, I am confident in my ability to…	Mean, Pre-	Mean, Post-	M-W *U*-test* P value	Effect size**
Discuss the transition to palliative care with patients/families	4.86	6.11	<0.001	1.38
Discuss the role of palliative care with health-care providers	4.96	5.44	<0.001	1.64
Support patients with serious illness and their families	5.07	6.21	<0.001	1.41
Treat pain using morphine	5.15	6.22	<0.001	1.44
Manage nausea and vomiting	5.26	6.22	<0.001	1.07
Manage shortness of breath (dyspnea)	5.41	6.26	<0.001	1.03
Provide bereavement care	4.78	5.89	<0.001	1.02
Identify patients who are approaching end of life	5.04	6.07	<0.001	0.98
Discuss death with patients or their families	4.93	5.89	<0.001	1.02
Discuss stopping treatments which are no longer effective	4.86	6.05	<0.001	1.36
Holistically assess patients (physical, psychosocial, & spiritual)	4.93	6.04	<0.001	1.23
Serve as an expert on palliative care in my workplace	4.57	5.89	<0.001	1.18
Attitudes about palliative care				
	Mean, Pre-	Mean, Post-	M-W *U*-test* P value	Effect size**
Providing palliative care is a worthwhile experience	5.43	6.43	<0.001	1.35
Palliative care should be started at the time of diagnosis	5.89	6.71	0.01	0.93
When used according to guidelines, opioids do not shorten life expectancy	5.67	6.32	0.03	0.77
Introducing palliative care to the loved ones of a patient who has progressive incurable illnesses but is expected to live many months is recommended	5.56	6.32	0.01	0.61
Palliative care requires active care	5.56	6.22	0.04	0.53
Avoiding NG tube feeding at end of life may be good care	4.68	5.00	0.27	0.18

(Continued)

Table 4. (*Continued.*)

Attitudes about palliative care				
Talking about death with the family of a dying patient should be avoided	5.39[#]	5.57[#]	0.41	0.12
Palliative care represents a failure of modern medicine	5.39[#]	5.46[#]	0.47	0.04

*Mann–Whitney *U*-test.
**Effect size (Cohen's *d*). Effects of ≥0.8 generally suggest large effect.
[#]Response options reverse coded to improve comprehensibility of results; strongly agree (1) to strongly disagree (7).
Items without significant effect size and/or difference between pre- and post-survey scores.

Table 5. Participants' comfort and learning experience of ECHO program

Benefits of participation: Participants agreeing with the following statements.[a] (*n* = 27 or 28)	*n*	%	Mean	SD
This program was a supportive COP for me	25	93	5.89	1.22
This program was an effective way for me to learn	25	89	5.93	1.51
Participating in this program was a valuable experience for me.	25	89	5.89	1.83
I would recommend this program to my colleagues.	25	89	6.11	1.59
I have learned about best practices of care for patients with serious illnesses	25	89	5.47	1.35
I respect the knowledge of the faculty involved in this program	24	86	6.30	1.61
This program reduced my professional isolation	22	79	5.32	1.54
Participant experiences with learning via the ECHO program[a] (*n* = 26 or 28)	*n*	%	Mean	SD
I feel comfortable speaking, asking questions, and sharing my opinion with other participants (*n* = 26)	19	68	5.39	1.42
I feel comfortable using videoconferencing to learn (*n* = 28)	24	86	5.57	1.57
The faculty are supportive and approachable (*n* = 28)	25	89	6.14	1.58
The faculty try to include and engage me in the discussion (*n* = 28)	24	86	5.86	1.58
I felt ECHO teaching was a better environment than in person teaching (*n* = 28)	21	75	4.28	1.41
What were the obstacles to changing your clinical practice based on ECHO program?[b]	*n*	%		
I need for more formal teaching or training	9	32		
I need clinical exposure or hands-on training	8	29		
I lack time to provide care as described in ECHO	6	21		
Other members of my team are not aware of palliative care and how it can potentially help	6	21		
There is no one else at my hospital to help me implement palliative care as discussed in ECHO	4	14		
The rest of my team does not provide clinical care in the way it was discussed in ECHO	3	11		
The medications discussed in ECHO are not available in my setting	2	7		
The medications discussed in ECHO are too expensive for my patients to afford	1	4		
Barriers to participating in ECHO program (*n* = 37)[b]	*n*	%		
Lack of time or working hours interfering with ECHO session	20	71		
Technical issues	11	39		
No barriers	1	4		

[a]Includes strongly agree, agree, or somewhat agree.
[b]Multiple responses permitted.

Table 6. Moore's expanded CME framework (2009)

Moore's expanded CME framework
Participation (Level 1)
Satisfaction (Level 2)
Learning: Declarative Knowledge (Level 3A)
Learning: Procedural Knowledge (Level 3B)
Competence (Level 4) *(in an educational environment)*
Performance (Level 5) *(in clinical practice)*
Patient Health (Level 6)
Community Health (Level 7)

Framework, such as competence (Level 4) or performance in clinical practice (Level 5), is needed.

Despite the potential benefits of online education and the ECHO model, there are several important challenges to implementing virtual learning in resource-limited settings. First, a lack of face-to-face interaction can limit active interaction between participants which is important for learning (Frehywot et al. 2013). Our program mitigated this through interactive case discussions and session moderation by trained facilitators who focused on encouraging active participation from leaners. Incorporating practice activities and enabling learners and teachers to interact have been identified as evidence-based principles for online learning (Scott et al. 2017). Second, it is important to ensure that education and training materials are adapted to the local health-care environment and resources available (Frehywot et al. 2013; Kiss-Lane et al. 2019). This was addressed through during preparation of teaching materials, by ensuring that the content focused on medications and treatments available in Nepal. During ECHO sessions, the faculty from local health-care facilities ensured that resource availability and the practicality of implementing various aspects of palliative care were discussed. Working closely with local health-care facilities is important to ensure that treatments and recommendations are relevant and feasible for learners.

Development of a learning community

Communities of practice (COP) is a social learning theory which describes how learning can occur when HCP with shared interests interact and learn together, seeking to improve patient care (Wenger 1999). Project ECHO facilitates opportunities for learners and faculty to establish connections and build relationships with their peers around a shared interest, in this case palliative care. The collaborative nature of the ECHO sessions encouraged participants to engage in active discussions, ask questions, and learn from each other's experiences. Study participants noted that the program created a supportive learning environment, which supported enhanced learning. Previous studies have described how ECHO programs can lead to the development of COP, including 1 study from South Asia, where participants identified the value of safe and encouraging environment where they could share ideas about how to provide palliative care (Doherty et al. 2021a). Future studies should continue to explore the impact of COP in online learning programs, seeking to identify how COP impacts learning amongst different types of learners and in different settings.

This ECHO project seemed to enhancing collaboration, communication, and mutual support among participants. The collective problem-solving approach not only increased the participants' knowledge and self-efficacy but also strengthened professional relationships and created a supportive COP. The creation of a COP also streamlined the referral process, as providers were able to refer patients to different centers within Nepal for improved access to palliative care services. Our findings match those of previous authors in high-income countries who have described how ECHO established acted as a hub for continuous learning, professional development, and ongoing support among the participants, with participants reporting that they provided improved palliative care services to patients and families (Lalloo et al. 2021; Usher et al. 2022). Despite improvements in knowledge and self-efficacy, participants identified that they needed further hands-on training, suggesting that Project ECHO should be included as a component of palliative care training initiatives which also include clinical training opportunities.

Learning resources

During this ECHO, additional learning resources, including videos, presentations, and related articles, were accessed by most learners during the program, as learners reported that they watched session recordings and reviewed additional resources for self-study as well as to teach others at their health facilities. These findings suggest that combining the ECHO sessions with complementary educational resources may enhance learning for individuals and may also lead to diffusion of new ideas to other HCP who have not attended ECHO training, creating a multiplier effect from ECHO. A social media chat group via WhatsApp also provided participants with a way to connect asynchronously between ECHO sessions. Participants used the WhatsApp chat to discuss complex cases with local and international experts during the ECHO program and afterwards as well. Creating a social media group to enhance learning and facilitate asynchronous communication has not previously been described in the ECHO literature. A previous study of undergraduate medical students described the importance of social media chats in facilitating peer support (Chou et al. 2011). Our findings show that HCP in Nepal use social media to support clinical decision and incorporate new palliative care knowledge into practice as the connections established through ECHO-enabled participants to seek ongoing guidance and mentorship from experts, as they developed a sense of belonging to a larger community of HCP focused on a shared goal of improving palliative care in Nepal. Further studies should explore the use of social media to enhance online learning, to better understand participants' preferences, barriers, and limitation to its use.

Strengths and limitations

The study describes the implementation of a novel online palliative care training program in Nepal. The education program showed positive outcomes on participants' knowledge, comfort, and attitudes toward palliative care. The program included health-care professionals from nursing and medicine, with representation from oncology, general practice, as well as internal medicine and palliative care, which suggests that the findings may be transferable. Future studies should seek to incorporate assessments of changes in clinical practice as well as patient outcomes and broader outcomes for the health-care system and communities.

Project ECHO can successfully be implemented in Nepal to build local palliative care capacity. Bringing together palliative care experts and teachers from Nepal and internationally supports learning for participants through COP. Encouraging active participation from participants and ensuring that teaching addresses the availability and practicality of treatments in the local health-care context addresses key barriers of online education.

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