

# Pediatric Project ECHO<sup>®</sup>: A Virtual Community of Practice to Improve Palliative Care Knowledge and Self-Efficacy among Interprofessional Health Care Providers

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## Abstract

**Background:** Health care providers (HCPs) require ongoing training and mentorship to fully appreciate the palliative care needs of children. Project ECHO<sup>®</sup> (Extension for Community Healthcare Outcomes) is a model for delivering technology-enabled interprofessional education and cultivating a community of practice among HCPs who care for children with life-limiting illness.

**Objectives:** To develop, implement, and evaluate the Project ECHO model within the pediatric palliative care (PPC) context. Specific objectives were to evaluate (1) participation levels, (2) program acceptability, (3) HCP knowledge changes, (4) HCP self-efficacy changes, and (5) perceived practice changes after six months.

**Intervention:** An interprofessional PPC curriculum was informed by a needs assessment. The curriculum was delivered through monthly virtual 90-minute TeleECHO sessions (didactic presentation and case-based learning) from January 2018 to December 2019. The program was freely available to all HCPs wishing to participate.

**Design:** A mixed-methods design with repeat measures was used. Surveys were distributed at baseline and six months to assess outcomes using 7-point Likert scales. Descriptive and inferential statistical analyses were conducted. The study was approved by the Research Ethics Board at the Hospital for Sick Children.

**Results:** Twenty-four TeleECHO sessions were completed with a mean of  $32 \pm 12.5$  attendees. Acceptability scores ( $n=43$ ) ranged from  $5.1 \pm 1.1$  to  $6.5 \pm 0.6$ . HCPs reported improvements in knowledge and self-efficacy across most topics (11 out of 12) and skills (8 out of 10) with demonstrated statistical significance ( $p < 0.05$ ). Most participants reported positive practice impacts, including enhanced ability to provide PPC in their practice.

**Conclusion:** Project ECHO is a feasible and impactful model for fostering a virtual PPC-focused community of practice among interprofessional HCPs.

**Keywords:** continuing professional development; distance education; pediatric palliative care; Project ECHO

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## Introduction

**P**EDIATRIC PALLIATIVE CARE (PPC) seeks to optimize quality of life, regardless of where a child is on their illness trajectory.<sup>1</sup> PPC provides comprehensive care that addresses the physical, psychosocial, and spiritual needs of a child as well as their family.<sup>1</sup> Most patients referred to PPC services have multiple complex chronic conditions requiring individualized comprehensive care plans and are followed for months to years before death.<sup>2</sup> Although it is not uncommon for palliative care providers to take on primary care for many referred adults, PPC across Canada is typically delivered using a shared-care model between PPC consultant teams working together with primary care physicians (general practitioners and pediatricians) and other subspecialists.<sup>3</sup> Involvement of PPC has been associated with improved communication about important end-of-life issues with the child and family,<sup>4</sup> increased likelihood of death occurring in the home,<sup>5</sup> reduced days in hospital before death, with fewer invasive procedures and deaths in the intensive care unit<sup>6</sup>; and parental reports of less suffering in their child and feeling more prepared at the time of death.<sup>7</sup> PPC does not conclude on the death of the child; ongoing grief support to siblings and parents is routine.

Relative to adults, there is a small number of children in need of palliative care services, and these children are dispersed over a large geographic region. It is cost-prohibitive and practically difficult to have PPC specialists located in each geographic region of Canada. As such, the care of these children and the support of their families in their own community must rely on local nurse practitioners, family physicians, pediatricians, and adult palliative care physicians. Non-PPC trained community providers may be reluctant to provide PPC because of their perceived inexperience with children with life-threatening conditions.<sup>8–11</sup> Parents, in turn, may perceive the discomfort of these providers and be reluctant to accept their support.<sup>12</sup>

Respondents to a national survey ( $n = 239$ ), examining how well Canadian residency programs prepare pediatricians for clinical practice, reported feeling the least prepared in dealing with issues related to palliative care, death, and bereaved families.<sup>10</sup> Even training programs for pediatric subspecialists in fields of relative high mortality, such as hematology/oncology identified insufficient education related to end-of-life care.<sup>13</sup> A recent well-funded project delivered aspects of

the Education in Palliative and End-of-Life Care—Pediatrics curriculum through in-person sessions to >3000 health care providers (HCPs) working in hospitals and communities across Canada.<sup>14</sup> The focus was on care of children with cancer and the most commonly taught module focused on an introduction to PPC. However, once the project ended, there were limited resources available to continue with delivery of advanced content that would be more likely to improve care quality for children with life-limiting conditions. There is a clear need for accessible programs that overcome geographic and resource barriers while providing ongoing support to community providers.

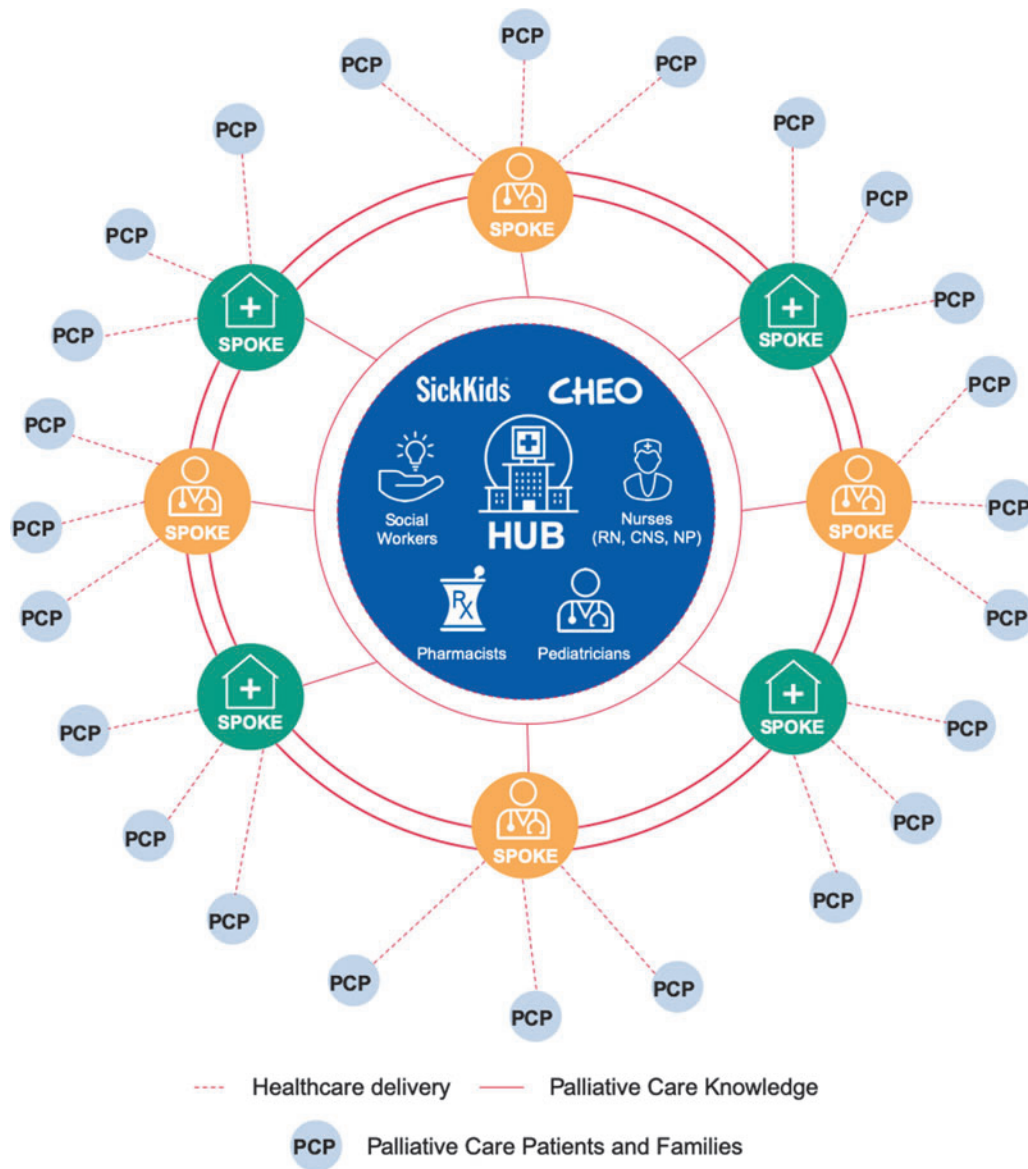
Project ECHO<sup>®</sup> (Extension for Community Healthcare Outcomes) is a model for technology-enabled interprofessional health education developed in 2003 in Albuquerque, New Mexico.<sup>15</sup> It provides a unique model to expand access and strengthen capacity of HCPs to deliver evidence-informed specialized care locally (Fig. 1).

A “Hub-and-Spoke” structure is used, where Hub members connect virtually with geographically dispersed community HCPs at “Spokes” to address the health needs of underserved communities. The ECHO model is designed to cultivate a virtual community of practice, offer ongoing mentorship, and provide a trusted avenue to share best practices. Project ECHO has supported HCPs managing a range of clinical conditions, including hepatitis and chronic pain.<sup>15–17</sup> Most ECHO programs focus on care of adults (~90%), whereas a minority focus on pediatric health conditions.<sup>16</sup> The Project ECHO model has potential to improve the dissemination of principles and best practices of palliative care among community nurse practitioners, family physicians, pediatricians, and adult palliative care providers.<sup>18</sup> However, despite widespread implementation of the ECHO model globally, few programs focus on palliative care and none specific to PPC exist in Canada.<sup>18</sup> To address this gap, Pediatric Project ECHO for Palliative Care (ECHO for Palliative Care) was launched in January 2018 and is implemented by an interprofessional team of clinicians based at The Hospital for Sick Children (SickKids) and the Children’s Hospital of Eastern Ontario (CHEO) (Fig. 2). The goal of ECHO for Palliative Care is to mentor community HCPs to develop the knowledge and skills required to integrate palliative care approaches into their practice.

This study focused on developing, implementing, and evaluating ECHO for Palliative Care. The primary study



**FIG. 1.** Project ECHO<sup>®</sup> is a virtual interprofessional education model that seeks to increase access to specialty care for underserved communities. Scan the QR code for more information about Project ECHO. ECHO, Extension for Community Healthcare Outcomes. Color image is available online.



**FIG. 2.** Hub-and-spoke structure of Pediatric Project ECHO for Palliative Care, a technology-enabled interprofessional education program to support community management of PCP and their families. PCP, palliative care patients. Color image is available online.

objective was to determine whether the program could be feasibly implemented based on participation and program acceptability. The secondary objective was to summarize perceived impacts of the program on self-assessed knowledge, self-efficacy, and clinical practice after six months of participation.

## Methods

### Needs assessment to inform curriculum development

A needs assessment was conducted from May to July 2017 to inform the development of a PPC-specific ECHO curriculum. An online survey was distributed to HCPs through targeted e-mails to professional associations and health organizations throughout Ontario, Canada. Potential curriculum topics were identified from the literature and through consensus by specialists at SickKids and CHEO. Survey

items used 5-point Likert scales, where (1) indicated “no interest” and (5) indicated “very interested.” Open text fields were used to capture additional curriculum topic suggestions. Survey items are shown in Supplementary Data S1.

### Program structure

A structured 12-month repeating curriculum was delivered by specialists at SickKids and CHEO from January 2018 to December 2019. An interprofessional team of PPC experts facilitated monthly 90-minute TeleECHO sessions using Zoom videoconferencing technology, with support from the telemedicine department at SickKids and information services at CHEO. Each session included a 25-minute didactic presentation and a 50-minute de-identified patient case presentation by either a community or subspecialty HCP followed by in-depth discussion to generate best practice recommendations. Didactic presentations aligned with

curriculum topics and where possible, case presentations related to curriculum topics.

### **Program attendees**

ECHO for Palliative Care launched in January 2018 offering a no cost flexible learning opportunity with continuing professional development credits. The program was open to any individual (e.g., HCPs, administrators, and trainees) providing or with an interest in PPC. Attendees were initially recruited through pediatric specialists and community providers caring for pediatric patients. A single overarching program registration was completed online. Subsequently, registrants were sent periodic electronic communications about upcoming education sessions. They were then required to sign up for individual TeleECHO sessions, as a means of anticipating attendance. As ECHO for Palliative Care was an emerging community of practice, flexibility was allowed wherein individuals who were not official program registrants were still permitted to attend individual sessions (for instance, if a colleague had shared information about a particular TeleECHO session). In these cases, the individual was permitted to attend the session and encouraged to complete the program registration.

### **Design**

A mixed-method study design with repeat measures was used. The study was approved by the Research Ethics Board at the Hospital for Sick Children (No. 1000057321). All program registrants were invited to participate in the study and were sent baseline surveys. Pre-test (baseline) data were collected between January 2018 and June 2019. Post-test data were collected six months after the completion of baseline surveys from those participants who attended one or more sessions between January 2018 and December 2019. For example, study participants completing baseline surveys in April 2018 would receive a six-month survey in October 2018, if one or more TeleECHO sessions were attended within this time period.

### **Data collection tools**

At baseline and six months, participants were e-mailed a unique link to surveys administered through Research Electronic Data Capture (REDCap) database, a secure web-based clinical research application. Surveys were developed to evaluate performance-related outcomes of ECHO for Palliative Care, with survey items corresponding to content in the annual curriculum. Surveys measured program acceptability, self-assessed knowledge and self-efficacy, and clinical practice impact. Surveys were developed to accommodate the interprofessional nature of participants, as no existing validated tools for PPC were suitable for the interprofessional scope of the program. The format of survey items included yes–no responses, open text fields and 7-point Likert scales, where (1) indicated “strongly disagree,” (7) indicated “strongly agree” and “not applicable” options were provided where relevant.

An overall change in participants’ knowledge related to the management of PPC was assessed, in addition to curriculum-specific knowledge. The knowledge domain included 12 items, which were framed with the stem, “for my scope of

practice, I currently have an appropriate level of knowledge about [topic]” and the self-efficacy domain included 10 items, with the stem “for my scope of practice, I am confident in my ability to [skill].” Anecdotal evidence from other Project ECHO programs suggests that participants may not accurately estimate their baseline self-efficacy before ECHO participation. To correct for this possibility, at the six-month time point, participants were given the opportunity to review their baseline responses and adjust them if appropriate. For each self-efficacy item, participants could choose to (i) accept their baseline rating, (ii) lower their baseline rating (i.e., “didn’t know what they didn’t know”), or (ii) increase their baseline rating (i.e., “didn’t realize how much they already knew”). The adjusted baseline responses were used in subsequent analyses. To evaluate practice-level impacts of ECHO for Palliative Care at six months, participants provided item ratings ranging from (1) “strongly negative impact” to (7) “strongly positive impact.” Clinical practice items were derived from ECHO literature and the clinical expertise of the program team. A summary of survey items is provided in Supplementary Data S2.

### **Analyses**

Curriculum preferences gathered by the needs assessment survey were sorted descriptively. Standard descriptive statistics were computed for all variables, with categorical variables reported as frequencies and proportions and Likert responses summarized as means and standard deviations. Program feasibility was operationally defined using a minimum threshold of six attendees per session, based on targets of other newly formed ECHO programs. The target threshold for acceptability and satisfaction was a mean score  $\geq 5$  (7-point Likert scale) across survey items. Differences in pre- and post-test results for self-assessed knowledge and self-efficacy were identified using a two-tailed paired *t* test for participants who completed both baseline and six-month surveys. An  $\alpha=0.05$  (two sided) was set *a priori* and used to establish statistical significance.

## **Results**

### **Needs assessment**

Twenty-eight responses were received from an interprofessional group of HCPs for the PPC needs assessment. Approximately 30% ( $n=8$ ) were pediatricians (including specialists) and other respondents were registered nurses ( $n=7$ , 25.0%), dietitians ( $n=5$ , 17.9%), nurse practitioners ( $n=4$ , 14.3%), an occupational therapist ( $n=1$ , 3.6%), a social worker ( $n=1$ , 3.6%), program manager ( $n=1$ , 3.6%), and palliative care program coordinator ( $n=1$ , 3.6%). Respondents were affiliated with 19 unique health care institutions and nearly 80% of respondents ( $n=22$ , 78.6%) had practiced for more than five years. Interest for possible curriculum topics varied and the final ECHO for Palliative Care curriculum integrated topics as per respondents’ interest (mean score  $\geq 3.8$  on 5-point Likert scale) and availability of a corresponding speaker. Curriculum topics represented foundational knowledge critical for PPC and was accredited through Continuing Professional Development, University of Toronto, which awarded participants continuing medical

education credits. The full ECHO for Palliative Care curriculum is available in Supplementary Data S3.

### Program attendance

A total of 24 ECHO for Palliative Care TeleECHO sessions were held between January 17, 2018 and December 18, 2019. Three hundred and thirty-six unique HCPs attended a session during this period. Individual session attendance

exceeded the *a priori* minimum threshold of six attendees and on average had  $32.1 \pm 12.5$  attendees, with a minimum attendance of 14 and maximum of 62. The average attendance per individual was  $2.3 \pm 2.4$  TeleECHO sessions. Approximately 60% ( $n=198/336$ ) of program attendees attended 1 session, 56 attendees (16.7%) attended 2 sessions, 23 attendees (6.8%) attended 3 sessions, 19 attendees (5.7%) attended 4 sessions, and 40 attendees (11.9%) attended  $\geq 5$  sessions.

TABLE 1. DEMOGRAPHIC DATA OF PEDIATRIC PROJECT ECHO FOR PALLIATIVE CARE PROGRAM REGISTRANTS FOR THE FIRST TWO CYCLES OF THE PROGRAM (JANUARY 2018 TO DECEMBER 2019)

Characteristic	Baseline survey completed (n = 108)		
	Attended no sessions, n = 32	Attended $\geq 1$ session, n = 76	Completed six months survey, n = 43
Sex, n (%)			
Female	29 (90.6)	64 (84.2)	35 (81.4)
Male	3 (9.4)	8 (10.5)	5 (11.6)
Prefer not to respond	0 (0.0)	1 (1.3)	1 (2.3)
Missing	0 (0.0)	3 (3.9)	2 (4.7)
Age group, n (%)			
$\leq 29$ Years	5 (15.6)	11 (14.5)	5 (11.6)
30–49 Years	22 (68.8)	43 (56.6)	28 (65.1)
50–69 Years	5 (15.6)	19 (25.0)	8 (18.6)
Missing	0 (0.0)	3 (3.9)	2 (4.7)
Profession, n (%)			
Child life specialist	1 (3.1)	2 (2.6)	1 (2.3)
Dietitian	0 (0.0)	3 (3.9)	2 (4.7)
Nurse			
Nurse practitioner	3 (9.4)	3 (3.9)	2 (4.7)
Registered nurse	11 (34.4)	26 (34.2)	11 (25.6)
Registered practical nurse	3 (9.4)	1 (1.3)	1 (2.3)
Pharmacist	0 (0.0)	2 (2.6)	1 (2.3)
Physician			
Pediatrician	1 (3.1)	8 (10.5)	3 (7.0)
Physician (specialist)	1 (3.1)	11 (14.5)	8 (18.6)
Primary care	5 (15.6)	5 (6.6)	4 (9.3)
Psychologist	1 (3.1)	0 (0.0)	0 (0.0)
Rehabilitation therapist	1 (3.1)	1 (1.3)	1 (2.3)
Social worker	1 (3.1)	5 (6.6)	2 (4.7)
Other <sup>a</sup>	4 (12.5)	9 (11.8)	7 (16.3)
Primary practice setting, n (%)			
Academic hospital	9 (28.1)	20 (26.3)	13 (30.2)
CHC	5 (15.6)	11 (14.5)	4 (9.3)
Community/home-based palliative care	10 (31.3)	27 (35.5)	15 (34.9)
FHT	1 (3.1)	2 (2.6)	1 (2.3)
Nonacademic hospital	3 (9.4)	7 (9.2)	5 (11.6)
Private practice	4 (12.5)	6 (7.9)	3 (7.0)
Other <sup>b</sup>	0 (0.0)	2 (2.6)	2 (4.7)
Missing	0 (0.0)	1 (1.3)	0 (0.0)
Years in practice, n (%)			
$< 1$ Year	4 (12.5)	4 (5.3)	2 (4.7)
1–4 Years	3 (9.4)	15 (19.7)	9 (20.9)
5–10 Years	7 (21.9)	17 (22.4)	10 (23.3)
$> 10$ Years	17 (53.1)	38 (50.0)	21 (48.8)
Not applicable	0 (0.0)	1 (1.3)	0 (0.0)
Missing	1 (3.1)	1 (1.3)	1 (2.3)

<sup>a</sup>Other professions were clinical nurse specialist, registered practical nurse, program manager, resident, student, and palliative care volunteer.

<sup>b</sup>Other primary setting was university.

CHC, Community Health Centre; FHT, Family Health Team.

**Demographics**

In total, 252 HCPs provided informed consent for the research study. Of those consented participants, 108 (42.9%) completed the baseline survey. Within this group, 76 participants (70.4%) attended one or more sessions, and were thus eligible for the six-month survey. Overall, 43 of the eligible 76 participants (56.6%) completed a six-month survey. Participant demographics are shown in Table 1. The program engaged HCPs residing nearly 700 km from one of the implementing sites as well as eight HCPs from outside the province of implementation.

**Program acceptability and satisfaction**

Program acceptability and satisfaction with ECHO for Palliative Care was moderate to high at six months, with mean scores  $\geq 5$  (Table 2). Most respondents “agreed” or “strongly agreed” that involvement in the program was a worthwhile experience ( $n=33/43$ , 76.7%), would recommend the program to colleagues ( $n=39/43$ , 90.7%), and valued the knowledge of facilitators ( $n=40/43$ , 93.0%).

**Perceived knowledge and self-efficacy changes of HCPs**

Baseline survey responses suggest that there were areas in which some HCPs lacked knowledge, as indicated by responses in the “strongly disagree,” “disagree,” and “somewhat disagree” categories. These included neuroirritability in children ( $n=44/76$ ; 57.9%), talking to children about death ( $n=33/75$ ; 44.0%), medical marijuana in children ( $n=57/75$ ; 76.0%), dyspnea in children ( $n=30/75$ ; 40.0%), and depression and anxiety in children ( $n=37/76$ ; 48.7%). Forty-three participants completed a six-month survey, although the number of responses to individual survey items varied. Approximately 70.0% of respondents ( $n=29/43$ ) described overall changes in knowledge as “somewhat better” ( $n=15/43$ ), “moderately better” ( $n=7/43$ ), “better” ( $n=6/43$ ), or “a great deal better” ( $n=1/43$ ). The remaining participants described changes in their knowledge as “a little better” ( $n=9/43$ ), “almost the same” ( $n=3/43$ ), or “no change” ( $n=2/43$ ). Participants reported positive gains in PPC knowledge for all (12/12) survey items. Mean knowledge values were significantly higher, for 11 of the 12 survey

items at six months (Table 3). For self-efficacy, 27 study participants (62.8%) opted to adjust at least one baseline response and changes were made to 13% ( $n=97/749$ ) of baseline responses. These ratings were lowered for 15 responses (15.5%; “didn’t know what they didn’t know”) and increased for 82 responses (84.5%; “didn’t realize how much they already knew”). Using these adjusted baseline scores, increases in perceived self-efficacy were reported by respondents at six months and these self-efficacy changes were statistically significant for 8 of the 10 skills assessed (Table 4).

**Perceived impacts on clinical practice**

Figure 3 summarizes the perceived impacts of ECHO for Palliative Care on respondents’ clinical practice. Overall, 35% ( $n=15/43$ ) and 33% ( $n=14/43$ ) of respondents reported that ECHO for Palliative Care had a “somewhat positive impact” or “positive impact” on their willingness/comfort to manage children with palliative care needs.

**Discussion**

This study demonstrates the successful delivery of a virtual interprofessional education initiative for PPC, where *a priori* feasibility and acceptability thresholds were exceeded. Respondents reported improvements in self-assessed knowledge and self-efficacy at six months and preliminary practice impact data suggest that ECHO for Palliative Care had a positive impact on participants’ clinical practice related to PPC.

An increasing number of children in Canada can benefit from specialized palliative care and consequently, there is a growing number of palliative care programs and hospice services to meet the needs of this underserved population.<sup>19</sup> Many children receive palliative care from community-based clinicians who may or may not have substantive training in this area. Furthermore, the shift to the early integration of a palliative care approach necessitates widespread education.<sup>20</sup> This study has shown that ECHO for Palliative Care is an ideal model for the delivery of evidence-based continuing education to HCPs with an interest in PPC as it overcomes participation barriers arising from geographic and resource limitations that reduced the sustainability of previous efforts to deliver PPC education.<sup>14</sup>

TABLE 2. PEDIATRIC PROJECT ECHO

Item	Mean	SD	Minimum, maximum
Involvement in the Pediatric Project ECHO® Program is a worthwhile experience for me.	6.1	0.8	4, 7
I would recommend involvement in the Pediatric Project ECHO Program to my colleagues.	6.4	0.7	4, 7
The Pediatric Project ECHO Program has connected me with peers and diminished my professional isolation.	5.1	1.1	2, 7
Pediatric Project ECHO has created a supportive community of practice.	5.7	1.0	4, 7
The Pediatric Project ECHO Program is an effective way for me to learn.	6.0	0.8	4, 7
I have learned new information through the Pediatric Project ECHO Program.	6.0	0.9	4, 7
I have learned best practice care through the Pediatric Project ECHO Program.	5.8	0.8	4, 7
I respect the knowledge of the facilitators involved in the Pediatric Project ECHO Program.	6.5	0.6	5, 7

Survey item response options ranged from (1) “strongly disagree” to (7) “strongly agree.” ECHO, Extension for Community Healthcare Outcomes; SD, standard deviation.

TABLE 3. MEAN KNOWLEDGE SCORES AMONG PARTICIPANTS AT BASELINE AND SIX MONTHS

Knowledge	n	Baseline, mean (SD)	Six months, mean (SD)	Mean difference (SD)	Paired t test	
					p	95% CI
Introducing pediatric palliative care to families	43	4.26 (1.81)	5.72 (0.93)	1.47 (1.65)	<0.001	0.97 to 1.96
Neuroirritability in children	42	3.05 (1.58)	4.26 (1.50)	1.21 (1.69)	<0.001	0.70 to 1.73
Preparing for death and the time that follows	43	4.95 (1.65)	5.70 (0.83)	0.74 (1.57)	0.003	0.27 to 1.21
Forgoing artificial nutrition and hydration at end of life in children	41	4.46 (1.63)	5.37 (1.39)	0.90 (1.48)	<0.001	0.45 to 1.36
Talking to children about death	41	3.93 (1.81)	5.39 (1.05)	1.46 (1.53)	<0.001	0.99 to 1.93
Medical marijuana in children	40	2.55 (1.71)	4.45 (1.41)	1.90 (1.63)	<0.001	1.39 to 2.41
Nausea and vomiting in children	42	4.14 (1.66)	5.14 (1.28)	1.00 (1.56)	<0.001	0.53 to 1.47
Dyspnea in children	41	3.98 (1.59)	5.20 (1.36)	1.22 (1.31)	<0.001	0.82 to 1.62
Pain at end of life in children	41	4.17 (1.96)	5.39 (1.26)	1.22 (1.86)	<0.001	0.65 to 1.79
The importance of respite for families	43	5.67 (1.04)	5.98 (1.03)	0.30 (1.12)	0.085	-0.03 to 0.64
Legacy creation	41	4.59 (1.77)	5.29 (1.15)	0.71 (1.45)	0.003	0.26 to 1.15
Depression and anxiety in children	42	3.71 (1.74)	4.69 (1.44)	0.98 (1.85)	0.001	0.42 to 1.54

Possible item scores ranged from (1) “strongly disagree” to (7) “strongly agree.” Each item used the stem: “For my scope of practice, I currently have an appropriate level of knowledge about ... .” Neuroirritability=persistent or recurrent episodes of behaviors suggestive of pain in a child with underlying serious neurological impairment. This term should only be used after assessment and management of potential sources of pain (e.g., gastroesophageal reflux, dental problem, and constipation). Dyspnea=an unpleasant subjective sensation of shortness of breath.

CI, confidence interval.

Performance-related metrics from ECHO for Palliative Care span the initial two years of program implementation. This study’s findings suggest that a six-month observation period is satisfactory for determining trends in program feasibility and acceptability. Similar to adult palliative Project ECHO programs, our study found significant increases in self-assessed knowledge and self-efficacy for respondents who participated in ECHO for Palliative Care.<sup>21-23</sup> Findings suggest that the overall knowledge of respondents improved, and this change had positive impacts on practice. The mod-

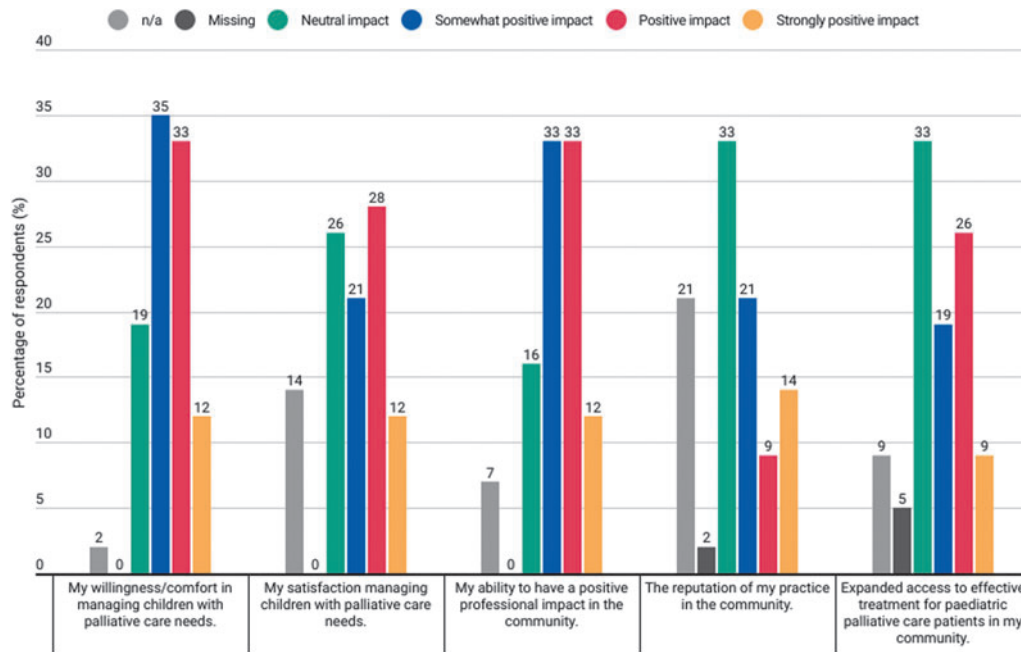
erate impact observed at the practice level may reflect a limitation of the six-month observation period. Similar to challenges noted through previous efforts to deliver PPC education to HCPs in Canada, participation in multiple sessions with advanced content for a longer time period may be required before further changes in practice can be seen.<sup>14</sup>

This study had several limitations. Although surveys were distributed electronically and multiple standardized reminders were sent to ECHO for Palliative Care participants through REDCap, survey response rate at baseline was 42.9%

TABLE 4. MEAN SELF-EFFICACY SCORES AMONG PARTICIPANTS AT BASELINE (ADJUSTED) AND SIX MONTHS

Self-efficacy	n	Baseline, mean (SD)	Six months, mean (SD)	Mean difference (SD)	Paired t test	
					p	95% CI
Identify and define who may benefit from palliative care involvement.	40	5.90 (1.13)	6.05 (1.22)	0.15 (1.31)	0.474	-0.26 to 0.56
Introduce and discuss palliative care with families and other health care providers.	39	5.92 (1.06)	6.05 (0.89)	0.13 (0.86)	0.360	-0.14 to 0.40
Support children with serious illness, as well as their families.	39	5.21 (1.64)	5.69 (1.20)	0.49 (1.10)	0.009	0.14 to 0.83
Manage pain in children with serious illness, including at end of life.	38	4.68 (1.68)	5.26 (1.37)	0.58 (1.13)	<0.001	0.22 to 0.94
Manage nonpain symptoms in children with serious illness, including at end of life.	38	4.76 (1.34)	5.21 (1.38)	0.45 (1.06)	0.013	0.11 to 0.78
Talk to children at various ages and developmental levels about serious illness and death.	39	4.46 (1.54)	5.36 (1.18)	0.90 (1.17)	<0.001	0.53 to 1.26
Understand the importance of communication and advance care planning in children with serious illness.	39	5.64 (1.16)	6.10 (0.88)	0.46 (1.25)	0.027	0.07 to 0.85
Serve as an expert in my community for pediatric palliative care-related questions and issues.	40	3.63 (1.78)	4.55 (1.50)	0.93 (1.16)	<0.001	0.56 to 1.29
Provide support to bereaved families.	39	4.74 (1.46)	5.44 (1.29)	0.69 (0.92)	<0.001	0.40 to 0.98
Recognize multisystem care needs and work within a collaborative team.	39	5.95 (1.00)	6.28 (0.97)	0.33 (0.97)	0.030	0.03 to 0.64

Possible item scores ranged from (1) “strongly disagree” to (7) “strongly agree.” Each item used the stem: “Within my scope of practice, I feel confident in my ability to ...”



**FIG. 3.** Practice and Patient-level Impacts of Pediatric Project ECHO for Palliative Care after six months ( $n=43$ ). Response options ranged from “strongly negative impact” to “strongly positive impact.” Only endorsed responses are shown. Color image is available online.

and at six months was 56.6%. Findings may not be generalizable to other ECHO for Palliative Care participants as there may be selection bias in terms of who chose to respond to the surveys. Findings are also subject to the limitations of self-assessed knowledge and self-efficacy and may not reflect concrete changes in knowledge and self-efficacy, which could be derived if valid tools for evaluating interprofessional PPC knowledge and confidence were available. Finally, results for practice impact were from the perspective of HCPs rather than patients and families, and were determined at a single time point (six months) post program registration and participation in ECHO for Palliative Care.

**Conclusion**

Pediatric Project ECHO for Palliative Care has demonstrated feasibility and acceptability among community HCPs across Canada and was successful in achieving perceived changes in knowledge and self-efficacy. Although several performance-related outcomes were evaluated at six months, additional research is needed to determine the long-term impacts of ECHO for Palliative Care. Future studies will report on self-assessed knowledge, self-efficacy, and practice impact after 12 months of participation in the program. The demonstrated success of implementing ECHO for Palliative Care suggests that the ECHO model is conducive for the delivery of continuing professional education to geographically dispersed HCPs providing PPC. This program may assist other institutions in developing training programs to enhance community-based PPC.

**Authors' Contributions**

C.L. conceptualized the study and oversaw data acquisition, analysis, and interpretation as research lead for Pediatric

Project ECHO. She drafted the initial article and approved the final article as submitted. J.-A.O.-T. carried out statistical analyses, contributed to data interpretation, drafted the initial article and approved the final article as submitted. A.R., C.V., K.W., and S.V.Z. are the medical leads responsible for delivering the Pediatric Project ECHO for Palliative Care program. They contributed to data interpretation, reviewed and revised the article, and approved the final article as submitted. K.W. contributed to data interpretation, reviewed and revised the article, and approved the final article as submitted. J.S. oversaw the research study as principal investigator of the Pediatric Project ECHO program. She contributed to data interpretation, reviewed and revised the article, and approved the final article as submitted.

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### Author Disclosure Statement

Authors have no disclosures to declare.

### Supplementary Data

Supplementary Data S1  
Supplementary Data S2  
Supplementary Data S3

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